NPTEL Phase IV Proposal

-November 23rd 2015

-Domain Experts Committee (DEC) meeting
• Building on the accomplishments of Phases I, II, and III
• Increasing the access and utility of NPTEL content

**NPTEL phase IV online course delivery**
93 Crores;
Control Number: AEC 3012201413260
Submission date: November, 2015

**Translation and Subtitling of NPTEL video lectures in Indian Languages**
Rs 39.91 Crore;
Control Number: PEC2602201513271
Submission Date: February, 2015
NPTEL

Accomplishments:
- 933 Live courses (512 Video courses of 40 hours duration, 421 Web)
- Over 350 million views (80% Indian)
- World’s most accessed educational channel on YouTube

Present Status:
- Successful rollout of MOOCs based education (2.5 Lakh users, 3.7 Lakh enrolments)
- 93 MOOCs courses – New (47)/repurposed (46) and delivered in MOOC format
- Unique features such as online programming exams, successfully deployed for MOOC offering
- Multiple course durations (10 hour, 20 hour, and 40 hour) successfully completed
- Successfully opened Local Chapters in colleges to directly engage MOOC participants. 97 Colleges across 15 states so far.

Future directions:
- Creation of **300 courses** in MOOCs format in 2016 *(effort already on going)*
- ‘Shiksha’ – internally developed portal for MOOC delivery *(alpha testing stage)*
- Translation and subtitling NPTEL content in more than 15 Indian Languages *(trials completed)*
NPTEL Phase IV Proposal Summary

Name of the Institution: IIT Madras (Coordinating Institute)

Title of the Project: NPTEL Phase IV for the period 2016-2018

Cost of the Project: Rs. 93 crores

Name of the Principal Investigator responsible for implementation of the Project:
Dr. Andrew Thangaraj, IIT Madras (Coordinating Institute)
Dr. Prathap Haridoss, IIT Madras (Coordinating Institute)
Dr. Kushal Sen, IIT Delhi
Dr. Satyaki Roy, IIT Kanpur
# NPTEL Summary

## Overall Course summary over all phases

<table>
<thead>
<tr>
<th>Phase</th>
<th>Web course</th>
<th>Video Course</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
<td>125</td>
<td>138</td>
<td>263</td>
</tr>
<tr>
<td>Phases 2/3</td>
<td>296</td>
<td>374</td>
<td>670</td>
</tr>
<tr>
<td>(current)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>421</td>
<td>512</td>
<td>933</td>
</tr>
</tbody>
</table>

The current numbers of 670 courses delivered during Phase 2 /3 far exceeds the proposed (includes 47 Open Online Courses)

## Current phase II/III courses – Institute-wise

<table>
<thead>
<tr>
<th>Course Type</th>
<th>IISc</th>
<th>IITB</th>
<th>IITD</th>
<th>IITG</th>
<th>IITK</th>
<th>IITKGP</th>
<th>IITM</th>
<th>IITR</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Live Courses</td>
<td>61</td>
<td>57</td>
<td>44</td>
<td>77</td>
<td>120</td>
<td>91</td>
<td>141</td>
<td>32</td>
<td>623</td>
</tr>
<tr>
<td>Work In Progress (live by Dec 31)</td>
<td>2</td>
<td>15</td>
<td>25</td>
<td>20</td>
<td>12</td>
<td>16</td>
<td>63</td>
<td>6</td>
<td>159</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>72</td>
<td>69</td>
<td>97</td>
<td>132</td>
<td>107</td>
<td>204</td>
<td>38</td>
<td>782</td>
</tr>
</tbody>
</table>
NPTEL Online Courses Delivery Summary

From March 2014 till now
- 7 Course-runs in 2 years
- 93 Courses completed

<table>
<thead>
<tr>
<th>Semester</th>
<th>40 hour courses</th>
<th>20 hour courses</th>
<th>10 hour courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Semester</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Half Semester</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 credit equivalent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration</th>
<th>40 hour courses</th>
<th>20 hour courses</th>
<th>10 hour courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 weeks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 weeks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4-5 weeks</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Lectures per week | 40 hour courses | 20 hour courses | 10 hour courses |
|                   |                 |                 |                 |
| 3-4 hours of lecture per week |             |                 |                 |
| 2.5 hours of lecture per week  |             |                 |                 |
| 2-2.5 hrs of lecture per week  |             |                 |                 |

<table>
<thead>
<tr>
<th>Workload</th>
<th>40 hour courses</th>
<th>20 hour courses</th>
<th>10 hour courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two quizzes or practice exams</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weekly assignments</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Material</th>
<th>40 hour courses</th>
<th>20 hour courses</th>
<th>10 hour courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mostly use existing NPTEL course material for self-study</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newly created videos</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Newly created videos</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total courses conducted so far</th>
<th>40 hour courses</th>
<th>20 hour courses</th>
<th>10 hour courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

https://onlinecourses.nptel.ac.in
NPTEL Phase IV Proposal – Objectives

• Creation of Open Online Courses
• Repurposing Courses for Online Delivery
• Rerun of Open Online Courses
• Lecture Series on Special Topics
• NPTEL workshops and International Conferences
Creation of Open Online Courses

- Offer free 10-hour, 20-hour, 40-hour online courses
- Basic core courses in sciences and humanities with relevant exposure to tools and technologies
- 2-4 hours of lecture every week
  - The lectures are broken up into short modules
  - Every module
    - Description of contents
    - Expected learning outcomes
- Weekly submission of assignments
- Programming or other assignments every week
- Active interaction through a discussion forum
- NPTEL offices coordinate from sign up to completion of course

**Proposed: Create 300 Open Online Courses during the period 2016-18**
Repurposing Courses for Online Delivery

• Lecture videos to be annotated or resized into smaller modules.
• Define tangible learning outcomes
• Additional content to be created (if required)
• Plan weekly schedule of lessons
• Weekly assignments to be created
• Content to be moved to online course delivery portal
• Course delivered as per schedule – start date/ end date
• Forums to be manned by TAs

• Proposed: Repurpose 300 courses during the period 2016-18
Rerun of Open Online Courses

• A successful course can be offered again either by same SME or a new SME
• Need to alter / create new assignments
• Manage content of the portal
• Respond to questions on the forum
• Based on feedback from the previous run, new content may be created, if necessary.
• Rerun involves little effort in lecture content creation
• But the effort and methodology of running the course is same as before.

• Proposed: Rerun 200 successful Open Online Courses during the period 2016-18
Lecture Series on Special Topics

• Highlight excellent contributions on learning native to India
• Get the best exponents of every area for a series of lectures
• Bring India’s own traditional knowledge to the fore in a scientific and rigorous manner.

**Proposed: Create 100 special topics lecture series during the period 2016-18**
NPTEL workshops and International Conferences

- Workshops throughout the country
- Creation of Local Chapters in colleges
- Inform teachers and students, leaders of the industry and general public
- Inform on availability and curriculum adoption of course contents
- Encourage students to participate and obtain knowledge
- Invite faculty members to participate as collaborators
- Support educational institutions that offer NPTEL courses for their students
- Establish online mentoring principles
- Research conferences will be partially supported to provide inputs on
  - Pedagogy, development and implementation
  - ICT tools in NPTEL and NMEICT
- NPTEL has helped previously on Technology Enhanced Learning known as T4E (Technology for Education).
## Deliverables of the proposal (year wise)

<table>
<thead>
<tr>
<th>S.No</th>
<th>Proposed item</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>Total (deliverables / Courses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Creation of Open Online Courses</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>Repurposing Courses for Online Delivery</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>3</td>
<td>Rerun of Open Online Courses</td>
<td>30</td>
<td>70</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>Lecture Series on Special Topics</td>
<td>25</td>
<td>40</td>
<td>35</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Workshops and research conferences</td>
<td>80</td>
<td>60</td>
<td>60</td>
<td>200</td>
</tr>
<tr>
<td>Topic</td>
<td>Content</td>
<td>Unit Cost (in Lakhs)</td>
<td>Number</td>
<td>Total Cost (in lakhs)</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td>----------------------------</td>
<td>----------------------</td>
<td>--------</td>
<td>-----------------------</td>
<td></td>
</tr>
<tr>
<td>1 Creation of Open Online Courses</td>
<td>Online course</td>
<td>12.0</td>
<td>300</td>
<td>3600</td>
<td></td>
</tr>
<tr>
<td>2 Repurposing Courses for Online Delivery</td>
<td>Course supplements</td>
<td>6.0</td>
<td>300</td>
<td>1800</td>
<td></td>
</tr>
<tr>
<td>3 Reruns of Open Online Courses</td>
<td>Course delivery</td>
<td>5.0</td>
<td>200</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>4 Lecture Series on Special Topics</td>
<td>Lecture Series</td>
<td>6.0</td>
<td>100</td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>5 Workshops and Conferences (National and International)</td>
<td>Training and research</td>
<td>5.0</td>
<td>200</td>
<td>1000</td>
<td></td>
</tr>
<tr>
<td>6 Travel for Coordinators of various institutes for three years along with coordinator Honoraria and office expenditure for managing NPTEL offices centrally at least in three locations IIT Madras, IIT Kanpur and IIT Delhi</td>
<td>---------------</td>
<td>---------------</td>
<td>---------------</td>
<td>1300</td>
<td></td>
</tr>
<tr>
<td><strong>Overall Total Cost</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>9300</strong></td>
<td></td>
</tr>
<tr>
<td>S. No</td>
<td>Proposed item</td>
<td>Human resource support</td>
<td>Web studio hardware/software and infrastructure support</td>
<td>Honoraria to faculty</td>
<td>Student/teacher assistant/mentor online technical support</td>
</tr>
<tr>
<td>-------</td>
<td>----------------------------------------------------</td>
<td>------------------------</td>
<td>--------------------------------------------------------</td>
<td>----------------------</td>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Creation of Open Online Courses</td>
<td>3.5</td>
<td>1.5</td>
<td>3.5</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Repurposing Courses for Online Delivery</td>
<td>2</td>
<td>0.5</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Reruns of Open Online Courses</td>
<td>2</td>
<td>0.5</td>
<td>1.5</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Lecture Series on Special Topics</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>-</td>
</tr>
</tbody>
</table>
## Office, Honoraria and Travel Budget

<table>
<thead>
<tr>
<th></th>
<th>Years</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2016</td>
<td>2017</td>
<td>2018</td>
<td>In lakhs</td>
</tr>
<tr>
<td>IIT Madras NPTEL Office</td>
<td>16.5</td>
<td>16.5</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>TEL coordinator Honoraria</td>
<td></td>
<td></td>
<td></td>
<td>250</td>
</tr>
<tr>
<td>(IIT Madras: Rs. 40 lakhs, 7 other institutes: Rs. 30 lakhs each per Institute. This includes honoraria payment to support staff of the institute for providing all administrative and infrastructure support.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TEL coordinator honorarium will be fixed at Rs. 2.5 lakhs per coordinator per Institute per year</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Travel expenses for meetings, publicity, coordinators and faculty deliberations on project related matters</td>
<td></td>
<td></td>
<td></td>
<td>1000</td>
</tr>
<tr>
<td>(Rs. 3.0 crores for coordinating Institute and Rs. 1.0 crore each for seven partner Institutes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1300</td>
</tr>
</tbody>
</table>
Translation and Subtitling of NPTEL Video Lectures in Indian languages

Proposal aims to increase the reach of NPTEL content (including online courses) to students who are more comfortable with instruction in Indian languages, while simultaneously helping them improve their English skills.

Accomplished by subtitling NPTEL video lectures in Indian Languages

_Hindi, Bengali, Telugu, Marathi, Tamil, Kannada, Gujarati, and Malayalam_

_Urdu, Oriya, Punjabi, Assamese, Santhali, Kashmiri, Manipuri, and Sanskrit_
The process addresses cognitive skills which might be native to the learner and to help him or her with enhancement of communication skills through constant and persistent training by listening to spoken English.

Grammar structure of Indian languages is different from that of English, automated software cannot be used for generating the subtitles.

In addition, a large amounts of metadata can be created in Indian languages that can be used to search content.
Proposal Summary

Name of the Institution: **IIT Madras (Coordinating Institute)**

Title of the Project: **Translation and subtitling of Higher Education Video Lectures in Indian languages**

Cost of the Project: **Rs. 39 crores**

Name of the Principal Investigator responsible for implementation of the Project:
Dr. Prathap Haridoss, IIT Madras
Dr. Andrew Thangaraj, IIT Madras
Dr. Rajesh Kumar, IIT Madras
Dr. Abhijit P. Deshpande, IIT Madras
Work done – initial efforts

Lec-10 Goal Programming Solutions Complexity of Simplex Algorithm

Example:

Minimize \([\eta_1 - \eta_2 + \rho_3], \rho_4, \gamma_5\)  

\[
\begin{align*}
X_1 + Y_1 + \eta_1 - \rho_3 &= 20 \\
X_1 + Y_2 + \eta_4 - \rho_2 &= 20 \\
4X_1 + 3Y_3 + \eta_4 - \rho_2 &= 90 \\
7X_1 + 8Y_4 + \gamma_5 &= 0
\end{align*}
\]
Organisation of work elements

1) Reviewing the correctness of all of the existing English transcripts by Subject matter experts.
2) Generating a sentence by sentence translation in Indian Languages, with suitably developed guidelines for translation and transliteration in a uniform manner.
3) Reviewing the correctness of the translation in Indian Languages, from a language perspective
4) Reviewing the correctness of the translation in Indian Languages, from a technical perspective
5) Updating the NPTEL videos to support the subtitles in Indian Languages.

Generating documentation towards establishing standards for technical translation and transliteration in Indian Languages, will also be examined.
<table>
<thead>
<tr>
<th>S.No</th>
<th>Proposed Item</th>
<th>First Year</th>
<th>Second Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reviewing the correctness of the existing English transcripts by Subject matter experts.</td>
<td>40 courses</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Generating a sentence by sentence translation in Indian Languages</td>
<td>10 courses in 8 languages + 2 course in an additional 8 languages</td>
<td>30 courses in 8 languages + 6 courses in an additional 8 languages</td>
</tr>
<tr>
<td>3</td>
<td>Reviewing the correctness of the translation in Indian Languages, from a language perspective</td>
<td>10 courses in 8 languages + 2 course in an additional 8 languages</td>
<td>30 courses in 8 languages + 6 courses in an additional 8 languages</td>
</tr>
<tr>
<td>4</td>
<td>Reviewing the correctness of the translation in Indian Languages, from a technical perspective</td>
<td>10 courses in 8 languages + 2 course in an additional 8 languages</td>
<td>30 courses in 8 languages + 6 courses in an additional 8 languages</td>
</tr>
<tr>
<td>5</td>
<td>Updating the NPTEL videos to support the subtitles in Indian Languages.</td>
<td>2 workshops on average per language</td>
<td>2 workshops on average per language</td>
</tr>
<tr>
<td>6</td>
<td>Conducting awareness workshops</td>
<td>2 workshops on average per language</td>
<td>2 workshops on average per language</td>
</tr>
<tr>
<td>Item</td>
<td>Details</td>
<td>1st Year</td>
<td>2nd Year</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Office team</td>
<td>2 senior project officers</td>
<td>Rs. 5,00,000</td>
<td>Rs. 60,00,000</td>
</tr>
<tr>
<td></td>
<td>12-15 project associates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outsourcing translation of 40 courses in 8 languages</td>
<td>Rs. 8,00,000 per language per course</td>
<td>Rs. 6,40,00,000</td>
<td>Rs. 19,20,00,000</td>
</tr>
<tr>
<td>Outsourcing translation of 8 courses in 8 additional languages;</td>
<td>Rs. 8,00,000 per language per course</td>
<td>Rs. 1,28,00,000</td>
<td>Rs. 3,84,00,000</td>
</tr>
<tr>
<td>Honorarium for language coordinators and project coordinators. 2 coordinators per language and 4 overall project coordinators</td>
<td>Rs 1,00,000 per year per language coordinator. Rs. 2.5 lakh per year to project coordinators</td>
<td>Rs. 42,00,000</td>
<td>Rs.42,00,000</td>
</tr>
<tr>
<td>Workshops and related expenses</td>
<td>Two Workshops on average, in each language. Rs 10000 Per participant, for 200 participants each in 16 Languages</td>
<td>Rs. 1,95,00,000</td>
<td>Rs. 2,95,00,000</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Travel</td>
<td></td>
<td>Rs. 30,00,000</td>
<td>Rs. 30,00,000</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
<td>Rs. 1,20,00,000</td>
<td>Rs. 10,00,000</td>
</tr>
<tr>
<td>Consumables</td>
<td></td>
<td>Rs. 10,00,000</td>
<td>Rs. 15,00,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Thank you
Backup slides
## NPTEL Financial Summary – actuals from UCs received

<table>
<thead>
<tr>
<th>Institute Name</th>
<th>Allocation</th>
<th>Utilized</th>
<th>Balance</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIT Madras (30-Sep-15)</td>
<td>96,00,00,000</td>
<td>92,67,98,510</td>
<td>5,29,51490</td>
</tr>
<tr>
<td>IISc Bangalore (13-Oct-15)</td>
<td>6,05,16,979</td>
<td>5,33,04,212</td>
<td>72,12,767</td>
</tr>
<tr>
<td>IIT Guwahati (14-Oct-15)</td>
<td>6,80,65,963</td>
<td>6,30,84,060</td>
<td>49,81,903</td>
</tr>
<tr>
<td>IIT Kanpur (5-Oct-15)</td>
<td>14,74,12,600</td>
<td>13,64,87,907</td>
<td>1,09,24,693</td>
</tr>
<tr>
<td>IIT Kharagpur (16-Oct-15)</td>
<td>10,69,76,600</td>
<td>11,13,30,656</td>
<td>-43,54,056</td>
</tr>
<tr>
<td>IIT Roorkee (19-Oct-15)</td>
<td>3,30,62,033</td>
<td>3,23,19,001</td>
<td>7,43,032</td>
</tr>
<tr>
<td>IIT Delhi (20-Nov-14)</td>
<td>7,61,48,551</td>
<td>4,89,03,210</td>
<td>2,72,45,341</td>
</tr>
<tr>
<td>IIT Bombay (26-Oct-15)</td>
<td>6,73,70,600</td>
<td>5,85,76,058</td>
<td>87,94,542</td>
</tr>
</tbody>
</table>

The remaining balance in NPTEL funds is 10,84,99,712
In the first meeting of the Domain Experts Committee held on July 14, 2015, the initial version of the NPTEL Phase IV proposal was presented. The NPTEL team thanks the committee for its careful review of the proposal and various comments for improvement. After the meeting, the proposal for Phase IV has been significantly revised in response to the comments of the committee.

Our responses to the specific queries raised are given below:

Comment 1: Relevance of various deliverables proposed as many of them are being considered by various other stakeholders.

Response: In the original proposal, there were more than 10 items with several different deliverables. Following the various queries raised in the meeting, in the revised proposal, the only deliverable is online course content. The other items may possibly be submitted as a separate proposal in the future.

Comment 2: The financial status of the phase-II/III project on the sanctioned budget versus expenditure thereon along with UCs, along with the work done and pending status.

Response: All the commitments under Phases II and III are now complete, and all courses are live on our portal http://nptel.ac.in. The necessary UCs are enclosed as separate documents.

Comment 3: Justifications of the costs proposed for various components of the project - including the justification for inclusion of infrastructure costs, when the unit rate for each course is being proposed.

Response: The cost per course is in accordance with that proposed by the costing committee for MOOCs. The basic infrastructure needed to support recording of videos including studio equipment, computing hardware and software requirements fall under the category of infrastructure costs. In keeping with previous phases of NPTEL, the infrastructure cost is included with the course unit cost. The same has been recommended by the costing committee for MOOCs.

Comment 3: Clarification on certification and its format being awarded.

Response: This proposal is only concerned with the creation of online course content. The certification part is fully independent of this proposal, and may be carried out by the organizing institute, if the institute deems it to be fit. The only connection is that the course content created under this proposal will be such that it is suitable for certification purposes. No funds from this proposal are for the purposes of covering the costs of certification.
From March 2014, as a pilot, NPTEL has been creating open online courses and delivering them through the portal https://onlinecourses.nptel.ac.in. Courses in this portal are completely free. However, students who did these courses have the option of registering for a proctored exam, which is conducted in several cities through an exam partner, and obtain a certificate from the Centres for Continuing Education (CCE) of the institute that ran the course. The costs of certification are independent of the course creation. The certificate is given by the CCE of the organizing institute and also has the NPTEL logo on it along with other partners.

We have seen that students and colleges see value in the online delivery of courses and certification. We encourage the participating institutes that create the courses to continue offering certification for value addition to the student community.

**Comment 4:** The need and provision of improved Interactive and doubt clearance sessions, in the certification courses.

**Response:** The online course portal https://onlinecourses.nptel.ac.in has a discussion forum as an integral part of it. Students who have doubts post questions on the forum. The questions on the forum are answered actively by the faculty and the teaching assistants. In addition, periodic announcements are made to all registered students. We present below sample data from a few representative courses:

<table>
<thead>
<tr>
<th>Name of course</th>
<th>Course duration</th>
<th>Topics in forum</th>
<th>Posts</th>
<th>Number of views</th>
<th>Announcements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital Circuits and Systems</td>
<td>Jan-Mar 2015</td>
<td>455</td>
<td>2218</td>
<td>42060</td>
<td>33</td>
</tr>
<tr>
<td>Basic Electrical Circuits</td>
<td>Sep-Nov 2014</td>
<td>664</td>
<td>2496</td>
<td>35716</td>
<td>19</td>
</tr>
<tr>
<td>Introduction to Programming in C</td>
<td>July-Sep 2015</td>
<td>1244</td>
<td>4662</td>
<td>66006</td>
<td>23</td>
</tr>
<tr>
<td>Language and Mind</td>
<td>Jan-Mar 2015</td>
<td>109</td>
<td>199</td>
<td>2179</td>
<td>27</td>
</tr>
<tr>
<td>Networks and Systems</td>
<td>July-Nov 2015</td>
<td>236</td>
<td>1182</td>
<td>8394</td>
<td>34</td>
</tr>
</tbody>
</table>

**Comment 5:** As some of the deliverables proposed (particularly deliverable mentioned at No.1 above) of Phase IV proposal are related to development and delivery of MOOCs, a clarification is required from MHRD on whether these components of the proposal have to be referred to the MHRD constituted "Implementation and Monitoring Committee on MOOCs Content", chaired by Prof. Bhaskar Ramamurthi, Director, IIT Madras.

**Response:** We will be happy to present the proposal to the mentioned committee, if necessary.

**Final comments:** After discussions, it was decided that an exclusive one full day session on NPTEL proposal is needed to seek clarifications and answers from PI on questions asked by various members, including above. The PI would also give information about different domain being taken up, Virtual Labs justification and lab kits, etc.
Response: We hope the above responses have answered the queries raised and provided the necessary clarification. The proposal has undergone a significant revision with much more focus on the topic of online course content creation. We will be happy to present the revised proposal to the Domain Expert Committee on a convenient date.

In summary, we thank the committee members, once again, for their many comments. Our proposal has benefited immensely from hearing the committee members’ views on the various topics we had included in the original proposal. The revised version of the proposal has incorporated all the comments, and we are eager to present the revised version to the committee and seek its inputs.
NMEICT
National Mission on Education Through ICT MHRD, Govt. of India

Control Number: AEC3012201413260
Submission Date: Nov 16, 2015

PART I - Personal Details

<table>
<thead>
<tr>
<th>PI - 1</th>
<th>PI - 2</th>
<th>PI - 3</th>
<th>PI - 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Dr. Andrew Thangaraj</td>
<td>Dr. Prathap Haridoss</td>
<td>Dr. Kushal Sen</td>
</tr>
<tr>
<td>Designation</td>
<td>Professor</td>
<td>Professor</td>
<td>Professor</td>
</tr>
<tr>
<td>Organisation</td>
<td>IIT Madras</td>
<td>IIT Madras</td>
<td>IIT Delhi</td>
</tr>
<tr>
<td>Postal Address</td>
<td>Web Studio, 3rd floor, ICSR building, IIT Madras, Chennai 600036</td>
<td>Web Studio, 3rd floor, ICSR building, IIT Madras, Chennai 600036</td>
<td>Educational Technology Services Centre, IIT Delhi, New Delhi 110016</td>
</tr>
<tr>
<td>Fax</td>
<td>044-22570545</td>
<td>044-22570545</td>
<td>-</td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:andrew@iitm.ac.in">andrew@iitm.ac.in</a></td>
<td><a href="mailto:prathap@iitm.ac.in">prathap@iitm.ac.in</a></td>
<td><a href="mailto:kushal@textile.iitd.ac.in">kushal@textile.iitd.ac.in</a></td>
</tr>
<tr>
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<td>9940489032</td>
<td>9444468235</td>
<td>9810602231</td>
</tr>
<tr>
<td>Project Category</td>
<td>Content Creation and Online Certification</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

PART II - Information relating to Department/Institute

1. Name of Institute with complete address:
   Indian Institute of Technology Madras, Chennai 600036 (Coordinating Institute)

2. Title of the Research Project
   NPTEL Phase IV for the period 2016-2018

3. Department/ Broad Area - Not Applicable

4. Major areas of research in the Department - Not Applicable

5. Names & Designation of Principal Researchers in the major areas and list of publications during last 5 years based on work done in the Department:
   Dr. Andrew Thangaraj (Professor, IIT Madras), Dr. Prathap Haridoss (Professor, IIT Madras), Dr. Kushal Sen (Professor, IIT Delhi) and Dr. Satyaki Roy (Associate Professor, IIT Kanpur); The CV of the Principal Investigators is attached at the end of this document.
6. Is it Interdisciplinary Project? Yes  
7. Is it Inter Institutional Project? Yes  
8. Is any Industry/User agency participating? No  

9. Brief of completed and or ongoing research projects supported by MHRD/ AICTE in the Department during last 5 years.  
Please refer Part IV- section 15(a) for details  

PART III - Information relating to Department/Institute  

10(a) Principal Investigator Details:  

1. **Dr. Andrew Thangaraj** is a Professor in the Department of Electrical Engineering at the Indian Institute of Technology, Madras, where he has been since 2004. His areas of research interest are Coding Theory, Information-theoretic Security and Information Theory. For the past five years he has been interested in online and distance education pedagogies and paradigms, and has been an active coordinator of NPTEL Phases II and III for the past three years. He has been heading the NPTEL Massive Open Online Courses (NPTEL MOOC) for the past one year. He is also a content creator for NPTEL Phases II and III. More details are in the CV attached.  

