Project: Novel Educational / Pedagogical application on Aakash platform (Control Number:-AOT18011212366)

**The major objectives of this project as laid out in the proposal are:**

1. Identify the required set of rich applications to be ported to Aakash
2. Port/Create the Educational Software for students from basic learning to advanced learning with animated video contents
3. Tools to assist Teachers
   1. To create content for teachers
   2. To manage large set of on-line students learning progress
4. Educational Content delivery tools such as:
   1. Large Scale Video Streaming software
   2. Teacher assisted on-line student exercise tools
   3. On-line exam tools
   4. Central Educational content repository
   5. Cloud based Tools for Teachers and Students
5. Tools to assist Students
   1. Organize educational content
   2. Organize learning schedule
   3. Monitor the learning progress
   4. Newer data interpretation tools

6. Pedagogical applications for

i) Interactive class room Response system application

ii) Participatory simulations between a group of students & teachers

iii) Collaborative data gathering applications

**Approach**

To create the educational ecosystem with high quality educational content and software tools to deliver the content and manage the learning process, we propose to create a team of skilled people. We propose to set up a team from 5 IITs, led by TCOE, IIT Madras. This team will study the available software tools and the required tools for Indian rural students and teachers. This study will provide the list of tools/contents to be ported / created. This study will provide detailed localization requirements.

**Project Calendar and Cost:**

Duration of this project: 2 years

Participation: TCOE IIT Madras (lead member) and other four IITs

|  |  |  |  |
| --- | --- | --- | --- |
|  | **First Year** | **Second Year** | **Total** |
| Human Resource | 1.25 Cr. | 1.25 Cr. | 2,5Cr. |
| Travel and Institute overheads | 35 Lakhs | 40 Lakhs | 0.75 Cr |
| Hardware Platform /software tools | 13 Lakhs | 12 Lakhs | 0.25Cr |
| Content Creation | 25 Lakhs | 25 Lakhs | 0.5 Cr |
| Test Tools | 25 Lakhs | 25 Lakhs | 0.5 Cr. |
| Field Trials | 10 Lakhs | 40 Lakhs | 0.5Cr |
|  |  |  | **5 Cr.** |

Status Update Report as of March 2013

**Lead: Ms. Gayathri Gurumurthy**

**Aakash Application Development Lab:**

1. **All AADL Meeting: 11 March, 2013**

* A meeting of all six participating IITs namely: IIT Madras, IIT Bombay, IIT Mandi, IIT Kanpur, IIT Kharagpur and IIT Guwahati took place on 11 March 2013, at CDAC Noida.
* Each AADL presented their plans and on-going activities in student training and application development. The following were decided in the meeting:

1. **Student Training and App Development:**
   * Each IIT to train close to 400-500 students
   * In the long run inter-IIT trainings over NKN can also be conducted
   * Encourage students to develop interesting applications on android
   * Each IIT to set up forum were participating students can register and form a community of app developers
   * In the long run, to set up forum where student developers across IITs can participate and interact with each other – IIT Kgp will be responsible for the same.
   * Conduct inter AADL competitions over summer for student app developers
2. **Localization Support:**

* CDAC Noida and IIT Kgp to work on the same

1. **Virtual Labs:**

* Explore the use of Virtual Labs already developed by IITM, IITB, Amrita and CDAC under various NME-ICT initiatives

1. **eBook:**

* IITM has developed the tool to author eBooks
* Each lab to use the tool to publish eBooks

1. **Mirror Server:**

* To decide on specifications of Mirror Server for connectivity and access to eContent, which will be set up in the meanwhile fibre connectivity reaches every institution
* IITM to come up with specs.

1. **Education Technologies and application being developed**

The following tools/platforms have been developed and in various stages of development and implementation in each of the AADLs.

**IIT Madras**

1. **Interactive Digital Book Platform**

* Tool for authoring and presenting Digital content and consists of the following modules:
* **Web based authoring/publishing tool** to create eBook using multimedia content such as videos, animation, images, reference links, presentations and quiz modules in addition to core text material
* **Android based tablet application** for the student where similar to any conventional book; every topic has text material along with all of the above mentioned resources in one platform. Also embedded is a dictionary for reference and translation module that helps in translation of words and phrases into few Indian languages to start with. Features such as bookmarking, note taking and worksheets are embedded with the eBook.

