FORMATS FOR SUBMISSION OF PROJECTS UNDER THE MISSION ON EDUCATION THROUGH INFORMATION AND COMMUNICATION TECHNOLOGY

(To be filled by applicant)

1. Project Title : Text Transcription of Technical Video Lectures and Creation of Searchable Video Index, Metadata and Online Quizzes

2. Broad Subject: Video content digitization, conversion, chunking and dubbing CEC / IGNOU / NCERT / SIET / OTHERS

3. Sub Area: Video Content digitization

4. Duration in months: 24 months

5. Total cost: Rs. 3,15,00,000 (Rupees Three Crores and Fifteen Lakhs)

6. Project Category: (Research/software development/Content Development /Training/other) Research/Content Development

7. Principal Investigator: **Dr. Mangala Sunder Krishnan**

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21. Project summary (maximum 500 words) :

The National Programme on Technology Enhanced Learning (NPTEL), proposed for the first time in 1999 by Professor M. S. Ananth, Director, IIT Madras and funded by the Ministry of Human Resource Development, Government of India, has developed curriculum based course contents for more than 240 engineering courses in five disciplines at the undergraduate level. The programme has been executed jointly by all seven Indian Institutes of Technology (Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras and Roorkee) and the Indian Institute of Science, Bangalore. More than 350 faculty members from the above have participated in the programme to develop content. It is coordinated by the IIT Madras.

The disciplines covered are Civil Engineering, Computer Science and Engineering, Electrical Engineering, Electronics and Communication Engineering, Mechanical Engineering and Core science, Management Studies and Language courses that all engineering students are required to take. The course contents are available freely on the Internet (URL: http://nptel.iitm.ac.in). The courses have been prepared in two formats, namely as web based lectures (slides, chapters or modules with animations), or as a sequence of thirty to fifty video recorded lectures of one hour duration each. They are modularized in such a way that a large part of each course covers basic learning materials for different University syllabi throughout the world on that topic. The contents of video lectures are available as video streams on demand through the generous offer of free web hosting by YouTube (channel: http://www.youtube.com/iit).

The video archive that has been created through this project is the single largest open video archive containing contents in engineering and technical courses at the undergraduate level anywhere in the world. Contributed by more than 200 faculty members from all partner Institutions in this project, it is also a unique exercise in which eight competing Indian academic institutions of international repute have worked together to deliver for a common cause, namely, improve current engineering education in India and at the same time, provide for any student in the world to undertake a systematic and self-study of engineering concepts. Approximately 5,000 one hour video lectures have been recorded under this programme. More than 3,500 hours have been made available already through the

above site, with the rest to be uploaded within the next few months. Many different styles and pedagogies have been accommodated using a few simple guidelines for faculty contributors to adopt in content creation through the video and the web. The web based contents are already registered with Google Analytics and the statistics provided by Google is being used to study the effectiveness of this programme.

22. Key words: Information retrieval, extraction and organization, multi-media search, education innovation

23. Technical details:

- Accurately transcribed and certified text files with video images of all lectures from 5,000 hours of video lectures. Approximately 70,000 print pages (A4) will be made available for online access. The text files will be certified by the faculty who developed the video courses. This will enable viewers to browse through authenticated text contents of 5,000 hours of engineering lessons in video and search for specific topics with the help of powerful search engines.
- A programme for online quiz and self-evaluation by students in these courses through the Internet.
- Creation of a thesaurus of Indian pronunciation of technical terms as a suitable database for future research in speech-to-text translation using AI and other search algorithms.
- Extensive indexing of videos for enabling search tools to search through the video.
- The creation of text files to act as catalysts to the design and development of digital and online text books in engineering by the faculty.

24. Introduction: Accurate text transcription of videos with spoken lecture content enables the viewer of the video with unambiguous content and the searcher with indexes, keywords and other web tools without having to listen to the video completely. In addition, creation of a large number of such examples manually in the Indian context where spoken English has many different accents, helps in the development of algorithms for accurate speech-to-text that will enable future conversions to be automated by well-defined boot-strapping procedures. In addition it will enable automatic translation of content in English to other national languages in India and enable education to be spread far and wide in our country.

24.1. Origin of the proposal: The availability of a large number of video files in technical education and the possibility of creating many thousands of videos in the

near future in science, engineering, humanities, social sciences, law, commerce, agriculture etc. through implementation of the National Mission on Education Though Information and Communication Technology lead to the question of how access to information can be facilitated. The conversion of video files to text files either through the use of software or through manual operations when such software is not available, enables efficient search as well as translation of the content into many Indian languages and thus help students and teachers learn the concepts without the immediate burden of a mastery of English language. Scientific vocabulary also gets built in many languages over a period of time through constant efforts.

24.2. Definition of the problem:

1. A large number of video archives in education is not searchable through software due to images and non-standard text representations in the videos. While considerable effort is being made by the Western countries to develop software for transcribing into text form plain audio files and speech in a video into text through automated procedures, the efforts in India have been fragmented.