2. **Dr. Prathap Haridoss** is a Professor in the Department of Metallurgical and Materials Engineering, Indian Institute of Technology Madras, where he has been since 2003. His areas of interests are Carbon Nanotubes, Fuel Cells, Semiconducting Nanomaterials and Recycling Printed Circuit Boards. For the past five years he has been developing online and distance education pedagogies and coursework and paradigms, and has been an active coordinator of NPTEL Phases II and III for the past two years. He is also a content creator for NPTEL Phases II and III. More details are in the CV attached.  

3. **Dr. Kushal Sen** is a Professor in the Department of Textile Engineering in IIT Delhi, where he has been since 1981. His areas of specialization are Dyeing, printing, finishing of natural and manufactured fibers, which come under the area of Textile Chemical Processing. He is a Founder and National Coordinator of Video Courses of the NPTEL Project from the first phase of NPTEL launched in 2003 and has been championing the programme of Eklavya, a Gyan Darshan TV Channel from 2004 and is well versed with
all aspects of NPTEL for the past eleven years. In addition he is a contributor to NPTEL content. More details are in the CV attached.

4. **Dr. Satyaki Roy** is an Associate Professor jointly with the Department of Humanities and Social Sciences at Indian Institute of Technology, Kanpur and the Design Programme. He has been the IIT Kanpur NPTEL coordinator since the year 2005 and has been responsible for the promotion of NPTEL MOOCs in IIT Kanpur and for NPTEL’s presence in all the Northern and Eastern States of India. His areas of interest include Graphics, Media and Design. More details are in the CV attached.

Detailed CVs of the PI are in **Annexure I - CVs of Principal Investigators:**

10(b) **Co-Principal Investigator Details:**
Not Applicable

11. **In case it is a joint project with other Institution, research labs and industries, names(s) of Participating investigators:**
NPTEL is a joint project of the 7 IITs (IIT Madras, IIT Bombay, IIT Delhi, IIT Kanpur, IIT Kharagpur, IIT Kanpur, IIT Roorkee, IIT Guwahati) and IISc Bangalore. NPTEL is administered through a national committee known as the NPTEL Programme Implementation Committee whose members are from each of the Institutes above. In addition there are other national and international experts who are invited from time to time to provide valuable inputs. The list of current NPTEL PIC Members is enclosed as Annexure III to this proposal.

12. **In case industry/user agency is participating, whether a MOU has been signed or letter of intent given.**
Several industries are partners to NPTEL and a number of MOUs have been signed with them. They are all non-exclusive to the partner industries. In addition NPTEL has signed MOUs and license agreements with national and international agencies to ensure promotion of the educational content and the NMEICT programme without compromising the fundamental integrity of the National effort. These details can be provided on request.

13a) **Present commitments of the Principal Investigators:**
No major commitments apart from regular departmental and institute duties. All the PIs are active TEL coordinators of NPTEL Phases II and III, which is about to be concluded.

13(b) **Present commitments of the Co-Principal Investigators**
PART IV - About Research Project

15 (a) Summary of the project (brief):

Over the past ten years, the National Programme on Technology Enabled Learning (NPTEL) has been successful in creating the largest online repository in the world of courses in engineering, basic sciences and selected humanities and social sciences subjects and maintaining the popular online web portal http://nptel.ac.in. More than 16000 video hours have been uploaded in NPTEL and NPTEL’s YouTube channel, and the portal constitutes the most accessed library of peer-reviewed educational content in the world. Cognizant of the rapid advances and changes in the area of online and distance education with tremendous transformations in efficacy, acceptance and quality of delivery, NPTEL has proposed new activities in the current proposal. Globally, popular online education portals have been witnessing rapid growth. In India, which has the largest growing population of youth in the world, the need for scalable, certifiable education for a large number of students is vital for the future growth of the country, and this need is addressed in this proposal as a key initiative. The main items in this proposal are the following:

- Creation of Open Online Courses
- Repurposing Courses for Online Delivery
- Courses in New Disciplines
- Lecture Series on Special Topics

(b) Justification, importance of projects:

Given its expertise, use and success in the Indian online education context, NPTEL is uniquely placed to be an important player in the country’s effort towards affordable, high-quality, online education for all in every area of higher education. To work towards this larger objective, this document presents NPTEL’s plans and proposals for the next three years 2016-18. All aspects of current and previous NPTEL proposals have been incorporated in the Mission Document that MHRD created and obtained approval from the Cabinet of Government of India in the year 2009 for launching the National Mission on Education through Information and Communication Technology (NMEICT). NPTEL has continued to
create new vistas in online education and online certification with uniform policy for copyrights and
distribution/access of materials throughout the world and provides full support for present and future
NMEICT initiatives while creating a credible online programme and a model for the whole nation.

(c) Details of the work already done by Principal Investigator in this area

*Introduction and Motivation (along with a summary of the past phases)*

The National Programme on Technology Enhanced Learning (NPTEL) was initiated by five Indian
Institutes of Technology (Bombay, Delhi, Kanpur, Kharagpur and Madras) and four Indian Institutes of
Management (Ahmedabad, Bangalore, Lucknow, and Calcutta (Kolkata now)) in the year 1999. In 1998
some of the Directors visited several Academic Institutions in the United States to explore active
learning by students and teaching by faculty using the Internet and Technology Enhanced Learning (TEL).
Professor Paul Goodman, Director, Center for Strategic Learning in Carnegie Mellon University (CMU) in
Pittsburgh followed the visits with active support for TEL. He was the Director of the Center for Strategic
Learning which had been helping CMU faculty create interactive and cognitive learning support using
technology. He had also helped establish a highly successful Virtual University in Mexico earlier. Prof.
Goodman arranged for a workshop in IIT Madras with funds from Ford Foundation (USA) in 1999.
Industry, Government and academics from India and United States participated in the three day
workshop conducted by IIT Madras in May 1999 and drafted a proposal a TEL framework for four
activities, namely,

1. Creation of electronic and web based content for core engineering, management and basic
    science curriculum by the IITs and IIMs (about 100 courses)
2. Creation of digital library archives in India following CMU’s pioneering effort in that direction,
3. Creation of online guidance for IIM Doctoral students by faculty who would be in other IIMs and
4. Creation of a Virtual Technical University (VTU) once the core content creation process had been
    standardized with about 500-600 complete one-semester courses.

IITs felt that a number of components such as core content creation and establishing a VTU (or a virtual
IIT as the case may be with approval from IIT Council and with active partnership from all IITs and NITs)
were vital to online science and engineering education in India as a whole and also the drivers for
innovation in design and manufacturing to make the nation competitive in the twenty first century, and
needed Government support. With a large number of private institutions in India created already due to
liberalization of economy in the nineties and without adequate support of quality faculty the quality of
students had started declining; the latter was already beginning to have its effects in the intake quality
of M. Tech and M. S students to IITs. Large-scale teacher training and quality monitoring of engineering
students were urgently needed before the situation got out of control. This prompted Prof. M. S. Ananth, Director of IIT Madras, who had earlier written a proposal based on the TEL workshop, to champion the TEL programme to the Government from 1999 onwards for providing high quality, peer-reviewed educational contents freely, as a priority from those four activities listed above; he succeeded in convincing the Ministry and in 2003, funds to the tune of Rs. 15 crores (Rs. 150 million, or equivalently, 3.5 million US Dollars then) were sanctioned for creating a National Programme on Technology Enhanced Learning (NPTEL) that would be coordinated by IIT Madras with six other IITs and IISc Bangalore. Five core disciplines were identified, namely, civil engineering, computer science and engineering, electrical engineering, electronics and communication engineering and mechanical engineering; in addition core science, language and management courses that all engineering students needed would be developed as the sixth discipline. Undergraduate courses covering the syllabi provided by the model curricula of All India Council of Technical Education would be the focus along with relevant components of three large affiliating engineering Universities in India at that time, Anna University (Tamil Nadu), Jawaharlal Nehru Technological University (Hyderabad) and Visvesvaraya Technological University (Karnataka). The courses would be modularized so that there is flexibility in their use by Universities and colleges. Between six to twelve modules containing three to four lectures each would be developed with sixty to eighty percent of the course covering core syllabus materials.

The Minister for the Human Resource Development, Dr. Murli Manohar Joshi, requested the project coordinators in 2003, soon after sanctioning funds, to restructure the proposal for 200 web based courses to about 100 full broadcast quality, video recorded courses and 100 online web based educational material. He argued that television had the last mile reach in India (which is a fact even today after eleven years of various interventions with Internet!) with more than forty percent of colleges in rural and semi-urban locations; internet had not penetrated even in the cities and reaching out to teachers and students had to be done fast with the steady increase in the opening up of new institutions and requirements for a large number of engineering students in the IT industry. The presence of a teacher, through the medium, could be quite influential to the students and other learners for the learning process. He created a new GyanDarshan T. V. Channel and named it as Ekalvya, which began hosting NPTEL content from 2005 until June of this year.

The first phase of the programme was completed in 2007 with about 130 video courses each containing approximately forty one-hour lectures recorded with high quality broadcast studios in seven IITs
Another 130 courses were created as web based lecture materials with animations and other completely in-house contents. The requirement for adherence to copyrights was impressed upon faculty early-on and in return, the Government had agreed for a one-time honorarium to the faculty who contributed to the teaching-learning process through their intellectual property. In order to facilitate content development in both the video and the web format, studios were created with state-of-the-art recording facility and computer-software-human technical support infrastructure in each of the eight institutes. An additional 5.5 crores of Indian Rupees was released towards the end the first phase to cover the costs of more than 60 courses that were added over and above the sanctioned number of 200 courses. Recording from other books, scanned pictures and use of one’s own text books in both web and video lectures were forbidden and this practice enabled NPTEL later to adopt Creative Commons copyright license to the NPTEL project.

NPTEL activities summary for Phases II and III during 2009-2014

The video lectures from the first phase needed to be converted from the high-resolution broadcast format to low-resolution Internet streaming format in order to enable any-time, any-place access by any one. Google Inc. came forward with the option of providing a free Indian educational channel in YouTube similar to their offer to MIT, Stanford and University of California system in 2006. Dr. Ramanathan Guha, an Alumnus of IIT Madras and a senior Vice-President in Google spearheaded the effort inside his organization. The channels would be free of commercials and would be administered by the NPTEL academic team. In addition Google would provide data on analytics of usage. After considerable discussions among the Directors of IITs and IISc (who were the custodians of intellectual property created by their faculty), approval was given to the NPTEL Project Implementation Committee to compress the videos and upload them in the YouTube. The programme was launched on Nov 5, 2007 and has registered more than 120 million channel views until Sep 2015. It is the single, largest, free academic channel in the world hosting more than 15000 curriculum based lectures videos (all in English) recorded by faculty in IITs and IISc and is growing everyday with uploads of new lectures. Every country in the world has viewers on that channel. Some of the videos have crossed the million-viewer mark. The largest number of YouTube users (75-80 percent) is from India. Corporates and academic institutions in India and abroad use the contents freely. In an Appendix to this document data on usage of some of the courses is provided.

The main goal of Phase II (2009-14) was to build on the engineering and core science courses launched previously in NPTEL Phase I by the Ministry for Human Resource Development, Government of India on
September 03, 2006 and create online course contents and interactions between faculty members in science and engineering using the best academics in India. The main deliverables in Phase II were the following:

1. Conversion of NPTEL phase I video courses in streaming video lecture format and setting up eight distributed national video servers for delivering lectures on demand in each of the eight partner institutions.
2. Creation of additional 600 web and video courses in all major branches of engineering, physical sciences at the undergraduate and postgraduate levels and management courses at the postgraduate level.
3. Integration of College curricula in engineering education with NPTEL contents through a large number of course specific workshops and interaction with Colleges in India for improving TEL infrastructure.
4. Creation of discussion forum for each course created under the NPTEL using a grid of computer servers and setting up FAQ’s for each course.
5. Indexing of all video and web courses and setting up powerful search engines to enable content and keyword search on all topics in science and engineering developed under NPTEL.

Setting up internal infrastructure in each IIT for implementing virtual online certification programmes in science and engineering.

16. Total amount required for Phase IV (2016-18): Rs. 93 crores

<table>
<thead>
<tr>
<th>Topic</th>
<th>Content</th>
<th>Unit Cost (in Lakhs)</th>
<th>Number</th>
<th>Total Cost (in lakhs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Creation of Open Online Courses</td>
<td>Online course</td>
<td>12.0</td>
<td>300</td>
<td>3600</td>
</tr>
<tr>
<td>2 Repurposing Courses for Online Delivery</td>
<td>Course supplements</td>
<td>6.0</td>
<td>300</td>
<td>1800</td>
</tr>
<tr>
<td>3 Reruns of Open Online Courses</td>
<td>Course delivery</td>
<td>5.0</td>
<td>200</td>
<td>1000</td>
</tr>
<tr>
<td>4 Lecture Series on Special Topics</td>
<td>Lecture Series</td>
<td>6.0</td>
<td>100</td>
<td>600</td>
</tr>
<tr>
<td>5 Workshops and Conferences (National and</td>
<td>Training and research</td>
<td>5.0</td>
<td>200</td>
<td>1000</td>
</tr>
<tr>
<td>International)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Travel for Coordinators of various institutes for three years along with coordinator Honoraria and office expenditure for managing NPTEL offices centrally at least in three locations IIT Madras, IIT Kanpur and IIT Delhi</td>
<td></td>
<td></td>
<td>1300</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>-------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>Overall Total Cost</td>
<td></td>
<td></td>
<td>9300</td>
</tr>
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</table>
17(a) Recurring budget of the proposal along with item-wise breakup (Manpower, Contingency, Consumable, Travel, Miscellaneous year wise breakup).

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Proposed item</th>
<th>Cost (in INR, lakhs) per course</th>
<th>Total cost (per course) in INR, lakhs</th>
<th>Number of courses</th>
<th>Total (INR in lakhs)</th>
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<tbody>
<tr>
<td></td>
<td>Human resource support#</td>
<td>Web studio hardware/software and infrastructural support</td>
<td>Honoraria to faculty</td>
<td>Student/teacher assistant/mentor online technical support</td>
<td>English text Transcription, indexing and assessment material for certification</td>
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<td>1</td>
<td>Creation of Open Online Courses</td>
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<td>2</td>
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<td>1</td>
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<td>Reruns of Open Online Courses</td>
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<td>0.5</td>
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<td>4</td>
<td>Lecture Series on Special Topics</td>
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<td>1</td>
<td>2</td>
<td>-</td>
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</tbody>
</table>

#Human resource support includes 30% House Rent Allowance (HRA)
Item 6. Travel for Coordinators of various institutes for three years along with coordinator Honoraria and office expenditure for managing NPTEL offices centrally at least in three locations IIT Madras, IIT Kanpur and IIT Delhi

<table>
<thead>
<tr>
<th></th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>In lakhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIT Madras NPTEL Office</td>
<td>16.5</td>
<td>16.5</td>
<td>17</td>
<td>50</td>
</tr>
<tr>
<td>TEL coordinator Honoraria</td>
<td></td>
<td></td>
<td></td>
<td>250</td>
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<tr>
<td>(IIT Madras: Rs. 40 lakhs, 7 other institutes: Rs. 30 lakhs each per Institute. This includes honoraria payment to support staff of the institute for providing all administrative and infrastructure support.)</td>
<td></td>
<td></td>
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<tr>
<td>TEL coordinator honorarium will be fixed at Rs. 2.5 lakhs per coordinator per Institute per year</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Travel expenses for meetings, publicity, coordinators and faculty deliberations on project related matters</td>
<td></td>
<td></td>
<td></td>
<td>1000</td>
</tr>
<tr>
<td>(Rs. 3.0 crores for coordinating Institute and Rs. 1.0 crore each for seven partner Institutes)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>1300</strong></td>
</tr>
</tbody>
</table>
18. SUMMARY SHEET:

1. **Name of the Institution:** IIT Madras (Coordinating Institute)

2. **Title of the Project:**
   
   NPTEL Phase IV for the period 2016-2018

3. **Name of the Department:** Not Applicable

4. **Cost of the Project:** Rs. 93 crores

5. **Amount released earlier if any:** None

6. **Utilization position in respect of grants released earlier (upto 2001) for various projects (Details to have given project wise)**
   
   a. **Fully spent:** Not Applicable
   
   b. **Unspent, proposal to utilize it:** Not Applicable

7. **Reasons for unspent balance:** Not Applicable

8. **Name of the Principal Investigator responsible for implementation of the Project:**
   
   Dr. Andrew Thangaraj, IIT Madras (Coordinating Institute)
   
   Dr. Prathap Haridoss, IIT Madras (Coordinating Institute)
   
   Dr. Kushal Sen, IIT Delhi
   
   Dr. Satyaki Roy, IIT Kanpur
PART V - Detailed Project Report (DPR)

1. Objective:
The main aspects of the proposal are the following:

1) Creation of Open Online Courses

Through an online portal, it is proposed to offer free 4-, 8- or 12-week or full-semester online courses typically on topics relevant to students, preferably in their final years of higher education along with basic core courses in sciences and humanities and relevant exposure to tools and technologies. The portal includes support for weekly submission of assignments by students and active interaction through a discussion forum. These courses are suitable for possible certification by any participating organization. As a pilot, since March 2014, online courses are being run by NPTEL. A total of 45 courses have already been newly created as open online courses. We propose to create 300 new courses in Phase IV.

2) Repurposing Courses for Online Delivery

Existing NPTEL courses were created without an explicit online course delivery model. In online delivery of courses, the videos have to be annotated and, if needed, broken up into smaller pieces. Also, weekly assignments have to be added, and the entire content needs to be moved to an online course delivery portal. In the pilot phase, since March 2014, a total of 9 courses have been repurposed for online delivery. We propose to repurpose 300 existing courses in Phase IV.

3) Reruns of Open Online Courses

An open online course, once created and run, can be offered again at a future time. However, during a rerun, the assignments are typically changed and questions in the discussion forum will have to be answered. If needed, new content is created based on feedback from previous course runs. In the pilot phase, since March 2014, 4 courses were rerun. We propose to rerun 200 courses in Phase IV.

4) Lecture Series on Special Topics
To highlight excellent contributions on learning native to India and invigorate its younger citizens, it is proposed to bring the best exponents of every area in higher learning for delivering a series of lectures. Four such lecture series have been created in 2013-14. They are in the areas of Ayurveda, siddha medicinal practices, Indian contribution to mathematics from First Century AD and Psychology. The science behind professional practices of ancient India and its arts and culture are some of the areas actively being promoted. It is proposed to create at least 100 such special topics lecture series during the period 2016-18 to bring the learning from our past to the present and the future generations using ICT.

5) NPTEL workshops and International Conferences

Workshops will be conducted throughout the country for fostering and promoting NPTEL and NMEICT. Research Conferences will be partially supported to provide inputs to pedagogy, development and implementation or ICT tools in NPTEL and NMEICT and to create rigorous peer-review mechanisms for ICT in education. The conferences will also have other sources of funding through registration and sponsorship outside of NPTEL funding. NPTEL has helped in the creation and organization of the research conference series in India on Technology enhanced learning known as T4E.

2. Methodology:

The exact methodologies to be followed for achieving the objectives are detailed in this section.

1) Creation of Open Online Courses

Online courses are to be offered along the lines of Massive Open Online Courses (MOOCs). A typical online course contains the following:

1. Clear assumptions about prerequisites for a learner
2. Clear learning outcomes
3. 8-12 weeks in duration or full semester courses
4. 2-4 hours of lecture every week
   - The lectures are broken up into short modules
   - Every module has a clear description of its contents and expected learning outcomes
5. Objective-type assessments every week (to be auto-graded)
6. Programming or other assignments every week (to be auto-graded or peer-graded)
Subject Matter Experts

Subject Matter Experts (SMEs) will be invited from all over India to create the video lectures and other content adhering to a curriculum. If the SMEs already have a course in NPTEL, that course may be modified to meet the requirements of an online course. However, all the important pedagogical aspects of the online course will be met – prerequisites, learning outcomes, splitting into weeks and short modules, weekly assessments and assignments will be provided.

The content of the online course will be peer-reviewed to see if it meets all the requirements. Even if the online course is created from an existing NPTEL course, a second round of peer review will be carried out to confirm that the newly created online course is suitable for open offering.

The effort of the SMEs for content creation and that of the reviewers will be funded adequately and according to norms approved by the Standing Committee and the PAB of NMEICT from time to time. The role of the SMEs will not end with content creation. The SME team (assuming there are more than one for a particular course; the team could have a single SME as well) will play a crucial role in the conduct of the course on the portal. The SME team will be assisted by a group of Teaching Assistants (TAs) provided by the SME team’s department at their institute.

Course announcement

Once a course is ready, it will be announced on the portal for students to sign up for the course. The announcement will include the following:

- Date when sign-ups are opened
- Date when sign-ups will be closed
- Start date for the course
- End date for the course

Sign-up

Sign-up will be kept open typically for a month or two. Anyone who signs up will get a welcome email and get added to email lists for course announcements and course discussion. The welcome email for these lists will be drafted by the SME team. This will be done on the portal. The SME team and TAs will have course admin logins in the portal, and this will allow them to manage the content and the email lists.
Uploading content

The course will open on the announced start date. Content will be released every week: Week 1 to Week 8 or 12, or the entire semester. Content includes video lectures, lecture slides, additional material, assessments and assignments. The SME team and TAs will be responsible for uploading the content on the portal, formatting it suitably, making it public and posting an announcement in the announcement email list about the content being available.

A suggested practice is to upload all content by Wednesday of the previous week, check the content for a couple of days and then make it public on Sunday night or Monday morning. The SME team and TAs will function as a well-knit group that would meet often and discuss the modalities of running the course.

Solutions for the assessments and assignments will be created and uploaded on the portal. Whenever possible, suitable videos will be created for explaining the solutions.

Forum

An important duty for the SME team and TAs during the running of the course is monitoring the forum. The discussion forum on the portal tends to be very active and numerous questions are posted in it on a daily basis. The SME team and TAs will respond to the questions every day.

Multiple runs

The same course may be run multiple times depending on the availability of the SMEs and the necessity as recognized by requests from institutions. The rerun may also be done by a different team of SMEs, who will create/manage the content and the running of the course on the portal. The efforts of the SME team and TAs in running the course on the portal will be remunerated at applicable and suggested rates provided in the budget details in a later section.

Pilot courses and portal (data ownership and integrity)

For the pilot courses, NPTEL has a partnership with Google for maintaining the portal. This is through a Google App Engine agreement, which many businesses use today. Through this, NPTEL and NMEICT will continue to own all the data on the portal and also access it. Developers and designers from Google have contributed significantly to the coding and the look-and-feel of the portal. They have extended full support for some time at least, through a personal oral and written assurance by the Google’s software Head to the Secretary and the Mission Director. Google also released a white paper on how its
processes and support will be made available to NPTEL without any cost for its involvement. All of this is also due to a relationship that NPTEL has developed with the best search engine team in the world for helping with NPTEL analytics so far from 2007 when it launched the video channel with YouTube. The popularity of the YouTube IIT channel has belied everyone’s expectations including Google. However, NPTEL will initiate efforts from the date of sanction of the project to migrate open source codes from Google cloud to a cloud identified by the NMEICT and integration effort will be carried out. The fully open coursebuilder codebase has been built on it significantly, and the entire codebase is in a git repository owned by NPTEL.

An important development effort from engineers in Google India is the support for programming assignments though an installation of a Mooshak instance and its connection to the portal. The Mooshak instance is being run on a Google Compute Engine instance, which, once again, through a suitable agreement, is owned by NPTEL. Google has donated all the development time and server space for the portal.

2) Repurposing Courses for Online Delivery
SMEs who already have an NPTEL course will work with the recorded video lectures and content from the other quadrant to repurpose their existing course into an open online course suitable for online delivery through the portal. The methodology involves porting the content to the online course portal in a suitable format. Typical tasks include adding annotations for video lectures to describe the content, uploading the content onto the portal and adding weekly assignments.

The running of the course is similar to that of a newly created course. The effort of the SME is lesser for repurposing because new video lectures are not being created. However, the effort of running the course – managing the content on the portal and responding to forum posts – are same as that of a newly created course.

3) Rerun of Open Online Courses
Once a course has been uploaded onto the portal and successfully run once, it can be offered again at a future time. At this time, either the same SME or a new SME, will be expected to alter the assignments suitably, manage the content of the portal, and respond to questions on the forum. Based on feedback from the previous run, new content may be created, if necessary.
A rerun involves little effort in lecture content creation, but the effort and methodology of running the course is same as before.

4) Lecture Series on Special Topics

To highlight excellent contributions on learning native to India and invigorate its younger citizens, it is proposed to bring the best exponents of every area in higher learning for delivering a series of lectures that will bring India’s own traditional knowledge to the fore in a scientific and rigorous manner. Four such lecture series have been created in 2013-14 on a trial basis. It is proposed to create 100 such special topics lecture series during the period 2016-18.

NPTEL would launch, in addition to creating courses in more areas such as humanities, arts and sciences, performing arts such as music, motion picture, theatre and drama, special lecture programmes comprising of fewer but more focused lectures by experts in various fields in India. Strengthening the core humanities and social science programme online is envisaged as a fundamental need of the hour to engage students meaningfully and to bring out the best of culture and tradition as an embodiment of scientific knowledge. A large number of these lectures can be elective/special topics for students in higher education. Already, the following four programmes have been created:

a. Lectures on Ayurvedic Tradition of India by Padma Vibhushan Prof. M. S. Valiathan of Manipal University,

b. Lectures on Mathematics in Ancient and Modern India by Prof. M. D. Srinivas, Prof. Sriram (both from Madras University) and Prof. Ramasubramanian (IIT Bombay) who are international experts on the history and contribution of Indian Mathematicians to modern mathematical thought,

c. Lectures on Creativity in Indian Art and Culture and Temple inscriptions, in the Chola period of Tamil Kingdoms by the renowned archeologist Dr. Nagaswamy (Chennai), and

d. Lectures on Selected Topics in Psychology, by renowned people in the areas of Psychology and Psychiatry. The contributors are experts from IIM Bangalore, NIMHANS, Delhi University, Allahabad University, DRDO and ASSERT along with other experts in Neuro Radiology as well as R&D establishment. The series was coordinated by Prof. Braj Bhushan, Department of Humanities and Social Sciences, IIT Kanpur.