**Next Steps:**

* Plan to use the eBook by AADLs from all IITs for books that are lapse copyright and also for curriculum based courses to work with IIT professors to publish content on eBook.
* To add to the eBook, an activity log and analytics module is being developed that captures every stroke of the student on the tablet and analytics on gathered data can provide feedback/reports to students/teachers/parents on the following and many more parameters.
* What the student studied?
* For how long?
* How many times?
* What time of the day?
* How many times was quiz attempted?
* Performance history

1. **e Quiz and eEvaluation Application:** A quiz application has been developed for both objective (exact answer) as well as subjective (essay) assessments. The quiz module has different types/formats of quizzes such as:

* **Objective Type:**
* Fill-in-the Blanks
* Match the following
* Drag and drop
* Multiple Choice Questions (MCQ)
* True-False
* **Subjective Type:**
* Worksheet were short answers can be written using stylus or can be typed in using the keypad on Aakash
* Worksheet also has paint, draw, scribble features which enables drawing of figures, writing equations, etc. for answers

**e Evaluation module:**

* **For objective type quiz:** The evaluation is automatic system evaluation
* **For Subjective type quiz:** Where human intervention is required, a unique ‘peer evaluation’ system has been developed where the subjective questions are separated from the objective ones and are sent to assigned ‘evaluators’. These evaluators based on the key/template evaluate the answers and send it back to the server. It is important to note that each/every question is sent to 3 assigned evaluators ‘A,B,C’ in order to compare their scores/evaluation of the same question. If the scores across evaluators varies too much then it needs to be sent for re evaluation to another 4th examiner.

1. **Examination Management System:**

This is a platform developed to conduct large scale exams such as IIT/JEE, UPSC, and other national level exams. These exams are conducted amongst large groups of people in distributed geographical locations. This platform will help in conducting the exams in a secure and efficient manner.

* The platform consists of a central server (CS), exam room server (ERS) and the tablets in which the exam is taken.
* The CS is where the question paper, answer keys, exam centre details, students taking the exams and other exam related details are uploaded and stored in an encrypted format.
* Each exam centre has ERS (laptops preferably) that communicate with the CS and can access the question paper.
* The students in these exam centres take their exams in tablets which run a unique exam application. Only tablets with this application can access the ERS and the questions in turn. The questions are decrypted only on reaching the student tablet and they are given to the students one after the other and in a random order (varies from student to student). On answering the question, it is submitted back to the CS, where the evaluation takes place and the report can be generated at a later point.
* Both Subjective as well as objective type questions and evaluation can be carried it out in this platform
* Testing of the platform in progress

1. **Live Lecture Application:**

Web based platform that enables the delivery of live broadcast lectures using network connectivity. The platform can be used in a scenario where a lecturer located in one place using the tool can deliver live lectures to many students who are geographically distributed. The features of the platform include:

* Live video streaming
* White board application running on the tablet/device of the lecturer which reflects on every students screen
* Document sharing—pdf, presentation, external links etc.
* Quiz module
* Quick notes
* Synchronous View
* PTT, Rise Hand for asking doubts
* Group chat (lecturer and institute co ordinator)
* Classroom chat

1. **Collaborative Learning Platform:**

Platform that enables small groups of 8-10 students to form virtual groups with/without the presence of a teacher/tutor to study together. The platform enables synchronous learning in real-time amongst students who want to study/work together but cannot come together at the same time. It enables interactivity among the students with features like document sharing, screen sharing, text/voice chat, live video streaming for video conferencing, and synchronous video viewing such that when a video is stopped, played, forwarded/rewound in one computer reflects on other users’ screens as well.

**IIT Kanpur**

1. **Port Magic- Teaching electronics with Aakash Tablet**

This work explores how the computing power of the modern mobile devices can be utilized for developing a mobile application platform for the embedded world. After a few versions, final prototype software development platform “PortMagic” was built for Android, which provides a simple but rich language and could support all Arduino (an Open Source Electronic development platform) projects (sketch is the term used by Arduino community) available across the web. The application is a standalone platform for creating, editing and compiling projects, and programming Arduino boards through USB port.

PortMagic allows it to be used as an educational toolkit for teaching the functioning of electronic components, sensors and other devices through the microcontrollers. It provides a simple learning tool for understanding embedded programming concepts. It can be used an independent mobile platform for advanced embedded programmers.

1. **Apps for the differently abled**

The main objective of this project is to create new apps for the children with special needs or mentally challenged children.

Here is a sample list of apps we have in mind:

* Functional literacy- Hindi and English functional Vocabulary ( with Phonological awareness)
* Words with picture cards
* Functional Numeracy: Number concept, functional money concept, basic counting, identifying   different shapes and sizes.
* Communication aid- Facilitate the children for making their own choices to communicate about the things that they require for their daily living. For this create different blocks of picture card data-base for all the common needs and the things that the child will need to use at home and at school.