2.

24.3. Objective

- To create accurate text transcriptions of NPTEL video lectures in engineering sciences from Phase I and other metadata for video indexing and searching
- To use the transcribed text and the video to set up a tutored online programme of quizzes for self-evaluation by users
- To create a suitable database for AI algorithms in speech recognition (Indian English)

25. Alignment with the Mission Objective

25.1 Importance of the proposed project in the context of current mission

The videos were initially recorded in the DVCAM format so as to permit their broadcast through Television channels. However the availability of MPEG4 Part 10 standard has led to the encoding of videos in this format at multiple bit rates to enable continuous streaming with low bandwidth (with a bit rate between 128 and 512 kbps) for personal viewing to streaming for a classroom projection at high bit rate (2 mbps). However a comprehensive indexing of videos through automated software solutions appears unrealistic at present. Indexing high quality educational videos enriches lifelong and just-in-time learning programmes considerably since segments of videos can be instantly made available to the viewer through

appropriate keyword and other more efficient context-specific searches. Powerful search engines such as that provided by Google will enrich the learning experience when coupled with this effort.

In addition, a full-text transcript of these videos is desirable for effective use of the video lecture contents as all of the speakers in this programme so far are non-native English speakers. Also Indian English is well-known for its rich diversity in pronunciation and it is desirable for the listener to associate spoken words with a clear, unambiguous text which matches one-to-one with the speech. This will lead to creation of world-class text books in more than 100 technical subjects at the same time. There are no automatic speech-to-text translations which are more than 50 percent efficient for obtaining machine translations of Indian English with its varying dialects. The text, annotated with video-time markers and keywords along with full search capability through HTML, XML and other special outputs such as PDF will ensure the fully optimized and truly open video lectures through text search. Metadata can be created and other standards based on SCORM can be implemented to enable reusability of content between different learning management systems.

The project will result also in the creation of a large thesaurus in technical education which can be used in future implementations of speech-text translation algorithms. All video courses developed in NPTEL Phase I will be employed for the above. This will also result in about 60,000-70,000 normal (Letter or A4) print-ready pages of engineering content as a digital repository for the world.

It is proposed to conduct online quizzes which are voluntary for students and which will help them understand the lectures better and focus their learning aptitudes. They will also know their relative standing in a peer group over a period of time through statistics generated online. The process will also help the teachers of the course to refine their contents. Tools provided freely on the Internet will be made use of.

25.2 Review of expertise available with proposed investigating group/institution in the subject of the project

26. Detailed Work plan

26.1. Methodology

26.2. Organisation of work elements

26.3. Time schedule of activities giving milestones (also append to bar diagram)

26.4. Suggested plan of action for utilization of outcome expected from the project.

Indian Institute of Technology Madras has an excellent web and video studio where some part of the activities related to metadata creation, thesaurus, RSS feeds, Wiki Development, online quizzes can be carried out with the help of suitably trained engineering and science graduates. It is proposed to employ about five to ten associates for this purpose for the entire duration of the project.

Text transcription of video will be done semi-automatically by engaging private companies in and around Chennai and using the expertise available in speech recognition technology at IIT Madras. To enable this, the video lectures will be transcribed first using private agencies. The transcribed data will then be used to train an Indian English Speech recognition system. The data from future recordings will be transcribed using the bootstrapped speech recognition system. Transcription is one of the most expensive activities and will utilize about 40 percent of the project costs for approximately 5000 video hours. To establish a working model at the end of this project, and to ensure that faculty who delivered the video lectures are available for authenticating the transcript, a small token honorarium is proposed to all the faculty who will authenticate the text created by the project team. An extensive index of keywords and technical terms will also be created with their help. A thesaurus of these words will be generated for use with a speech-to-text transcription system such as Dragon Naturally Speaking (or any other appropriate software). This will enable the development of a fully automatic transcription program for future when video recordings will be made as part of the second and third phases of the NPTEL programme. A future application could also be the development of audio indexing tools and standalone audio tracks of the video lectures. Together with the transcribed and edited text slides and quizzes, the audio can provide a low-cost substitute to a band-width intensive video transmission.

A national video server will be located at IIT Madras to permit concurrent access of videos, text and search indices by several thousands at any time and the service will be provided uninterrupted. Scalable processors for such activities are needed with a

cluster containing at least thirty two nodes, and preferably 64 nodes as past experiences show.