The objective is to recreate excellent contributions on learning native to India, to its younger citizens as formal education content. Hundreds of such topics are envisaged in the coming years and NPTEL will continue to bring the best exponents of every area in higher learning and India’s own traditional
knowledge to the fore. While humanities and social sciences subjects cannot be separated from the convictions and opinions of individual exponents, a scientific process of enumerating counter and contrary thoughts processes of others by the same individual expert offering the course as a part of his or her lectures is being made a requirement to let the learner learn the topics more objectively. A total of 100 titles are proposed with 20 or fewer lectures in each title (not less than 10 per topic to ensure reasonable depth and to form a part of elective for students).

5) NPTEL workshops and International conferences

Workshops will be conducted throughout the country with the following objectives:

1. Inform teachers and students throughout the country as well as leaders of the industry and general public in the region about the availability and curriculum adoption of course contents developed by NPTEL. Encourage students to participate and obtain professional and competent certificates.

2. Invite faculty members to directly participate in NPTEL and NMEICT programmes as collaborators with adherence to the quality and content standards and procedures already in place and to evolve them with more participation by Universities, scientists in the national and private research labs and industry experts.

3. Evolve suitable mechanisms and support for educational institutions that offer NPTEL courses for their students and to establish online mentoring principles.

Research Conferences will be partially supported to provide inputs to pedagogy, development and implementation or ICT tools in NPTEL and NMEICT and to create a rigorous peer-review mechanism for ICT in education. The Conferences will have other sources of funding through registration and sponsorship outside of NPTEL funding. NPTEL has helped in the creation and organization of the research conference series in India on Technology Enhanced Learning known as T4E (Technology for Education). It is fully sponsored by the IEEE (USA) Society under the Computer Society’s division on Learning Technologies. Its chairs have been Prof. Demetrio Sampson (University of Greece, Greece) and Prof. Kinshuk (Athabasca University, Canada). Prof. Mangala Sunder who was the National Coordinator of NPTEL Web Courses for the period 2003-2014 has also been the Chair of the Steering committee of T4E approved by the IEEE till December 20, 2014. Steering Committee on T4E is the Apex body for selecting and approving proposals to hold research conferences in this area in India with the sponsorship of IEEE. Proceedings are published as peer-reviewed papers by IEEE fostering research and
tools in online education and pedagogy research, which are also listed as goals of the NMEICT Mission. Four fully sponsored T4E have been conducted in the past. They are

1. T4E 2011, IIT Madras
2. T4E 2012, IIIT Hyderabad
3. T4E 2013, IIT Kharagpur
4. T4E 2014, Amrita University, Kollam Campus
5. T4E 2015, NIT Warangal (Scheduled)

Two co-sponsored T4Es were held in the years 2009 (IIIT Bangalore) and 2010 (IIT Bombay) before IEEE upgraded the Conference to a fully sponsored event. Many International experts in educational technologies and pedagogies in online education have already participated and have been apprised of NMEICT and NPTEL. Panel discussions in these conferences devote adequate time to inform national and international educationists and researchers in the field of educational technology about Government of India’s active role in promoting quality higher education and invite them to participate and contribute to the resource creation. The full proceedings have been published in several websites under T4E and will be archived for public access in the immediate future.
3. Deliverables year wise and its possible contribution to major objectives of mission.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Proposed item</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>Total (deliverables / Courses)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Creation of Open Online Courses</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>2</td>
<td>Repurposing Courses for Online Delivery</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>300</td>
</tr>
<tr>
<td>3</td>
<td>Rerun of Open Online Courses</td>
<td>30</td>
<td>70</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>4</td>
<td>Lecture Series on Special Topics</td>
<td>25</td>
<td>40</td>
<td>35</td>
<td>100</td>
</tr>
<tr>
<td>5</td>
<td>Workshops and research conferences</td>
<td>80</td>
<td>60</td>
<td>60</td>
<td>200</td>
</tr>
</tbody>
</table>
4. Time schedule (half yearly):

The above graphic shows how the item-wise deliverables are spread out over the 3-year duration of the project.

5. Details of permanent assets to be procured from the project with estimated cost.

The total budget allocated for Webstudio hardware/ software and infrastructure support is Rs. 8 crores. This total amount is to be split as follows into equipment and consumables.

Proposed:

<table>
<thead>
<tr>
<th>Details</th>
<th>Amount (in crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>6</td>
</tr>
<tr>
<td>Consumables</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>8</td>
</tr>
</tbody>
</table>
Equipment Details:
The total budget of Rs. 6 crores for equipment is to be split as follows. The split is based on similar expenditure in previous NPTEL phases.

<table>
<thead>
<tr>
<th>Item Details</th>
<th>Amount in Crores</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPUTER SYSTEMS BOUGHT FOR VIDEO PROCESSING AND FOR THE WEB STUDIO</td>
<td>1.2</td>
</tr>
<tr>
<td>EQUIPMENT RELATED TO STUDIO</td>
<td>3.2</td>
</tr>
<tr>
<td>SERVER RELATED</td>
<td>0.6</td>
</tr>
<tr>
<td>SOFTWARE</td>
<td>0.8</td>
</tr>
<tr>
<td>MISC.</td>
<td>0.2</td>
</tr>
<tr>
<td>Total</td>
<td>6</td>
</tr>
</tbody>
</table>

More details about the exact equipment proposed to be purchased are presented in Annexure II of the proposal.

6. Details of financial outlay in year wise for recurring and nonrecurring fund

<table>
<thead>
<tr>
<th>Item</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Consumables</td>
<td>1</td>
<td>0.5</td>
<td>0.5</td>
<td>2</td>
</tr>
<tr>
<td>Staff salary</td>
<td>7.5</td>
<td>7.5</td>
<td>7.5</td>
<td>22.5</td>
</tr>
<tr>
<td>Total</td>
<td>12.5</td>
<td>10</td>
<td>8</td>
<td>30.5</td>
</tr>
</tbody>
</table>

(All costs are in crores)

Consumables include filing cabinets/ stationery/ Labour/ furniture/ refreshment/ flooring/ repairs/ books/ fans/ Video Tapes.
Annexure II provides sample expenditure of IIT Madras – NPTEL project for the previous phases.

7. Management of Deliverables & IPR etc.

All learning materials developed on this project will be released as Open Education Resource (OER) Creative Commons By Attribution ShareAlike (CC BY SA 4.0 India), which is consistent with NMEICT guidelines. All software developed will be licensed through an appropriate open source license.
8. Justification of the projection with clear cut statement about outcomes if the project contributing to mission objective.

The Mission objectives are fully met by this proposal in the area of content creation, pedagogical and instructional design, online ICT tools and development of platforms. The outcomes of the past NPTEL activities have been coherent and were released as unanimously approved by the partner institutions. At every stage NPTEL proposal has provided the Mission document and founders of the Mission with the necessary clarity on the proposed objectives of the Mission in 2009 with its experience preceding the Mission for six years (2003 – 2009).

PART VI: Uploaded CV and DPR

Uploaded CV: Yes

Uploaded DPR: Yes
Part VII - DPR Summary

1. **Objective:**

This project proposes to deploy the power and advantages of technology enhanced learning (TEL) using ICT to build capabilities of professionals and students (UG level and above)

2. **Deliverables:**

<table>
<thead>
<tr>
<th>S.No</th>
<th>Proposed item</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<td>100</td>
<td>300</td>
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<td>Repurposing Courses for Online Delivery</td>
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<td>100</td>
<td>100</td>
<td>300</td>
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<tr>
<td>3</td>
<td>Rerun of Open Online Courses</td>
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<tr>
<td>5</td>
<td>Workshops and research conferences</td>
<td>80</td>
<td>60</td>
<td>60</td>
<td>200</td>
</tr>
</tbody>
</table>

**Milestones and Payments:**

<table>
<thead>
<tr>
<th>Timeline</th>
<th>Percentage of payment</th>
<th>Payment (crores)</th>
<th>Milestone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start of project</td>
<td>26.88%</td>
<td>25</td>
<td>-</td>
</tr>
<tr>
<td>End of Year 1</td>
<td>26.88%</td>
<td>25</td>
<td>Progress towards deliverables for Year 1</td>
</tr>
<tr>
<td>End of Year 2</td>
<td>26.88%</td>
<td>25</td>
<td>Progress towards deliverables for Year 2</td>
</tr>
<tr>
<td>Mid of Year 3</td>
<td>19.35%</td>
<td>18</td>
<td>Progress towards deliverables for Year 3</td>
</tr>
</tbody>
</table>

The milestones will be assessed and monitored through regular meetings of the NPTEL Programme Implementation Committee.

**Arrangements for quality control:** Platform quality control is exercised through a review by a committee of users and technical experts. Content quality control is exercised through faculty selection and content review; process quality control is patterned after globally emerging practices for online certification with special reference to NPTEL.
**Accuracy:** Platform accuracy is verified through standard software engineering practices. Content accuracy will result from the quality control exercises.

**Coverage:** Nationally Open for participation in certification; content is science-based and contextually national; the portal is globally open for browsing and for certification in limited places.

**Updating Mechanism:** Platform will be continually updated throughout the project phase, with feedback from each course offering. Subsequently, the platform will be put in an appropriate Open Source license. Content will be updated as appropriate based on inputs and suggestions from peers and from online communities in the MOOCs. Further, content will be released under NPTEL content licensing scheme (Creative Commons CC BY SA 4.0 India). The idea of using Creative Commons for all NPTEL content was first initiated by the NPTEL coordinator Prof. K. Mangala Sunder in the year 2011 to the NMEICT and has now been adopted as the Universal model for all contents released under NMEICT. The document which enabled this change has been uploaded in the NPTEL website and is free for everyone to view.

**Testing by Users:** Both content and services are provided in a “permanently beta” mode, open to continuous evaluation and subject to continual improvement.

**Testing by Peer Group:** Please see above comment.

### 4. Scaling up

NPTEL online courses model is designed in a scalable manner to reach a large number of students and learners. Through online courses, we plan to offer certification to interested students spread across the country and even internationally.

All NPTEL content is hosted on web servers and on YouTube and a National server that is being mirrored at multiple locations. This enables scalable distribution of content across the globe.

### 5. Popularizing and extension activities and plans

NPTEL activities and efforts will be popularized through workshops conducted in colleges all over the country. A total of 700 plus workshops have been conducted in the past five years. It is proposed to
popularize NPTEL through similar workshops for the next three years. In addition, it is proposed to use online advertisement methods and popularization through facebook/twitter and other similar social network portals.

6. Review Mechanism

All NPTEL content is peer-reviewed. Reviewers from a list approved by the coordinator are contacted for comments. The comments are provided to the content creator for incorporation and editing. The content creation process is deemed to be complete only after the peer review is complete.

For project review, it is proposed to continue with the same committee chaired by Prof. Arun Nigavekar (Former UGC Chairman) and ten to twelve members who reviewed the NPTEL Phases II and III in September 2014. The list of committee members with their affiliations as of Sep 2014 is given below.

1) Prof. Arun Nigavekar, Former UGC Chairman, Pune
2) Prof. P. Rama Rao, Chairman Governing Council, International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI), Balapur PO, Hyderabad
3) Prof. Bandhopadhyay, former VC, Indraprastha University
4) Prof. Sunil Sarangi, Director, NIT Rourkela
5) Prof. Sandip Sancheti, Vice Chancellor, Manipal University, Jaipur
6) Prof. V. Ramachandran, Director, NIT Nagaland
7) Prof. M. K. Surappa, IIT Ropar
8) Shri. Kris Gopalakrishnan, Infosys
9) Prof. Ashok Mishra, Chairman, BOG, IIT Roorkee
10) Shri. Ravi Shankar, I. A.S. Additional Secretary, Dept. of Electronics and Communication Technology, New Delhi
11) Shri. N. K. Sinha, I. A. S. Principal Secretary, IT, Government of Bihar
12) Prof. S. Ramani, formerly Founder NCST and Director, HPLabs, Bengaluru
13) Prof. Ramakrishna Ramaswamy, Vice Chancellor, Central University of Hyderabad.

7. Budget

| Overall Total Cost | Rs. 93 Crores |
*Travel expenses have been adjusted for inflation and increased fares and are otherwise based on the NPTEL proposal submitted to the Cabinet and to the NMEICT Mission in 2009. A copy of that will also be uploaded as support document for this proposal once a provision has been made.

#Workshop and research conferences will be supported in the same form as has been done till now. The budget for the NPTEL workshop for a typical 2-3 day workshop was approved earlier in 2009 by NMEICT for a sum of Rs. 4.0 lakhs and has been revised to Rs. 5 lakhs after adjusting for increased travel costs. Otherwise the unit cost is unaltered from the previous budget.

**Focused comments on:**

**Total honorarium to be paid in the project:**

<table>
<thead>
<tr>
<th>Item No</th>
<th>Item Description</th>
<th>Honorarium unit (in crores)</th>
<th>No. of Units</th>
<th>Rs. Total (in crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Creation of Open Online</td>
<td>0.035</td>
<td>300</td>
<td>10.5</td>
</tr>
</tbody>
</table>
### Course Costs

<table>
<thead>
<tr>
<th>Courses</th>
<th>COST PER STUDENT</th>
<th>100</th>
<th>200</th>
<th>300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repurposing Courses for Online Delivery</td>
<td>0.015</td>
<td>300</td>
<td>4.5</td>
<td></td>
</tr>
<tr>
<td>Rerun of Open Online Courses</td>
<td>0.015</td>
<td>200</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Lecture Series</td>
<td>0.02</td>
<td>100</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Workshops</td>
<td>0.0025</td>
<td>200</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>PI and Support staff</td>
<td>------</td>
<td>------</td>
<td>2.5</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
</tr>
</tbody>
</table>

Individual costs have all been identified under every category. Apart from technology tools, this is also a human intensive project in content creation of the best kind in the whole world and faculty, students and other contributors have been provided with honoraria at the rates approved by NMEICT earlier for many of its other projects as well. Therefore, the justification for this process has been amply given for the total amount of honorarium that includes all payments to all content generators and to the support groups involving teachers, students and other employees for three years.

### Cost Benefit Analysis

8. **Cost benefit analysis including cost effectiveness approach viz-a-viz other alternatives:**

The cost effectiveness of online course delivery and certification has been proven by our pilot courses run so far. The cost per student for certification is around Rs. 1000, which is affordable to most students. The cost of content creation is a one-time cost and the benefits accumulate over a long period of usage by students. Compared to other alternatives, the proposed NPTEL Online Courses model provides high quality content to all students in a scalable manner. Content creation through NPTEL is done predominantly using NPTEL studios maintained at all the institutions. So, the content creation process is cost-effective for those who certify through special MOOCs and NOCs.

The cost effectiveness is calculated with the total number of participatory learners to the whole programme and is arrived approximately as follows. From NPTEL Phases I, II and III the website has recorded more than 220 million visits till now and represent between forty to sixty percent of all viewers. More than 90 percent of these visits are due to NPTEL Phase II/III during the period 2009 – 2014. The scaling down to 40 percent is appropriate since more than 900 educational institutions and several university campuses have been provided local repository of the entire content and their students’ views are not included in the Internet capture by Google. Thus assuming that more than 400
30 million views have been recorded altogether, and about ten percent of these is due to dedicated visits by the same learner we can assume that about 40 million dedicated viewers. With increasing richness and variety of contents in the coming years, and using this as a base figure, Rs. 93 crores divided by 4 crores of visitors at the current level (10 percent of total views) for the next three years amounts to Rs. 23.25 per viewer for the whole of three years, or Rs. 2.4 per visit to the web site! With more numbers visiting in the coming years, this is likely to be a lot less. The cost-benefit ratio to a learner by a Government funded academic initiative to provide the highest quality learning educational materials freely and with no prejudice to anyone, is yet to be lowered by any country in the world and is a record low among all OER contributors, including the UNESCO.

9. Social Impact:
Significant increases in human capability and skills to harness technology infused methods to enhance national skill levels. The MOOC, as a social good, for developing and enhancing skill sets in the various domains of technology, engineering and sciences to empower students and professionals. The courses and the special topics foster a whole new generation of young learners to a value system developed in this country over centuries and Millennia. The impact is likely to be phenomenal and can result in the transformation of education in the country.

10. Outcome Extent to which the project will realize the objectives of the Mission may be given explicitly:
NPTEL is a major initiative and continues to act as the source for the whole content programme under NMEICT. Certification is the logical next step and an important new initiative for the mission. The final goal of creating a virtual IIT is in line with the mission and with the original goal of the workshop held in 1999 in IIT Madras.
Annexure I - CVs of Principal Investigators:

Curriculum Vitae – Andrew Thangaraj

Andrew Thangaraj

ESB212A, Electrical Engineering, IIT Madras, Chennai, Tamil Nadu 600036
Phone: 044 22576424   E-Mail: andrew@ee.iitm.ac.in

Professional Experience

Professor, Department of Electrical Engineering, IIT Madras   Sep 2015-
   ▪ Research Area: Coding and Information Theory

Associate Professor, Department of Electrical Engineering, IIT Madras  Apr 2009-Sep 2015
Assistant Professor, Department of Electrical Engineering, IIT Madras  Jun 2004-Mar 2009
Post-doctoral Researcher, Georgia Tech Lorraine, France   Aug 2003-May 2004

Education

Doctoral Student, Georgia Institute of Technology, Atlanta, USA   Sep 1998-July 2003
   ▪ Research in iterative error control codes and quantum codes.


Publications

Journal Papers


**International Conferences (peer-reviewed)**

1) S. Harikumar, J. Ramesh, M. Srinivasan and A. Thangaraj, "Threshold Upper Bounds and Optimized Design of Protograph LDPC Codes for the Binary Erasure Channel", 7th International Workshop on Signal Design and its Applications in Communications (IWSDA), Bangalore, India, Sep 2015.


19) A. Subramanian and A. Thangaraj, "A Simple Algebraic Formulation for the Scalar Linear Network Coding Problem," Forty-Sixth Annual Allerton Conference on Communication, Control, and Computing, Sep. 2008, University of Illinois at Urbana-Champaign, IL, USA.

33) S. Dihidar, A. Thangaraj, S. McLaughlin and R. Calderbank, "Linear-time Decodable Secrecy Codes for Binary Erasure Wiretap Channels", 43rd Annual Allerton Conference on Communication, Control, and Computing, Sep. 2005, University of Illinois at Urbana-Champaign, IL, USA.


**National Conferences (peer-reviewed)**


Patents

Student Guidance
Graduated Doctoral Students (PhD)
1) M. Bama (jointly with Prof. Srikrishna Bhashyam): Graduated 2012
   Thesis topic: Enhancing Information Flow in Wireless Networks using Interference Processing
2) A. Ayyar (jointly with Prof. K. Giridhar): Graduated 2013
   Thesis topic: Interference Canceling Block Modulation
3) V. Rajaraman: Graduated 2015
   Thesis topic: Correlation Attacks on Physical Layer Security Protocols

Graduated Masters Students (MS by research)
1) A. S. Mohan Vamsi (jointly with Prof. Bhaskar Ramamurthi): Graduated 2007
Thesis topic: Low Density Parity Check Codes with Feedback
2) Sunil Kaimalettu: Graduated 2008
   • Thesis topic: Constellation Shaping using LDPC Tree Codes
3) P. Sankar (jointly with Prof. Devendra Jalihal): Graduated 2008
   • Thesis topic: Implementation of Turbo-Product Codes
4) Raviteja Upadrashta: Graduated 2009
   • Thesis topic: Nested LDPC codes for Key Reconciliation
5) Krishna Chaitanya: Graduated 2009
   • Thesis topic: Time-sharing and Priority Encoding for Raptor Codes
6) S. Srimathy: Graduated 2009
   • Thesis topic: Codes on Planar Graphs
7) Mukundan Madhavan: Graduated 2010
   • Thesis topic: Hopper-Blum lightweight authentication protocol
8) T. S. V. Gautham: Graduated 2010
   • Thesis topic: Implementation of turbo decoders
9) Amaranath Alapati: Graduated 2013
   • Thesis topic: Network coding
10) K Venkata Sreenath: Submitted 2015
    • Thesis topic: Implementation of physical-layer key distribution
    • Thesis topic: Equalization of self-interference in full-duplex relays

Current Students

Doctoral Students : 5
Masters Students : 1

Professional Memberships and Service

• Editor, IEEE Transactions on Communications, 2012-
• Senior Member, IEEE
  o Societies: Information Theory, Communications, Signal Processing
• Member of Memberships and Chapters Committee of Information Theory Society
• Technical Program Committee Member
  o VTC 2009, 2011
  o ICC 2011, 2015
  o IEEE ITW 2011
  o SPCOM 2010, 2012
  o GLOBECOM 2008, 2013; GLOBECOM Workshop 2011
  o PIMRC 2012
  o NCC 2009-2013
• Technical Program Committee Chair
Research Grants and Projects

1. Codes for Bidirectional Relaying (2010-13): funded by Renesas Corporation
2. Physical Layer Security Primitives for Wireless Communications (2009-12): funded by the Reliance Telecom Centre for Excellence
3. Software/Hardware Implementations of LDPC Codecs: funded by ORB Analytics, USA; DEAL (DRDO), Dehradun
4. SENECOM: Secure Network Communications (2006-2009): funded jointly by the international cooperation wings of DST, India and the Science Foundation of Portugal
5. Quantum Key Distribution (2005-07): funded by DST, India; Indo-French Centre for Promotion of Advanced Research (IFCPAR/CEFIPRA)

Awards and Honors

- IIT Madras Young Faculty Recognition Award 2012
- Indian National Academy of Engineering Young Engineer Award 2011
- IETE JC Bose Memorial Award 2006 for the Best Engineering Oriented Paper
- Col. Oscar P. Cleaver Award 1998 for Outstanding Graduate Students in Electrical Engineering at Georgia Institute of Technology
Curriculum Vitae – Prathap Haridoss

Name: Prathap Haridoss

Education:
- B.Tech. in Metallurgical Engineering, IIT Madras, 1992
- PhD in Materials Science, University of Wisconsin-Madison, USA, 1999

Current Appointment: Professor (2013-), Dept. of Metallurgical and Materials Engineering, IIT Madras, Chennai 600036, India

Previous Appointments:
- Associate Professor (2009-2013), Dept. of Metallurgical and Materials Engineering, IIT Madras, Chennai 600036, India
- (2003-2009), Assistant Professor, Dept. of Metallurgical and Materials Engineering, IIT Madras, Chennai 600036, India
- (2001-2003) Visiting faculty, IITM
- (1994-1999) Graduate Research Assistant, Los Alamos National Laboratory, Los Alamos, New Mexico, USA

Summary of Accomplishments:
- Patents: 3 US patents Issued, in the area of PEM fuel cells
- International Journal Publications: 25
- Conference Publications: 7
- NPTEL courses: Video and Web courses, titled “Physics of Materials”

Research Guidance:

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<th></th>
<th>PhD</th>
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Research Projects: Have participated either as Principal Investigator or Co-Principal Investigator in 9 projects funded by external agencies for a total of 950 Lakh rupees. Areas of research include PEM fuel cells, Carbon nanomaterials, developing devices for assisting the differently abled, and recycling of electronic waste.

Conferences conducted: Served as Convener, for the International Symposium for Research Scholars, ISRS 2008

Service in Institute Positions:

1) **NPTEL Coordinator**, IIT Madras, 2013 onwards.
2) **Advisor Co-curricular** activities for the Institute 2010-2012
3) Served as Member of the IIT Madras Research Park Council
4) Served as Member of the Board of IC & SR

List of Patents and Publications

**US PATENTS GRANTED:**

1) **US Patent # 6,821,661**: Hydrophilic Anode Gas Diffusion Layer: P. Haridoss, C. Karuppaiah, and J. McElroy; Plug Power; **Granted**: November 2004

2) **US Patent # 6,774,637**: Method of Qualifying At Least a Portion of a Fuel Cell System and an Apparatus Employing the Same; R. Hallum, C. Comi, Y. Wu, P. Haridoss, and C. Karuppaiah; Plug Power; **Granted**: August 2004

3) **US Patent # 6,696,190**: Fuel Cell System & Method: P. Haridoss; Plug Power; **Granted**: February 2004

**Publications in Refereed International Journals:**

1) Jagannatham M., Sankaran S., Haridoss Prathap
   “Electroless nickel plating of arc discharge synthesized carbon nanotubes for metal matrix composites” Applied Surface Science, Volume 324, 1 January 2015, Pages 475-481

2) A. Joseph Berkmans, M. Jagannatham, S. Priyanka, Prathap Haridoss
   “Synthesis of branched, nano channeled, ultrafine and nano carbon tubes from PET wastes using the arc discharge method” Waste Management, Volume 34, Issue 11, November 2014, Pages 2139-2145

3) Joseph Berkmans, A., Ramakrishnan, S., Jain, G., Haridoss, P.;
   “Aligning carbon nanotubes, synthesized using the arc discharge technique, during and after synthesis”, 2013, Carbon, 55, Pages 185-195.


5) John Felix Kumar, R., Radhakrishnan, V., Haridoss, P.;

6) Radhakrishnan, V., Haridoss, P.;

7) “John Felix Kumar, R., Radhakrishnan, V., Haridoss, P.;

8) Suresh, P.V., Jayanti, S., Deshpande, A.P., Haridoss, P.;

9) Berkmans, A.J., Haridoss, P.;
“High yield formation of carbon nanotubes using arc discharge assisted with a nitrogen jet”, 2011, Transactions of the Indian Institute of Metals, 64 (1-2), Pages 137-142.

