

# Aakash Project Status Report

Collated by  
**Firuza Aibara**

Project Investigators  
**Prof. D. B. Phatak**  
**Prof. Kannan M. Moudgalya**

Advisor  
**Prof. Pradeep Varma**



**Indian Institute of Technology Bombay**

**August 19, 2013**



**Aakash Project Status Report from IIT Bombay, 30 July 2013**  
**Summary for Executive Perusal**

1. IIT Bombay was entrusted with the responsibility of executing the Aakash project, in March/April 2012. Funds were transferred in May 2012.
2. The main objective was to empower college teachers and students in the country, to provide quality education to millions of Indian students. This objective was to be achieved by procuring 1 lakh tablets, developing applications, content, and methods for their effective educational use, and by deploying these in our colleges. A pilot for schools was also planned.
3. IIT Bombay renegotiated the technical specifications prescribed earlier, to obtain a better performing Aakash tablet at a lower price. Procurement of 1 lakh tablets has been completed.
4. For lab testing, a partnership was established with CDAC. It has provided test results and useful feedback on the given samples. The delivered tablets have been found compliant with the hardware and software specifications. Only about 300 out of all the delivered tablets, have been found to have manufacturing defects (about 0.30%). These units are being replaced by the supplier. CDAC has submitted its final lab-test report.
5. Many useful educational applications and content were initially developed by IIT Bombay, to kick-start the deployment of tablets in educational institutions.
6. For field testing, IIT Bombay has selected about 300 colleges in the country, called Aakash Project Centres. Tablets have been supplied to these centres for use in classroom teaching, and for further application development through final year projects. Additionally, Aakash Application Development Labs have been set up by IIT Madras, at five sister IITs. The tablets are also being used in the large-scale teacher training program T10KT, being conducted by IIT Bombay and IIT Kharagpur. The results of this field testing are positive and very encouraging. The school pilot has also been deployed recently in 4 schools.
7. IIT Bombay has trained over 10,000 teachers on the use of Aakash in education, and about 13,000 students in developing applications for Aakash, on the Android platform. Contests have been organized as an incentive to get more focussed work done.
8. Based on the feedback from this project, a committee has worked out the specifications for the next version of Aakash. These have been now frozen. It is recommended that a project should be initiated jointly by IITB and CDAC, under the aegis of DEITY, for developing and implementing a reference design, to achieve greater and faster indigenisation.
9. The project will continue to refine the learning, and to add more useful applications to the repository. Developed applications and content are released in open source, to benefit the entire community of students and teachers.
10. IIT Bombay thanks MHRD for this wise and timely initiative, and for strongly supporting the project. Its successful execution at IIT Bombay, should be the Launchpad to integrate Aakash in Indian education system, on a much larger scale.



# Contents

<b>1</b>	<b>Introduction</b>	<b>1</b>
1.1	Work done on the project from May to July 2012 . . . . .	1
1.2	Further upgrade to the Aakash specifications . . . . .	2
1.3	Launch of Aakash-2 and Subsequent Activities . . . . .	4
<b>2</b>	<b>Proposal Submitted by IITB</b>	<b>7</b>
<b>3</b>	<b>Receipt of Funds and Summary of Expenditure</b>	<b>13</b>
<b>4</b>	<b>Aakash Tablets Received and Distributed by IIT Bombay</b>	<b>25</b>
<b>5</b>	<b>Lab Testing by C-DAC (Thiruvananthapuram)</b>	<b>35</b>
<b>6</b>	<b>Results of Field Trials for Development and Testing</b>	<b>67</b>
6.1	Training and Orientation . . . . .	68
6.2	Orientation Program for Teachers . . . . .	68
6.3	Training Program for Students . . . . .	68
6.4	Training Program for Interns . . . . .	69
6.5	Development of Training Material . . . . .	70
<b>7</b>	<b>Aakash Projects at IITB</b>	<b>71</b>
7.1	M.Tech Theses Abstracts . . . . .	71
7.2	Arterial Pulse Analyzer . . . . .	81
7.3	Microscopy on the Aakash . . . . .	81
7.4	Galla-on-Aakash . . . . .	81
7.5	GATE on Aakash . . . . .	81
7.6	ekShiksha . . . . .	82
7.7	OSCAD . . . . .	82
7.8	Spoken Tutorials . . . . .	82
7.9	Aakash Lab . . . . .	87
7.10	Clicker . . . . .	88
7.11	3D Animation Content for Aakash Tablets . . . . .	89
7.12	School Education . . . . .	90
7.13	Pilot projects in schools . . . . .	91
7.13.1	Shikshan Pandhari . . . . .	91
7.13.1.1	Aakash Pandharpur School Pilot Project . . . . .	91
7.13.2	Experiment for using Aakash in Hindi Medium School . . . . .	93
7.13.3	Experiments in Unorganized School Education . . . . .	93
7.14	Aakash Bazaar . . . . .	93

7.15 OSCAR . . . . .	94
7.16 Attachment for Aadhar Authentication on Aakash . . . . .	94
7.17 Linux on Aakash . . . . .	94
7.18 8051 Emulator . . . . .	99
7.19 Interactive Lesson Builder My Point . . . . .	99
7.20 Audio video classroom interaction . . . . .	99
7.21 Clicker Native Application . . . . .	99
7.22 Peer-to-Peer Communication . . . . .	99
7.23 Visual Programming for Android using Blockly . . . . .	100
7.24 All Terrain Vehicle with Data Acquisition System and GPS tracking . . . . .	100
7.25 proxyMITY . . . . .	100
7.26 DiaSlate(Slate Application) . . . . .	100
7.27 Video Conferencing . . . . .	100
7.28 Aakash Developers Portal and Enhancements to Aakash Tech Support Portal . . . . .	101
7.29 Mathematics Playground . . . . .	101
7.30 Online Physics Laboratory . . . . .	101
7.31 Explore Chemistry . . . . .	101
7.32 Living Biology . . . . .	102
7.33 Know Our World . . . . .	102
7.34 Graphical interpreter - Buddhuram Dumbo in action . . . . .	102
7.35 Robot Application . . . . .	102
7.36 Aakash Programming Lab . . . . .	102
7.37 GNUKhata . . . . .	103
7.38 Aakash Business Tool . . . . .	103
7.39 FOSSEE - Free and Open Source Software in Education . . . . .	104
7.40 Textbook Companion on Aakash . . . . .	104
7.41 Methodology to create optimized 3D models using Blender for Android devices . . . . .	105
<b>8 Aakash Projects at RC Colleges</b>	<b>107</b>
8.1 Categories of Projects . . . . .	107
8.2 Summaries of Project Descriptions . . . . .	108
8.2.1 Kalyani Government Engineering College . . . . .	108
8.2.1.1 Design of User Authentication Modle for Bluetooth Piconet/WiFi Using Aakash Tablet . . . . .	108
8.2.1.2 Development of User Interace in Aakash Tablet for Online Shar-ing of Mechanical Department Resources . . . . .	108
8.2.2 SIES Graaduate School Of Technology . . . . .	109
8.2.2.1 Intelligent Tutor . . . . .	109
8.2.3 Sasurie College of Engineering . . . . .	109
8.2.3.1 Design of a Humanoid Robot Controlled using the Aakash Tablet	109
8.2.3.2 College Phonebook . . . . .	109
8.2.3.3 Bus information . . . . .	110
8.2.3.4 Employee Monitoring System . . . . .	110
8.2.3.5 Citizen Card System . . . . .	110
8.2.3.6 Friend Mapper . . . . .	110
8.2.3.7 Vehicle Tracer . . . . .	111
8.2.4 Rajalakshmi Engineering College . . . . .	111
8.2.4.1 An Enhanced Learning and Assessment Tool for Visually Impaired	111

8.2.4.2	SAVIOR:Speed, Accident Detection and Emergency Service System on Android Smartphones . . . . .	112
8.2.4.3	Cafe Internet(Restaurant based Application) . . . . .	112
8.2.4.4	QuizApp: An quiz application for board examination students .	113
8.2.5	B. H. Gardi College of Engineering and Technology . . . . .	113
8.2.5.1	Home Makeover . . . . .	113
8.2.6	Sarvajanik College of Engineering and Technology . . . . .	114
8.2.6.1	Tracking the object using Multiple Access Points . . . . .	114
8.2.6.2	MyELib . . . . .	114
8.2.6.3	CrackIT . . . . .	114
8.2.7	Government College of Engineering . . . . .	115
8.2.7.1	Learning Through 3D Cooperative Environment . . . . .	115
8.2.8	BRCM College Of Engineering and Technology . . . . .	115
8.2.8.1	Aaksah Tablets for School Education . . . . .	115
8.2.8.2	Aaksah Tablets for Engineering . . . . .	115
8.2.8.3	Aaksah Tablets For Farmer . . . . .	116
8.2.9	Federal Institute of Science And Technology . . . . .	116
8.2.9.1	Smart Class . . . . .	116
8.2.9.2	First Aid . . . . .	116
8.2.9.3	Wikimedia Search . . . . .	116
8.2.9.4	Baby Care . . . . .	117
8.2.9.5	Tastebuds . . . . .	117
8.2.9.6	Assignment Support . . . . .	117
8.2.9.7	Linux Tutorial . . . . .	117
8.2.9.8	Attendance . . . . .	117
8.2.9.9	Wolframalpha Math . . . . .	117
8.2.9.10	Advanced Calculator with Graph Plotting . . . . .	118
8.2.9.11	NPTEL Client . . . . .	118
8.2.10	VIT University . . . . .	118
8.2.10.1	Simulation Methods and Tools for Biologist using Aakash Tablet	118
8.2.10.2	Development of Android Application using Aakash for Switching between AC Power Line and Solar to Charge a Notebook Battery . . . . .	118
8.2.10.3	Development of Job Portal Application using Aakash Tablet.	119
8.2.10.4	Home Automation System Design Using Aakash Tablet . .	119
8.2.10.5	Business Plan Assessment tool design using android for Aakash Tablet . . . . .	119
8.2.10.6	Air pollution Monitoring System . . . . .	119
8.2.10.7	Creating Demo Model for Electrical Subjects . . . . .	119
8.2.10.8	Bat Inspired Micro Air Vehicle . . . . .	119
8.2.10.9	Design and development of health state monitoring of infants . .	120
8.2.10.10	Design and Development of Tier Pressure Monitoring System for Automotive Applications . . . . .	120
8.2.11	Rajarambapu Institutue of Technolgy . . . . .	120
8.2.11.1	Students Attendance Application . . . . .	120
8.2.11.2	Students Assessment Application . . . . .	120
8.2.11.3	Implementing MANET using Aakash . . . . .	120
8.2.12	KIIT College of Engineering . . . . .	121
8.2.12.1	Development in Android Overflow UI Widgets . . . . .	121