**IIT Kharagpur**

1. **Development of an Online Repository of Picture Library:**

This Picture Library project is an online repository of a set of more than 1200 standard icons that are used by people with Severe Speech and Motor Impairment (SSMI) to communicate their daily needs. These Icons have been developed by Indian Institute of Cerebral Palsy, Kolkata and are available in both colored as well as grey scale. The icons dictionary is freely available from <http://aadl-iitkgp.nltr.org/>

1. **Development of Aakash Bani:**

A Voice Output Communication Aid (VOCA) is an electrical device that assists people who are unable to use natural speech to express their needs and exchange information with other people during a conversation. The VOCAs store pre-recorded messages, which are produced in the form of digitized speech when the user presses an image. The most elaborate VOCAs include software that allows users to create and combine words to produce novel utterances in the form of computerized synthetic speech. IIT Kharagpur in association with Society for Natural Language Technology Research, Kolkata has recently developed a VOCA system for people with autism. This would definitely enable autistic persons to use tablets running on Android platform seamlessly.

**Key Features:**

* Can be customized as per the needs of the user.
* No. of grids may be increased or decreased.
* Grids can be modified, changed, edited.
* Provision for sound recording in .mp3 format.

1. **Development of Talking Keyboard**

A talking keyboard is a specially designed tool that allows people with motor disorder to seamlessly type texts in android based tablets. The keyboard is integrated with automatic scanning mechanisms and pre recorded audio files of individual alphabets that help the target population to type as well as listen to the typed letter.

**IIT Mandi**

1. **Data Structure Simulation:** This app will ease the understanding of the data structure and various algorithms.
2. **Interactive e-Book:**  Developing interactive eBook for various engineering subjects to help students in their studies because larger numbers of graduate students are more favorably leaning to e-books.
3. **Doubt Buster:** It’s a teacher student interaction application to solve doubts regarding any stream anytime.
4. **E-Blackboard**: This application provides interface for free hand writing to take notes. It also contains toolbar of different elements such as: pencil, color, shapes etc.
5. **Easy Engineering:** This application is to perform a role of a handy pocket reference guide for students stepping into engineering colleges who need guidance on different aspects of engineering courses.
6. **Note Mania:** This app is intended especially for the students to make study easier i.e. taking notes, remembering the important things, setting up the reminders to get alerts about projects/assignments etc.
7. **Aakash Ayurveda:** It is simple but useful Educational App that makes students aware about various Ayurvedic plants of Himachal region. The information that app contains mainly include plant name, plant common name and medicinal properties. It also provide offline as well as online quiz mode.

**IIT Guwahati**

* 1. **Speak2Learn:** This application teaches alphabets to kindergarten students through interactive pictures and audio. It recognizes the word spelt by the user to verify against the picture and help the user to learn alphabets in an interactive fashion.
  2. **Formula App:** This application has support to evaluate mathematical formulae and teach students to learn periodic tables, calculus, algebraic equations and few other scientific tools for engineering students.
  3. **Library Book Reminder:** This application helps a student in campus to automatically keep track of his library account details and set reminders for due dates of books issued. It can work on campus wireless network and can also work in offline mode with inputs provided by the user.
  4. **Mess Calorie Calculator:** This application acts as a calorie counter for Indian food items served in hostel mess and can suggest health diet plan for the students eating in hostel.
  5. **Note Taking App:** This application integrates the academic calendar of a student with an application to write lecture notes. The application takes the academic calendar of the student and automatically identifies the lecture a student is supposed to attend at a time. Any notes taken during the time is written into the notes corresponding to the subject. The application gathers lecture notes for different subjects at the end of the week and helps in the revision of the class proceedings.

**III. Student training and Involvement**

As of May 2013, around 800 students have been trained from all the four AADLs put together (IITM, K, Kgp, Guwahati & Mandi). All AADLs keeping a common training manual as the base have built on top of it to provide interactive, practical sessions to interested and enthused students.

The goal of these training workshops is to not only target students from CSE background, but focus on students from other departments such as electrical sciences, chemical engineering, civil engineering etc. who are keen on developing applications on the android platform. Post training these students are engaged by developers and project staff of the respective AADLs to involve them in application development activites.

Each of the AADLs have a forum for interaction of the students amongst themselves and with the trainers and developers from the AADL. The plan is to set up a common portal for all AADLs, such that cross AADL interaction among student developers can be encouraged.

Going forward the plan is to conduct combined training sessions across AADLs, followed by contests and competitions among student developers.

Status of Funding & Expenditure (as of March 2013)

|  |  |  |  |
| --- | --- | --- | --- |
| **Project Title** | **Approved**  (In Lakhs) | **Received**  (In Lakhs) | **Spent**  (In Lakhs) |
| Aakash Education proposal (includes payment to other IITs)\* | 500 | 150 | 93.62 |
|  |  |  |  |
| \*Total Approved budget to 4 IITs | 25,000,000 |  |  |
| Committed (Release pending) to 4 IITs | 18,750,000 |  |  |