10) Vijay, R., Seshadri, S.K., Haridoss, P.;

11) Radhakrishnan, V., Haridoss, P.;

12) Radhakrishnan, V., Haridoss, P.;

13) Joshi, R., Engstler, J., Haridoss, P., Schneider, J.J.;

14) Ravi Joshi, Jorg Engstler, P. Kesavan Nair, Prathap Haridoss, Jorg J. Schneider;


16) T.S. Vaishnavi, Prathap Haridoss, C. Vijayan;
“Optical properties of Zinc Oxide nanocrystals embedded in Mesoporous silica”, 2008, Materials Letters, 62 (10-11), Pages 1649-1651

17) K. Suresh Kumar, Prathap Haridoss, and S. K. Seshadri;

18) R. Vetri Murugan, S. Bharat, Abhijit P. Deshpande, Susy Varughese, and Prathap Haridoss;

19) K. Suresh Babu, C. Vijayan and Prathap Haridoss;

20) K. Suresh Babu, C. Vijayan and Prathap Haridoss;

21) K. Suresh Babu, C. Vijayan and Prathap Haridoss;

22) K. Suresh Babu, C. Vijayan and Prathap Haridoss;


25) P. Haridoss, F. A. Uribe, F. H. Garzon, T. A. Zawodzinski, Jr.;  

International Conferences Proceedings:


2) R. John Felix Kumar, Prathap Haridoss; “Effect of cyclic changes in relative humidity on mechanical durability of SPEEK and SPEEK blended membranes in a simulated PEMFC environment”, Proceedings of International Symposium for Research Scholars on Metallurgy, Materials Science and Engineering (ISRS 2010), IIT Madras. Pages 110-115


Curriculum Vitae – Kushal Sen

Prof. Kushal Sen
Department of Textile Technology
Indian Institute of Technology Delhi
New Delhi-110016
India
kushal@textile.iitd.ernet.in

Prof. Kushal Sen obtained his B. Tech. Degree in Textile Chemistry in 1977 and Ph. D. Degree in 1981- both from IIT Delhi. He joined the Department of Textile Technology, IIT Delhi as a faculty in 1981 and is currently a professor in the same Department. His areas of specialization include textile chemical processing, texturing, structure property analysis, and geo-technical textiles. His current areas of research include microencapsulation and electrically conductive textiles. He has keen interest in Educational Technology. Has made several films on textile chemical processing for handloom workers and has produced video courses for the undergraduate and postgraduates textile courses. He initiated the educational transmission of video programmes from IIT Delhi in 2001, which resulted in a full fledged 24-hour Educational channel- Eklavya. Since 2004, he is also the IIT Delhi coordinator of NPTEL-a project. On the administration front at IIT Delhi, he has been the Dean, Alumni Affairs and International Programmes Head, Department of Textile Technology and Head, and Educational Technology Services Centre. Has been member Board of Governors, IIT Delhi. Currently, he is Dean (Faculty), at IIT Delhi.
Curriculum Vitae – Satyaki Roy

Prof. Satyaki Roy  
Head, Design Programme  
Coordinator, Media Technology Centre  
Humanities and Social Sciences  
Indian Institute of Technology Kanpur  
Pin: 208016, Uttar Pradesh, India

Phone +91 512 259 6617, 4060  
E-mail satyaki@iitk.ac.in

Brief Summary  
Dr. Satyaki Roy is jointly associated with the Department of Humanities and Social Sciences and Design Programme with research interest in Design Thinking, Creativity, Visual Communication, Folk Art & Craft, Film Studies, Education and E-Learning and User Experience Design. He has developed and taught several courses over the years and guided many students for their M.Des thesis. He established the Media Technology Centre at IIT Kanpur in 2004 which is fully equipped with state of the art infrastructure for video production and web based design research. He has been the Institute Coordinator and a member of PIC for NPTEL (National Programme on Technology Enabled Learning) project, sponsored by the Ministry of Human Resource and Development, Govt. of India and has been involved with several other projects in e-learning, video project and design of products. In 2010 he started a community radio station (90.4FM) that broadcasts programmes for 8 hours every day catering to the information needs of the community within and outside the IIT Kanpur premises. He has served as a Member of the Board for National Institute of Fashion Technology and USID Foundation of India. He has been a mentor to several design companies under the students entrepreneurship programme initiated by SIIC SIDBI and very recently started a private limited company called Gestures Design and Media Solutions.

Current Research  
Design Thinking, Creativity, Visual Communication, Folk Art & Craft, Film Studies, Education, User Experience Design

Academic Record

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<tr>
<th>Degree</th>
<th>Institution</th>
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<tr>
<td>Bachelor of Fine Arts</td>
<td>Visva Bharati University, Santiniketan</td>
<td>1997</td>
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<tr>
<td>Master of Fine Arts</td>
<td>Visva Bharati University, Santiniketan</td>
<td>1999</td>
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<tr>
<td>Ph.D</td>
<td>Visva Bharati, University, Santiniketan</td>
<td>2007</td>
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Teaching Experience

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<tr>
<td>October 2001-Till Date (13 Years)</td>
<td>Indian Institute of Technology Kanpur</td>
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<tr>
<td>2001 April – October</td>
<td>New Era High School, Panchgani</td>
</tr>
<tr>
<td>1999 June – 3 March</td>
<td>Sahyadri School, Krishnamurti Foundation of India, Pune</td>
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Courses Taught
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<td>Art101 Indian Art and Civilization</td>
<td>UG</td>
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<td>Art103 Introduction to Western Art</td>
<td>UG</td>
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<td>Art402 Modern Art</td>
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<tr>
<td>Art410 Video Production Theory &amp; Practice</td>
<td>UG</td>
<td>Yes</td>
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<td>Art105 Introduction to the Art of Video Making</td>
<td>UG</td>
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<td>Des620 Design Theory</td>
<td>PG</td>
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<td>Des621 Creative Visualization</td>
<td>PG</td>
<td>Yes</td>
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<tr>
<td>Des622 2D and 3D Visual Design</td>
<td>PG</td>
<td>Yes</td>
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<td>Des623 Topics in Motion Pictures</td>
<td>PG</td>
<td>Yes</td>
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<td>Des626 Interaction Design</td>
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<td>Des681 Design Project I</td>
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<td>Des682 Design Project II</td>
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<td>Des628 Design Culture &amp; Society</td>
<td>PG</td>
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<td>Des698 Special Topics in Design</td>
<td>PG</td>
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Scholar in Residence at IIT Gandhinagar, May-June 2014. Taught a course on Film Making and Appreciation
A short term course, Effective Ways for Video Making, Design Factory, Aalto University, Finland, 2009
A short term course, Film Theory and Practice, PDPMIIITDM Jabalpur, 2010

**Thesis (M.Des) Supervision**

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<tr>
<th>Name</th>
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<tr>
<td>Pillai, S Jayesh</td>
<td>2008</td>
<td>3D CHILD Virtual Platform for Evaluation of Products for Children</td>
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<td>Kumar, Senthil</td>
<td>2009</td>
<td>Application UI Design for a Collaborative Network Portal</td>
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<td>Bathla, Siddharth</td>
<td>2011</td>
<td>Applying user centric design to architecture</td>
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<tr>
<td>Singh, Neha Kiran</td>
<td>2010</td>
<td>An Awareness through Print Media</td>
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<tr>
<td>Ghosh, Mainak</td>
<td>2006</td>
<td>A conceptual Model of Information Architecture</td>
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<td>Karnika</td>
<td>2009</td>
<td>Board Game for Indian Family</td>
</tr>
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<td>Dutta, Sourav</td>
<td>2007</td>
<td>Building an Interactive Visual Archive of Indian Heritage – An Information Portal</td>
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<tr>
<td>Chowdhury, Payal</td>
<td>2009</td>
<td>Co-designing a learning device for children with emphasis on product semantics</td>
</tr>
<tr>
<td>Rangnekar, Parul</td>
<td>2007</td>
<td>Communication Design and Media Services for Children with Special Needs</td>
</tr>
<tr>
<td>Siddhartha, Partha</td>
<td>2005</td>
<td>Design and Development of Graphic User Interface Brihaspati – The Virtual Classroom</td>
</tr>
<tr>
<td>Khera, Richa</td>
<td>2011</td>
<td>Creativity Intercrossed</td>
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<td>Chaudhary, Shibika</td>
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<td>Design Cell: A User Centered Design Toolkit</td>
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<td>Yadav, Alok</td>
<td>2009</td>
<td>Design &amp; Development of Products for Promotional Marketing of Higher Education</td>
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<td>Sharma, Shanu</td>
<td>2011</td>
<td>“Design for barriers”–Stairs climbing Manual Wheel Chair</td>
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<td>2009</td>
<td>Designing a Mobile School Communicator Device with Special Emphasis on Developing a Collaborative GUI</td>
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<td>Subramanya, T N</td>
<td>2007</td>
<td>Design of a web portal for Campus Relations, Oracle</td>
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<td>Roy, Adita</td>
<td>2009</td>
<td>Design of classroom chair for student with Cerebral Palsy</td>
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<td>Shah, Alap Harshad</td>
<td>2010</td>
<td>Design of Future Magazine (SENSE Service) and User Experience and User Interface Design of Interactive Magazine(MAG X)</td>
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<td>Abbas, Butool</td>
<td>2009</td>
<td>Design of Signage and way finding system of Kanpur zoological park</td>
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<td>Solanki, Mona</td>
<td>2006</td>
<td>Design Principles for Print – A Contextual Model as Cookbook</td>
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<td>Sekar, Sathish</td>
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<td>“Drift” - Three Wheeler for a Green Ride</td>
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<td>Rajamanohar, K S</td>
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<td>Edutainment - Multimedia Education Content Development for School Children</td>
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<td>Ahuja, Simarjeet Singh</td>
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<td>2009</td>
<td>Graphic Adaptation of “The Conqueror Worm” by Edgar Allan Poe</td>
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<td>Mallya, Prabha</td>
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<td>Manjiri, Arvind Joglekar</td>
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<td>Verma, Kratika</td>
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<td>iServe: A Smart Phone Application</td>
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<td>Kumar, Ankit</td>
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<td>Verma, Paridhi</td>
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<td>Desai, Niral Ajaybhai</td>
<td>2010</td>
<td>Study of 3D Technology and Application in Visualization and Tele-immersion</td>
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<td>Singh, Akansha</td>
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<td>U.P. Handloom: A Neo-Retail Experience</td>
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<td>Rathor Pragam</td>
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<td>Urban housing eco-system of low income groups: A human centric exploration</td>
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<td>Banerjee, Bidisha</td>
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<td>GUI, UX Reconstruction of IITK Website</td>
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<td>Yaramilli, Praveen</td>
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<td>Product Innovation in Indian Craft Clusters: Tribal Art and Craft from Phad, Rajasthan</td>
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<td>Chopra, Vikas</td>
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<td>Iron Wielding Practices in India – video ethnography and Ux design project</td>
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<td>Hangshing, Mangkhankhual</td>
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<td>Research on Public Perception Towards Mental Disorder - Designing to Mend the GAP</td>
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<td>The Possible Impact of Wearable Computing on productivity: Design proposition with experiments</td>
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<td>Vivek Anand, Polasapalli</td>
<td>2013</td>
<td>REASSIGNMENT OF E-WASTE: EXPLORING CONSTRUCTIVE DESIGN RESEARCH</td>
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<td>Jacob, Thomas</td>
<td>2013</td>
<td>Future of Travel - User Experience in the Air Travel Industry</td>
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<td>Shukla, Parth</td>
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<td>Study of Dhokra Art &amp; Craft clusters of Chhattisgarh and West Bengal</td>
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<td>Singh, Yogendra</td>
<td>2014</td>
<td>User Centered Approach To Architecture</td>
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<tr>
<td>Agarwal, Charul</td>
<td>2014</td>
<td>Active Ageing: Life and Wellness in Later Years</td>
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<td>Shankar, Vivek</td>
<td>2014</td>
<td>Understanding And Supporting Desktop Management For Multiple Monitor Users</td>
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### Sponsored Projects

<table>
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<tr>
<th>Period</th>
<th>Sponsoring Organization</th>
<th>Title of Project</th>
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<tbody>
<tr>
<td>2003-07</td>
<td>Ministry of Human Resource &amp; Development</td>
<td>National Program on Technology Enhanced Learning (NPTEL Phase I) IIT Kanpur</td>
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<tr>
<td>2008-14</td>
<td>Ministry of Human Resource &amp; Development</td>
<td>National Program on Technology Enhanced Learning (NPTEL Phase II) IIT Kanpur</td>
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<td>2005-07</td>
<td>Ministry of Information Technology</td>
<td>Digital Ecosystem for Agriculture and Rural Livelihood (Digital Mandi Phase II)</td>
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<td>2008-09</td>
<td>European Commission</td>
<td>OPAALS – Social Sciences</td>
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<td>2007-10</td>
<td>Ministry of Textiles</td>
<td>Design Center in Leather Handicrafts Products for Development of Kanpur Cluster</td>
</tr>
<tr>
<td>2013-14</td>
<td>Alumni Association, IIT Kanpur</td>
<td>Creating Health Awareness Among Community – In and Around IITK (Focus on Laborers and School Children)</td>
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### Consultancy

<table>
<thead>
<tr>
<th>Period</th>
<th>Organization</th>
<th>Nature of Work</th>
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<tbody>
<tr>
<td>2003-04</td>
<td>CHIPS, State Government of Chattisgarh</td>
<td>Design of Electronic Class Rooms at Raipur and Bilaspur University for IT enabled distant learning</td>
</tr>
<tr>
<td>2011</td>
<td>Nokia Research Center</td>
<td>Bhasha: Encouraging Use of Indian Languages Through Mobile Phone Developing concepts to promote use of vernacular language and empowering the rural segment</td>
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### Video Projects & Documentaries

<table>
<thead>
<tr>
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<th>Details</th>
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<tbody>
<tr>
<td>Celiac, A documentary film sponsored by Grow India Foundation, 2014</td>
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<tr>
<td>60 short videos for a project related to armed forces , DRDO, 2013</td>
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<tr>
<td>A promotional film for Kanpur Plastipacks Ltd, 2013</td>
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<td>A short film on research initiatives of the Engineering Research Lab, IIT Kanpur, 2013</td>
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<td>A short video supporting the functioning of International Relations office, IIT Kanpur, 2013</td>
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<tr>
<td>A short film on research and development initiatives and facilities at Indian Institute of Technology Kanpur, Doordarshan 2012-2014</td>
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<td>Giving back, A film on liquid and solid waste management, 2012</td>
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<td>Digital Ecosystem for Knowledge around KVK in North India screened at the London School of Economics, London, UK, 2009</td>
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<tr>
<td>A film on IITK - An informative documentary focusing on the varied aspects of research, education and life at Indian Institute of Technology Kanpur, screened at the FinIndia Conference, Design Factory, Helsinki, Finland, 2008</td>
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</table>
Saksham – A short video on the children suffering with cerebral palsy screened at the ‘WE CARE Film Festival’, New Delhi 2006

Digital Proudyogiki Aur Samajik Nirman – A documentary film on the research initiatives of Media Lab Asia, IITK hub, 2003

A promotional advertisement campaign (Video) for Weather Risk Management Services Pvt. Ltd. (WRMSPL) on company’s schemes for weather insurance and the financial risk management for weather based risks. Originally created in Hindi and then dubbed in multiple languages and distributed across 5 states in India. 2007

A corporate video and multimedia presentation for Lohia Starlingers, 2005

Mandu – a promotional video on Mandavgarh (Mandu), for MP Tourism, 2003-2004

SAMTEL – an instructional video on the manufacturing and fabrication facility of SAMTEL Research Center, 2007

BSBE – a promotional video on the Department of Bio-Sciences and Bioengineering, IIT Kanpur, 2003

Administrative Experience

Department of HSS and Design Programme

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<tr>
<th>Year</th>
<th>Institute</th>
<th>Position</th>
<th>Details</th>
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<tbody>
<tr>
<td>2005-2009</td>
<td>IIT Kanpur</td>
<td>Department Post Graduate Committee</td>
<td>Convener M.Des</td>
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<tr>
<td>2004-2005</td>
<td>IIT Kanpur</td>
<td>Department Under Graduate Committee</td>
<td>Convener HSS</td>
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<td>2003-2004</td>
<td>IIT Kanpur</td>
<td>Department Library Committee</td>
<td>Convener HSS</td>
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<td>2005-2006</td>
<td>IIT Kanpur</td>
<td>Department Seminar Committee</td>
<td>Convener HSS</td>
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<td>2008-2010, 2011-2012</td>
<td>IIT Kanpur</td>
<td>Department Placement Committee</td>
<td>Convener M.Des</td>
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<td>2011-2012</td>
<td>IIT Kanpur</td>
<td>Department Computer’s Committee</td>
<td>Convener HSS</td>
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<td>2010-2011</td>
<td>IIT Kanpur</td>
<td>Department Web Committee</td>
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<td>2007-2008</td>
<td>IIT Kanpur</td>
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Institute

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<th>Year</th>
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<th>Position</th>
<th>Details</th>
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<tr>
<td>Since 2005</td>
<td>IIT Kanpur</td>
<td>Media Technology Center</td>
<td>Coordinator</td>
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<tr>
<td>Since 2010</td>
<td>IIT Kanpur</td>
<td>Management and Creative Head of the 90.4 FM, IIT Kanpur Community Radio Station</td>
<td>Coordinator</td>
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<td>2002-2005</td>
<td>IIT Kanpur</td>
<td>Hall of Residence II</td>
<td>Warden</td>
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<td>2012-2014</td>
<td>IIT Kanpur</td>
<td>Hall of Residence XI</td>
<td>Warden Incharge</td>
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<td>2009-2011</td>
<td>IIT Kanpur</td>
<td>Golden Jubilee Organizing Committee</td>
<td>Co Coordinator</td>
</tr>
<tr>
<td>Since 2013</td>
<td>IIT Kanpur</td>
<td>Design Programme</td>
<td>Head</td>
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</table>

Others

Member of the Board, Universal Sustainable Innovative Design Foundation, Hyderabad, India, 2011-12
Served as a Member of the Board, NIFT, Rae Barely, India, 2009-10
Served as a Member of PIC, NPTEL (National Programme for Technology Enhanced Learning) since 2004
Invited as a faculty reviewer in the Product Design Gala 2011, as part of the Product Development Project course with industry partners organized by Design Factory, Aalto University, Finland
Member of Review Committee for Design Projects under NMEICT, MHRD

Patents

<table>
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<tr>
<th>Title</th>
<th>Indian Patent No.</th>
<th>Dated</th>
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<tbody>
<tr>
<td>“The Drift-Battery Operated Campus Vehicle”</td>
<td>234987</td>
<td>07/03/11</td>
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Workshops Organized & Conducted

**Break out session Day 1: 'IDI 75', Design for Social Innovation & Sustainable Development, 5th India International Design Innovation & UX Conference, Auroville, Tamil Nadu, Jointly conducted by Satyaki Roy, Atul Tiwari, Jayanta Chatterjee, 2011**

**Break out session Day 2: 'Innovation Think - Work', Design for Social Innovation & Sustainable Development, 5th India International Design Innovation & UX Conference, Auroville, Tamil Nadu, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011**

**Opportunity Translation to Marketable Innovation: IDI 3, Organized by TYE for secondary school students, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011**

**PD6 workshop during the VLFM Course in the Department of Industrial Management and Engineering, IIT Kanpur, Jointly Conducted by Satyaki Roy and Kalevi Ekman, 2011**

**A short module (3 Hours), Design Innovation, Prabandhan’11, the annual management conclave in the Department of Industrial Management and Engineering, IIT Kanpur, Jointly conducted by Satyaki Roy and Jayanta Chatterjee, 2011**

**A short module (3 Hours), Design and Creativity, Tata Motors, Lucknow, 2010**

**A short module (12 Hours), Principles and Elements of Motion Pictures, Organized by Parivartan Forum for secondary school students, Merchant Chamber, Kanpur, 2010**

**A short module (6 Hours), Design and Emotion, Department of Design, IIT Guwahati, 2010**

**A workshop (6 hours) for students and industry participants on India Centric Design Problem Identification and Problem Solving at the Design Factory, Aalto University, Finland, during FinIndia Conference, 2008**


**National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses for Civil Engineering, Core Sciences (including Physics, Chemistry and Mathematics)', IIT Kanpur, August 2011**

**National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses for Electrical & Electronics Engineering, Computer Sciences and Engineering, Mechanical Engineering, JSS Noida, October 2010**

**National Workshop (NPTEL Phase II) on 'Deployment and Use of NPTEL Courses for Electrical Engineering, Computer Sciences and Engineering, Mechanical Engineering, IIT Kanpur, July 2010**

**National Design Challenge, "Tractors for 2020" in collaboration with ESCORTS Pvt. Ltd, IIT Kanpur, as part of ADEX 2010**

**National Design Challenge, "Inter City Bus Exterior Styling" in collaboration with JCBL, IIT Kanpur, as part of ADEX 2009**

**National Workshop (NPTEL Phase I) on 'Deployment and Use of NPTEL Courses for Electrical Engineering, Computer Sciences and Engineering, Mechanical Engineering, Civil Engineering, and Core Sciences, IIT Kanpur, March 2007**

Exhibition of Prints and Pantings

**Exhibition Organized by Saga Art Collage, Japan, 2000**

**Avantika National Exhibition, New Delhi and Jaipur, 2000**

**Annual exhibition of Birla Academy of Fine Arts & Culture, Kolkata, 1997-1999**
<table>
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<tr>
<th>Event</th>
<th>Date</th>
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<tbody>
<tr>
<td>Annual exhibition of Prints, All India Fine Arts and Craft Society (AIFACS), New Delhi</td>
<td>1998</td>
</tr>
<tr>
<td>An Exhibition organized by Lalit Kala Academy, Calcutta Information Center</td>
<td>1998</td>
</tr>
<tr>
<td>An Exhibition organized by Lalit Kala Academy, Nandan, Shantiniketan</td>
<td>1998</td>
</tr>
<tr>
<td>A group Show at Birla Academy of Fine Arts &amp; Culture, Kolkata</td>
<td>1997</td>
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<tr>
<td>Exhibition organized by the Oriental Association of India, Birla Academy of Fine Arts &amp; Culture, Kolkata</td>
<td>1996</td>
</tr>
<tr>
<td>A group Show at Academy of Fine Arts, Kolkata</td>
<td>1995</td>
</tr>
<tr>
<td>Eastern Zonal Biennial of prints, Lalit Kala Academy</td>
<td>1996</td>
</tr>
<tr>
<td>Printmaking workshop, Bharat Bhavana, Bhopal</td>
<td>1997</td>
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<tr>
<td>Artists Camp and Exhibition, Birbhum Jila Chatra Yuva Utsav, Bolpur</td>
<td>1997</td>
</tr>
<tr>
<td>Camlin Art Material Awareness Camp and Exhibition, Shantiniketan</td>
<td>1998</td>
</tr>
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Annexure - II

The table given below is a sample of the permanent assets acquired during NPTEL phases II and III. It is not exhaustive but gives an idea of the nature of assets that will be acquired this time too.

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<tr>
<th>CATEGORY BELONGING TO</th>
<th>ITEM DESCRIPTION</th>
<th>VALUE</th>
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<tr>
<td>COMPUTER SYSTEMS BOUGHT FOR VIDEO PROCESSING AND FOR THE WEB STUDIO (Includes Apple Mac for Video editing and conversions, Desktops, Players, Spare Parts, Computers, Taptops)</td>
<td>APPLE IMAC 2.93 GHZ</td>
<td>873600</td>
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<tr>
<td></td>
<td>MAC PRO 2.26 GHZ++</td>
<td>1200603</td>
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<td>APPLE MAC PRO</td>
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<td>TOW PUR OF NOTE BOOK</td>
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<td>APPLE MAC PRO</td>
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<td>APPLE MAC PRO</td>
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<td>APPLE MAC PRO</td>
<td>2290716</td>
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<td>APPLE MAC PRO</td>
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<td></td>
<td>TOW HP ELITE BOOK 87</td>
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<td></td>
<td>TOW APPLE MACPRO&amp; AP NOTEBOOK COMPUTER</td>
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<td></td>
<td>COMPUTER SYSTEM WITH DESKTOP</td>
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<td></td>
<td>SONY DVD 100’S PACK</td>
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<td></td>
<td>L3CFB (200MTR)</td>
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<td></td>
<td>FUJIFILM DV171HD 276</td>
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<td>APPLE MAC PRO WITH S</td>
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<td>LENOVO DESKTOP</td>
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<td>TOW HVR DIGITAL HD V</td>
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<td>TOW PUR OF DIGITAL CAMERA</td>
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<td>WACOM INTERACTIVE PE</td>
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<td>ACOUSTIC PARTITION &amp;</td>
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<table>
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<table>
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<td>NPTEL MEDIA AND APPL</td>
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</table>
The table given below is a sample of the recurring expenses during NPTEL phases II and III. It is not exhaustive but gives an idea of the expenditure that will be required.

**Consumables cost - sample expenditure from IIT Madras NPTEL project**

Consumables include filing cabinets/ stationery/ software licenses/ Labour/furniture/ refreshment/ flooring/ repairs/ books/ fans / Video Tapes

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount in Rs</th>
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<tbody>
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<td>2009 Sub-Total</td>
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<tr>
<td>2010 Sub-Total</td>
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<tr>
<td>2011 Sub-Total</td>
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<td>2012 Sub-Total</td>
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<tr>
<td>2013 Sub-Total</td>
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<tr>
<td>2014 (partial) Sub-Total</td>
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<tr>
<td>Total</td>
<td>13828533</td>
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</table>

**Staff salary cost - sample expenditure from IIT Madras NPTEL project**

Staff Salaries include salaries paid to administrative / accounts/ designers/ coders/ server maintenance personnel

<table>
<thead>
<tr>
<th>Year</th>
<th>Amount in Rs</th>
</tr>
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<tbody>
<tr>
<td>2009 Sub-Total</td>
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<tr>
<td>2010 Sub-Total</td>
<td>7536713</td>
</tr>
<tr>
<td>2011 Sub-Total</td>
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<tr>
<td>2012 Sub-Total</td>
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</tr>
<tr>
<td>2013 Sub-Total</td>
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</tr>
<tr>
<td>2014 (partial) Sub-Total</td>
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<tr>
<td>Total</td>
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</tbody>
</table>

**Travel cost - sample expenditure from IIT Madras NPTEL project**

Travel includes travel by PIs, NPTEL coordinators, partner institution faculty, SMEs, PIC members.