8.2.12.2	Delhi Metro Alert . . . . .	122
8.2.13	Techno India . . . . .	122
8.2.13.1	Online Information System for Educational Institutions . . . . .	122
8.2.13.2	English Learning Apps Development for Slum area Literacy Programme . . . . .	122
8.2.13.3	Content Based Training on Introduction to RDBMS . . . . .	123
8.2.13.4	Self Learning and Evaluation Strategy in Distance Education using Aakash Tablet . . . . .	123
8.2.13.5	Data Structure Simulator DSS 1.0.0 . . . . .	123
8.2.13.6	Akshar . . . . .	123
8.2.14	Jaypee Institute of Information Technology . . . . .	124
8.2.14.1	UML Generator . . . . .	124
8.2.15	Srinivas Institute of Technology . . . . .	124
8.2.15.1	ANDRO-EAR . . . . .	124
8.2.16	St. Margaret Engineering College . . . . .	125
8.2.16.1	Village Information and Knowledge Centre (VIKC) . . . . .	125
8.2.17	Maharaja Agrasen Institute Of Technology . . . . .	125
8.2.17.1	Guru . . . . .	125
8.2.18	Knowledge Institute of Technology . . . . .	126
8.2.18.1	Knowledge Management System . . . . .	126
8.2.19	Govt.Engineering College . . . . .	126
8.2.19.1	GEC Live An Event Notifier . . . . .	126
8.2.19.2	Project Dequeue- A Wi-Fi based mobile ticketing cum monetary system . . . . .	127
8.2.19.3	Project Tracker for Civil Engineers in Android using Aakash Tablet . . . . .	127
8.2.19.4	4Slide Presentation Controller for Aakash Tablets . . . . .	127
8.2.20	SASTRA University . . . . .	128
8.2.20.1	AAKASH pustak (An E-Book Reader for AAKASH) . . . . .	128
8.2.20.2	Career Counseling for High School Students on Aakash Tablet . . . . .	128
8.2.21	Textile and Engg. Institute . . . . .	128
8.2.21.1	Tutorial on Hormonic Analysis of one dimensional signals using SCILAB . . . . .	128
8.2.22	Sarvajanik College of Engg. and Tech . . . . .	129
8.2.22.1	Tracking the object using multiple Access points . . . . .	129
8.2.22.2	MyELib . . . . .	129
8.2.23	Rajalakshmi Engineering College . . . . .	130
8.2.23.1	An Enhanced Learning and Assessment Tool for Visually Impaired . . . . .	130
8.2.23.2	SAVIOR:Speed, Accident Detection and Emergency Service System on Android Smartphones . . . . .	131
8.2.23.3	Cafe Internet(Restaurant based Application) . . . . .	131
8.2.23.4	QuizApp: An quiz application for board examination students . . . . .	132
8.2.24	Sardar Patel Institue of Technology . . . . .	132
8.2.24.1	Indian Monuments and Achievements of India . . . . .	132
8.2.24.2	Project Title: A Trip To Zoo . . . . .	133
8.2.25	DCR University of Science and Technology . . . . .	133
8.2.25.1	Aakash:Testing Environment for Video Ecncryption Techniques . . . . .	133
8.2.26	Maharaja Institute Of Technology Mysore . . . . .	134
8.2.26.1	Paper Less World (Go Green) . . . . .	134

8.2.27 RK University School of Engineering . . . . .	134
8.2.27.1 K. S Patel Scholarship Exam Block Arrangement . . . . .	134
8.2.27.2 Online Notice Board . . . . .	135
8.2.27.3 Survey On Various Issues . . . . .	135
8.2.27.4 E- Learning . . . . .	135
8.2.27.5 Knowledge Hunt . . . . .	135
8.2.27.6 Notification Apps . . . . .	135
8.2.27.7 E- Tube . . . . .	135
8.2.27.8 Multipassword Locker . . . . .	136
8.2.27.9 Oops Solution . . . . .	136
8.2.27.10 Quiz Application . . . . .	136
8.2.27.11 Standard Elements Data Generator . . . . .	136
8.2.27.12 Design of Knuckle Joints (Mechanical Based) . . . . .	136
8.2.27.13 IT Quiz . . . . .	136
8.2.27.14 Spell Regulator . . . . .	137
8.2.27.15 Mobile Attendence . . . . .	137
8.2.27.16 CGPA and SGPA Calculator . . . . .	137
8.2.27.17 Security Camera Monitor . . . . .	137
8.2.27.18 Activity Log Tracker . . . . .	137
8.2.27.19 RKU News . . . . .	137
8.2.27.20 ERP . . . . .	137
8.2.27.21 SNAPEDIA . . . . .	138
8.2.27.22 College Notification . . . . .	138
8.2.27.23 TODOPRI- an Android Application . . . . .	138
8.2.27.24 Draw- Ipad . . . . .	138
8.2.27.25 Educational Video Sharing . . . . .	138
8.2.27.26 Bunk Snapper . . . . .	138
8.2.27.27 Equation Solver . . . . .	139
8.2.27.28 Quiz Time . . . . .	139
8.2.27.29 Time Table with Notification . . . . .	139
8.2.27.30 Mobile ERP . . . . .	139
8.2.27.31 Speak and Learn . . . . .	139
8.2.27.32 Math Tables . . . . .	139
8.2.27.33 Periodic Table . . . . .	139
8.2.27.34 Roidsource . . . . .	140
8.2.27.35 QRXCHANGER . . . . .	140
8.2.27.36 Voice Applications . . . . .	140
8.2.27.37 I-TECH . . . . .	140
8.2.27.38 Help Me . . . . .	140
8.2.27.39 IC HUB . . . . .	140
8.2.27.40 Picture, Gestures And Face Lock Password . . . . .	140
8.2.27.41 Generic Calculator . . . . .	141
8.2.27.42 Binary Converter . . . . .	141
8.2.27.43 Math Genius . . . . .	141
8.2.27.44 Cam Profile Generator . . . . .	141
8.2.27.45 Easy English Learning . . . . .	141
8.2.27.46 Account Tracker . . . . .	141
8.2.27.47 Edu.Link . . . . .	141
8.2.27.48 English World . . . . .	142

8.2.27.49 Dictionary . . . . .	142
8.2.27.50 Audio Dictionary . . . . .	142
8.2.27.51 Message Blocker . . . . .	142
8.2.27.52 Auto Tune Swapper . . . . .	142
8.2.27.53 Picture Password . . . . .	142
8.2.27.54 Battery Saver . . . . .	142
8.2.27.55 RAR (ZIP) File . . . . .	143
8.2.27.56 Mp4 to Mp3 Converter, Mp4 to 3gp, Avi, flv,ogg etc. Format . . . . .	143
8.2.27.57 Kids Maths App . . . . .	143
8.2.27.58 Kids Corner . . . . .	143
8.2.27.59 Document Scanner . . . . .	143
8.2.27.60 Math's and Physics Unit Conversion with Math's Fun . . . . .	143
8.2.27.61 Buddy Messenger . . . . .	143
8.2.27.62 Format Factory . . . . .	144
8.2.27.63 Widgets . . . . .	144
8.2.27.64 Money Manager . . . . .	144
8.2.27.65 Social Messenger . . . . .	144
8.2.27.66 Translator . . . . .	144
8.2.28 MES's IMCC . . . . .	144
8.2.28.1 Educational Tool for displaying Science Project . . . . .	144
8.2.28.2 Falling Number game to learn Basic Arithmatic . . . . .	145
8.2.28.3 Mathematical Formulae LIVE WALLPAPER . . . . .	145
8.2.28.4 Teaching Data Structure for Higher Education Student . . . . .	145
8.2.28.5 Human Skelton Application . . . . .	146
8.2.29 Thiagarajar College of Engineering . . . . .	146
8.2.29.1 Wordposer . . . . .	146
8.2.29.2 Science Helper . . . . .	146
8.2.30 Saveetha Engineering College . . . . .	147
8.2.30.1 Bharathi- Hand Written Tamil Character Recognizer . . . . .	147
8.2.30.2 Biometric Web Security . . . . .	147
8.2.30.3 Car Parking . . . . .	147
8.2.30.4 Anti Theft Privacy . . . . .	148
8.2.30.5 Treasure Hunt A Game of Knowledge . . . . .	148
8.2.30.6 Location Tracking . . . . .	149
8.2.30.7 Speak India - a Voice Translator . . . . .	149
8.2.30.8 Buzzzone App . . . . .	150
8.2.30.9 Anti Plagiarism Tool . . . . .	150
8.2.30.10 Saveetha Social Networking . . . . .	150
8.2.30.11 Principal Office Automation . . . . .	150
8.2.30.12 Gui Password for Android . . . . .	151
8.2.30.13 Click to Contact . . . . .	151
8.2.30.14 Talk Free using Wifi . . . . .	152
8.2.30.15 Placement Portal . . . . .	152
8.2.30.16 Learn Music . . . . .	152
8.2.31 Loyola-ICAM College of Engineering and Technology (LICET) . . . . .	153
8.2.31.1 AR Labs Education with no boundaries . . . . .	153
8.2.32 Sir Padampat Singhania University (SPSU) . . . . .	153
8.2.32.1 Student out-pass system . . . . .	153
8.2.33 St. Xavier's Catholic College of Engineering . . . . .	154

8.2.33.1	Android Controlled Helicopter . . . . .	154
8.2.34	Vels University . . . . .	154
8.2.34.1	Solar Powered Battery Backup for Aakash Tablet . . . . .	154
8.2.34.2	Customisable and Downloadable Moodle Courses for Android .	154
8.2.34.3	Wireless Data Projector Interface for Aakash . . . . .	154
8.2.34.4	Interactive Book Authoring Tool on Aakash . . . . .	155
8.2.34.5	Low cost stylus for Aakash tablet . . . . .	155
8.2.34.6	Content Annotating Tool . . . . .	155
8.2.35	Amrita School of Engineering . . . . .	155
8.2.36	Sona College of Technology . . . . .	156
8.2.36.1	eAssignment . . . . .	156
8.3	Feedback on Aakash Tablets from Remote Centres . . . . .	157
<b>9</b>	<b>Aakash Application Development Labs</b>	<b>173</b>
<b>10</b>	<b>Enhancing Participation through Contests</b>	<b>195</b>
10.1	Contest for Teachers . . . . .	195
10.2	Software Development Competition on Aakash Tablet . . . . .	201
10.3	Android Application Development Contest for Aakash Tablet . . . . .	202
10.3.1	Introduction . . . . .	202
10.3.2	Prizes . . . . .	202
10.3.3	Rules of the Contest . . . . .	203
10.4	IITB-IEEE Aakash Challenge . . . . .	203
10.4.1	Registration . . . . .	203
10.4.2	Timeline . . . . .	204
10.4.3	Eligibility . . . . .	204
10.4.4	Form for Enrollment to IITB-IEEE Aakash Challenge Registration . . . . .	204
10.5	Ron Mehta Aakash contest . . . . .	204
<b>11</b>	<b>Conclusion</b>	<b>207</b>
11.1	Achievements . . . . .	207
11.2	Future work . . . . .	207
11.2.1	Educational activities . . . . .	208
11.2.2	Optimization of Aakash tablet . . . . .	208



# Chapter 1

## Introduction

### Preamble

Responsibility for running this flagship project of NME-ICT, was given by MHRD to IIT Bombay on 19 March 2012. Ministry's orders for transfer of funds were issued on 16 April 2012. Project funds were received by IIT Bombay in three tranches. Substantial amount was received by 20 April, and the remaining by 5 May 2012.

IIT Bombay initiated a fresh procurement process in April 2012, continuing with the same vendor Datawind, identified earlier through a global tender, as L1 bidder. Upgraded specifications for Aakash were prescribed by us, and the Institute managed to negotiate a notional reduction in the previously agreed price which now stands at Rs 2263 per unit. Purchase order was placed by IIT Bombay on 4 May 2012. Delivery schedule was stipulated as 6 months after acceptance of samples. The required LC was opened on 9th May 2012.

CDAC was requested to join the project as Co-PI. Prof. Rajat Moona agreed to become co-PI, and CDAC Thiruvananthpuram took the responsibility of carrying out the detailed lab testing of the Aakash samples from each delivered lot. 100 samples were delivered by Datawind during the month of May 2012.

### 1.1 Work done on the project from May to July 2012

The main objective of the project assigned to IIT Bombay, is empowerment of teachers in engineering colleges. We have planned the deployment of the Aakash tablets in a large number of engineering colleges in the country, with two objectives. The first is to test and enhance the effectiveness of these tablets for use in a classroom environment. The second is the development of new educational applications and contents on Aakash, largely through final year R&D projects done by BE/ME students.

In these 3 months, we developed some key educational applications on Aakash 2. These include applications for playing interactive video lessons on Aakash 2, and for conducting on-line real time quiz tests in a classroom. We ported the popular programming environment for C, C++, Python, and Scilab on Aakash. To demonstrate the development capabilities of engineering college students, we guided summer interns from other colleges to develop a Robot control application on Aakash 2.