27. BUDGET ESTIMATES: SUMMARY

	Item	BUDGET		(in lakhs of Rupees)
		1st Year	2nd Year	Total
A.	Recurring			
	1.Salaries/wages	Rs.89,40,000	Rs.89,40,000	Rs.1,78,80,000
	2. Consumables	Rs.60,000	Rs.60,000	Rs.1,20,000
	3. Travel	Rs. 2,00,000	Rs. 2,00,000	Rs. 4,00,000
	4. Other costs	Rs. 2,50,000	Rs. 2,50,000	Rs. 5,00,000
B.	Equipment			Rs.1,26,00,000
	Grand total (A+B)			**Rs.3,15,00,000**

28. BUDGET FOR SALARIES/WAGES

		(in Rupees)		
		1st Year (m.m.*)	2nd Year (m.m.)	Total (m.m.)
Designation & number of persons	Monthly Emoluments			
A programmer/System Analyst with three	Rs. 25,000	Rs. 3,00,000	Rs. 3,00,000	**Rs. 6,00,000**

to five years of experience for two years				
Six Project Associates for each branch of Engineering/Core Science video program two years	Rs. 15, 000	Rs. 10,80,000	Rs. 10,80,000	**Rs. 21,60,000**
One attendant	Rs. 5,000	Rs.60,000	Rs.60,000	**Rs. 1,20,000**
Honoraria payments to faculty for authenticating course contents (120 Course)	Rs. 25,000 per course	Rs. 15,00,000	Rs. 15,00,000	**Rs. 30,00,000**
Outsourcing transcription for 5000 video hours to produce text and time-line indexed videos	Rs. 2,400 per lecture	Rs.60,00,000	Rs.60,00,000	**Rs.1,20,00,000**
Total				**Rs.1,78,80,000**

29. Justification for the manpower requirement.

30. BUDGET FOR CONSUMABLE MATERIALS

N	**n**	**BUDGET**		**(in Rupees)**
Item		**1st Year**	**2nd Year**	**Total**
	Other consumables	Rs. 60,000	Rs. 60,000	Rs. 1,20,000
Total				**Rs. 1,20,000**

31. BUDGET FOR TRAVEL

		BUDGET		(in Rupees)
		1st Year	**2nd Year**	**Total**
Coordinator travel	Travel (Only inland travel)	Rs. 2,00,000	Rs. 2,00,000	**Rs. 4,00,000**
	Travel abroad (specify details)			

33.1. Justification for intensive travel, if any.

34. BUDGET FOR OTHER COSTS/CONTINGENCIES

		BUDGET		(in Rupees)
		1st Year	**2nd Year**	**Total**
	One Workshop with about fifty participants to understand the technology and provide feedback on the text transcription procedures and content costs	Rs. 2,50,000	Rs. 2,50,000	**Rs. 5,00,000**

34.1 Justification for specific costs under other costs, if any.

35. BUDGET FOR EQUIPMENT (Computers, peripherals contingency, consumables):

Sl. No.	**Generic name of the Equipment along with make & model**	**Imported /Indigenous**	**Estimated Costs (in Foreign Currency also)***	**Spare time for other users (in %)**
1	Two high speed scanners		Rs. 50,000	
2	A high quality laser printer		Rs. 50,000	
3	Contingency expenses for stationeries, other computer		Rs. 5,00,000	

	peripherals, Eight Desktop servers for the Associates			
4	High end server with 32-64 processors, adequate memory, storage and warranty or three years for providing access to all the contents and video lectures through the servers for national access A formal quotation from one of the vendors is attached along with the proposal as a basis for arriving at this limit.		Rs 1,20,00,000 (Rs. 120 lakhs)	
	Total		**Rs.1,26,00,000**	

35.1. Justification for the proposed equipment.

36. Time Schedule of Activities through BAR Diagram

37. Detailed Bio-data of the Investigator(s)/Co-Investigator(s) including Name, Address, Date of Birth, Institution's Address etc. Academic Qualifications (University/College from where attained, year of passing, class, Thesis title, publications list (Title of paper, authors, Journal details, pages, year etc.))

Who are eligible to apply?

Paste from the Mission document here.

General Guidelines

1. The project proposals for consideration under the Mission can be submitted anytime throughout the year.
2. The Investigators may submit 5 copies of the proposal printed on both the sides of A4 size paper, properly stapled and without spiral binding along with an electronic version in the form of pdf only to the Joint Secretary, Distance Education (address given below)

3. The proposal should be prepared and submitted strictly according to the formats prescribed in this document. Please use double space to type the document.
4. The maximum duration of the project should not go beyond June 30, 2012, the end of the Plan period

GENERAL TERMS AND CONDITIONS

1. All potential investigators are required to read the Mission document in detail and propose activities only under the stated objectives of the Mission.
2. The Principal Institution implementing the project assumes financial and other
3. In case of multi-institutional project the Principal Investigator (PI) has to obtain formal agreement from the collaborating institutions/scientists.
4. International travel is permissible under the project subject to approval by the Project Approval Board.
5. The manpower recruited for the project are temporary and should be paid as per the rules of the institute and guidelines of the Govt. of India.
6. It is the policy of MHRD to make all the output / contents / software developed under this programme to the public through Sakshat portal. All copyrights must therefore be such that no part of the project outcome can be made inaccessible. 6. The proposals are scrutinized by experts in the field and after a peer review by PAC/Expert Committee, the SERC takes the decision.
7. The role of the Co-PI(s) in the project should be clearly spelt out.