<table>
<thead>
<tr>
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<th>Amount in Rs</th>
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<tbody>
<tr>
<td>2009 Sub-Total</td>
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<td>2011 Sub-Total</td>
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<td>2013 Sub-Total</td>
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<td>160444200</td>
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<td>2012 Sub-Total</td>
<td>220838610</td>
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<tr>
<td>2013 Sub-Total</td>
<td>49028992</td>
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<tr>
<td>2014 (partial) Sub-Total</td>
<td>20820605</td>
</tr>
</tbody>
</table>
Annexure – III: List of NPTEL Programme Implementation Committee Members

Prof. Bhaskar Ramamurthi - Chairman, NPTEL PIC & Director, IIT Madras
Prof. R. K. Shevgaonkar - Co-Chairman, NPTEL PIC & Director, IIT Delhi
Prof. M. S. Ananth, Professor Emeritus, Indian Institute of Science, Bangalore
Prof. Kushal Sen - National Video Coordinator and TEL coordinator, IIT Delhi
Prof. K. Mangala Sunder - National Web Course Coordinator and NPTEL Coordinator, IIT Madras
Prof K. R. Srivathsan - Director, Chinmaya Institute of Technology, Kannur, Kerala (Special invitee)
Prof. Andrew Thangaraj - NPTEL Coordinator, IIT Madras
Prof. Prathap Haridoss - NPTEL Coordinator, IIT Madras
Prof. K. Gopakumar – NPTEL Coordinator, IISc Bangalore
Prof. Bani Bhattacharya - NPTEL Coordinator, IIT Kharagpur
Prof. Shyamal Kumar Das Mandal - CET, IIT Kharagpur
Prof. Bikash Mohanty - NPTEL Coordinator, IIT Roorkee
Prof. A. N. Chandorkar - NPTEL Coordinator, IIT Bombay
Prof. Satyaki Roy - NPTEL Coordinator, IIT Kanpur
Prof. Pradeep Yammiyavar, NPTEL Coordinator, IIT Guwahati
Dr. Kandasamy - NPTEL Coordinator, NIT K Surathkal
Dr. S. Vaidhyasubramaniam- NPTEL Coordinator, SASTRA University
Prof. K. S. Rajan - NPTEL Coordinator, SASTRA University, Thanjavur
Prof. Neelakrishnan - NPTEL Coordinator, PSG College of Tech, Coimbatore
E-content Development & Development and Delivery of MOOCs

Consortium for Educational Communication
An Inter University Acceleration Centre
IUAC Campus, Aruna Asaf Ali Marg,
New Delhi – 110067
website: www.cec.nic.in
E-content Development in 87 UG subjects under NME-ICT Project

• The MHRD vide its communication dated 31st March, 2009 approved a Project Proposal for e-content development to CEC in 87 Under Graduate(UG) subjects.

• After receiving the initial funds in March, 2011, CEC Media Centres started producing the e-content courseware in allotted subjects.

• CEC developed the e-Content Template in Four Quadrant following instructional design methodology.
The Scope of Work under the project

• Phase –I
  ➢ No. of subjects: **29 UG Subjects**
  ➢ Proposed no. of modules to be developed: **8341**

• Phase -II
  ➢ No. of subjects: **58 UG Subjects**
  ➢ Proposed no. of modules to be developed: **16353**
Development Approach

• CEC adopted template based approach for development of the content where all the content elements are bundled within the template.

• The content can be made available online. This enables CEC to upload the content on CEC – LMS, presently hosted on NIC Servers.

• For the benefit of the students who are not connected with internet, the content can be taken on a memory device such as USB drive, DVD etc. and student can study at his own pace and time.
Development Process - Subject Mapping

Process and steps involve in development of e-content module by CEC and Media Centres.

I) Allotment of Subject to Media Centres
II) Appointment of Subject Coordinator
III) Adopting UGC model curriculum for 3 years UG course.

- Identification of Subject Experts
- Subject overview and extent of subject coverage (18-24 papers)
- Topic selection for e-content modules (average 300 modules)
Development of Academic Script

• Following Instructional design and strategies.

• Research and Academic script development along with Illustration, Summary, Text, Case Studies, FAQ’s, Assignments, Quiz, Tutorial, References, Glossary, Links, Download and other elements of e-template.

• Vetting of the Academic script by Subject Coordinator.
Pre Production Arrangements

• Adopting final Academic script for Audio/Visual production.

• Developing story board.

• Collection of All Multimedia Resources such as samples, illustration, models, graphs, etc.
Production of e-content modules

- Video / audio recording.
- Editing
- Development of e-content elements
- Integration of elements in the e-content templates
- Preview of module by outside Subject Experts in presence of Subject Expert/Coordinator
- Modification if required
Using Production Assembly Lines for optimum resource utilization

Subject Expert

Studio Recording

Producer / Production Assistant

Academic Elements of e-Template

Graphics, Charts Models

Video Editor

Down Converted Video

500 kbps, 5-7 min. Seg.

Flash Integration

Asstt. Computer Programmer

E-content Module

HDD

25 mbps video Programmes, ½ hour /500 kbps video

Recorded A/V Programme

Studio Team

Cameraman

Tech. Assistant

Technician

Animator / Graphics Artists
Matrix Operation for increasing production

Producer 1

Producer 2

Producer 3

Studio

Animator

Video Editor

Flash Integrator

E-content Module
# Four Quadrant Approach

<table>
<thead>
<tr>
<th>1st Quad Text Resources</th>
<th>2nd Quad Visual Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Textual Document, PDF / e-Books / illustration</td>
<td>Video and Audio Content in an organized form, Animation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3rd Quad Web Resources</th>
<th>4th Quad Self Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Related Links, Case Studies, Historical development of the subject, Articles, Web-links</td>
<td>MCQs, Quizzes, Assignments, FAQs</td>
</tr>
</tbody>
</table>
Unique Features of CEC e-content module

• Maintaining highest Audio/Video quality

• Production of e-content in complete 4 Quadrants

• Creating Transcription (Text) out of the video spoken by the Teacher and making the text available to the students in e-content modules

• Creating e-book out of each e-content module is developed & incorporated in Template under Downloads & Academic Script, besides introducing Glossary, Frequently Asked Questions and their replies, Quiz, Assignment, case studies, Tutorials etc.
Time required for developing One E-content Module

A. Preproduction Stage:-

• Orientation of subject expert by organising workshops at CEC/Media Centres. 
  (24 Hrs/3 Days)

• Providing module wise Academic Script alongwith other elements of the e-template like Module Mapping, Objectives, Summary, Downloadable Text, Case studies, FAQ’s, Assignments, Quiz, Tutorial, References, Glossary, Web References etc. 
  (16 Hrs)

• Assuming that the Resource Persons will devote at least 4 hours each day, besides his/her normal academic work.
### B. Production Stage:
(Assuming that each module is of 25-30 minutes duration)

<table>
<thead>
<tr>
<th>Item</th>
<th>Days</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic briefing of the Subject Expert regarding Orientation for e-content development</td>
<td>½</td>
<td>4</td>
</tr>
<tr>
<td>Studio set-up &amp; Audio/Video Recording</td>
<td>½</td>
<td>4</td>
</tr>
<tr>
<td>Preparation of animation/graphic/Digitisation</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Post-production-video Programme***</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Preview, correction &amp; certification of Video programme</td>
<td>¼</td>
<td>2</td>
</tr>
<tr>
<td>Recording video programme on Final Media</td>
<td>¼</td>
<td>2</td>
</tr>
<tr>
<td>Down converting and Chunking</td>
<td>½</td>
<td>4</td>
</tr>
<tr>
<td>E-content integration in template and Platform validation</td>
<td>2</td>
<td>16</td>
</tr>
<tr>
<td>Preview, correction &amp; certification of e-content</td>
<td>½</td>
<td>4</td>
</tr>
</tbody>
</table>

**TOTAL** 8 ½ 68
Content Certification and Validation

• CEC ensures Rigorous Quality Assurance during development of e-content at two stages:-

  **Stage–I** : At Media Centres, Outside Experts Preview the e-content in presence of Subject Expert and Production Staff.

  **Stage–II** : At CEC by Academic Experts. Suggestion for correction and modifications are send to Media Centres.

• Only accepted and certified e-content modules are uploaded and released in public domain.
E-Content Development Project Status
E-content development in 29 UG subjects under Phase – I

• Project Approval Board (PAB), MHRD approved a sanction of Rs. 18.5 Crores to this project in its 18th meeting, held on 24th Jan, 2011. Ministry of Human Resources Development under the project NME-ICT sanctioned an amount of Rs. 18.50 Crores vide letter no.: F.16-38/2009-DL dated 28th February, 2014 as grant-in-aid for production of e-content of courseware by CEC and Media Centres.

• Till date Rs. 15.92 Crores out of the total Rs. 18.50 Crores sanctioned has been released by Ministry. As resolved in the Standing Committee Meeting held on 6th December, 2013 the remaining amount of Rs. 2.08 Crores shall be released after closer of the Phase – I.
CEC has completed e-content under Phase-I (29 subjects)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subject Allotted</th>
<th>Media Centres</th>
<th>E-content Module proposed as per subject mapping by Centre</th>
<th>E-content Developed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B. A. History</td>
<td>Kolkata</td>
<td>356</td>
<td>356</td>
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<tr>
<td>2</td>
<td>B.A. Botany</td>
<td>Srinagar</td>
<td>279</td>
<td>280</td>
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<tr>
<td>3</td>
<td>B.A. / B.Sc. English Language</td>
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<td>131</td>
<td>131</td>
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<tr>
<td>4</td>
<td>B.A. / B.Sc. Environmental Science</td>
<td>Indore</td>
<td>76</td>
<td>75</td>
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<td>B.A. Anthropology</td>
<td>Manipur</td>
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<td>199</td>
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<tr>
<td>6</td>
<td>B.A. (Hons.) Mathematics</td>
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<td>379</td>
<td>378</td>
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<tr>
<td>7</td>
<td>B.A. / B. Sc. Hindi Language</td>
<td>Indore</td>
<td>147</td>
<td>147</td>
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<td>8</td>
<td>B.A. Vocational Studies (Photography)</td>
<td>Indore</td>
<td>27</td>
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<tr>
<td></td>
<td>Course</td>
<td>Institution</td>
<td></td>
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<tr>
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<td>---------------------------------------------</td>
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</tr>
<tr>
<td>9</td>
<td>B.A. Communication &amp; Journalism</td>
<td>MCRC Jamia</td>
<td>312</td>
<td>326</td>
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<tr>
<td>10</td>
<td>B. Sc. Computer Science</td>
<td>Chennai</td>
<td>350</td>
<td>405</td>
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<tr>
<td>11</td>
<td>B.A. Performing Arts</td>
<td>Patiala</td>
<td>290</td>
<td>329</td>
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<tr>
<td>12</td>
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<td>Hyderabad EFLU</td>
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<td>B.Sc. Geology</td>
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<td>316</td>
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<td>26</td>
<td>B.Com Commerce</td>
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<td>782</td>
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<td>B.A. Economics</td>
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<td>B.Sc. Chemistry</td>
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<td>B.Sc. Applied Life Science (Sericulture)</td>
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<td>351</td>
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**TOTAL** 8948
E-content development in 58 UG subjects under Phase – II

• The Ministry sanctioned an amount of Rs. 63.8290 Crores under centrally sponsored scheme of e-content courseware development Phase – II in 58 subjects under NME-ICT project vide letter no.: F.16-38/2009-DL dated 19th May, 2014.

• MHRD released an amount of Rs. 17.80 Crores out of the total sanction of Rs. 63.8290 Crores. The Media Centres are already at various stages of production under Phase – II. The e-content for phase – II is scheduled to be completed by December, 2016.
<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Subject Allotted</th>
<th>Media Centres</th>
<th>E-content Module proposed as per subject mapping by Centre</th>
<th>E-content Developed till September, 2015</th>
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<td>1</td>
<td>B.A. (Hons) Urdu (1&lt;sup&gt;st&lt;/sup&gt; Year)</td>
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<td></td>
<td>B.A. (Hons) Urdu (2&lt;sup&gt;nd&lt;/sup&gt; Year)</td>
<td>EFLU</td>
<td>100</td>
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</tr>
<tr>
<td></td>
<td>B.A. (Hons) Urdu (3&lt;sup&gt;rd&lt;/sup&gt; Year)</td>
<td>MCRC, Jamia</td>
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<td>48</td>
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<td>Kolkata</td>
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<td>4</td>
<td>B.A. (Hons) Hindi Journalism</td>
<td>MCRC, Jamia</td>
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<td>B.A. (Hons) Philosophy (3 year)</td>
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<td>121</td>
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<td>6</td>
<td>B.A. (Hons) Business Economics</td>
<td>Ahmedabad</td>
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<td>07</td>
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<tr>
<td>7</td>
<td>B.A. (Hons) Sanskrit (1&lt;sup&gt;st&lt;/sup&gt; and 2&lt;sup&gt;nd&lt;/sup&gt; Year) (52+110)</td>
<td>Roorkee</td>
<td>162</td>
<td>16</td>
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<td></td>
<td>B.A. (Hons) Sanskrit (3&lt;sup&gt;rd&lt;/sup&gt; &amp; 4&lt;sup&gt;th&lt;/sup&gt; Year)</td>
<td>Chennai</td>
<td>200</td>
<td>33</td>
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<td>8</td>
<td>B.A. (Hons) Music (Karnataki Sangeet) 3 year</td>
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<td>9</td>
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<td>B.A. (Hons) Social Work</td>
<td>Osmania</td>
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<td>11</td>
<td>B.A. Management &amp; Marketing of Insurance (1&lt;sup&gt;st&lt;/sup&gt; &amp; 2&lt;sup&gt;nd&lt;/sup&gt; Year)</td>
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<td>350</td>
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<td>B.A. Management &amp; Marketing of Insurance (3&lt;sup&gt;rd&lt;/sup&gt; Year)</td>
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<td>120</td>
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<td>12</td>
<td>Foreign Language courses – German, Spanish, French &amp; Russia (at the level of certificate course) 50X4</td>
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<td>13</td>
<td>B.A. Fine Arts</td>
<td>MCRC Jamia</td>
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<tr>
<td>14</td>
<td>B.A. in Film Studies</td>
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<td>15</td>
<td>B.A. Vocational Studies (Advertising papers)</td>
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<td>34</td>
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<tr>
<td>16</td>
<td>B.A. Vocational Studies (Financial Accounting papers)</td>
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<td>17</td>
<td>B.A. Vocational Studies (Computer &amp; Networking papers)</td>
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<td>18</td>
<td>B.A. Tourism</td>
<td>Pune</td>
<td>355</td>
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<td>19</td>
<td>B.A. Human Resources Management</td>
<td>Pune</td>
<td>105</td>
<td>72</td>
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<td>B.A. Social Welfare Administration – 3 year</td>
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<td>355</td>
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<td></td>
<td>Course</td>
<td>City</td>
<td>Fee</td>
<td>Seats</td>
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<td>21</td>
<td>B. A. Vocational Studies</td>
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<td>26</td>
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<td>22</td>
<td>B. A. Marketing Management &amp; Retail Business</td>
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<td>23</td>
<td>B.A. Office Administration &amp; Secretarial Practice</td>
<td>Pune</td>
<td>310</td>
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<td>24</td>
<td>B.A. Public Administration</td>
<td>Osmania</td>
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<td>14</td>
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<tr>
<td>25</td>
<td>B.A. LLB (1\textsuperscript{st} &amp; 2\textsuperscript{nd} Year)</td>
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<td></td>
<td>B.A. LLB (3\textsuperscript{rd}, 4\textsuperscript{th} &amp; 5\textsuperscript{th} Year)</td>
<td>EFLU</td>
<td>400</td>
<td>38</td>
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<td>26</td>
<td>B. A. Vocational Studies - Mass Communication Video Production</td>
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<td>B. A. Population Studies</td>
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<td>B. A. Education</td>
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<td>29</td>
<td>B A. Criminology – 3 Year</td>
<td>Sagar</td>
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<td>30</td>
<td>B. Sc. Forensic Science – 3 Year</td>
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<td>No.</td>
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<td>Duration</td>
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<td>B. Sc Bio-Informatics</td>
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<td>B.Sc. Applied Physical Sciences (Environmental Science)</td>
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<td>47</td>
<td>B.Ed. (Special Education for Visually Impaired)</td>
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<td></td>
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</tr>
<tr>
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<td>47</td>
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<tr>
<td>No.</td>
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<td>City</td>
<td>Fees</td>
<td>E.R.</td>
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<td>-----</td>
<td>--------------------------------------------------</td>
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<td>-------</td>
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<tr>
<td>51</td>
<td>B.P.Ed. (1&lt;sup&gt;st&lt;/sup&gt; &amp; 2&lt;sup&gt;nd&lt;/sup&gt; Year)</td>
<td></td>
<td>150</td>
<td>11</td>
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<tr>
<td></td>
<td>B.P.Ed. (3&lt;sup&gt;rd&lt;/sup&gt; Year)</td>
<td>Imphal</td>
<td>250</td>
<td>06</td>
</tr>
<tr>
<td>52</td>
<td>B. Pharmacy</td>
<td>Sagar</td>
<td>524</td>
<td>01</td>
</tr>
<tr>
<td>53</td>
<td>BFA Painting Applied Art Sculpture (core paper)</td>
<td></td>
<td>80</td>
<td>31</td>
</tr>
<tr>
<td>54</td>
<td>BFA Painting Applied Multimedia</td>
<td></td>
<td>220</td>
<td>04</td>
</tr>
<tr>
<td>55</td>
<td>Bachelor for Theatre Arts</td>
<td></td>
<td>80</td>
<td>38</td>
</tr>
<tr>
<td>56</td>
<td>Bachelor of Business Studies</td>
<td>MCRC, Jamia</td>
<td>300</td>
<td>82</td>
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<tr>
<td>57</td>
<td>Manuscriptology (core papers)</td>
<td></td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>Cyber Security/Information Security</td>
<td></td>
<td>185</td>
<td>20</td>
</tr>
</tbody>
</table>
Deliverables to CEC Media Library

• Final Subject Mapping alongwith Metadata in CEC format and syllabus for the UG Subject.

• Video Programs: 25 – 30 min
  High resolution SD files on MPEG - 2 / DV Format with resolution 720 x 576 @ 25 Mbps on Optical Disc

• Low resolution SD files on MP4 Format with resolution 480 x 360 compressed @ 500 Kbps or better.

• E-content with all elements embedded in the CEC template.

• Short Learning Objects (LoR) upto 2 min duration.

• Completion Certificate in prescribed format.
Achievement So Far:

Phase I

• No. of subjects taken up: **29 UG Subjects**

• No. of modules proposed to be developed: **8341**

• No. of Modules developed: **8948**

• No. of subjects completed: **29 UG Subjects**
Phase II

• Phase –II started on: December, 2014
• No. of subjects: 58 UG Subjects
• No of modules proposed to be developed: 16703
• No of Modules developed till October, 2015: 2551
• Approximate no. of Modules under Development: 4000
• CEC Plans to complete Phase –II by December, 2016
• CEC proposes to partly outsource the content development for timely completion of the project.
# Financial Status of the Project - Phase - I

<table>
<thead>
<tr>
<th>GRANTS RECEIVED FROM MHRD FOR PHASE- 1</th>
<th>Amount in Lakhs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanction letter No.16-38/2009-DI dated 28.02.2011 Grants Received on 09.03.2011</td>
<td>Rs. 540.00</td>
</tr>
<tr>
<td>Sanction letter No.16-38/2009-DI dt. 16.12.2011 Grants Received on 02.01.2012</td>
<td>Rs. 300.00</td>
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<tr>
<td>Sanction letter No.16-38/2009-DI dt. 28.03.2012 Grants Received on 31.03.2012</td>
<td>Rs. 310.00</td>
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<tr>
<td>Sanction letter No.16-38/2009-DI dt. 18.02.2014 Grants Received on 27.02.2014</td>
<td>Rs. 442.00</td>
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<tr>
<td>Total Grants received</td>
<td>Rs. 1592.00</td>
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<tr>
<td>Total Gross Expenditure (1st April, 2010 to 31.10.2015)</td>
<td>Rs. 1564.90</td>
</tr>
<tr>
<td>Unspent Fund</td>
<td>Rs. 27.10</td>
</tr>
<tr>
<td>Committed liabilities</td>
<td>Rs. 185.00</td>
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<tr>
<td>Balance amount to be released by MHRD</td>
<td>Rs. 157.90</td>
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### Phase –II

**GRANTS RECEIVED FROM MHRD FOR PHASE- 2**

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<th>Description</th>
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<td>133.512</td>
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<td>F.16-38/2009/DL dt.19.05.2014</td>
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<td>F.16-38/2009/DL dt.19.05.2014</td>
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<td><strong>Total Grants received</strong></td>
<td><strong>1780.16</strong></td>
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<td>1. Total Gross Expenditure (1st April, 2014 to 31.10.2015)</td>
<td>866.68</td>
</tr>
<tr>
<td>2. Amount Committed for various activities in content development</td>
<td>850.00</td>
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<tr>
<td><strong>Unspent Fund</strong></td>
<td><strong>16.68</strong></td>
</tr>
<tr>
<td><strong>Balance amount to be released by MHRD</strong></td>
<td><strong>4602.90</strong></td>
</tr>
</tbody>
</table>
Availability of the Content to Users

• 26 Subjects have already been uploaded on CEC portal.

• We are in the process of uploading 3 more subjects.

• Online availability:
The uploaded content is available on CEC Web-Portal: www.cec.nic.in/e-content

• Offline availability
For the users who are not connected with the Internet the content can be copied on a memory device
Development and Delivery of MOOCs
CEC approach for Development and Delivery of MOOCs

- CEC proposes to repurpose e-content resources for developing MOOCs to be made available on MHRD MOOCs platform **SWAYAM** except from development of some introductory and some additional Multimedia Content as per the requirement of the course.

- CEC will involve subject matter experts (SME) and academics who have contributed for the development of e-content courseware in various subjects.

- The courses are proposed to be offered by Tripartite arrangement between CEC, Media centers and the host University, where the media centers are located.
Repurposing E-content Resources for MOOC’s

- Files to be retained at Media Centres for development of MOOCs/online courses and for archival of content.

- A copy of all the items delivered to CEC.

- Text files – Objectives, Summary, Text (Case Study and FAQs), Assignment (Quiz & Tutorials), Reference (Glossary and Links) etc. - in MS Word (.doc/.docx).

- Downloads/E-books – PDF file formats.
Plan to deliver EduSat/Webcast live lecture transmission in MOOC’s Compliant Format in some new areas specially skill/vocational courses

- CEC is planning for delivering daily 4 live Lectures from CEC New Delhi and another 4 live Lectures are planned by Media Centre focusing on following areas in MOOCs compliant form in structured skill based/vocational MOOCs courses:
  - Fundamentals/Basics of Subjects
  - Skill development and vocational course contents
  - Lecture Series by eminent scholars/Scientist
  - Soft Skills and communication skills/career counseling
Preparatory steps for offering/delivery of MOOCs:

• CEC plans to start 2 MOOC’s on existing Course Builder and IITBombayX platform, the course developer rights and password for each course to be provided by IIT-M/IIT-B as a Pilot

• CEC plans to repurpose about 9000 modules of e-content developed under Phase – I into approx. 150-200 MOOCs and about 100 MOOCs courses have been identified.

• CEC would require to create MOOC’s/Multimedia labs at CEC and Media Centre to develop/re-purpose e-content into MOOC’s at large scale

Contd.
• We would require minimum 2 MOOC’s/Multimedia Lab at CEC @ 15-20 system each lab with ICT resource persons and at least 2-3 systems and resource persons at each Media Centre

• The courses would be offered by a tripartite arrangement between CEC, Media Centre and the Proctored exam and certification would be by the Host University where Media Centre is located.
CEC Requirements for MOOCs

• CEC has already requested MHRD regarding permission to provide Rs. 50 Lakhs out of e-content funds for starting MOOC’s Activities including Training and Pilot running of MOOCs.

• Formal communication regarding ‘Go ahead’ from MHRD to develop and run MOOC’s and funding for re-purpose and development of MOOC’s based on MHRD costing committee report to enable CEC to sustain the activity.