We had a strong relationship with 185 engineering colleges across the country, including several NITs, which work with us as Remote Centers for teachers' training workshops under 'Talk to a Teacher' project of NME-ICT. In these 3 months, 168 colleges agreed to participate in deploying Aakash tablets for achieving the project objectives.

Aakash-2 was soft launched by the then hon'ble HRM, Shri. Kapil Sibal, on the occasion of inauguration of our workshop on Research Methodologies for 10,000 teachers, conducted from 25 June to 4 July 2013. Hon'ble HRM, as also Shri. Ashok Thakur, Secretary (HE), remotely interacted with participants during this workshop.

## 1.2 Further upgrade to the Aakash specifications

We had developed applications using the 100 sample devices delivered to us. The devices were working as expected. However, we noticed a few issues. We discovered that the Android version 2.2 supplied, was not a stable build. There were snags with the device driver software. Occasionally, tablet would simply freeze during operation, requiring a hard reset. These problems are common with lower-end versions of mobiles/tablets available in the market. We were concerned with the fact that thousands of our students were going to use the tablets regularly in their studies, and such intermittent problems could seriously affect their enthusiasm. We sent 25 of these tablets to CDAC, for more rigorous lab testing. It also endorsed our findings on the occasional non-working of tablets, and freezing of the operating system in the middle of usage. There was also delay at DataWind manufacturing units, due to late delivery of the capacitive screens from their Montreal facility.

We raised these issues with Datawind which admitted that the processor used did have occasional operational issues with Android software. It mentioned that it had completed work on a different and faster processor, which was certified on Android platform. The enhanced device operate on an Android 4.0, and much larger memory of 512 MB. However, the device was costlier, and had only one mini-USB port instead of two required by us. We called Datawind people for immediate discussions on 20th July, to determine the suitability of this version. Datawind team handed us 2 samples. Our team was able to port all applications, and there was a much greater comfort level about the stability of the new device. The device ran faster due to a higher processor speed and larger memory. We could convince the Datawind team, that it was as much in their interest as ours, to supply Aakash tablets which were very stable in operations. They agreed, and after considerable persuasion, offered the upgraded version with the new processor, at the same price. There would however, be a delay in getting 100 samples all over again, and testing and certifying the golden samples as per contract, for them to start deliveries in substantial quantities.

We waited for two more weeks, for our development teams to carry out further tests. Their report was satisfactory. While this change involved some more delay, it was our considered opinion that the upgrade was in the greater interest of the project. Datawind agreed to supply all remaining units with upgraded specifications, at the same price. Since the design was now completely new, they felt more time was needed for the delivery of all units, but agreed to try and complete all deliveries by 31 December 2012.

No. 201200018/1

Date : 26.07.2013

To,  
M/s. Datawind Innovations Private Limited  
8148, Jubilee Complex, Sultanwind Road,  
Amritsar – 143 001.

Sub : Amendment of PO No. 201200018/1 Dtd. 04.05.2012  
Ref. No. MHRD/12/EQP/001/2012/001/L/CS/DBP

Dear Sir,

This has reference to our email Dated 29.08.2012 from Computer Science & Engineering Dept.  
The following upgradation are done in Aakash – 2 Tablets :

	Current	Upgraded Offer
Microprocessor	700 MHz Cortex A8	1 GHz Cortex A8
Memory (RAM)	256 MB	512 MB
Storage	2GB & 2GB SD Card	4 GB Internal Partitioned
Peripherals	2 USB Ports	1 mini-USB & 2-port USB-A adapter cable
Sensor	N/A	G-Sensor
Audio In	3.5mm jack	Integrated Mic
Connectivity	Wifi 802.11 a/b/g	Wifi 802.11 b/g/n
Operating System	Android 2.3	Android 4.0

The battery in the Upgraded Offer will be 3000 mAH, but continue to provide 3 hours of usage under normal mixed usage conditions.

The above specifications will apply to 98,000 units & Pricing will remain the same.

Other terms and conditions will remain unchanged.

Thanking You,

Yours faithfully,

  
Dy. Registrar (MM)

C.C. To : Dean (R&D), Prof. D B Phatak, CS&E, DSK

### 1.3 Launch of Aakash-2 and Subsequent Activities

From this point onwards, we prepared ourselves for the large scale field testing envisaged in our proposal. This involved distribution of tablets to various colleges, and starting different training, development and R&D programs. We soon ramped-up the number of our Remote Centers. Most of them agreed to become Aakash Project Centres (APCs) of IIT Bombay. In order to train teachers and students of these colleges, we planned two training programs. The first was a 2 day orientation program for teachers, which was conducted on 10, 11 November 2012. Over 13,000 teachers from the APCs, participated in this program. On this occasion, Aakash 2 was formally launched by Hon'ble President of India, Shri. Pranab Mukherjee, on 10 November 2012. Honble HRM Dr. Pallam Raju, Honble Ministers of State Dr. Shashi Tharoor and Shri. Jitin Prasada, and Secretaries from MHRD, were present during this launch.

An ‘Aakash Research Fellowship Award’ contest was announced for participating teachers. They were asked to form teams, and write essays, on how best to utilize Aakash tablets to enhance the effectiveness of learning process, and to improve quality of education in engineering colleges. More than 2000 submissions have since been received. These are being evaluated through a peer review process.

A training program for students from these colleges, was similarly planned and conducted over 2 weekends: 23-24 February 2013, and 3-4 March 2013. More than 30,000 students originally registered for this training program. Because of the restricted lab facilities in our remote centers, we could accommodate only about 8000 of these to attend the program and complete all quizzes and assignments, and they were awarded certificates. The program was greatly appreciated by the participants. We had asked the students to work on their final year projects, for further application and content development on Aakash. Additionally, we also announced an ‘Aakash Android application development’ contest. More than 700 students have registered for the contest, and 250 project ideas have been submitted by them.

We had also planned R&D projects at the level of M. Tech. dissertations at IIT Bombay. 20 such research projects were given, which have since been completed. Several other important projects have also been undertaken and completed at IIT Bombay. In August 2012, Prof. Jhunjhunwala established Aakash Application Development Labs (AADL) in several sister IITs. They have also carried out substantial development work at 5 IITs. We had asked all our Aakash Project Centers to offer development projects on Aakash. These APCs have begun doing that task. We have already received details from 28 colleges which have started work on over 120 projects.

All of this work and feedback obtained are included in this report.

During the last semester (January-April 2013), we have extensively used Aakash tablets in several of our courses at IIT Bombay. The application which teachers have found to be most useful, is the clicker application for conducting short quizzes in the classroom. Students have reported that the ability to carry digital contents for a course, in a searchable format, is what they find most useful. The clicker application has also been successfully used in a workshop on DBMS, under our T10KT program, conducted across the country at about 250 Remote centers, in which over 9000 teachers participated.

In the coming academic year, July 2013 to December 2013, it is expected that each of the participating APC will teach a course using Aakash. At IIT Bombay and IIT Kharagpur, a large scale deployment is being carried out.



## Chapter 2

# Proposal Submitted by IITB

Proposal for the Aakash project, sponsored by MHRD

### **1. Title**

Hardware and software optimization and testing of Low Cost Access Devices (LCAD)

### **2. Background:**

These LCAD tablets, named 'Aakash', have been under test and development by IIT Rajasthan. It had conducted a regular tender process to acquire 1,00,000 tablets. The tender was won by M/s DataWind. Unfortunately, some intractable problems arose during execution of the project. IIT Rajasthan has requested MHRD to take back the project and hand it over to another PI for its continuation and successful implementation. MHRD has now decided to transfer the project to IIT Bombay, with CDAC acting as Co-PI for the overall project.

### **3. Deliverables:**

Based on the preliminary discussions, the scope of the project is to undertake and complete the following activities:

3.1 To complete the acquisition process initiated by IIT Rajasthan.

3.2 To test these tablets in the labs, and then more comprehensively in the field, to provide feedback on functionality and usability.

3.3 To further optimize the tablet by adding useful educational applications and contents, and by providing critical feedback on the tablet architecture, design, and construction.

3.4 To liaison regularly with the Committee appointed by MHRD for Continuous R&D on Aakash.

### **4. Duration : 2 Years**

### **5. Budget : Rs. 47.72 Crores**

[Notes:

(i). An amount of Rs. 27.72 Crores is earmarked for payment to DataWind, for acquisition of 100,000 tablets.

(ii). An amount ranging between Rs 2 Crores to Rs 5 Crores is earmarked for lab testing. This will be mainly carried out by our project partner CDAC, and to a smaller extent, by IIT Bombay]

## 6. Project Leadership at IIT Bombay

**PI** : Prof. Deepak B Phatak (CSE)

**CoPI** : Prof. Sridhar Iyer (CSE)

Prof. Kannan Moudgalya (Chemical Engineering)

## 7. Proposed activities:

Activities are described below for each of the four deliverables mentioned in section 3 above.

### 7.1 Completion of procurement. [0 - 8 months]

This is the most critical activity, and needs to be concluded as early as possible. MHRD is transferring the project to IIT Bombay from IIT Rajasthan, on an as-is basis. We will have to place an order with M/s DataWind, on the basis of the earlier contract between them and IIT Rajasthan. For this purpose, a study will be carried out on the tender process followed by IIT Rajasthan, and copies of the relevant documents will be obtained for our scrutiny and record. An LC has already been opened by IIT Rajasthan in favor of DataWind. It will be studied, and if possible, it will be transferred in the name of IIT Bombay. A new contract will be executed between us and DataWind. M/s DataWind have suggested a draft contract, which is being uploaded on the IRCC website, for a preliminary legal opinion.

Once the contract is signed, M/s DataWind is supposed to deliver the tablets as per an agreed time table. These will be tested as elaborated in the next section. Payments will be released to M/s DataWind, against the deliveries of tested and accepted tablets, by using the operative LC. This will complete the acquisition phase.

**It is explicitly provided that we will be responsible for the project, only from the point when the project is transferred to IIT Bombay. Any issues between IIT Rajasthan and M/s DataWind, arising out of activities conducted for the project earlier, before being transferred to IITB, will be resolved by them directly.**

### 7.2 Testing. [2 months to 18 months]

The delivered tablets will have to be first tested in the labs, and subsequently in field by deploying these in a well planned fashion. These two components are elaborated in next subsections.

#### 7.2.1 Lab Tests. [2 months to 9 months]

Our project partners, M/s CDAC, will be providing their expertise, and their Lab (currently identified as their Thiruananthpuram and/or Bengaluru establishments), for conducting these tests. Additionally, we will be procuring some test and development facility in the Aakash lab, set up at IITB for this purpose. The details are being worked out jointly with CDAC. The agreement with M/s DataWind will contain details of the tests to be carried out, and the acceptance criteria, as also the process for testing rejected tablets, when redelivered after appropriate modifications.

### **7.2.2 Field testing [3 months to 18 months]**

This is the larger part of testing, which will be carried out by IIT Bombay. Here, the functionality and usability of tablets will be tested by the actual users, i.e., students and teachers of different colleges in the country. Feedback obtained in the process will be used to further optimize the tablet. Selection of these colleges and the approach to carry out the tests, are proposed under three different categories, as follows:

#### **7.2.2.1 Category I, Institutes with relatively large deployment.**

About 10 Institutions will be chosen for what may be called a large scale deployment test. A complete batch of new UG and PG students will be given these tablets, along with several final year students working on projects for development of new applications. These institutions will be expected to carry out the following tasks:

- (a) Teachers teaching courses to these students will identify specific course components for which these tablets will be used. These would include quizzes, assignments, and contents for home reading. Even class attendance is expected to be taken using these tablets
- (b) Usage by students will be monitored and feed back will be collected and forwarded to IIT Bombay. A simple web based mechanism will be set up to collect and accumulate such feedback.
- (c) They will set up several student projects for development of additional useful Open-Source applications and contents for educational use
- (d) Additionally, the Institutes will be required to propose and implement an action plan to incorporate the use of these tablets into their internal assessment system (e.g., attendance, assignments, etc), and provide details of the same. It is expected that such usage will be based on Open Source components at the back-end, such as moodle for LMS, a local web portal based on Drupal/ Joomla / or Java, an Open Source ERP system, etc. This will ensure that the software interfaces, built for such integration, will be usable by every other Institute deploying such systems.

**It is proposed that a total of 20000 tablets be deployed in this fashion.**

### **7.2.2.2 Category II. Colleges with medium deployment**

At present, IIT Bombay is executing ‘train 1000 teachers’ program, as a project under NMEICT. This program has successfully engaged about 10000 teachers, belonging to over 1000 different colleges, in focused workshops. The workshops are conducted through Remote Centers, which are institutes of some standing. Currently, there are 78 remote Centers. This number will be scaled up to 200 shortly, such that all parts of the nation are covered, with an equitable distribution of these Institutes across all Indian states.

It is proposed that each centre will be given 150 tablets, provided they agree to do the following:

- a) About 100 tablets will be given to a selected class of that college (up to 90 students). Their usage in the classroom for purposes as in (a) and (b) of section 7.2.2.1 above, along with the usage in hostels (outside the class), will be monitored.
- b) Teachers participating in the future workshops, conducted during vacation period, will be given these tablets for use during the workshop, for conducting quizzes conducted, and for accessing e-learning contents of the workshop.
- c) About 50 tablets will be given to final year students, for projects related to further development of applications and contents.

**A total of 30000 tablets are proposed to be deployed in this fashion.**

### **7.2.2.3 Category III, Other Institutions.**

The first two components will account for deployment of 50,000 tablets. The remaining 50000 will be deployed in consultation with MHRD. It is suggested that a certain number be allocated to high school students, so that features such as use of Indian Language scripts, and of Open Source contents suitable for high school students for some select subjects, can be tested.

Several novel schemes for popularizing the usage of Aakash can be launched. For example, colleges making proposals for specific content and application development can be given, say, 20 tablets to begin with, and the Institutes coming out with best implementations can be given ‘awards’ of additional 100 tablets.

In any case, a proper feedback must be provided by these colleges as well.

In the context of the overall deployment proposed in these sections, it should be noted that the chosen colleges will also have to be provided with a small server dedicated for use with Aakash tablets, and a few Wi-Fi access points in some class rooms, labs, and a seminar hall, connected on the Institute LAN through a VPN. Category I Institutions

are expected to deploy this infrastructure on their own. For the 200 Institutes of category II, some minimal equipment will have to be provided as part of the project implementation. Since this may entail an expenditure of about Rs 1,00,000 per Institute, an amount of Rs 2 Crores is proposed to be earmarked for this purpose from the project budget. A further reduction in the cost of this equipment will be attempted through our Affordable Solution Lab.

Provision of such equipment to other Institutes in category III, is outside the scope of this project

### **7.3 Applications and contents.**

The tablet is expected to become a ubiquitous tool in the hands of all learners. As such, more and more applications and contents will keep coming. Some of it could have a cost model associated with them. Thus we may see some license fee for applications; a monthly access fee for internet access; an annual subscription for useful contents, courses and on-line tests; etc. In such an emerging scenario, it is vital to provide useful open source applications, open source educational contents, and free access (at least within the school and colleges campuses).

An important thrust area for this project, is to build and release more applications and contents in open source. Towards this end, the spectrum of applications will be studied, and a few important ones will be selected for development and porting. Similarly the accessibility to all the available open source educational contents will be studied, and usage formats will be suitably modified for access through tablets. We have already identified a few such applications and contents. These include a simple Quiz/Assignment application, an attendance recording application, a stand-alone e-learning application for using multi-media lessons, etc. We have also initiated work on porting of SciLab.

While the team at IITB would be working on these developments, we will rope-in the large number of teachers (over 10000 already), engaged in workshops over last two years, and through them, many of their enthusiastic students. They will be encouraged to work on multiple useful projects as collaborative teams, We may consider conducting a special 5 day workshop for teachers and students, to train them on such developments. The IITB project web portal will be extended to include a development and testing platform for such groups to work on.

Some incentive schemes can be operated through this project for individuals as also for participating Institutes, such as award of more tablets for best Institutions in each category, cash rewards for the best projects, etc.

#### **7.4 Liaison**

As mentioned in the objectives, the project will provide regular feedback to the committee set up for continuous R&D on Aakash tablet. Different R&D projects, emanating from the committee recommendations will receive regular reports on shortcomings, if any, found in the working of the tablets, as also inadequacies of applications and contents.

### **8. Project Governance Structure**

This project will be governed under the existing provisions of administration of sponsored projects prevailing at IIT Bombay. In view of the criticality of this project, it is proposed to have regular reviews by a steering committee. These would be conducted on quarterly basis in the first year, and every six months in the second year. Additionally, there would be a monthly activity report submitted by the project team in the first six months of the project. An appropriate project monitoring tool will be used for tracking project progress.

(Prof Deepak B Phatak)

## Chapter 3

# Details of Receipt of Funds and Summary of Expenditure

We received a total of Rs. 51,76,84,893 from IIT Rajasthan, including the interest component. The tables given below gives details of the expenses as on 30 June 2013.

	Amount (Rs)
Funds Received	51,76,84,893
* Total Expenses	31,89,84,949
Balance As On 30 June 2013	19,86,99,944

* Account Head Wise Expenses	Amount (Rs)
Consumables / Contingencies	53,43,495
Equipment	23,83,68,449
Paid To C Dac	5,03,14,000
Staff Salaries	1,30,85,564
Travel	71,00,413
Workshops	47,73,028
Total Expenses	31,89,84,949

The table given below provides the details of payment to Datawind, security deposit and the penalty. All the amounts are in rupees.

Cost of the tablets	22,63,00,000
10% withheld as security deposit	2,26,30,000
90% of the cost paid	20,36,70,000
Penalty for late delivery	29,56,836
Amount paid (90% - penalty)	20,07,13,164

Copies of purchase order, and subsequent ammendments are included in the subsequent pages.



14

सामग्री प्रबंधन प्रभाग  
भारतीय प्रौद्योगिकी संस्थान मुंबई<sup>1</sup>  
पर्वई, मुंबई-400 076, भारत

### Materials Management Division

Indian Institute of Technology Bombay  
Powai, Mumbai-400 076, India

राजनीय क्रयादेश  
LOCAL PURCHASE ORDER

### Receipt of Funds and Summary of Expenditure

दूरभाष/ Phone : (+91-22) 2576 8800 (DR),  
8802/8805 (Billing Section/Inquiry)  
8801 (PO) 8803  
मोबाईल/ Mobile : 9833117920 (DR)  
फैक्स/ Fax : (+91-22) 2576 8808, 2572 3480  
ई-मेल/ E-mail : dr mm@iitb.ac.in, bkganesh@iitb.ac.in  
वेबसाइट/ Website : www.iitb.ac.in

IIT BOMBAY

(Please quote "Purchase Order No. & Code No." for reference in all documents)

Ref Number: MHRD/12/EQP/001/2012/001/L/CS/DBP  
( PO Number: 201200018/1 )

INDENT TYPE: Local  
PO Number: 201200018/1  
Sanctioning Authority:  
Department/Project: Project  
[P12MHRD001]  
Head of Account: EQP

To,

✓ DataWind Innovations Pvt. Ltd  
8148 Jubilee Complex,  
Sultanwind Road,  
Amritsar 143001

Thru,

Ref Number: MHRD/12/EQP/001/2012/001/L/CS/DBP  
Your Ref. : NIL  
Supplier ID : S/101461

Date: 04/05/2012  
Date: 02/05/2012

Dear Sir / Madam,  
Please supply the under mentioned items subject to the terms and conditions stated in this order.

All Amounts are in: Indian Rupees

S.No.	Item Description	Unit Cost	Qty	Discount	Total
1	LCAD LCAD(Low Cost Access Device) / Aakash-2 tablets with minimum hardware, software, and safety requirements, as per enclosed attachment.  Out of these 1,00,000 tablets following number LCAD with higher technical specification:  (a) Minimum 2000 with one USB port and GPRS 2.5 G voice and data modem.  (b) Minimum 1000 tables with	2263.00	100000	0.0%	226300000.00

*gkm*  
Deputy Registrar (MM)



सामग्री प्रबंधन प्रभाग  
भारतीय प्रौद्योगिकी संस्थान मुंबई<sup>१९४६</sup>  
पवई, मुंबई-400 076, भारत

**Materials Management Division**  
Indian Institute of Technology Bombay  
Powai, Mumbai-400 076, India

दूरभाष/ Phone : (+91-22) 2576 8800 (DR),  
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ई-मेल/ E-mail : drmm@iitb.ac.in, bkganesh@iitb.ac.in  
वेबसाइट/ Website : www.iitb.ac.in

राजनीय क्रयादेश  
LOCAL PURCHASE ORDER

(Please quote "Purchase Order No. & Code No." for reference in all documents)

Ref Number: MHRD/12/EQP/001/2012/001/LCS/DBP  
( PO Number: 201200018/1 )

S.No.	Item Description	Unit Cost	Qty	Discount	Total
	one USB port and UMTS 3G data modem.				
		Total			226300000.00
		Total Discount		0	0.00
		Other Charges		0	0.00
		Net Amount		Indian Rupees	226300000.00

#### Particulars:

THIS PURCHASE ORDER IS SUBJECT TO ALL TERMS & CONDITIONS OF INTEGRITY PACT ISSUED ALONG WITH TENDER DOCUMENT.

YOU ARE REQUESTED TO SUPPLY 100 DEVICES FOR SAMPLE TESTING.

#### Price Base:

Inclusive of All Taxes.

Free delivery to C-DAC Hyderabad.

Octroi charges extra if necessary as applicable. Payment of Octroi charges will be against original Octroi receipt only.

#### Guarantee:

GUARANTEE/WARRANTY : Supplies should be guaranteed/warranted for 12 months after successful testing report from C-DAC and date of acceptance of LCAD(AAkash-2) by the IIT Bombay.

#### Other Details:

##### I) Delivery Schedule:

First lot of the Delivery should start in the month of May, 2012 after acceptance of golden samples and establishment of a commercially valid Letter of Credit, whichever is later. Minimum 2000 units of LCAD must be delivered by end of May, 2012, subject to acceptance of golden samples and establishment of a commercially valid Letter of Credit by May 5, 2012. The last lot of delivery should be send before 31st October, 2012, subject to acceptance of golden samples by May 5, 2012 and establishment of a commercially valid Letter of Credit.

Deputy Registrar (MM)



16

**सामग्री प्रबंधन प्रभाग**

भारतीय प्रौद्योगिकी संस्थान मुंबई  
पवई, मुंबई-400 076, भारत

**Materials Management Division**

Indian Institute of Technology Bombay  
Powai, Mumbai-400 076, India

राजनीय क्रयादेश  
LOCAL PURCHASE ORDER

**Receipt of Funds and Summary of Expenditure**

दूरभाष/ Phone : (+91-22) 2576 8800 (DR),  
8802/8805 (Billing Section/Inquiry)  
8801 (PO) 8803

मोबाइल/ Mobile : 9833117920 (DR)  
फैक्स/ Fax : (+91-22) 2576 8808, 2572 3480  
ई-मेल/ E-mail : dr mm@iitb.ac.in, bkganesh@iitb.ac.in  
वेबसाईट/ Website : www.iitb.ac.in

(Please quote "Purchase Order No. & Code No." for reference in all documents)

Ref Number: MHRD/12/EQP/001/2012/001/IJCS/DBP

( PO Number: 201200018/1 )

**II) LIQUIDATED DAMAGES :** Timely delivery is essence of the contract and hence should any consignment be delayed, liquidated damages at the rate 0.5% of the price of the delayed consignment, for each weeks or part thereof shall be levied and recovered subject to maximum of 10% of total order value.