• CEC is working in a hutment which does not have any space available for MOOC’s Lab. We would require hire/make temporary constructions/arrangements for 2 MOOC’s lab and related activities which would require working space of approx. 16,000 sqr. ft. in a properly furnished building.
Thank You
For YOUR
KIND
ATTENTION
Talk to a Teacher

Teachers empowerment, students empowerment, and integration of tools for empowerment (synchronous delivery)

IIT Bombay:
Kannan M. Moudgalya, D. B. Phatak

IIT Kharagpur:
Raja Datta

Domain Experts Committee Meeting
23 November 2015
Budget and project components
Plan vs. delivery
Requests to this committee
Brief description of T10KT and Spoken Tutorials
Components

1. 10,000 Teacher Training Programme (T10KT)
2. Spoken Tutorials
10,000 Teacher Training Programme: Deliverables

1. Conduct 15 courses
   ▶ 9 at IIT Bombay
   ▶ 6 at IIT Kharagpur

2. Train 1,50,000 teachers

3. Establish 10 Nodal Centres

4. Establish 500 Remote Centres
1. Create 5,000 Spoken Tutorials of 10 minute duration each
2. Train 1,50,000 students and faculty
## Overall Budget (in lakh)

<table>
<thead>
<tr>
<th></th>
<th>I Year</th>
<th>II Year</th>
<th>III Year</th>
<th>Total</th>
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<tbody>
<tr>
<td>IITB</td>
<td>5557</td>
<td>3879</td>
<td>3937</td>
<td>13373</td>
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<tr>
<td>IITKgp</td>
<td>1299</td>
<td>1893</td>
<td>2637</td>
<td>5829</td>
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<tr>
<td>Total</td>
<td>6856</td>
<td>5772</td>
<td>6574</td>
<td>19202</td>
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</table>
Cost of training through T10KT

- Projected cost per person = Rs. 6,290
- Achieved cost per person = Rs. 5,287
- Partly due to using MOOCs HALF the time in the latter courses
- No quality degradation
- With MOOCs use in remaining courses, cost will continue to come down
- QIP cost: Rs. 12,000 to 18,000
Recurring Budget (Rs. Lakh)
<table>
<thead>
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<th>Total</th>
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<td>625</td>
<td>2100</td>
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<td>Consumables</td>
<td>420</td>
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<td>Nodal centres upkeep</td>
<td>350</td>
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<tr>
<td>Remote centres upkeep</td>
<td>1400</td>
<td>0</td>
<td>1400</td>
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<td>10K Workshops</td>
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<td>Publicity/sponsorship</td>
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<td>180</td>
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<td>Coord. honorarium</td>
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<td>IITKgp</td>
<td>Total</td>
</tr>
<tr>
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<tr>
<td>Equipment</td>
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<td>475</td>
<td>950</td>
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<tr>
<td>Nodal centre establishment</td>
<td>1120</td>
<td>0</td>
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<tr>
<td>Remote centre establishment</td>
<td>1400</td>
<td>0</td>
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<tr>
<td>Total</td>
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<td>475</td>
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## Details of funds received

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<th>Amount Released (Rs. crore)</th>
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<td>6 Feb. 2013</td>
<td>30%</td>
<td>57.60</td>
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<tr>
<td>2</td>
<td>18 Sept. 2014</td>
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</table>

- The SC (27-28 May 2014) recommended the release of Rs. 57.60
- Only Rs. 20 crore was released on 18 Sept. 14
- The current presentation is for the release of the balance Rs. 37.60 crore of Year 2.
First request to this committee

- To get the balance funds of Rs. 37.60 crore
- It is a part of the Rs. 57.60 crore already approved by SC on 27-28 May 2014
Current financial position

- IITB has salary money for 1 month only
- We have two courses, one each in IITB and IITKgp, in Dec. 2015
- To pay TA/DA to about 20,000 people
- For future courses, need to start working - coordinator training should happen in the next two months
- Need money urgently
## T10KT Training Alone: Planned vs. Delivered

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<th>Year</th>
<th>No. workshops</th>
<th>Planned</th>
<th>Delivered</th>
</tr>
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<td>13-14</td>
<td>No. trained</td>
<td>3+1</td>
<td>4+2</td>
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<td></td>
<td>40,000</td>
<td>56,377</td>
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</tr>
<tr>
<td>14-15</td>
<td>No. trained</td>
<td>3+2</td>
<td>5+2</td>
</tr>
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<td></td>
<td>50,000</td>
<td>49,407</td>
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<tr>
<td>Total</td>
<td>No. trained</td>
<td>90,000</td>
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## T10KT Overall: Planned vs. Delivered

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<th>Delivered (&lt; 2 years)</th>
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</thead>
<tbody>
<tr>
<td>People trained</td>
<td>1,50,000</td>
<td>1,05,784</td>
</tr>
<tr>
<td>Nodal Centres</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Remote Centres</td>
<td>500</td>
<td>350</td>
</tr>
</tbody>
</table>

We are at about the midpoint of this project!
<table>
<thead>
<tr>
<th>Year</th>
<th>Planned</th>
<th>Delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. trained</td>
<td></td>
</tr>
<tr>
<td>13-14</td>
<td>50,000</td>
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<td>14-15</td>
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<td>3,300</td>
<td>3,130</td>
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</table>
Second request to this committee

Extend the duration of this project to until Dec. 2016
PRSG Meetings

1. 3 Oct. 2013
2. 25 June 2014
3. 8 Jan. 2015
4. 16 July 2015
Some PRSG Recommendations

1. Release money urgently
2. Good processes learnt (esp. spoken tutorials) should be shared with Govt. departments
3. Spoken tutorial should become a separate project
Some independent assessments

- ISTE’s independent assessment
- A Ph.D thesis on the efficacy of T10KT
Some recognitions

- GOOGLE MOOC research award for the offline work of Spoken Tutorials
- WIPRO is “officially” using Java spoken tutorials as an accepted study material for its 5,000 trainees a year
- 1,750 programmes “officially” use spoken tutorials in “time table slots”
- Several research and newspaper articles
Another PRSG Recommendation

Release Rs. 4.51 crore to Amrita University - sanctioned by PAB in Phase I, but not released yet
T10KT: Empowerment of teachers

Remote Centre 1
Remote Centre 2
Remote Centre 89
Remote Centre 90
IIT Bombay
Features of T10KT

- Coordinator training: contact mode, two months in advance
- 10,000 Teacher Training through A-VIEW
- Mornings - lectures, afternoons - labs
- Ten working days
- 10,000 people trained = 300 QIP
- Extensive collection of instructional material created
- Now, MOOCs for half the time
Benefits of T10KT

- Empowered young faculty members in many colleges - it takes a long time through QIP courses
- Large number of women teachers attending these courses
- Experience in rural colleges is equal to that in urban colleges
Brief on Spoken Tutorials
What is a Spoken Tutorial?

- Audio-video tutorial of ten minutes length
- Created for self learning
- Workshops can be conducted by non-experts
- Highly scalable
- Focus: spreading ICT, open source software
What is a Spoken Tutorial? - ctd

- Explanation can be in vernacular languages
- Useful to bridge digital divide also
What is a Spoken Tutorial? - ctd

- Low cost educational methodology
- Only 1MB per minute
- In a CD costing Rs. 8, can pack 700 minutes of recording!
Dubbing

- Dub only audio
- Video remains the same
- *If original spoken tutorial is made properly, dubbing is easy - only 5% of the effort*
<table>
<thead>
<tr>
<th>Language</th>
<th>Frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assamese (dubbing)</td>
<td></td>
</tr>
<tr>
<td>Bengali (Sci)</td>
<td></td>
</tr>
<tr>
<td>Indian English (PHP)</td>
<td></td>
</tr>
<tr>
<td>Hindi (Linux)</td>
<td></td>
</tr>
<tr>
<td>Khasi (CS)</td>
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<tr>
<td>Malayalam (dubbing)</td>
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</tr>
<tr>
<td>Mythili (CS)</td>
<td></td>
</tr>
<tr>
<td>Rajasthani (CS)</td>
<td></td>
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<tr>
<td>Sindhi (CS)</td>
<td></td>
</tr>
<tr>
<td>Telugu (Sci)</td>
<td></td>
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<tr>
<td>Bodo (Ubuntu)</td>
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</tr>
<tr>
<td>Bhojpuri (dubbing)</td>
<td></td>
</tr>
<tr>
<td>Gujarati (Xfig)</td>
<td></td>
</tr>
<tr>
<td>Kannada (CS)</td>
<td></td>
</tr>
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<td>Konkani (CS)</td>
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<tr>
<td>Marathi (Sci)</td>
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</tr>
<tr>
<td>Oriya (dubbing)</td>
<td></td>
</tr>
<tr>
<td>Sanskrit (\LaTeX)</td>
<td></td>
</tr>
<tr>
<td>Tamil (\LaTeX)</td>
<td></td>
</tr>
<tr>
<td>Urdu (Sci)</td>
<td></td>
</tr>
</tbody>
</table>
IT Jobs through English

- English is useful for IT jobs: video
- Mother tongue for learning: audio
- Useful for children weak in English, without affecting employment
- After listening to tutorial in mother tongue, go through tutorial in English also: can possibly improve English
- Helpful to school students studying in vernacular medium, for example
Focus Areas

- IT
  - Technologies, employment, good marks in exams
- Bridging digital divide
- First aid, public health
To Bridge Digital Divide

- How to buy train tickets through http://irctc.co.in
- How to locate low cost agricultural loans
- How to locate information on primary health care
- How to obtain information on first aid
- How to do web search to locate the shop that sells TVs at the lowest price

This list is endless
Sample Tutorials on Digital Divide

- Registering user at IRCTC
- Buying a train ticket at IRCTC
- Managing tickets at IRCTC
A remote child, working alone, at midnight, without anyone to help her
Website of the Spoken Tutorial Project

- http://spoken-tutorial.org
- Videos are available for free download
Final recommendation of PRSG

Please release Rs. 4.5 crore, due to Amrita
Thanks
# Qualitative feedback

<table>
<thead>
<tr>
<th></th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>“Though I have taught Computer Programming several times, I did not find this workshop boring, I enjoyed the lectures, labs, and assignments sessions.”</td>
</tr>
<tr>
<td>2</td>
<td>“This workshop gave a very good experience on new methodology like clickers, moodle etc. More workshops like this are advisable and welcome.”</td>
</tr>
<tr>
<td>3</td>
<td>“Its been a great experience being part of such a distance learning program, gained confidence in this subject ..it will be reflected when the session of my college starts...learning with so many colleagues is amazing .....”</td>
</tr>
<tr>
<td>No</td>
<td>Workshop name</td>
</tr>
<tr>
<td>----</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>1</td>
<td>Engineering thermodynamics</td>
</tr>
<tr>
<td>2</td>
<td>Research methods in education technology</td>
</tr>
<tr>
<td>3</td>
<td>Database management systems</td>
</tr>
<tr>
<td>4</td>
<td>Analog electronics</td>
</tr>
<tr>
<td>5</td>
<td>Engineering mechanics</td>
</tr>
<tr>
<td>6</td>
<td>Signals &amp; Systems</td>
</tr>
<tr>
<td>7</td>
<td>Fluid mechanics</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
</tr>
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</table>

IIT Bombay, IIT Kharagpur  
Talk to a Teacher  
46/92
<table>
<thead>
<tr>
<th></th>
<th>Course Title</th>
<th>Institute</th>
<th>Credits</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>Computer programming</td>
<td>IITB</td>
<td>272</td>
<td>9,381</td>
</tr>
<tr>
<td>9</td>
<td>Computer networking</td>
<td>IITB</td>
<td>246</td>
<td>8,481</td>
</tr>
<tr>
<td>10</td>
<td>Cyber security</td>
<td>IITB</td>
<td>207</td>
<td>6,015</td>
</tr>
<tr>
<td>11</td>
<td>Control systems</td>
<td>IITKgp</td>
<td>241</td>
<td>9,216</td>
</tr>
<tr>
<td>12</td>
<td>Pedagogy for effective use of ICT in engineering education</td>
<td>IITB</td>
<td>148</td>
<td>4,582</td>
</tr>
<tr>
<td>13</td>
<td>Introduction to design of algorithms</td>
<td>IITKgp</td>
<td>221</td>
<td>7,468</td>
</tr>
<tr>
<td>14</td>
<td>Environmental studies</td>
<td>IITB</td>
<td>158</td>
<td>4,264</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>49,407</strong></td>
<td></td>
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</table>
## Budget

<table>
<thead>
<tr>
<th></th>
<th>First year</th>
<th>Second year</th>
<th>Third year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bom</td>
<td>Kgp</td>
<td>Bom</td>
<td>Kgp</td>
</tr>
<tr>
<td><strong>Equipment</strong></td>
<td>325</td>
<td>325</td>
<td>50</td>
<td>100</td>
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<tr>
<td><strong>Salary</strong></td>
<td>275</td>
<td>125</td>
<td>300</td>
<td>200</td>
</tr>
<tr>
<td><strong>Consumables</strong></td>
<td>100</td>
<td>50</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Nodal centres (10)</strong></td>
<td>750</td>
<td>0</td>
<td>250</td>
<td>0</td>
</tr>
<tr>
<td><strong>Remote centres (500)</strong></td>
<td>1600</td>
<td>0</td>
<td>600</td>
<td>0</td>
</tr>
<tr>
<td><strong>10K workshops (15)</strong></td>
<td>1950</td>
<td>650</td>
<td>1950</td>
<td>1300</td>
</tr>
<tr>
<td><strong>Coordinator W/S (15)</strong></td>
<td>75</td>
<td>25</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td><strong>Publicity/sponsorship</strong></td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td><strong>Travel</strong></td>
<td>50</td>
<td>30</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td><strong>Contingency</strong></td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td><strong>Coord. honorarium</strong></td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12405</td>
<td>6075</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Total budget = Rs. 18480 lakh
- Equipment budget includes portal servers - Moodle installations for colleges, etc.
- If e-cloud is available, equipment budget can be reduced by Rs. 4 (=2+2) crore.
- Salary is calculated on the basis of 150 people at each IIT.
- We propose to raise the nodal centres to the level of a hub.
- Costing for the 10 day course is on the basis of Rs. 6,500/person (TA/DA).
Spoken Tutorial Framework

Videos
Assignments
Additional Learning
Exams
Discussions
User examples
Reviews, ratings
Automated emails
Family of Spoken Tutorials

Outline, brochures, workshops, etc.

Tutorial 1

First Language Script
Videos
Assignments
Additional Learning
Exams
Discussions
User examples
Reviews, ratings
Automated emails

(n-2)nd Language Script
(n-1)st Language Script
nth Language Script

Tutorial 2

First Language Script
Videos
Assignments
Additional Learning
Exams
Discussions
User examples
Reviews, ratings
Automated emails

(n-2)nd Language Script
(n-1)st Language Script
nth Language Script

Tutorial m

First Language Script
Videos
Assignments
Additional Learning
Exams
Discussions
User examples
Reviews, ratings
Automated emails

(n-2)nd Language Script
(n-1)st Language Script
nth Language Script
Infrastructure required for using Spoken Tutorials

- Ordinary desktop/laptop/Aakash
- Ear phone for listening (Rs. 20)
Using Spoken Tutorials

- Listen to a command, pause
- Try the command on the software
- If it works, go to the next command
- If not, rewind, listen to it
- Repeat until the tutorial is completed
Spoken tutorials are created for self learning

Workshops can be conducted without domain experts

Can support many workshops in parallel

We join through Skype for the first time workshops
IITB through Skype at Kerala Workshop
Spoken tutorial based Education and Learning through Free FOSS Study Workshops

Further abbreviated as SELF Workshops
Features of SELF Workshops

1. Instructional material
2. Duration of the workshop
3. Conductor of the workshop
1. Instructional Material

- a. Checklist for infrastructure
- b. Instruction sheet for learners
- c. Instruction sheet for conductors
1a. Checklist for infrastructure

<table>
<thead>
<tr>
<th>PC No.</th>
<th>Is the PC Booting?</th>
<th>Can log into PC? (if applicable)</th>
<th>These can be separated in 2 PCs, possibly</th>
<th>PC for spoken tutorial</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC 1</td>
<td></td>
<td></td>
<td>FOSS loaded?</td>
<td>Spoken Tut. Copied?</td>
</tr>
<tr>
<td>PC 2</td>
<td></td>
<td></td>
<td>Plays in VLC?</td>
<td>Audio works?</td>
</tr>
<tr>
<td>...</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PC 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
1a. Checklist Explained - for Every PC Check:

- Is the PC booting?
- Can you log into it?
- Is FOSS loaded?
- Is spoken tutorial copied?
- Are all the resource files copied?
- Does the spoken tutorial play in VLC?
- Does the audio work through headphones?
1b. Instruction Sheet for Learners

- Only instructions at the beginning - no theory
- Every instruction should be for an activity
- Verb is present in every instruction
- Theory comes later
1. **Click** Places **button** at the top left hand corner and then **click** the **Home Folder**. **The folder that opens is called your home folder.**
2. Please locate the folder LaTeX_Workshop that is available on Desktop. The sub-folder 01-compilation contains the following files that you need for this tutorial: hello.tex and compiling.mov.

3. Please copy hello.tex from this folder to your home folder.
4. Open the terminal using the command Ctrl-Alt-t, by pressing all these three keys simultaneously.

5. Open the file that you copied above into the editor using the command
   gedit hello.tex &
   
   Do not forget the symbol ampersand
(&) at the end of the command, obtained by pressing shift 7. Please leave spaces exactly as given above.

6. Right click on compiling.mov, point the cursor on Open With and select VLC Media Player, now listen to this spoken tutorial.
7. As shown in the video at 1:57min, compile from the terminal the file hello.tex using the command

```
pdflatex hello.tex
```

Note that `pdflatex` is ONE command. Please do not leave a space between pdf and latex.
8. Pause the video at 2:04min. You should now be able to give the command `pdflatex hello.tex` and get a file `hello.pdf`. If there is any difficulty in this step, please listen to the tutorial from 1:57min to 2:04min once again.

9. The video talks about a pdf viewer called `skim` at 3:04min.
Please do not attempt to use skim - it is NOT available on Linux.

You have to use the pdf viewer evince instead. Give the following command from the terminal to open the pdf file:

evince hello.pdf &

Once again, do not forget the & symbol in the above command.
1b. Salient Features of Instruction Sheets

- Exact time of an activity - see 7, 8, 9
- Difference pointed out - see 9
- Detailed instructions - see 9
2. Duration of SELF Workshops

- Two hours
- Learn some of the possible tutorials
- Learn the methodology to use the tutorials
- Reminder is completed at leisure, easily

IIT Bombay, IIT Kharagpur
Talk to a Teacher
2. What can you learn in 2 hours?

- **LaTeX**

  - How to write a letter?
  - How to write a report?
  - How to write Maths?
  - How to write Equations?
  - Introduction to presentation using Beamer
  - Give guarantee on this

IIT Bombay, IIT Kharagpur
What you do not learn in 2 hours?

- Green field research is permissible
- If stuck, go to the next tutorial
- There are lots of things to learn any way
- Keep green field research outside tutorial
- Our method is dictatorial, but effective
Answering Student Doubts

- Through discussion forums
- Doubt clearing sessions through audio chat and A-VIEW
- We need to institutionalise these methods
2. Two hour workshop - Reasons

- Many workshops can be conducted with the same resources
- Less resources are wasted on uninterested students
- No need to give eats
- Less honorarium for the conductor, organiser
3. Conductor of the SELF Workshop

- Is NOT a domain expert
- We do not want them to answer domain related questions
- There is no guarantee that the conductor will give the correct answer
- If domain answers are given a conductor cannot handle many students - we want 20:1 ratio
3. Conductor of the SELF Workshop

- Shall not answer domain related questions
- Shall point out the mistakes
  - & is not given
  - Command is typed in the editor - not terminal
- May ask the learner to repeat
  - Only 10 minute tutorial
  - Maximum 5 minutes to be repeated
- Need not be a domain expert

IIT Bombay, IIT Kharagpur
Talk to a Teacher
78/92
Salient Features of Workshops

- The learning outcome is well defined
- Quality maintained, with no dilution
- Different from the conventional train the trainer programme, where the quality usually decreases
Salient Features of Workshops

- Students learn at their own pace
- Learn using a language of choice
- All can come to same level
  - Children of house maids, construction workers and so on can hope to become as good as the children of professors!
  - irrespective of initial preparation levels
  - students with poor initial conditions may have to work harder
IIT Bombay is NOT at all required to conduct these workshops!
Benefits

- Excellent self learning methodology
- Scale-up of workshops is possible
- Can learn in a language of one’s choice
- Can learn at a convenient pace
- Can learn at a convenient time
- Hi-tech solutions to even linguistic minority
- Knowing English keyboard retains job opportunities
- Learn English and other languages
SELF Workshops are Effective

- Linux workshop at Alwar, Rajasthan
- Pre-workshop and post-workshop tests
- Average marks went up by 85%
- Everyone passed the second test
- Certificates issued to everyone!
ORCA Spoken Tutorials for Workshops

- We recently conducted a workshop for VI at IGNOU, Delhi.
- All students learnt ORCA at their own pace - each had a head phone.
- They did not complete all the tutorials - they would complete by themselves at home - created for self learning.
- Workshop can be conducted by people who are not VI and who are not IIT Bombay, IIT Kharagpur.
Current Status of Workshops

- 2500 workshops completed in the past one year!
- Trained 80,000 to 1,00,000 students!

IIT Bombay, IIT Kharagpur
Popularity of our website
http://spoken-tutorial.org

More than 2,000 page loads a day
How can you participate? 1.

**Colleges**

Organise SELF Workshops at your college
- For your students
- For your staff members
- For students in nearby colleges
Spoken Tutorials Available for Workshops

- C, Java
- Python
- PHP/MySQL
- Linux / Ubuntu
- Scilab
- \LaTeX
- Blender, GIMP
- ORCA
- LibreOffice
  - Writer, Calc, Impress, Math, Draw, Base
- OpenFoam
- GeoGebra
- FireFox
Spoken Tutorials: What is Proposed Now?
Spoken Tutorials: Deliverables

- 500 original spoken tutorials
- 5,000 dubbed spoken tutorials
- 1,50,000 students to be trained
## Budget for Spoken Tutorials

<table>
<thead>
<tr>
<th>Year</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment</td>
<td>25</td>
<td>25</td>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>Salary</td>
<td>175</td>
<td>200</td>
<td>225</td>
<td>600</td>
</tr>
<tr>
<td>Nodal centres (5,7,10)</td>
<td>50</td>
<td>70</td>
<td>100</td>
<td>220</td>
</tr>
<tr>
<td>Consumables</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>120</td>
</tr>
<tr>
<td>Contingency</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>120</td>
</tr>
<tr>
<td>Travel</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>75</td>
</tr>
<tr>
<td>Publicity/sponsorship</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>30</td>
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<tr>
<td><strong>Total</strong></td>
<td>340</td>
<td>410</td>
<td>490</td>
<td>1240</td>
</tr>
</tbody>
</table>

Total budget = Rs. 1240 lakh

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IIT Bombay, IIT Kharagpur

Talk to a Teacher

91/92
1. Total budget: Rs. 197.20 crore
2. IIT Kharagpur: Rs. 60.75 crore
Agenda

• Phase 1
  – Overview
  – Accomplishments
  – Awards & Testimonials

• Phase 2
  – Overview
  – Budget Summary
  – Development Modules
A-VIEW can be used as a Versatile E-Learning Platform for setting up online

- Classrooms
- Meetings
- Training & Workshops
- Conferences
- Real-time audio-video and synchronized content sharing
- Live assessment and feedback
- Multi-platforms & Multi-devices
Global Recognition by CISCO

Amrita University’s A-VIEW
Recognised as Global Internet Innovation by CISCO

A-VIEW & Aadhar are the only e-Governance projects selected from India
## Major A-VIEW Deployments

<table>
<thead>
<tr>
<th>Institution</th>
<th>Programme</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIT-BOMBAY</td>
<td>T10KT, Ask A Question</td>
</tr>
<tr>
<td>IIT-MADRAS</td>
<td>QEEE, Live Classes, Teachers from 7 IITs</td>
</tr>
<tr>
<td>IIT-KHARAGPUR</td>
<td>T10KT (Teacher Training)</td>
</tr>
<tr>
<td>IIRS-ISRO</td>
<td>Online Course Delivery; Satellite Network (trial)</td>
</tr>
<tr>
<td>NITTTR’s</td>
<td>Vocational training, Online Course Delivery</td>
</tr>
<tr>
<td>Maharashtra Govt, CBSE</td>
<td>Teacher Training, Schools tuitions</td>
</tr>
<tr>
<td>DOTE TN, MP</td>
<td>Online Course Delivery for Polytechnics</td>
</tr>
<tr>
<td>Skill Ministry; DGET</td>
<td>ITI / ATI Skill Training; Skill development Pilots</td>
</tr>
</tbody>
</table>
A-VIEW Features

Live Interaction

Live Audio/Video Streaming

Hand raise to ask question

Question & Chat

Tablet Poll

Mobile Quiz
Central Ministry Adopts Amrita Varsity App

Kollam: Ministry of Skill Development and Entrepreneurship has adopted the distance learning platform developed by Amrita University in its ambitious skill training program for over 50 crore Indians, after it was demonstrated in front of Prime Minister Narendra Modi on World Youth Skills Day.

During the inauguration of the event, the Prime Minister interacted with thousands of trainees across the nation using the platform named A-VIEW (Amrita Virtual Interactive E-Learning World). Prof Kamal Bijjani, the chief architect of A-VIEW, demonstrated the usage of A-VIEW with 100 ITIs. The new skill development program by the Central Government aims to reach its target by 2022. The Skills Ministry has used A-VIEW in the past to train 15,000 ITI trainees remotely.

A-VIEW, a free application developed by the University, is the preferred distance education video conferencing software package used in India. A-VIEW along with GOI’s Aadhar were the only two internet-based technology innovations from India chosen by CISCO to receive their prestigious award.

It is a proven large-scale distance education and skill training platform already deployed in over 8,000 institutions in India. A-VIEW is also being used in CBSE schools and National Skill Development Centres.

For the past several years, IIT-Bombay has been using A-VIEW to successfully train 10,000 teachers. Recently, the Government of Maharashtra trained over 35,000 school teachers simultaneously using the platform.

A-VIEW, developed by Amrita University in partnership with IIT-Bombay and NMEICT, Ministry of HRD, features a number of easy-to-use features for skill development.
Live interaction with 200 ITIs via A-VIEW.
Around 15,000 ITI teachers have been trained
Dr. Ashwini Kumar Sharma, MD, NIELIT used A-VIEW to reach out to thousands
A-VIEW in Digital India Week

• NIELIT Center at Jammu & Kashmir
35,000 School Teachers Trained Simultaneously by Maharashtra Government
Teacher Training in Regional languages

35,000 School Teachers Trained Simultaneously by Maharashtra Government
A-VIEW Features

Content Collaboration

- Desktop Sharing
- Document Sharing
- Whiteboard
- Video Sharing
- 2D/3D Viewer

Amrita E-Learning Research Lab © 2015
Teacher Training Programme by IIT’s

1 Lakh Teachers Trained

Prof. Phatak using A-VIEW

Train 10,000 Teachers Simultaneously - T10kT

Teacher Training Programme by
IIT Bombay
and
IIT Kharagpur
Teacher Training Programme by IIT’s-QEEE

Completed 3 Phases

Live classes by IITs to Thousands of Engineering Students

QEEE Programme by IIT Madras

Completed 3 Phases
Free online Tuition programs by CBSE
A-VIEW as a Meeting Tool
Mr. Ashok Thakur, Ministry of HRD, addressing VCs of various Universities using A-VIEW (along with Prof. Kamal Bijlani, Director, Amrita E-Learning Research Lab)
A-VIEW Features

Record & Playback

Administration

Manage
- Courses
- Classes
- Users
- Lectures

System Admin
Green color shows better detection

Yellow color shows average detection

Blue color shows bad detection

People Count
Student Node Monitoring – IIT Bombay
**A-VIEW Unique Strengths**

- **Network Independent:**
  - Any type of server like Cloud, Regional or Local Servers.
  - A-VIEW installed on NMEICT Cloud Baadal, BSNL servers, local servers

- **Security/Control:**
  - Complete control & security - live audio/video streams, content, recordings.
• **Integration Open APIs:**
  
  • Anyone can integrate A-VIEW to their existing web portal or software system.

➢ **Adaptive Open APIs:**
  
  • Any organization can extend the existing functions and features.
A-VIEW Unique Strengths

➢ Replicable:
  • Complete A-VIEW setup can be duplicated by any organization.

➢ Analytics:
  • Massive amount of Usage Data can be saved and analyzed.
A-VIEW Unique Strengths

➢ Versatile:
  • Used for Classroom, Meetings, Training, Workshops.
  • Custom features for huge number of users

➢ Make in India:
  • Entire software platform is developed by Amrita University.
  • Team includes expert professionals from Microsoft, Amazon.
A-VIEW Unique Strengths

• A-VIEW can be popularized and scaled for Digital India.