**III) TRANSFER AND SUBLETTING :** The seller shall not sublet, transfer, assign or otherwise part with the acceptance to the tender or any part thereof, either directly or indirectly, without the prior written permission of the Purchaser.

**IV) TRAINING :** The tenderer shall submit training proposal for the operation and maintenance to the personnel of IIT Bombay on the offered machine.

**V) LEGAL MATTER :** All Domestic and International disputes are subject to Mumbai Jurisdiction Only.

**Payment Term:**

- 1) Please send your order acceptance to enable us to establish LC.
- 2) 90 % payment of PO value against LC. Payment will be released in parts as per the delivery schedule and submission of dispatch document to the Bank.
- 3) Balance 10% of PO Value will retain as Performance guarantee till the expiry of warranty period.
- 4) Bank guarantee / Bid Bond will be returned after on expiry of Bank Guarantee Period.

**Other Conditions:**

1. The order should be acknowledged immediately on receipt and delivery period confirmed.
2. All goods are to be delivered carriage paid to the Institute's Materials Management Division/ C-DAC Hyderabad, unless otherwise stated between the hours of 10.30 a.m. & 4.00 p.m. on working days (Monday to Friday).
3. All goods will not be accepted by the Institute unless accompanied by delivery challans giving full details as to Order No, Order Code No., Description of the items, Quantity, Make, Unit, Gross Weight or Tare Weight. In the absence of any of the above, the Institute will not be responsible for refusing to take delivery of the goods.
4. We reserve the right to reject any goods which in materials or workmanship are not approved by the Dy.. Registrar (MM) whose decision shall be final.
5. If any goods are rejected, notice of such rejection shall be given to you and on receipt of such notice the rejected goods must be removed immediately at the Supplier's expenses and must be replaced by other goods to be approved by the Dy Registrar (MM).
6. All rejected goods pending removal will remain in our premises at the Supplier's risk and cost.
7. If any rejected goods are not removed by the Supplier within 7 days from the notice of rejection to by the Supplier, we shall be entitled to charge Godown rent, plus insurance charges on the approximate value of the goods. We shall also be at liberty to remove the rejected goods from the premises at the Supplier' expenses and to sell the same by public

  
Deputy Registrar (MM)



सामग्री प्रबंधन प्रभाग  
भारतीय प्रौद्योगिकी संस्थान मुंबई<sup>१</sup>  
पवई, मुंबई-400 076, भारत

### Materials Management Division

Indian Institute of Technology Bombay  
Powai, Mumbai-400 076, India

दूरभाष/ Phone : (+91-22) 2576 8800 (DR),  
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ई-मेल/ E-mail : drmm@iitb.ac.in, bkganesh@iitb.ac.in  
वेबसाईट/ Website : www.iitb.ac.in

स्थानीय क्रयादेरा

LOCAL PURCHASE ORDER

(Please quote "Purchase Order No. & Code No." for reference in all documents)

Ref Number: MHRD/12/EQP/001/2012/001/LCS/DBP

( PO Number: 201200018/1 )

auction and/or private treaty and in the event of such sale the supplier shall be entitled to claim only the net sale proceeds after deduction of the godown rent, insurance charges, removal charges and all other charges and expenses incurred by us in connection with the goods or the sale thereof.

8. If after the acceptance of this order you fail to deliver the goods within the specified time or if you fail to replace any rejected goods, we shall be at liberty to purchase the goods which you have failed to supply or replace as the case may be, in the open market on your account and risk and you will be liable to make good to us any loss or damage we may suffer thereby.

9. Your bill, in triplicate, should be submitted within 7 days from the date of delivery of the goods.

10. As per Govt. Notification No. 10/97-CE dt. 1-3-97, IIT is exempted from payment of whole of Excise Duty. We shall provide all the documents under this notification to enable you to clear the goods without payment of Excise Duty, wherever required. Please state clearly that this certificate is required.

11. As per the provisions of minimum wages Act 1948, if you are engaging labourers then, please inform to the undersign & a copy of labourers engaged in work to Regional Labour Commissioner, Shram Raksha Bhavan, Shivshrushti Road, Sion, Mumbai 400 022.

Deputy Registrar (MM)

Indentor: D B PHATAK (051013), CS  
cc: Accounts/Progress/Record/Indentor/DSK/Dealing Asst.



### सामग्री प्रबंधन प्रभाग

भारतीय प्रौद्योगिकी संस्थान मुंबई  
पवई, मुंबई-400 076, भारत.

### Materials Management Division

Indian Institute of Technology Bombay  
Powai, Mumbai-400 076, India

### Receipt of Funds and Summary of Expenditure

दूसरा/Phone : (+91-22) 2576 8800/ 8801 to 6

फैक्स / Fax : (+91-22) 2576 8808

ई-मेल / E-mail : armm@iitb.ac.in

वेबसाइट / Website : www.iitb.ac.in

IIT Bombay

### Technical Specifications

#### 1. Minimum Hardware Requirements

- 1.1 Processor 800MHz Cortex A8 (with HD Video Co-processor)
- 1.2 Memory (RAM): 256 MB or more/DDR1 SDRAM or better
- 1.3 Storage (Internal) 2GB or more integrated NAND flash
- 1.4 Storage (External): SD Interface (at least 2GB SD card to be provided, upto 32GB supported;or 4GB NAND flash in lieu of 2 GB SD Card)
- 1.5 Peripherals: Standard USB 2.0 ports (2nos.)
- 1.6 Audio-out: 3.5 mm jack or integrated speakers
- 1.7 Audio-in 3.5 mm jack for external headphones/speakers or integrated MIC
- 1.8 Display and Resolution: 7" display with at least 800x480 resolution
- 1.9 Input Devices: 7" Four point multi-touch projective capacitive touch panel
- 1.10 Connectivity and Networking: WiFi IEEE 802.11 a/b/g
- 1.11 Power and Battery: 3200 mAh. When fully charged, the device should run for 180 minutes without requirement of further charging. An AC adapter (Indian) for charging.

#### 2. Minimum Software Requirements

##### 2.1 Operating System and System Software

- 2.1.1 An open source operating system complying with an Open License approved by the Open Source Initiative (OSI), e.g., Android 2.3 or later, or some GNU/Linux distribution running a kernel more recent than 2.6.24.
- 2.1.2 All the device drivers for the device hardware, with additional support for: Broadband Internet (3G dongle), external VGA webcam drivers (supporting v412: video for Linux. Or some other video capture drivers)

##### 2.2 Document Rendering

- 2.2.1 Rendering of document formats: DOC, DOCX, PPT, PPTX, XLS, XLSX, ODT,ODP,ODS

##### 2.2.2 PDF viewer

##### 2.2.3 Text-editor

##### 2.3 Multimedia and Image Display

- 2.3.1 Image-viewer support PNG, JPG, BMP and GIF display

##### 2.3.2 Audio: MP3, AAC, AC3, WAV, WMA

- 2.3.3 Video: MPEG-2, MPEG-4 (AVI container, available through ffmpeg), FLV (Flash lite version 3 or later)

##### 2.4 Communication and Internet

- 2.4.1 Web-browser (XHTML1.1 compliant, JavaScript 1.8 compliant)

- 2.4.2 Browser Flash 9 or later support (through plugin)

- 2.4.3 Optional Java support (through plugin)

- 2.4.4 Audio/Video/Text chat/conferencing applications

- 2.4.5 Separate application for online video

(capable of playing at least YouTube video):Video pause/play

उपकूलसचिव (सा.प्र)

Dy. REGISTRAR(MM)

भारतीय प्रौद्योगिकी संस्थान, मुंबई

INDIAN INSTITUTE OF

TECHNOLOGY, BOMBAY

पवई/Powai, मुंबई/Mumbai - 400 076.



**सामग्री प्रबंधन प्रभाग**  
भारतीय प्रौद्योगिकी संस्थान मुंबई<sup>19</sup>  
पवई, मुंबई-400 076, भारत  
**Materials Management Division**  
Indian Institute of Technology Bombay  
Powai, Mumbai-400 076, India

दूरभाष / Phone : (+91-22) 2576 8800 / 8801 to 6  
फैक्स / Fax : (+91-22) 2576 8808  
ई-मेल / E-mail : armm@iitb.ac.in  
वेबसाइट / Website : www.iitb.ac.in

## 2.5 Other Utilities

2.5.1 Zip decompression utility as part of the file manager or standalone

## 2.6 Other Desirables (optional):

2.6.1 AVCHD Playback

2.6.2 DTV, IPTV, DTH Playback

## 3. Safety and other standards compliance

3.1 CE certification

3.2 RoHS certification

3.3 Any other

Note: In order to achieve the full functionality, if there are some licensing issues related to software, Indian Institute of Technology, Bombay will extend help to the Seller.

*AKM*  
उपकुलसचिव (सा.प्र.)  
Dy. REGISTRAR(MM)  
भारतीय प्रौद्योगिकी संस्थान, मुंबई  
INDIAN INSTITUTE OF  
TECHNOLOGY, BOMBAY  
पवई/Powai, मुंबई/Mumbai - 400 076.

## Receipt of Funds and Summary of Expenditure



DATAWIND

Date: August 27<sup>th</sup>, 2012

Professor D.B. Phatak  
Project Indentor

Indian Institute of Technology Bombay  
P.O. IIT, Powai, Bombay 400076.

Dear Sir,

Sub: Reference number MHRD/12/EQP/001/2012/001/L/CS/DBP  
Purchase Order 201200018/1

- Further to recent discussions, we're pleased to offer the following upgraded specifications:

	Current	Upgraded Offer
Microprocessor	700MHz Cortex A8	1 Ghz Cortex A8
Memory (RAM)	256 MB	512 MB
Storage	2GB & 2GB SD Card	4GB Internal Partitioned
Peripherals	2 USB Ports	1 Mini-USB & 2-port USB-A adapter cable
Sensor	N/A	G-Sensor
Audio In	3.5mm Jack	Integrated Mic
Connectivity	WiFI 802.11 a/b/g	WiFI 802.11 b/g/n
Operating System	Android 2.3	Android 4.0

The battery in the Upgraded Offer would be 3,000 mAH, but continue to provide 3 hours of usage under normal mixed usage conditions.

- Please note that in the Upgraded Offer we've only listed those specifications which have changed. All other specifications will remain the same.

We would continue to supply 2,000 Aakash2G tablets, while the above specifications would apply to 98,000 units. Pricing would remain unchanged. Please confirm your acceptance, subsequent to which we'll supply 50 units for testing and approval. Upon approval of the 'golden samples' we'll start delivery of the mass production.

Yours truly,

Suneet Singh Tuli  
President & CEO  
+1 416 848 0940

*Accepted and approved*  
*Phatak*  
28.8.12



सामग्री प्रबंधन प्रभाग  
भारतीय प्रौद्योगिकी संस्थान मुंबई<sup>१९४७</sup>  
पर्स. मुंबई-400 076, भारत  
**Materials Management Division**  
Indian Institute of Technology Bombay  
Powai, Mumbai-400 076, India

दूरभाष / Phone : (+91-22) 2576 8800 / 8801 to 6  
फैक्स / Fax : (+91-22) 2576 8808  
ई-मेल / E-mail : armm@iitb.ac.in  
वेबसाइट / Website : www.iitb.ac.in

No. MHRD/12/EQP/001/2012/001/L/CS/DBP

DATE : 19/10/12

IIT BOMBAY

To,  
Bank Manager,  
State Bank of India,  
I.I.T Powai, Mumbai – 400076.

Sub: Amendment to LC No. 0505012LC0000974 dt. 09/05/12  
against PO No. 201200018/1 dt. 04/05/2012  
Ref. No: MHRD/12/EQP/001/2012/001/L/CS/DBP  
Ref: Letter from Datawind Innovations Pvt. Ltd. dt. 12/10/2012  
& email dt. 19/10/12

Dear Sir/Madam,

You are requested to amend the subject Letter of Credit as below:

1. EXPIRY DATE is to be amended as “30<sup>th</sup> April 2013” Instead of “30<sup>th</sup> November 2012.”
2. AMOUNT OF L/C is to be amended as “INR 16,08,99,300/-” Instead of “INR Rs.20,36,70,000/-”.
3. The consignment is to be delivered to “-C-DAC, Hyderabad/Noida” Instead of “-C-DAC, Hyderabad.”
4. “Full set of LR/RR/Courier Receipt made out to the order applicant's Bank marked freight prepaid and notify applicant at the address stated in the credit evidencing shipment of Merchandise indicated in the L/C” Instead of “Full set of LR/RR made out to the order applicant's Bank marked freight prepaid and notify applicant at the address stated in the credit evidencing shipment of Merchandise indicated in the L/C”.

Kindly do the necessary amendment and let us know.

Thanking you.

Yours faithfully,

*Gopal*  
Dy. Registrar (MM) 19.10.2012

Cc: 1) M/s. Datawind Innovations Pvt. Ltd.  
2) Dean (R&D)  
3) Prof. D B Phatak (Indentor), Computer Sci. & Engg. Deptt.



## Receipt of Funds and Summary of Expenditure



**सामग्री प्रबंधन प्रभाग**  
 भारतीय प्रौद्योगिकी संस्थान मुंबई<sup>१</sup>  
 पर्वर्स, मुंबई-४०० ०७६, भारत  
**Materials Management Division**  
 Indian Institute of Technology Bombay  
 Powai, Mumbai-400 076, India

दूरभाष / Phone : (+91-22) 2576 8800 / 8801 to 6  
 फैक्स / Fax : (+91-22) 2576 8808  
 ई-मेल / E-mail : armm@iitb.ac.in  
 वेबसाइट / Website : www.iitb.ac.in

EQUITY RECEIVED

No. MHRD/12/EQP/001/2012/001/L/CS/DBP

DATE : 25/10/12

To,  
 Bank Manager,  
 State Bank of India,  
 I.I.T Powai,  
 Mumbai - 400076.

Sub: Amendment to LC No. 0505012LC0000974 dt. 09/05/12  
 against PO No. 201200018/1 dt. 04/05/2012  
 Ref. No: MHRD/12/EQP/001/2012/001/L/CS/DBP  
 Ref: Your email dt. 19/10/12.

Dear Sir/Madam,

You are requested to amend the subject Letter of Credit as below:

1. Latest Shipment Date is to be amended as "31<sup>st</sup> December 2012" Instead of "31<sup>st</sup> October 2012.

Kindly do the necessary amendment and let us know.

Thanking you.

Yours faithfully,

Dy. Registrar (MM)

Cc: 1) M/s. Datawind Innovations Pvt. Ltd.  
 2) Dean (R&D)  
 3) Prof. D B Phatak (Indentor), Computer Sci. & Engg. Deptt.



सामग्री प्रबंधन प्रभाग  
भारतीय प्रौद्योगिकी संस्थान मुंबई<sup>१९४६</sup>  
पवई, मुंबई-४०० ०७६, भारत  
**Materials Management Division**  
Indian Institute of Technology Bombay  
Powai, Mumbai-400 076, India

दूरभाष / Phone : (+91-22) 2576 8800 / 8801 to 6  
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ई-मेल / E-mail : armm@iitb.ac.in  
वेबसाइट / Website : www.iitb.ac.in

RECORDED

No. MHRD/12/EQP/001/2012/001/L/CS/DBP -

DATE : 21/12/12

To,  
Bank Manager,  
State Bank of India,  
I.I.T Powai,  
Mumbai – 400076.

Sub: Amendment to LC No. 0505012LC0000974 dt. 09/05/12  
against PO No. 201200018/1 dt. 04/05/2012  
Ref. No: MHRD/12/EQP/001/2012/001/L/CS/DBP

Dear Sir/Madam,

With reference to Datawind letter dt. 15<sup>th</sup> December, 2012, you are requested to amend the subject Letter of Credit as below:

1. **Latest Shipment Date** is to be amended as “31<sup>st</sup> March 2013” **Instead of “31<sup>st</sup> December 2012”**.
2. The consignment is to be **delivered** to “Any C-DAC center or IIT Bombay” **Instead of “C-DAC, Hyderabad/Noida”**

Kindly do the necessary amendment and let us know.

Thanking you.



Yours faithfully,

B.N. Bagade  
Dy. Registrar (MM) 21/12/2012  
O/C

Encl: Datawind letter dt. 15<sup>th</sup> December, 2012.

Cc: 1) M/s. Datawind Innovations Pvt. Ltd.  
2) Dean (R&D)  
3) Prof. D B Phatak (Indentor), Computer Sci. & Engg. Deptt.

**Receipt of Funds and Summary of Expenditure**

No. MHRD/12/EQP/001/2012/001/L/CS/DBP

Date : 07.03.2013

To,  
 The Bank Manager,  
 State Bank of India,  
 I.I.T Powai, Mumbai – 76

Sub : Amendment of LC No. 0505012LC0000974 Dtd. 09.05.12  
 against PO No. 201200018/1 Dtd. 04.05.2012  
 Ref . No. MHRD/12/EQP/001/2012/001/L/CS/DBP

Ref : Letter from M/s. Datawind Innovations Pvt. Ltd. Dtd. 24.02.2013.

Dear Sir,

You are requested to amend the Letter of Credit as below :

Amount of L/C is to be amended as “INR 10,99,81,800/-

**Instead of**

Amount of L/C as “ INR 16,08,99,300/-.

Kindly do the necessary amendment and let us know.

Thanking You,

Yours faithfully,

*GK MO*  
Dy. Registrar (MM)

Encl : Letter of M/s. Datawind Innovations Pvt. Ltd.

- c.c.to : 1. M/s. Datawind Innovations Pvt. Ltd.  
 2. Dean (R& D)  
 3. Prof. D B Phatak (Indentor ), Computer Sci. & Engg. Deptt.

- 7 MAR 2013 O/C

## **Chapter 4**

# **Aakash Tablets Received and Distributed by IIT Bombay**

The table given on the next page displays the date wise receipts of the tablets. The total number of tablets received is 1,00,000 as ordered.

The table given on the subsequent pages provides the distribution details of the tablet.

Note: IIT Kharagpur, now a part of IITB for Aakash related activities, have been entrusted with the responsibility of new Remote Centers in the eastern and northern India and to distribute Aakash for testing and application development.

<b>Details of Tablets Received by IIT Bombay</b>			
<b>Sr. No</b>	<b>Qty</b>	<b>Date</b>	<b>Place of Receipt</b>
1	5000	29/05/2013	C-DAC (Noida)
2	5000	22/05/2013	C-DAC (Noida)
3	5000	18/05/2013	C-DAC (Noida)
4	2936	18/05/2013	C-DAC (Noida)
5	6984	18/05/2013	C-DAC (Noida)
6	380	01/05/2013	C-DAC (Noida)
7	1100	29/04/2013	C-DAC (Noida)
8	2000	26/04/2013	C-DAC (Noida)
9	1700	24/04/2013	C-DAC (Noida)
10	1000	23/04/2013	C-DAC (Noida)
11	1500	23/04/2013	C-DAC (Noida)
12	2300	22/04/2013	C-DAC (Noida)
13	2000	22/04/2013	C-DAC (Noida)
14	1200	20/04/2013	C-DAC (Noida)
15	1300	18/04/2013	C-DAC (Noida)
16	250	17/04/2013	IIT BOMBAY
17	250	17/04/2013	IIT BOMBAY
18	250	17/04/2013	IIT BOMBAY
19	250	17/04/2013	IIT BOMBAY
20	250	17/04/2013	IIT BOMBAY
21	250	17/04/2013	IIT BOMBAY
22	250	17/04/2013	IIT BOMBAY
23	250	17/04/2013	IIT BOMBAY
24	5000	17/04/2013	C-DAC (Noida)
25	1500	16/04/2013	C-DAC (Noida)
26	2000	14/04/2013	C-DAC (Noida)
27	4000	13/04/2013	C-DAC (Noida)
28	4000	12/04/2013	C-DAC (Noida)
29	3000	04/04/2013	C-DAC (Noida)
30	2000	31/03/2013	C-DAC (Noida)
31	2200	31/03/2013	C-DAC (Noida)
32	4300	31/03/2013	C-DAC (Noida)
33	4000	30/03/2013	C-DAC (Noida)
34	2500	29/03/2013	C-DAC (Noida)
35	2500	29/03/2013	C-DAC (Noida)
36	2500	26/03/2013	C-DAC (Noida)
37	2000	25/03/2013	C-DAC (Noida)
38	3000	30/01/2013	IIT BOMBAY

<b>Details of Tablets Received by IIT Bombay</b>			
<b>Sr. No</b>	<b>Qty</b>	<b>Date</b>	<b>Place of Receipt</b>
39	1000	05/12/2012	C-DAC (Noida)
40	1000	04/12/2012	C-DAC (Noida)
41	1000	29/11/2012	C-DAC (Noida)
42	2000	10/11/2012	C-DAC (Noida)
43	1000	07/11/2012	C-DAC (Noida)
44	1000	07/11/2012	C-DAC (Noida)
45	2500	07/11/2012	C-DAC (Noida)
46	1500	06/11/2012	C-DAC (Noida)
47	1000	03/11/2012	C-DAC (Noida)
48	1000	03/11/2012	C-DAC (Noida)
49	100	01/10/2012	IIT BOMBAY
50	170	29/09/2012	IIT BOMBAY
51	200	28/09/2012	IIT BOMBAY
52	200	27/09/2012	IIT BOMBAY
53	200	15/09/2012	IIT BOMBAY
54	80	07/09/2012	IIT BOMBAY
55	50	06/09/2012	IIT BOMBAY
56	20	30/05/2012	IIT BOMBAY
57	17	28/05/2012	IIT BOMBAY
58	13	26/05/2012	IIT BOMBAY
59	15	22/05/2012	IIT BOMBAY
60	16	19/05/2012	IIT BOMBAY
61	19	14/05/2012	IIT BOMBAY
<b>TOTAL</b>	<b>100000</b>		

Distribution By IITB to RCs			
No.	Quantity	RC Code	Name of Institution
1	22162	1000	IIT Bombay*
2	965	8007	C-DAC, Trivandrum
3	542	1281	Sveri`S College Of Engineering, Pandharpur
4	462	1290	Cdac, Noida
5	10365	8001	IIT Kharagpur*
6	282	1012	G H Raisoni College Of Engineering, Nagpur
7	282	1014	P. V. P. Siddhartha Institute Of Technology, Kanuru
8	282	1025	National Institute Of Technology, Warangal
9	282	1032	Muffakham Jah College Of Engineering & Technology, Hyderabad
10	282	1036	Kakinada Institute Of Engineering & Technology, Kakinada
11	282	1054	National College Of Engineering, Muruthakulam
12	282	1056	Malla Reddy College Of Engineering & Technology, Maisammaguda
13	282	1061	Er. Perumal Manimekalai College Of Engineering, Krishnagiri
14	282	1079	Geeta Institute Of Management & Technology, Kurukshetra
15	282	1080	Griet, Kukatpally
16	282	1081	Gvit, Bhimavaram
17	282	1102	Mother Teresa Institute Of Science & Technology, Sathupally
18	282	1112	S. V. U. College Of Engineering, Tirupati
19	282	1125	Turbomachninary Institute Of Technology & Science, Patancheru
20	282	1145	Kmea Engineering College, Aluva
21	282	1147	Kongu Engineering College, Perundurai
22	282	1161	Anurag Group Of Institutions, Cvsr College Of Engineering, Ranga Reddy
23	282	1167	Birla Vishwakarma Mahavidyalaya Engg. College, Vallabh Vidhyanagar
24	282	1175	Truba College Of Science & Technology, Bhopal
25	282	1177	Vels University, Pallavaram
26	282	1193	Prof. Ram Meghe Institute Of Technology & Research, Badnera
27	282	1210	Gogte Institute Of Technology, Udyambag
28	282	1221	N.P.R. College Of Engineering & Technology, Natham
29	270	8002	Reliance IITM Telecom Centre of Excellence
30	250	8003	Indian Institute of Technology Guwahati
31	250	8004	IIT Mandi
32	250	8008	Indian Institute of Technology Hyderabad
33	250	8009	Indian Institute of Technology Gandhinagar
34	242	1001	Maulana Azad National Institute Of Technology, Bhopal
35	242	1002	Amal Jyoti College Of Engineering & Technology, Kanjirappally
36	242	1003	Government College Of Engineering, Salem
37	242	1004	National Institute Of Technology, Calicut
38	242	1006	National Institute Of Technology, Tiruchirappalli
39	242	1008	D.K.T.E Society`s Textile & Engineering Institute, Ichalkaranji
40	242	1010	Sardar Vallabhbhai National Institute Of Technology, Surat
41	242	1011	Jaipur Engineering College, Kukas
42	242	1013	Mepco Schlenk Engineering College, Sivakasi
43	242	1015	Vidya Pratisthan College Of Engineering, Baramati
44	242	1016	K. J. Somaiya College Of Engineering, Vidyavihar
45	242	1020	Don Bosco College Of Engineering & Technology, Azara