• These features make A-VIEW an ideal National Live Large-Scale E-Learning Platform.
Several Programmes Supported by Amrita University

8,000+

Major Users

IIT Bombay        Mumbai University
IIT Kharagpur     JNTU Hyderabad
IIT Madras        IIRS Dehradun
NITTTR Bhopal     DOTE Madhya Pradesh
NITTTR Chennai    CBSE School
NITTTR Kolkata    Maharashtra Government
Anna University   Directorate General of
                  Employment & Training
DOTE Chennai      INFLIBNET Centre
Online Live Courses by Indian Institute of Remote Sensing (IIRS – Dehradun)

- 15 courses using A-VIEW
- Able to train 10,000 participants
• A-VIEW on Satellite Network (under trial)
• Satellite and Internet Networks fully integrated
• Provides complete national video conference-based training platform
Tamil Nadu

• Subject wise training program for Polytechnic students across Tamil Nadu.

Madhya Pradesh

• Principal Secretary frequently conducts online meetings
• Connected around 7 Govt Engineering colleges and 44 Govt Polytechnics.
• Subject wise training program for Polytechnic students (Evaani Course)
Skill Development Training Programs

- 20 teaching hubs
- 200 remote centers
- Trained around 15,000 staff
• A-VIEW Platform for its National Digital literacy Mission (NDLM) program.

• Planning to connect around 7,200 centers & Partners for Digital India Week
• National Doubt Clearance program “Ask a Question”
• Led by Dr. Kannan Moudgalya IIT -Bombay
• More than 80 sessions successfully completed through A-VIEW Programs using A-VIEW
Programs using A-VIEW

- Weekly Interaction Program delivered by eminent academicians
- Nearly 60 Universities across India regularly participate
- Sessions held from National/International locations
Online Gurukul – Pilot Stage

- Free tuition for students in Kerala by eminent career experts
- Leading industrial experts interact directly with college students
- More than 30 sessions successfully completed
- Hundreds of college students benefited
• Online Network of Entrepreneurs at TBIs across India
• Business Guidance and Start up Advice by Experts
• Library of information rich videos of entrepreneurs
Community of College Students and Green Activists for Sustainable Development

Regular talks and meetings with experts over A-VIEW Program using A-VIEW.

Dr. R. K. Pachauri on Amrita’s Green Campuses initiative using A-VIEW.
Hands on Workshop in progress at Mumbai University
Hands on Workshop in progress at GTU Gujarat
Hands on Workshop in progress at FISAT Angamally, Kerala
Small Group Meetings

Conference Cam with built-in Camera, Speakers and Microphone
Awards & Recognition

- World Education Summit 2011
  Best Innovation in Open and Distance Learning

- Computer World Honors Laureate 2012 For Training and Education

- Educational Excellence Award
  Indo Global Educational Summit 2012

- Manthan Award South West India 2014
  e-Education, Learning and Development
First major release of A-VIEW on 12th August 2009 by Dr. A.P.J. Abdul Kalam

A-VIEW on tablet - Launched on 11th November 2012 by Shri Pranab Mukherjee
“The ‘Train the Trainers’ program, conducted through A-VIEW, which helps in improving the teaching standards in India, is very effective.”

Mr. S. Ramadorai
Vice Chairman, TCS
“It was a great experience for me to use A-VIEW, the efficacy of A-VIEW is evident, and we plan to use it more regularly.”

Dr. Ranjan Bose
IIT, Delhi
## Grants Overview

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Amt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Project Approval</td>
<td>34.46</td>
</tr>
<tr>
<td>Released to IIT-B vide PAB approval in Dec 2010</td>
<td>10.34</td>
</tr>
<tr>
<td>Released to IIT-B vide PAB approval in Dec 2011</td>
<td>19.61</td>
</tr>
<tr>
<td>Total Grants –in-aid released from NMEICT:</td>
<td>29.95</td>
</tr>
<tr>
<td>Balance to be received from NMEICT</td>
<td>4.51</td>
</tr>
</tbody>
</table>
Grants Timeline

• 2009
  – PAB approves AVIEW Project for 34.36 Crores
  – Rs. 10.34 Crores released from NMEICT to IIT-B
  – Rs. 10.34 Crores received at Amrita University

• December 09, 2011
  – PAB Approves Second Instalment of 24.12 Crores to IIT-B
  – NMEICT transfers a sum of Rs. 19.61 Crores against the approved 24.12 crores
  – Rs. 19.61 Crores received at Amrita University in instalments
  – Balance of Rs. 4.51 Crores not released, still available at NMEICT
Grants Timeline

• July 16 2015
  – AVIEW Project Phase 1 completed
  – AVIEW project borrows Rs. 4.51 Crores from Amrita University
  – PRSG accepts completion of deliverables
  – Recommends release of balance 4.51 Crores

• Requesting release of Rs. 4.51 Crores
• Phase 1
  – Overview
  – Accomplishments
  – Awards & Testimonials

• Phase 2
  – Vision & Overview
  – Development Modules
Phase II – Vision & Overview
A-VIEW Phase II

A-VIEW: Crores of Users

Free & Open

Low-end Mobiles

Mobile & Tablets

Lecture Recordings

Self Recorded Lectures

Satellite

Reach at Remote Areas

Server Set-up

Easy Server Installation

Open Source Secure

Lakhs of Users

Present

2015

2018
A-VIEW Phase II Vision: Crores of Users

Massively Scalable
Live Interactive Collaborative E-Learning Platform
A-VIEW Phase 2 : Mission

- Personalized Learning
- Teachers Training
- Live Classroom
- 1 Lakh User Live Feedback
- Satellite/LAN
- Doubt Clearance

Amrita Virtual Interactive E-Learning World
**Phase I**
- Lakhs benefited
- 9000+ Institutions (Higher Edu)
- Pilots: Schools, Skill Training

**Phase II**
- Crores benefited
- 25,000 Institutions (Higher Edu)
- Large Scale: Schools, Skill Training
A-VIEW Phase II

SOAR...
to new heights...

Open
Scalable
Accessible
Reliable
A-VIEW Phase II – Contribution to the Nation

- National Online Real-Time Platform over Internet & Satellite
  - Online Teacher Training
  - E-Learning Tools for Crores of Learners
  - Meeting Tools for Crores of Learners
  - Digital Literacy of Teachers & Students
- Online Exams and Proctoring
- Surveillance, Attendance during Live Classes
- Tool for Self Recording Lectures
Phase II – Modules

M1: Implementation for 1 Crore Users
M2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile
M3: A-VIEW on Low-End Mobiles and Tablets
M4: Open A-VIEW
M5: Classroom Surveillance and Monitoring
M6: A-VIEW Producer: Self Recording Lectures
M7: Adaptive Plug and Play Devices
M8: Major A-VIEW Enhancements (User Requests)
M9: Automation Testing & System Integration
M10: Online Collaboration
Phase II – Development Modules
Phase II – Modules

M1: Implementation for 1 Crore Users

M2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile

M3: A-VIEW on Low-End Mobiles and Tablets

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M5: Classroom Surveillance and Monitoring

M6: A-VIEW Producer: Self Recording Lectures

M7: Adaptive Plug and Play Devices

M8: Major A-VIEW Enhancements (User Requests)

M9: Automation Testing & System Integration

M10: Online Collaboration
# A-VIEW Phase II: Overall Budget

## Implementation for Crores of Users (For 3 Years, Figures in Lakhs of Rs)

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Functional Description</th>
<th>Year I</th>
<th>Year II</th>
<th>Year III</th>
<th>Budget (in Lakhs)</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Module 1</td>
<td>Implementation of A-VIEW for Crores of Users</td>
<td>79.71</td>
<td>81.83</td>
<td>121.74</td>
<td>283.28</td>
</tr>
</tbody>
</table>

## Development & Testing (For 3 Years, Figures in Lakhs of Rs)

<table>
<thead>
<tr>
<th>#</th>
<th>Item</th>
<th>Functional Description</th>
<th>Year I</th>
<th>Year II</th>
<th>Year III</th>
<th>Budget (in Lakhs)</th>
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</thead>
<tbody>
<tr>
<td>2</td>
<td>Module 2</td>
<td>Integrated A-VIEW: Satellite, CDN, Mobile, LAN</td>
<td>61.10</td>
<td>51.97</td>
<td>56.67</td>
<td>169.74</td>
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<td>3</td>
<td>Module 3</td>
<td>A-VIEW on Low End Mobiles and Tablets</td>
<td>48.60</td>
<td>31.57</td>
<td>34.18</td>
<td>114.35</td>
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<td>4</td>
<td>Module 4</td>
<td>Open Source Server Components</td>
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<td>34.37</td>
<td>37.31</td>
<td>108.48</td>
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<td>5</td>
<td>Module 5</td>
<td>Classroom Surveillance and Monitoring</td>
<td>74.10</td>
<td>39.66</td>
<td>43.03</td>
<td>156.79</td>
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<td>6</td>
<td>Module 6</td>
<td>A-VIEW Producer - Self Recorded Lectures</td>
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<td>31.07</td>
<td>33.68</td>
<td>106.85</td>
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<td>7</td>
<td>Module 7</td>
<td>Adaptive Plug and Play Devices</td>
<td>42.40</td>
<td>36.63</td>
<td>39.74</td>
<td>118.77</td>
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<td>8</td>
<td>Module 8</td>
<td>Major A-VIEW Enhancements (Users Requests)</td>
<td>71.70</td>
<td>60.22</td>
<td>65.74</td>
<td>197.66</td>
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<td>9</td>
<td>Module 9</td>
<td>Automation Testing and System Integration</td>
<td>41.00</td>
<td>33.04</td>
<td>35.94</td>
<td>109.98</td>
</tr>
<tr>
<td>10</td>
<td>Module 10</td>
<td>Online Collaboration</td>
<td>41.60</td>
<td>36.19</td>
<td>39.26</td>
<td>117.05</td>
</tr>
</tbody>
</table>

Subtotal In Lakhs (Rs) 459.40 354.72 385.54 1199.66

## Total Budget

<table>
<thead>
<tr>
<th>Year I</th>
<th>Year II</th>
<th>Year III</th>
<th>3 Year Total</th>
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<tr>
<td>539.11</td>
<td>436.55</td>
<td>507.28</td>
<td>1482.94</td>
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</table>

## Total Team

67
Module 2: Integrated A-VIEW: Satellite, LAN, Mobile, CDN

Huge Virtual Classrooms
JNTU Kakinada Blended Platform Case Study
A-VIEW as a Blended Learning Platform Plug-In

MOOC Online

- Pre-recorded Learning Videos
- Online Assessments
- Blogs / Wikis
- Discussion Forum

Online Real-Time Platform (A-VIEW)

- Live Classes
- Lecture Recordings
- Instant Poll / Quiz
- Mobile Chat
- Online Surveillance, Proctoring
JNTU Kakinada Case Study

• Semester-wise MOOC Program
  – 2 Courses
  – 1000 Students
• JNTUK-Hosted MOOC Web Site
  – Learning Materials
  – Self Assessments
  – Discussion Forum
• http://jntukucev.ac.in/moocs-schedule/
MOOCs Schedule

Software Engineering in Practice
- Monday and Thursday 10.00 A.M to 12.00 P.M from 17-08-2015 (Through WebEx)
- Attendance is compulsory for this course
- Audit course will be displayed on the marks memo
- Regarding Examination- Decision will be intimated soon

Big Data Analytics
- Monday, Wednesday and Friday 2.00 P.M to 3.00 P.M from 17-08-2015 (Through A-View)
- Attendance is compulsory for this course
- Internal and External Examinations-same as regular elective subjects
- Online questions will be given by JNTU. Descriptive paper will be given by Internal Mentor
- Same credits as regular Elective subjects

Computer Aided Engineering
- Tuesday and Thursday 2.30 P.M to 4.30 P.M from 26-08-2015 (Through A-View)
- Attendance is compulsory for this course
- Internal and External Examinations-same as regular elective subjects
- Same credits as regular Elective subjects
Using A-VIEW as Plug-In for:

- Live Lectures
- Doubt Clearance Sessions
- Class Monitoring
- Live Lecture Recording

Provide a complete Blended Learning Platform
Blended Learning Platform

- Watch Learning Materials
- Local Classroom
- Assessment
- Online Collaboration
- Virtual Classroom
- Low Bandwidth Mobile Application
JNTU Kakinada Next Semester

- Core Subjects Offered MOOC-Style
  - 263 Affiliate Colleges
  - 50,000 Students
- Live Lectures
- Doubt Clearance Sessions
- Teacher Self Recording
Blended Doubt Clearance

Live Class

Live Interaction

Questions

Recordings

Questions

Recordings

Online Course Room

Mooc Forum
Integrated A-VIEW (Satellite, CDN, LAN, Mobile)
Summary
• Tens of thousands of online users in a Virtual Classroom

Overview
• 10's of thousands of simultaneous connected users to live classes
• Video Delivery Network with application/physical layer multicast
• Clients connect to closest points of presence
• Automatically switch from receive-only mode to live-interaction mode
Overview (cont.)

- Policies for interaction, queuing if too many users want to interact
- Receive-only clients: Webinar, DTH, Satellite
- Receive video on multiple channels
- Automatically switch to channel with best quality
Hybrid Multicast

Multicast Fusion

Native IP Multicast

App-Level-Multicast
Leveraging DTH

Interactive VSAT Network

LARGE NUMBER OF REMOTE SITES

ANTENNA WITH ODU ON FEED

INDOOR UNIT

HUB SITE

USER'S CENTRAL COMPUTER
HUB EQUIPMENT
User Interface for each Role Type

Teacher
Content

Teaching Assistant
Content, Forum, Interaction

System Admin
Troubleshooting

Monitor
Supervision, Analytics
Interaction Architecture

- **Goal:** Tens of thousands of online users in a Virtual Classroom
- **New audio-video Webinar mode**
  - Audio-video sent via multiple channels with redundancy
  - Users are in receive-only mode by default
  - A-VIEW Web, DTH, Broadband, Satellite etc...
- **Video Delivery Network (similar to CDN)**
  - Receive Audio/Video from closest Edge/POP (Points of Presence)
  - Multicast Video (Application or Physical)
  - Client selects from “best quality”
    - choose cricket match from best reception TV channel
Interaction Architecture (2)

- Interaction: Text Chat, Poll/Quiz, Feedback
  - New light weight app for tablets and mobile
  - Low bandwidth high reliable interface
- Automatic switch from receive-only to full interaction
- Huge bandwidth savings, server/network scale
- Result: Reliable delivery to tens of thousands of online users
Huge Virtual Classroom: Role-based apps

**Summary:**

Customized user experience for each user role

**Overview:**

- Monitor app
- Teacher/TA app
- Sys admin app
- Student app
User Roles (1)

**Teacher**
- Teach Class
- Content Management

**Teaching Assistant**
- Content Management
- Discussion Forum
- Live Interaction
System Administrator
- Manage/Monitor Infrastructure, Bandwidth
- Troubleshoot User Issues

Classroom Monitor
- Monitor/Proctor Class

Management
- System Usage
- Effectiveness Analysis
- Program Benefits Analysis
Phase II – Modules

M1: Implementation for 1 Crore Users

M2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile

M3: A-VIEW on Low-End Mobiles and Tablets

M4: Open A-VIEW

M5: Classroom Surveillance and Monitoring

M6: A-VIEW Producer: Self Recording Lectures

M7: Adaptive Plug and Play Devices

M8: Major A-VIEW Enhancements (User Requests)

M9: Automation Testing & System Integration

M10: Online Collaboration
Low-End Mobile Platform

A-VIEW Lite
Amrita Virtual Interactive E-Learning World

Username

Password

LOGIN

CREATE NEW ACCOUNT

Forgot password?
Live Sessions
Tap to get into the class

- Introduction to MongoDB using the MEAN Stack
  5 September 2015, 4:00 am to 6 am
- Statistical Thinking for Data Science and Analytics
  5 September 2015, 4:00 am to 6 am
- IELTS Academic Test Preparation
  5 September 2015, 4:00 am to 6 am
- Entrepreneurship: Who is your customer?
  5 September 2015, 4:00 am to 6 am
Personalized App
General Knowledge (Marks: 50)

Question 1/10

Which is the longest river in India?

- Ganga
- Yamuna
- Kaveri
What Impact Has Social Media Truly Had On Society

Revealing personal information on social sites can make users vulnerable to crimes like identity theft, stalking, etc.

- Agree
- Disagree

Submit
Live Poll

What Impact Has Social Media Truly Had On Society

Are you sure you want to submit your poll?

YES NO

Session: Introduction to Social Media Impact
Module 3: A-VIEW on Low-End Mobiles and Tablets

• Enable Personalized Learning
• Whatsapp of Education
• Low-end android mobile phones to high-end phones
• Massive Live Classes (1 Lakh)
• Instant polling and quizzes
• Download course content and recordings for offline viewing
Immediate Feedback Mechanism
Immediate Feedback Mechanism
Mobile Application Features

- **Chat**: Text Chat, Private Chat
- **Assessments**: Poll, Quiz
- **Feedback**: Automatic Handraise Recognition, Manual Handraise, Live Questionnaires
- **Analytics**: Feedback Form
- **Bandwidth**: Low Bandwidth, Multiple Channel (Wireless, Data Plans)
- **Download Recordings for Offline Viewing (MP4)**
- **Live Video and Audio Interaction**
- **Content Collaboration**: Desktop Sharing, Whiteboards
Tablet: Interaction
Tablet: Document Sharing

What Qualifications Do You Need to Become a Plumber?

- BPEC
- NVQ Diploma
- City and Guilds
- Emergency First Aid

Specialise in the following areas of plumbing:
- Boilers & appliances
- Pipe fitting
- Kitchen installation
- Sanitary systems
- Central heating
- Bathroom design

Document Sharing

Plumbing Courses

Specialise in the following areas of plumbing:
- Boilers & appliances
- Pipe fitting
- Kitchen installation
- Sanitary systems
- Central heating
- Bathroom design
How social media affects new generation?
By Prof. Gopal on 10.15 AM

Drawbacks of Social Media?
By Prof. Karan on 10.15 AM
Phase II – Modules

- M1: Implementation for 1 Crore Users
- M2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile
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- M4: Open A-VIEW
- M5: Classroom Surveillance and Monitoring
- M6: A-VIEW Producer: Self Recording Lectures
- M7: Adaptive Plug and Play Devices
- M8: Major A-VIEW Enhancements (User Requests)
- M9: Automation Testing & System Integration
- M10: Online Collaboration
Summary

• Per-Class Online Chat Room
• Whatsapp for Education

Overview

• Student Group Chat
• Student Private Chat
• Contacts, Groups etc.
• Share Files
• Meeting Minutes
Moderator: Any Questions?

TA: What is the phase difference between two windings of A.C servomotor?

Akhila: Relative permittivity
Student Group Chat

Online Learning Group
My Profile | Contacts | Courses | Notifications

Video Chat

Arathy: How are you?
Ashwin: Fine
Mobile Online Collaboration

A-View Lite

Chat

Hello Sir, Please explain new features...
Arun Krishnan

Twitter Bootstrap New Version features
Moderator

It is HTML5 & CSS3 based framework for responsive
Kalpana

Flexbox support is the major feature
Moderator

Type a message

Amrita E-Learning Research Lab © 2015
Online Collaboration: Applications

- **Student Collaboration**
  - Students can share course materials, tips, ...

- **Tutoring**
  - Students and TA’s and Experts

- **Teacher Training and Collaboration**
  - Teachers can share course materials, tips, guidance

- **Research collaboration**

- **Government and Academic Collaboration**
Online Collaboration: Features

- Public chat with every one in Class
  - Students, Teachers, TA’s and Experts

- Group Chat
  - Chat with other Students or Coaches or colleagues

- Contact Lists: Import / Export
  - Students: Study Group, Friends
  - Teachers: Colleagues, Friends, TA’s
Phase II – Modules

- **M1**: Implementation for 1 Crore Users
- **M2**: Integrated A-VIEW: Satellite, LAN, CDN, Mobile
- **M3**: A-VIEW on Low-End Mobiles and Tablets
- **M4**: Open A-VIEW
- **M5**: Classroom Surveillance and Monitoring
- **M6**: A-VIEW Producer: Self Recording Lectures
- **M7**: Adaptive Plug and Play Devices
- **M8**: Major A-VIEW Enhancements (User Requests)
- **M9**: Automation Testing & System Integration
- **M10**: Online Collaboration
Feature: Open Source

Summary
• Substitute third-party licensed products with free or open source equivalent

Overview
• Simplify deployment for small groups
• Reduce cost for developer community
• Identify capacity of free version vs. licensed version
Substitution of licensed software

<table>
<thead>
<tr>
<th>Module</th>
<th>Current Technology</th>
<th>Proposed Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audio-Video Interaction</td>
<td>Adobe Media Server</td>
<td>Red5</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Adobe Media Server</td>
<td>Red5/NodeJs</td>
</tr>
<tr>
<td>Document Sharing</td>
<td>Windows 2008/2012, MS Office, Print2Flash, iSpring</td>
<td>Linux, Open Office</td>
</tr>
<tr>
<td>Desktop Sharing</td>
<td>Jscreen Capture SDK/Media Labs</td>
<td>Open Java Libraries</td>
</tr>
</tbody>
</table>
Feature: Open API

**Summary**

- Integrate A-VIEW into external systems using A-VIEW Open APIs

**Overview**

- Single sign-on work
- A-VIEW for live interaction
- A-VIEW for generating recordings
Single Sign-On API

A VIEW Service
- Protected resources
  - Login API
  - Access API

A VIEW Identity Provider
- A VIEW SSO Service

Partners:
- Facebook
- Other popular networks
- Partner databases
  - Eg. IITM QEEE
  - IITB
  - Aadhaar

A VIEW e.g. browser, desktop client, etc.
Single Sign-On Features

• Flexible Integration without needing to replicate password databases
  • Popular Social Networks (e.g., Facebook)
  • National Databases (e.g., Aadhar)
  • Institutional Databases (e.g., IITM QEEE, IITB)
• Open Standards
  • OAuth/OAuth2
• Plugin Architecture
  • Any one can write SSO Plugin for their own User Database
  • Examples published as part of Source Code
IITM QEEE Integration Example
A-VIEW as a Plug-In

• A-VIEW can act as a Plug-In for:
  – Live Sessions
  – Online Chat Rooms
  – Proctoring / Exam Surveillance
  – Teacher Self-Recording of Lectures

• Help provide a complete Blended Learning Platform
Phase II – Modules

M1: Implementation for 1 Crore Users

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M6: A-VIEW Producer: Self Recording Lectures

M7: Adaptive Plug and Play Devices

M8: Major A-VIEW Enhancements (User Requests)

M9: Automation Testing & System Integration

M10: Online Collaboration
Live Classroom Monitoring

Computer Networks : Screenshots  
Date : 2014-07-04

Unable to see thumbnail view? Click here to see list view of the screenshots
Module 5: Classroom Surveillance and Monitoring

**Summary:**
- Image Recognition
- People count
- Handraise count
- Classroom interaction
- Automatic attendance estimate
- Live classroom monitoring
- Proctoring students/groups
- Expression analysis
- PTZ remote control ...

Amrita E-Learning Research Lab © 2015
Handraise Count
Image Recognition - Architecture

Remote Teacher through A-View

Students (A-View Viewer's Node)

A-View Desktop PC

Internet

Send High Quality Images to Server

Find People Count & Result updation
• **Snapshots**: Automatic snapshots at configured intervals, timestamps
• **Auto Count**: Attendance Estimate, Attentiveness Analysis
• **Ease of Use**: Choose interested student nodes, save as “Custom”
• **Ease of Admin**: Automatic allotment to all available monitors
• **Interaction**: Private chat with student nodes
• **Analytics**: Reports by Email, Dashboards
• **Quality**: High resolution video images
Phase II – Modules

M1: Implementation for 1 Crore Users

M2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile

M3: A-VIEW on Low-End Mobiles and Tablets

M4: Open A-VIEW

M5: Classroom Surveillance and Monitoring

M6: A-VIEW Producer: Self Recording Lectures

M7: Adaptive Plug and Play Devices

M8: Major A-VIEW Enhancements (User Requests)

M9: Automation Testing & System Integration

M10: Online Collaboration
Module 6: A-VIEW Producer: Self Recorded Lectures

A-VIEW Producer

Carbon

Carbon is the most important element of life. Period. Sure, there are many others about which we would not exist, but from the structural backbone of DNA to the intricate rings and components of the molecule and proteins, carbon is the element whose unique properties it all impacts. The very term "organic compound," refers exclusively to those very molecules containing carbon.

No carbon in the foundation of all life on earth could have formed without carbon. Diamonds, the hardest known substance, at least for now, challenges are discussed under heat, density, etc. But contrary to popular belief, diamonds are not perfectly pure - nor are they completely hard. Nor are they absolutely infallible. There are no myths created by the DeCarats diamond company. Diamonds would cost you as much as a house for a home. Monopoly control, cubic structure, or extreme molecular orbital are not so pretty. And at high enough temperatures, diamonds turn into soot, but carbon divides.