<b>Distribution By IITB to RCs</b>			
<b>No.</b>	<b>Quantity</b>	<b>RC Code</b>	<b>Name of Institution</b>
46	242	1026	St. Xaviers Catholic College Of Engineering, Chunkankadai
47	242	1027	Sudharsan Engineering College, Sathiyamangalam
48	242	1028	Tatyasaheb Kore Institute Of Engineering & Technology, Warananagar
49	242	1029	Terna Engineering College, Nerul Navi Mumbai
50	242	1030	Nielit - Formerly Doeacc, Srinagar
51	242	1031	St. Margaret Engineering College, Neemrana
52	242	1033	Manipal Institute Of Technology, Manipal
53	242	1034	M. E. Society`S Imcc, Pune
54	242	1035	Srinivasa Institute of Engineering & Technology
55	242	1037	Jabalpur Engineering College, Jabalpur
56	242	1039	Ips Academy, Indore
57	242	1040	College Of Engineering, Pune
58	242	1041	Shri Mata Vaishno Devi University, Katra
59	242	1042	Saintgits College Of Engineering, Kottayam
60	242	1043	Sarvajanik College Of Engineering & Technology, Surat
61	242	1044	Sasurie College Of Engineering, Vijayamangalam
62	242	1045	Saveetha Engineering College, Thandalam
63	242	1046	Sagar Institute Of Research & Technology - Excellence, Bhopal
64	242	1047	S.D.M. College Of Engineering & Technology, Dhavalagiri
65	242	1048	Royal College Of Engineering & Technology, Akkikavu
66	242	1050	Prasad Engineering College, Jangaon
67	242	1051	Pacific Institute Of Technology, Udaipur
68	242	1052	Noorul Islam Centre For Higher Education, Thuckalay
69	242	1055	Mar Baselios College Of Engineering & Technology, Nalanchira
70	242	1057	Madhuben & Bhanubhai Patel Women`S Institute Of Engineering, Anand
71	242	1058	Goa College Of Engineering, Farmagudi Ponda
72	242	1059	Gf Gharda Institute Of Technology, Lavel
73	242	1060	Ebet Group Of Institutions, Nathakadaiyur
74	242	1062	Dungarpur College Of Engineering & Technology, Dungarpur
75	242	1063	Dr. D.Y. Patil Institute Of Engineering & Technology, Pimpri
76	242	1064	Deenbandhu Chhotu Ram University Of Science & Technology, Mурthal
77	242	1065	Finolex Academy Of Management Technology, Ratnagiri
78	242	1066	Shrinathji Institute Of Technology & Engineering, Nathdwara
79	242	1067	St. Francis Institute Of Technology, Borivali West
80	242	1068	Thakur College Of Engineering & Technology, Kandivali (E)
81	242	1069	Alluri Institute Of Management Sciences, Warangal
82	242	1070	Amrita School Of Engineering, Bangalore
83	242	1071	Amrita Vishwa Vidyapeetham, Amritanagar
84	242	1072	Angadi Institute Of Technology & Management, Belgaum
85	242	1073	Bannari Amman Institute Of Technology, Sathyamangalam
86	242	1074	Caarmel Engineering College, Ranni-Perunad
87	242	1075	D. Y. Patil College Of Engineering & Technology, Kolhapur
88	242	1076	Devi Ahilya University, Iet, Indore
89	242	1077	Federal Institute Of Science And Technology, Mookkannoor
90	242	1078	Galaxy Global Group Of Institutions, Dinarpur

<b>Distribution By IITB to RCs</b>			
<b>No.</b>	<b>Quantity</b>	<b>RC Code</b>	<b>Name of Institution</b>
91	242	1082	Hindustan Institute Of Technology And Management, Agra
92	242	1084	Institute Of Road And Transport Technology, Erode
93	242	1085	Nirma University, Institute Of Technology, Ahmedabad
94	242	1087	Joginpally B. R. Engineering College, Yenkapally
95	242	1089	K.L.E. College Of Engineering & Technology, Chikodi
96	242	1090	K.C.E. Society, Coeit, Jalgaon
97	242	1092	K.I.T. College Of Engineering, Gokul Shirgaon
98	242	1094	Lourdes Matha College Of Science & Technology, Trivandrum
99	242	1095	M. S. Bidve Engineering College, Latur
100	242	1096	Mahakal Institute Of Technology, Ujjain
101	242	1097	Maharaja Institute Of Technology, Belavadi
102	242	1098	Marathwada Institute Of Technology, Aurangabad
103	242	1099	Medi-caps Institute Of Technology & Management, Pidgamber
104	242	1100	Mes Pillai`S Institute Of Information Technology, New Panvel
105	242	1101	Mksss Cummins College Of Engineering, Karvenagar
106	242	1106	Nitttr, Chandigarh
107	242	1107	Poornima College Of Engineering, Sitapura
108	242	1108	R. C. Patel Institute Of Technology, Shirpur
109	242	1109	Rajiv Gandhi Proudyogiki Vishwavidyalay, Bhopal
110	242	1110	Regency Institute Of Technology, Adivipolam
111	242	1111	Rvs College Of Engineering And Technology, Coimbatore
112	242	1113	S. B. Patil College Of Engineering, Indapur
113	242	1114	Sangam University, Itm, Bhilwara
114	242	1116	S. G. S. Institute Of Technology & Science, Indore
115	242	1117	Shri Vaishnav Institute Of Technology & Science, Indore
116	242	1118	Sri Jayachamarajendra College Of Engineering, Mysore
117	242	1119	Ssbt`S College Of Engineering And Technology, Bambhori
118	242	1120	St. Aloysius Institute Of Technology, Jabalpur
119	242	1121	Svp Engineering College, Visakhapatnam
120	242	1122	Techno India Njr Institute Of Technology, Udaipur
121	242	1123	Thakral College Of Technology, Bhopal
122	242	1124	Truba College Of Engineering & Technology, Indore
123	242	1126	Vignan Institute Of Technology And Science, Deshmukhi
124	242	1127	Vishwakarma Institute Of Technology, Pune
125	242	1128	Visvesvaraya National Institute Of Technology, Nagpur
126	242	1129	Vit University, Vellore
127	242	1130	Walchand College Of Engineering, Sangli
128	242	1131	Walchand Institute Of Technology, Solapur
129	242	1132	Sir Padampat Singhania University, Bhatewar
130	242	1133	National Institute Of Technology, Agartala
131	242	1134	National Institute Of Technology, Kurukshetra
132	242	1135	Periyar Maniammai University, Vallam
133	242	1136	Psg College Of Technology, Coimbatore
134	242	1137	Rk University, School Of Engineering, Kasturbadham
135	242	1138	Rajalakshmi Engineering College, Chennai

<b>Distribution By IITB to RCs</b>			
<b>No.</b>	<b>Quantity</b>	<b>RC Code</b>	<b>Name of Institution</b>
136	242	1139	Rajarambapu Institute Of Technology, Islampur
137	242	1140	Sastras University, Tirumalaisamudram
138	242	1142	Government Engineering College, Sreekrishnapuram
139	242	1143	Indur Institute Of Engineering & Technology, Siddipet
140	242	1144	Sushila Devi Bansal College Of Engineering (Kcb Technical Academy), Indore
141	242	1146	Knowledge Institute Of Technology, Kakapalayam
142	242	1148	Krishna Institute Of Engineering & Technology, Ghaziabad
143	242	1149	Lenora College Of Engineering, Rampachodavaram
144	242	1150	Sou Sushila Danchand Ghodawat Charitable Trust`S Sgi, Atigre
145	242	1151	Srm University, Kancheepuram
146	242	1152	St. Joseph`S College Of Engineering & Technology, Palai
147	242	1153	Tezpur University, Tezpur
148	242	1154	Thanthai Periyar Government Institute Of Technology, Vellore
149	242	1155	Yeshwantaro Chavan College Of Engineering, Wanadongri
150	242	1157	Sona College Of Technology, Salem
151	242	1159	Agni College Of Technology, Thalambur
152	242	1160	Anna University Of Technology, Madurai
153	242	1162	Asia Pacific Institute Of Information Technology Sd India, Panipat
154	242	1163	Avinashilingam University For Women, Coimbatore
155	242	1164	Bhagwan Parshuram Institute Of Technology, Rohini
156	242	1165	Bharati Vidyapeeth College Of Engineering, Navi Mumbai
157	242	1166	Bhilai Institute Of Technology, Durg
158	242	1168	Brcm College Of Engineering & Technology, Bahal
159	242	1170	Chitkara University, Chandigarh
160	242	1171	Dmietr, Sarod Hirapur
161	242	1173	Thiagarajar College Of Engineering, Madurai
162	242	1174	Toc H Institute Of Science & Technology, Arakkunnam
163	242	1178	Vidyabharti Trust Institute Of Technology & Research Center, Umrakh
164	242	1179	Viswajyothi College Of Engineering & Technology, Vazhkulam
165	242	1181	Vivekananda Institute Of Technology, Jagatpura
166	242	1187	Government Engineering College, Thrissur
167	242	1190	Symbiosis Institute Of Computer Studies & Research, Pune
168	242	1194	Gandhi Engineering College, Badaraghunathpur
169	242	1195	Bansal College Of Engineering, Mandideep, Bhopal
170	242	1196	Balaji Institute Of Technology & Science, Narsampet
171	242	1197	G. H. Raisoni Institute Of Engineering & Technology, Wagholi Pune
172	242	1198	Mata Raj Kaur Institute Of Engineering & Technology, Rewari
173	242	1199	G. H. Raisoni Institute Of Engineering & Management, Jalgaon
174	242	1200	Ies College Of Technology, Bhopal
175	242	1201	Islamic University Of Science And Technology, Awantipora
176	242	1202	Ratnavel Subramaniam College Of Engineering And Technology, Dindigul
177	242	1205	Mahatma Gandhi Missions College Of Engineering & Technology, Noida
178	242	1206	Bansal Institute Of Research & Technology, Bhopal
179	242	1207	Jawaharlal Institute Of Technology, Borawan
180	242	1208	Anna University Of Technology, Tirunelveli