Amrita E-Learning Research Lab © 2015
Assign forum questions to upcoming Live sessions
Video answers to Questions

**Question 2**
What are the new features in HTML5?

**Answer by Teacher**

**Answer by Teacher Assistant**

HTML5 is a core technology markup language of the Internet used for structuring and presenting content for the World Wide Web. As of October 2014 [update] this is the final and complete fifth revision of the HTML standard of the World Wide Web Consortium (W3C). The previous version, HTML 4, was standardised in 1997.
Blended Doubt Clearance

Live Class

Live Interaction

Questions

Recordings

Online Course Room

Mooc Forum

Questions

Recordings
Features

- MP4 self recording by teachers
- Integration for easy Course Creation
- Customize Lectures
- Self-contained, no external software needed
Features

• Upload to Lecture Web Site
• Any platform, any language
• Class lectures automatically recorded
• Doubt clearance mechanism
A-VIEW Self-Recording Producer

Summary

• Teachers can self-record lectures
• Class lectures are automatically recorded
• Recordings are generated as MP4 video files
• Searchable recordings
• Recordings annotated with metadata.
• Published to any course library (pluggable)
<table>
<thead>
<tr>
<th>Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full recording including all modules that are not recorded currently (questions, video sharing, 2D/3D viewer).</td>
</tr>
<tr>
<td>Playback recordings exactly as seen by presenter.</td>
</tr>
<tr>
<td>Recordings are generated as MP4 video files.</td>
</tr>
<tr>
<td>Playback possible in Web Browser without any dependencies.</td>
</tr>
<tr>
<td>Notification mail once recording MP4 is made available.</td>
</tr>
<tr>
<td>Manual transcribe lecture in selected language.</td>
</tr>
<tr>
<td>Stitch back the lecture with manual transcript to assist students.</td>
</tr>
<tr>
<td>Make multiple languages available in recordings.</td>
</tr>
</tbody>
</table>
## Searchable Content & Recording Library

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Author</th>
<th>Instructor</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics 101</td>
<td>Anna</td>
<td>Anna</td>
<td>Anna</td>
</tr>
<tr>
<td>Physics 101</td>
<td>IIT</td>
<td>IIT Bombay</td>
<td>IIT Bombay</td>
</tr>
<tr>
<td>Physics 101</td>
<td>BITS</td>
<td>BITS</td>
<td>BITS</td>
</tr>
</tbody>
</table>

- **Physics 101 - by Anna University**
  - PPT
  - Video
  - Link
  - Documents
  - Questionnaire

- **Physics 101 - by IIT Bombay**
  - PPT
  - Video
  - Link
  - Documents
  - Questionnaire

- **Physics 101 - by BITS**
  - PPT
  - Video
  - Link
  - Documents
  - Questionnaire

- **Physics 101 - by Amrita University**
  - PPT
  - Video
  - Link
  - Documents
  - Questionnaire
Searchable Recording Library

Content & Recording Library

National Cloud

Regional Server Cluster

University 1
University 2
University n

University Server Cluster

College 1
College 2
College 3
College n

College Server Cluster

Laptop
Tablets
Computer
Mobile
Searchable Recording Library - Features

- **Integrated Library**
  - Class Recording
  - Class Content
  - Class Transcript (Q/A, Course Assessments, Outlines)
  - Search by various parameters
- **Saved at best available location**
  - National, Regional, University, College
- **MP4 format for offline viewing**
- **Flexible Sharing Policies**
  - Share with Class, within University, within State, Nationally
Phase II – Modules

M1: Implementation for 1 Crore Users

M2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile

M3: A-VIEW on Low-End Mobiles and Tablets

M4: Open A-VIEW

M5: Classroom Surveillance and Monitoring

M6: A-VIEW Producer: Self Recording Lectures

M7: Adaptive Plug and Play Devices

M8: Major A-VIEW Enhancements (User Requests)

M9: Automation Testing & System Integration

M10: Online Collaboration

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Module 7a: Video Quality

**Summary:**
Improved audio-video quality with available codecs and adaptive bit-rate streaming

**Overview:**
- Scalable video quality
- Adaptive bandwidth
- Manual bandwidth switching
- Codec investigation and integration
- Active visual feedback for users
Video Quality - Adaptive Bitrate Streaming

- Switch between High, Medium and Low automatically
  - Multiple bit rates transmitted from Server
  - Viewer picks up high or medium or low based on available bandwidth
- Bandwidth Monitoring and Estimation
  - Automatically estimate available bandwidth
- Visual Feedback to User
- Manual Override (next slide)
Adaptive Bitrate Streaming

• Client to Service Bandwidth Monitoring
  • Periodic speed test measurements
  • Use audio-video stream as a feedback mechanism
    – Measure packet loss, delay and effective bandwidth
  • Visual indications to user
    – Popup alert when bandwidth is too low

• Intelligent Adaptive Behavior
  • Adaptive Video Bandwidth Switching
    – Automatically reduce/increase video bandwidth
  • Manual overrides for user to reduce / increase / turn-off video
  • If Desktop sharing on, turn off presenter video on low bandwidth
Video Quality - Manual Video Switching
Video Quality – New Codecs

VP9 (used by Chrome) and H.265 (used by iphone 6)
Module 7b: Plug and Play Devices

Summary:
Support for wide-variety of certified audio and video devices.

Overview:
• Automatic Device Recognition
• Seamless reconfiguration
• Cloud-based Profiles and Roaming
• Device Certification
• Quality Lab
Plug And Play Devices
Plug And Play Devices

First Use
- Detect
- Prompt User
- Pretest
- Save Preferences

Device Change Detected

Monitor Device Health / Live UI Indication

Switch Device for Audio/Video

Save Preferences in User Profile Manager

Query Cloud Configuration

Automatically Configure New Device

Query User for Device Switch

Amrita E-Learning Research Lab © 2015
Plug And Play Devices- Features

• **Automatic Device Change Detection**
• **Cloud-Driven Configuration**
  • Well known Devices, Types, Settings stored in Cloud
  • Pushed down to Client periodically
• **User Profile Manager**
  • Saves User Profile to Cloud for subsequent use
• **First-time Sign-in Wizard**
  • A/V Device Selection
  • A/V Device Tuning and Pretesting
• **UI-Health Status Indication**
  • Mixer, A/V Studio Device
  • Signal, Noise Levels
Phase II – Modules

M1: Implementation for 1 Crore Users
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M10: Online Collaboration
Module 8: A-VIEW Enhancements

User Requested Enhancements

- Breakout Rooms
- Ease of Admin
- Centralized Analytics
Feature: Breakout Rooms

**Summary:**
Breakout room for group class work

**Overview:**
- Breakout room for group class work
- Coaching breakouts
- Sys admin breakout for troubleshooting
- Teacher breakouts (panel of teachers)
- Automatic/manual assignment
- Breakout management - timers, send a message, teacher join
Breakout Rooms

Meeting rooms

All rooms (2)

MHRD Meeting

A-view Meeting

Contacts in MHRD Meeting

- Meetings
- Contacts
- Multiple rooms

Search

Meet now

Meet later

Settings

Rooms

Main room

Participant 7
Participant 8
Participant 9
Participant 10

Room 1

Participant 1
Participant 2

Room 2

Participant 3
Participant 4

Sys Admin

Sys Admin 1
Sys Admin 2

Add new room
### Breakout Rooms

The image depicts a section of a software interface for managing breakout rooms in a meeting setup. The interface is divided into several sections:

#### Meeting rooms
- **All rooms (2)**
- **MHRD Meeting**
- **Aview Meeting**

#### My contacts

#### Contacts in MHRD Meeting
- Options for **Meetings**, **Contacts**, and **Multiple rooms**
  - **Meet now**
  - **Meet later**

#### Settings

#### Rooms

**Main room**
- Participant 7
- Participant 8
- Participant 9
- Participant 10

**Room 1**
- Participant 1
- Participant 2
- Sys Admin
  - Sys Admin 1
  - Sts Admin 2

**Room 2**
- Participant 3
- Participant 4
Breakout Rooms

<table>
<thead>
<tr>
<th>Users</th>
<th>Chat</th>
<th>Viewers</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main room</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stop multiple room meeting
Breakout Rooms: Applications

- **Classroom**: Divide a live class into multiple sub-groups to work on problems
- **Coaching**: Assign a coach to one or more selected students
- **Private Interaction**: Panel of teachers can have their own room
- **Troubleshooting**: Users with technical issues join Breakout with Sys Admins to get help
Automatic Classroom Provisioning

DC service system

Analytics system

Scheduling system

Monitoring system

A-VIEW Classes

A-VIEW Classes Schedules
Automatic Classroom Provisioning - Features

• **Recommend optimal servers using:**
  - Past history: class attendance, geo-distribution of attendees, calculated bandwidth usage
  - Input configuration: expected class attendance and geo-distribution of attendees

• **Special consideration for the below:**
  - Schedule of the Class Series
  - Reward points for institutes with high usage
  - Special meetings (e.g., Government)
### User Management

<table>
<thead>
<tr>
<th>Role</th>
<th>Username</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admin</td>
<td>Admin</td>
<td>Deepak Dev</td>
</tr>
<tr>
<td></td>
<td>Malini</td>
<td>Malini Venugopal</td>
</tr>
<tr>
<td></td>
<td>Arun</td>
<td>Arun Krishnan</td>
</tr>
</tbody>
</table>

Bulk User Management

---

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Bulk User Management - Features

- Bulk User Creation/Deletion/Edits
- Import existing LMS user details
- Automatic user registration for courses
- Hooks for email, reminder integration
- Session report generation hooks
- APIs
**Feature: Centralized Analytics**

**Summary:**
Capture, measure, analyze data to find out the effectiveness of the platform. Acts as a feedback mechanism to the system to reinforce strong practices and strengthen weak links of the platform.

**Overview:**
- Collect and collate usage data
- Throw light on usage pattern across different parameters
- Helps in understanding usage
- Perform course correction for areas which are not well received
Analytics / Effectiveness

Analytics
- System Usage
- Class-level Insights
- Technical Issues

Effectiveness
- Benefit to all Stakeholders
- Reports and Dashboards
System Usage

A-VIEW II

Dashboard | Reports | User Management

Monthly Online Lectures

University
Anna University

Courses
CS 022

Duration
Jan 2014 - Aug 2014

6560
NUMBER OF LECTURES

2132
NUMBER OF STUDENTS

Amrita E-Learning Research Lab © 2015
• How is the system being used?
• What are the most active modules?
• Which areas have issues with Live Interaction (e.g., bandwidth issues)?
• Who are the active colleges?
• What is the distribution across various States?
• Customized for
  – Government Agencies
  – Institute Administrators
  – Teachers and Teaching Assistants
  – Developers
• Zoom-in by Region, State, University, and College
• Scheduled Reports by Email – Daily, Weekly, Monthly
Class Level Insights

Class wise attendees (Avg.) Chart

- Class 1
- Class 2
- Class 3
- Class 4

Registered Users
Actual Attended
Class Level Insights

Lecture wise interaction count

Quiz and polling chart

Video mode and Audio only mode
Class/Lecture Level Insights - Features

• Attendance Percentage
• Live Interaction Ratio
• Percentage of users who are using audio vs. audio-video
• Percentage of users who are participating in Quizzes/Polls etc
• Customized for
  – Government Agencies
  – Institute Administrators
  – Teachers and Teaching Assistants
  – Developers
• Zoom-in by Region, State, University, and College
• Scheduled Reports by Email – Daily, Weekly, Monthly
Benefits to Students

Number of Students Attending Lectures Online

<table>
<thead>
<tr>
<th>College</th>
<th>Maharajas College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture</td>
<td>Physics</td>
</tr>
<tr>
<td>Duration</td>
<td>Jan 2014 - June 2014</td>
</tr>
</tbody>
</table>

- 1600 Number of Lectures
- 800 Number of Students
Classroom Effectiveness
Benefits of Effectiveness Analysis

• **Teaching Community**
  • Understand quality / effectiveness of course content
  • Understand how students are participating in class
  • Understand learning patterns
  • Pinpoint areas needing more Focus (e.g., too easy exams, quiz with poor results)

• **Government Agencies**
  • Understand benefit to students
  • Understand teaching quality
  • Pinpoint E-Learning Adoption Issues across the Country
Phase II – Modules

M1: Implementation for 1 Crore Users

M2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile

M3: A-VIEW on Low-End Mobiles and Tablets

M4: Open A-VIEW

M5: Classroom Surveillance and Monitoring

M6: A-VIEW Producer: Self Recording Lectures

M7: Adaptive Plug and Play Devices

M8: Major A-VIEW Enhancements (User Requests)

M9: Automation Testing & System Integration

M10: Online Collaboration
Module 9: Automation Testing & System Integration

- **Automation Testing**
  - Server / Cloud Validation
  - Client Automation
  - Load Testing
    - Satellite
    - IP Multicast

- **Tools for Deployment Validation**
  - Private Cloud Deployments
  - Self-Check Tools for Admins
Automation Testing & System Integration

- **System Integration**
  - Govt. Cloud
  - University Portal
  - External Course Web Sites

- **Beta Programs**
  - Early Preview for Major Partners
  - Identification of Compatibility Issues
Phase II – Modules

- **M1**: Implementation for 1 Crore Users
- **M2**: Integrated A-VIEW: Satellite, LAN, CDN, Mobile
- **M3**: A-VIEW on Low-End Mobiles and Tablets
- **M4**: Open A-VIEW
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- **M6**: A-VIEW Producer: Self Recording Lectures
- **M7**: Adaptive Plug and Play Devices
- **M8**: Major A-VIEW Enhancements (User Requests)
- **M9**: Automation Testing & System Integration
- **M10**: Online Collaboration
Module 1: Implementation for 1 Crore Users

• **Deploy to 1 Crore Learners and Teachers**
  - Divide the Country into Regions
  - Regional Phased Deployments
  - Bi-Annual Managed Refresh

• **Regional Support Coordinator**
  - Regional Implementation Plan
  - Dedicated Trainings in Selected Cities
  - Minimize Travel Budget for Admins
Implementation for 1 Crore Users

- **Central Deployment Team**
  - Assisted Remote Deployments
  - Regular Online Trainings

- **24x7 Technical Support**
  - Phone / Chat / Email Support
  - Prioritized Ticketing System

- **24x7 IT Support**
  - On-Call System Admins
  - Network Alerting, Escalation
Implementation for 1 Crore Users

- Training & Documentation
  - A-VIEW II Setup & Management
  - A-VIEW II – Configuring and Managing Users
  - A-VIEW II User Guide
  - Videos showing how to use A-VIEW II
  - Mobile App User Guide
  - Videos showing how to use the Mobile App
  - Multi-Language Documentation
  - Multi-Language Trainings
Phase II – Development Modules Overview
A-VIEW Phase II Vision: Crores of Users

Large-Scale
Live
Interactive
Collaborative
E-Learning
Platform
A-VIEW Phase II

A-VIEW: Crores of Users

Free & Open

Low-end Mobiles

Mobile & Tablets

Self Recorded Lectures

Lecture Recordings

Reach at Remote Areas

Satellite

Server Set-up
Open Source Secure

Easy Server Installation

Lakhs of Users

Present 2015

2018
A-VIEW Phase II

**Phase II**
- Crores benefited
- 25,000 Institutions (Higher Edu)
- Large Scale: Schools, Skill Training

**Phase I**
- Lakhs benefited
- 9000+ Institutions (Higher Edu)
- Pilots: Schools, Skill Training
A-VIEW Phase II

SOAR...

to new heights...

Open

Scalable

Accessible

Reliable

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A-VIEW Phase II – Contribution to the Nation

- National Online Real-Time Platform over Internet & Satellite
  - Online Teacher Training
  - E-Learning Tools for Crores of Learners
  - Meeting Tools for Crores of Learners
  - Digital Literacy of Teachers & Students
- Online Exams and Proctoring
- Surveillance, Attendance during Live Classes
- Tool for Self Recording Lectures
Phase II – Modules

M1: Implementation for 1 Crore Users
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M9: Automation Testing & System Integration
M10: Online Collaboration
Module 2: Integrated A-VIEW: Satellite, LAN, CDN, Mobile

- Teacher
- Teacher Assistant
- System Admin
- Monitor
- Live Users
- DTH/Satellite

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• Massive Live Classrooms
  • Multicast / Unicast Video Delivery Network
  • Satellite Delivery for Remote Areas
• A-VIEW User Ids for Students and Teachers
  • Easy / Free Sign-Up
# A-VIEW as a MOOC Plug-In

<table>
<thead>
<tr>
<th>MOOC</th>
<th>Online Real-Time Platform (A-VIEW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pre-recorded Learning Videos</td>
<td>• Live Classes</td>
</tr>
<tr>
<td>• Blogs / Wikis</td>
<td>• Lecture Recordings</td>
</tr>
<tr>
<td>• Course Building – Teachers</td>
<td>• Instant Poll / Quiz</td>
</tr>
<tr>
<td>• Course Building - Students</td>
<td>• Mobile Chat</td>
</tr>
<tr>
<td>• Online Assessments</td>
<td>• Online Surveillance, Proctoring</td>
</tr>
<tr>
<td>• Discussion Forum</td>
<td></td>
</tr>
</tbody>
</table>
JNTU Kakinada Case Study

• Semester-wise MOOC Program
  – 2 Courses
  – 1000 Students

• JNTUK-Hosted MOOC Web Site
  – Learning Materials
  – Self Assessments
  – Discussion Forum

• http://jntukucev.ac.in/moocs-schedule/
MOOCs Schedule

Software Engineering in Practice

Monday and Thursday 10.00 A.M to 12.00 P.M from 17-08-2015 (Through WebEx)
Attendance is compulsory for this course
Audit course will be displayed on the marks memo
Regarding Examination: Decision will be intimated soon

Big Data Analytics

Monday, Wednesday and Friday 2.00 P.M to 3.00 P.M from 17-08-2015 (Through A-View)
Attendance is compulsory for this course
Internal and External Examinations-same as regular elective subjects
Online questions will be given by JNTUK. Descriptive paper will be given by Internal Mentor
Same credits as regular Elective subjects

Computer Aided Engineering

Tuesday and Thursday 2.30 P.M to 4.30 P.M from 26-08-2015 (Through A-View)
Attendance is compulsory for this course
Internal and External Examinations-same as regular elective subjects
Same credits as regular Elective subjects
A-VIEW as a Plug-In for JNTU-K MOOC

• Using A-VIEW as Plug-In for:
  – Live Lectures
  – Doubt Clearance Sessions
  – Class Monitoring
  – Live Lecture Recording

• Provide a complete Blended Learning Platform
JNTU Kakinada Next Semester

• Core Subjects Offered MOOC-Style
  – 263 Affiliate Colleges
  – 50,000 Students
• Live Lectures
• Doubt Clearance Sessions
• Teacher Self Recording
Blended Doubt Clearance
Carbon

Carbon is perhaps the most important elementary material of life, period. Sun, there are many other materials which life would not exist, but from the spiral backbone of DNA to the intricate rings and arrangements of the molecules and proteins, carbon is the element whose unique properties are not only important, but also unique. The word "carbon compound" alone is enough to separate out carbon chemistry.

Carbon is the foundation of all life on earth; carbon also forms diamonds that have been known since ancient times and are still used today.

Diamonds are a common example of carbon, as they form in nature and are used in industry. Carbon also forms graphite, which is used in pencils and other applications.

Carbon is also used in the production of steel, which is used in a variety of applications, including construction and automotive parts.

Carbon is a versatile material that can be used in a variety of applications, from electronics to aerospace engineering.

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Module 3: A-VIEW on Low-End Mobiles and Tablets

Live Sessions
Tap to get into the class

- Introduction to MongoDB using the MEAN Stack
  5 September 2015, 4:00 am to 6 am
- Statistical Thinking for Data Science and Analytics
  5 September 2015, 4:00 am to 6 am
- IELTS Academic Test Preparation
  5 September 2015, 4:00 am to 6 am
- Entrepreneurship: Who is your customer?
  5 September 2015, 4:00 am to 6 am

Poll
What Impact Has Social Media Truly Had On Society

- Agree
- Disagree

Session: Introduction to Social Media Impact

Amrita E-Learning Research Lab © 2015
A-VIEW on Low-End Mobiles and Tablets

- Personalized Learning
- Whatsapp of Education
- Low-end phones and tablets
- Live Immediate Feedback
- Massive Live Classes (~1 Lakh Learners)
Mobile Chat

A-VIEW Lite

Chat

Hello Sir, Please explain new features...
Arun Krishnan
09:25, 10 September 15

Twitter Bootstrap New Version features
Moderator
09:25, 10 September 15

It is HTML5 & CSS3 based framework for responsive
Kalkan
09:25, 10 September 15

Floxbox support is the major feature
Moderator
09:25, 10 September 15

Type a message

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Moderator: Any Questions?
TA: What is the phase difference between two windings of A.C servomotor?
Akhila: Relative permittivity
Module 4: Open A-VIEW – API for Blended Learning

Watch Learning Materials

Local Classroom

Assessment

Online Collaboration

Virtual Classroom

Low Bandwidth Mobile Application

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Open A-VIEW

• Open APIs for Integration to provide Live Classes

• Easy Integration into:
  – University Portals
  – Government Portals
  – LMS/CMS Platforms
A-VIEW as a Plug-In

• A-VIEW can act as a Plug-In for:
  – Live Sessions
  – Online Chat Rooms
  – Proctoring / Exam Surveillance
  – Teacher Self-Recording of Lectures

• Provide a complete Blended Learning Platform
• Open Source
  • Open Source (Git Hub)

• Zero-Cost Server Software
  • Red5-based Video Conferencing Server
  • Open Source / Free Server Components
Module 5: Classroom Surveillance and Monitoring

A-VIEW II
University Control Panel
Monitoring | Plugins | Users

Classroom Monitoring

- 50 Students
- 75 Students
- 20 Students
- 48 Students
- 15 Students
- 45 Students

- Arun Krishnan
- Veena
- Vijayakumar
- Sunil Kumar
- Naveen Narayan
- Prasanth M
- Athi Narayanan
- Ashish
- Hareesh
- krishnakumar

- Neema
  - Abhirami
  - Sethu
  - Dharmik Dev
  - Swathik
  - Thumby

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Classroom Surveillance and Monitoring

• **Class Surveillance / Monitoring**
  • Monitor Classes Remotely
  • Automatic Snapshot at Regular Intervals
  • Audit Functionality

• **Automatic Handraise**
Module 6: A-VIEW Producer: Self Recorded Lectures

A-VIEW Producer

Carbon

Carbon is one of the most important elements of life. Period, sun, there are many others without which life would not exist, but from the spiral backbone of DNA to the intricate rings and movements of the molecule and proteins, carbon is the element whose unique properties make it all important. The very term "organic compound" originally referred exclusively to molecules containing carbon.

Not only does it make up the foundation of all life on earth, carbon also forms diamonds, that hardest known substance (at least for now, challenges are discussed under herein, perhaps). But contrary to popular belief, diamonds are not particularly rare, nor are they unusually beautiful, nor are they forever. All of these are myths created by the DeBeers diamond company. Diamonds would cost a penny or much less for a few private diamond collectors.

Diamonds are formed in the earth's crust under tremendous heat and pressure, leading to the formation of these beautiful, crystalline substances. Unlike other minerals, diamonds are often found near the surface of the earth.

Carbon has become a focus of political controversy recently due to the fact that our civilization is highly dependent on it. The use of carbon compounds has increased dramatically in the last century, leading to concerns about their impact on the environment.

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Video answers to Questions

Question 2
What are the new features in HTML5?

Answer by Teacher

A-VIEW SESSION
Recorded Video

Answer by Teacher Assistant

HTML5 is a core technology markup language of the Internet used for structuring and presenting content for the World Wide Web. As of October 2014 [update] this is the final and complete fifth revision of the HTML standard of the World Wide Web Consortium (W3C). The previous version, HTML 4, was standardised in 1997.

Enter your answer

Submit
A-VIEW Producer: Self Recorded Lectures

• MP4 self recording by teachers
• Integration for easy Course Creation
• Customize Class Lectures
• Self-contained, no external software needed
A-VIEW Producer: Self Recorded Lectures

- Upload to Lecture Web Site
- Any platform, any language
- Class lectures automatically recorded
- Doubt clearance mechanism
Module 7: Adaptive Plug and Play Devices
Adaptive Plug and Play Devices

- Adaptive Video Quality
  - Automatically reduce/increase video bandwidth
  - Manual User Overrides

- Plug and Play Devices
  - Device Certification
  - Support for Wide-Variety of Devices
Module 8: Major A-VIEW Enhancements (User Requests)

- Breakout Rooms
  - Group Work
  - Coaching
- Ease of Administration
  - Bulk User Management
  - Automatic Class Provisioning
- Analytics
  - Effectiveness
  - Dashboards
Module 9: Automation Testing & System Integration

• Automation Testing
  • Server / Cloud Validation
  • Client Automation
  • Load Testing
    • Satellite
    • IP Multicast

• Tools for Deployment Validation
  • Private Cloud Deployments
  • Self-Check Tools for Admins
• **System Integration**
  - Govt. Cloud
  - University Portal
  - LMS/CMS Libraries
  - External Course Web Sites

• **Beta Programs**
  - Early Preview for Major Partners
  - Identification of Compatibility Issues
Module 1: Implementation for 1 Crore Users

• **Deploy to 1 Crore Learners and Teachers**
  - Divide the Country into Regions
  - Regional Phased Deployments
  - Bi-Annual Managed Refresh

• **Regional Support Coordinator**
  - Regional Implementation Plan
  - Dedicated Trainings in Selected Cities
  - Minimize Travel Budget for Admins
Implementation for 1 Crore Users

• **Central Deployment Team**
  • Assisted Remote Deployments
  • Regular Online Trainings

• **24x7 Technical Support**
  • Phone / Chat / Email Support
  • Prioritized Ticketing System

• **24x7 IT Support**
  • On-Call System Admins
  • Network Alerting, Escalation
Implementation for 1 Crore Users

• Training & Documentation
  • A-VIEW II Setup & Management
  • A-VIEW II – Configuring and Managing Users
  • A-VIEW II User Guide
  • Videos showing how to use A-VIEW II
  • Mobile App User Guide
  • Videos showing how to use the Mobile App
  • Multi-Language Documentation
  • Multi-Language Trainings
Thank You
A-VIEW Phase 1 Grants Status
## Grants Overview

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Amt</th>
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<tr>
<td>Total Project Approval</td>
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<tr>
<td>Released to IIT-B vide PAB approval in Dec 2010</td>
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<td>Released to IIT-B vide PAB approval in Dec 2011</td>
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<td>Total Grants –in-aid released from NMEICT:</td>
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<td>Balance to be received from NMEICT</td>
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Grants Timeline

• 2009
  – PAB approves AVIEW Project for 34.36 Crores
  – Rs. 10.34 Crores released from NMEICT to IIT-B
  – Rs. 10.34 Crores received at Amrita University

• December 09, 2011
  – PAB Approves Second Instalment of 24.12 Crores to IIT-B
  – NMEICT transfers a sum of Rs. 19.61 Crores against the approved 24.12 crores
  – Rs. 19.61 Crores received at Amrita University in instalments
  – Balance of Rs. 4.51 Crores not released, still available at NMEICT
Grants Timeline

• July 16 2015
  – AVIEW Project Phase 1 completed
  – AVIEW project borrows Rs. 4.51 Crores from Amrita University
  – PRSG accepts completion of deliverables
  – Recommends release of balance 4.51 Crores

• Requesting release of Rs. 4.51 Crores