<b>Distribution By IITB to RCs</b>			
<b>No.</b>	<b>Quantity</b>	<b>RC Code</b>	<b>Name of Institution</b>
181	242	1209	Kiit College Of Engineering, Bhondsi
182	242	1212	Kalyani Government Engineering College, Kalyani
183	242	1213	St. Peter`S Engineering College, Hyderabad
184	242	1214	Srinivas Institute Of Technology, Valachil, Mangalore
185	242	1215	G L Bajaj Group Of Institutions, Akbarpur
186	242	1216	Bsa College Of Engineering & Technology, Mathura
187	242	1217	Sies Graduate School Of Technology, Nerul, Navi Mumbai
188	242	1219	Prestige Institute Of Engineering & Science, Indore
189	242	1220	Kurukshestra Institute Of Technology & Management, Kurukshestra
190	242	1223	Rbs Engineering Technical Campus, Bichpuri
191	242	1224	Reva Institute Of Technology & Management, Yelahanka
192	242	1225	Bms College Of Engineering, Bengaluru
193	242	1226	Skp Engineering College, Tiruvannamalai
194	242	1228	Loyola-icam College Of Engineering & Technology, Chennai
195	242	1229	Sardar Patel Institute Of Technology, Andheri
196	242	1230	Vidya Vikas College Of Engineering & Technology, Tiruchengode
197	242	1231	Bhajarang Engineering College, Thiruvallur
198	242	1234	Meghnad Saha Institute Of Technology, Uchhepotra
199	242	1235	Dr. Mahalingam College Of Engineering & Technology, Pollachi
200	242	1236	Excel Engineering College, Komarapalayam
201	242	1238	Maharaja Agrasen Institute Of Technology, Rohini
202	242	1240	Shri Shankaracharya Institute Of Professional Management & Technology, Raipur
203	242	1241	Nri Institute Of Information Science & Technology, Bhopal
204	242	1242	K.L.E. Society`S College Of Engineering & Technology, Belgaum
205	242	1243	National Institute Of Science & Technology, Berhampur
206	242	1244	Archana College Of Engineering, Palamel
207	242	1245	Stc School Of Engineering & Research Technology, Khamgaon
208	242	1247	School Of Management Sciences, Technical Campus, Kasimpur Biruha
209	242	1248	Shri Sant Gadge Baba College Of Engineering & Technology, Bhusawal
210	242	1249	Sri Ramakrishna Institute Of Technology, Coimbatore
211	242	1250	Sharad Institute Of Technology College Of Engineering, Yadav
212	242	1251	Jaypee Institute Of Information Technology, Noida-128
213	242	1252	Narayana Engineering College, Nellore
214	242	1253	Ssm College Of Engineering, Komarapalayam
215	242	1255	Mount Zion College Of Engineering & Technology, Lena Vilakku
216	242	1256	Sree Datha Institute Of Engineering & Science, Hyderabad
217	242	1257	Hctm Technical Campus, Kaithal
218	242	1258	Om Institute Of Technology & Management, Hisar
219	242	1259	N.D.M.V.P. Samaj`S K.B.T. College Of Engineering, Nashik
220	242	1260	S.K.N. Sinhgad College Of Engineering, Pandharpur
221	242	1262	Apex Institute Of Technology & Management, Pahala, Bhubaneswar
222	242	1263	Techno India, Salt Lake Kolkata
223	242	1264	Shoolini University, Solan
224	242	1265	Madhav Institute Of Technology & Science, Gwalior
225	242	1266	Netaji Subhash Engineering College, Technocity, Garia

<b>Distribution By IITB to RCs</b>			
<b>No.</b>	<b>Quantity</b>	<b>RC Code</b>	<b>Name of Institution</b>
226	242	1268	Techno India College Of Technology, Rajarhat Kolkata
227	242	1269	Iercem Institute Of Information Technology, Banipur
228	242	1271	Jawaharlal Nehru National College Of Engineering, Shimoga
229	242	1272	Mangalayatan University, Beswan
230	242	1273	Gudlavalleru Engineering College, Gudlavalleru
231	242	1274	Svs Group Of Institutions, Hanamkonda
232	242	1275	B H Gardi College Of Engineering & Technology, Rajkot
233	242	1276	Sankalchand Patel College Of Engineering, Visnagar
234	242	1277	Technology Education & Research Integrated Institutions, Kurukshetra
235	242	1278	S.D.M. Institute Of Technology, Ujire
236	242	1279	Mandsaur Institute Of Technology, Mandsaur
237	242	1280	Priyadarshini College Of Engineering Nagpur, Nagpur
238	242	1282	Sri Eshwar College Of Engineering, Coimbatore
239	242	1283	Kanksa Academy Of Technology & Management, Panagarh
240	242	1284	Saroj Mohan Institute Of Technology, Guptipara
241	242	1286	U V Patel College Of Engineering, Kherva
242	242	1287	Rayat-bahra Innovative Institute Of Technology & Management, Ganaur
243	242	1288	Vidyalankar Institute Of Technology, Wadala
244	242	1289	B K Birla Institute Of Engineering & Technology, Pilani
245	240	1009	Veermata Jijabai Technological Institute, Mumbai
246	240	1022	Shri Sant Gajanan Maharaj College Of Engineering, Shegaon
247	240	1083	IIIT Hyderabad
248	240	1176	University B.D.T. College Of Engineering, Davangere
249	170	1172	Theem College Of Engineering, Boisar East
250	130	1005	Anna University
251	130	1024	Vivekanandha College Of Engineering For Women
252	130	1049	PDE Association College Of Engineering
253	130	1086	JNTU College Of Engineering Hyderabad
254	130	1088	K K Wagh Instituite Of Engineering Education Research
255	130	1103	NMIM MPSTME Shirpur
256	130	1105	Nitte Meenakshi Institute Of Technology
257	130	1115	Shivaji University Kolhapur
258	130	1141	Government Engineering College
259	130	1182	NK Orchid College Of Engineering Technology Hipparaga
260	130	1184	National Institute Of Technology
261	130	1192	MGM s College Of Engineering
262	130	1203	Gnanamani College Of Engineering Namakkal
263	130	1211	Sri Shanmuga College Of Engineering Technology
264	130	1218	Bansal Institute Of Engineering Technology
265	130	1222	Chameli Devi Group Of Institutions
266	130	1227	J.J. Magdum College Of Engineering
267	130	1232	Jayalakshmi Institute Of Technology
268	130	1239	Mohandas College Of Engineering Technology
269	130	1246	C U Shah College Of Engineering Technology
270	130	1261	MET Institute Of Engineering Nashik

<b>Distribution By IITB to RCs</b>			
<b>No.</b>	<b>Quantity</b>	<b>RC Code</b>	<b>Name of Institution</b>
271	130	1292	Sagar Institute Of Science Technology Engineering
272	130	1293	Seacom Engineering College
273	130	1295	Gitam University Hyderabad Campus
274	130	1296	Nagole Institute Of Technology Science
275	130	1298	Sardar Vallabhbhai Patel Institute Of Technology
276	130	1299	Dronacharya College Of Engineering
277	130	1300	Kurukshetra University Electronic Science Department
278	130	1301	K L E Institute Of Technology
279	130	1302	Sree Buddha College Of Engineering
280	130	1303	Sree Narayana Gurukulam College Of Engineering Kadayiruppu
281	130	1306	Shree L R Tiwari College Of Engineering
282	130	1311	Arunai College Of Engineering
283	130	1314	Kathir College Of Engineering
284	130	1315	Selvam College Of Technology
285	130	1316	Dronacharya College Of Engineering
286	130	1317	Government Engineering College, Bikaner
287	130	1318	Amity University Haryana
288	130	1319	Mukesh Patel School Of Technology Management Engg
289	130	1322	Charusat University Of Science Technology
290	115	8000	IIT Bombay Development Activities
291	41	8006	MHRD
292	40	1017	Pvg`S College Of Engineering & Technology, Pune
293	40	1021	Nerist, Nirjuli
294	40	1237	Mewar University, Gangrar
295	40	1267	Sri Shakthi Institute Of Engineering & Technology, Chinniyampalayam
296	40	1285	Siddaganga Institute Of Technolgy, Tumkur
<b>Total</b>	<b>100000</b>		
<b>* Balance for further Distribution</b>			

## **Chapter 5**

# **Lab Testing by C-DAC (Thiruvananthapuram)**

The status reports in the subsequent pages have been forwarded to IITB by CDAC. We are awaiting a further detailed report.

1. Aakash Status Report dated 22 August 2012
2. Aakash Status Report dated 30 May 2013
3. ERTL Test Report dated 15 April 2013
4. Aakash Status Report dated 8 July 2013
5. Aakash Test Report dated 8 July 2013

## Aakash Project Status Report – August 22, 2012

### 1. Introduction

CDAC Thiruvananthapuram was entrusted the responsibility of carrying out the detailed lab testing of the Aakash tablet samples as part of the Aakash project given by MHRD to IIT Bombay. As part of the initial study 25 samples out of the 100 supplied by M/s Datawind were delivered to CDAC on 20<sup>th</sup> June, 2012. A formal project proposal for the Evaluation and Testing of the Aakash Tablet along with a Tentative Test Plan and Procedure was submitted to IIT-B on the 19<sup>th</sup> July, 2012. Project fund was received by CDAC, Thiruvananthapuram on 23<sup>rd</sup> July, 2012.

### 2. Work done on the project from July to August 2012

The objective of the project assigned to CDAC, Thiruvananthapuram is the evaluation and testing of the Aakash tablets. We have prepared a tentative test plan for the detailed tests to be carried out on the tablets. A first level of evaluation and testing has been done and feedback on the same was given to IIT-B on the 30<sup>th</sup> July, 2012. As mentioned in the feedback, the model of the Aakash supplied is of a lower specification which runs the Android 2.2 OS, which is found to be unstable and buggy. Several other issues with regard to the faulty hardware / software and poor mechanical design have been noted. The observations made are summarised below:

1. Android version 2.2.2 installed on the tablets provided, causes some issues w.r.t poor power management, application control and non-support of a Wi-Fi proxy, precluding downloading of apps through WLAN.
2. Observed boot failure and processor instruction errors in many of the machines.
3. Frequent system freeze observed which required hard reset using a pin.
4. Quality of the Power switch is poor, and sometimes gets recessed within the cabinet when pressed.
5. Touch screen sensitivity/calibration is erratic.
6. There is no charge indication LED on the Tablet.
7. When the device is in standby, the state-of-charge does not get updated in the Tablet screen.
8. RTC time does not get updated when the device is in standby.
9. The tablet cannot be kept in standby mode since it automatically wakes up every 5 minutes.

10. The USB drive does not work concurrently with a SD card plugged in.
11. Some of the software applications cannot be closed through the GUI. They can only be killed from the App killer. Tasks have to be forcibly closed.
12. Keyboard is not working from the USB slot.
13. No volume control button available.
14. Some background operations which seem unnecessary were found to be running (camera, Bluetooth, etc.). These seem to be eating up system resources, increasing the boot time as well.
15. PC connectivity is not provided for system checking, USB debugging and software installation.
16. Aakash Tablet model is not supported and recognised by Google Play.

### **3. Concluding remarks**

We have identified the various tools and apps for testing including benchmark tests, devices and OS tests. We have also purchased a few similar tablets available in Indian market for comparative study and performance evaluation. We have initiated procurement of various tools for test platform and are in the process of finalising the test procedure and setting up a semi-automatic test environment. We have also identified testing agencies / certifying authorities for carrying out the environment tests as per ISO/BIS standards.

Detailed testing of the 25 samples received at C-DAC is in progress and an interim test report of the same shall be delivered by first week of September. Since the performance of the devices supplied is not upto the mark, we would like to use this as development for our test platform and we shall focus on the testing of the newer upgraded model which is likely to be better and could alleviate most of the problems found in the current model.

We would like to gather more details from M/s Datawind including detailed specification, internal details, reliability data of critical components etc. Hence, we could explore the areas of hardware testing which would help bring down the failure rate.

We plan to start rigorous testing of the new version of Aakash Tablet with Android 4.0 as soon as we receive the same. Since rigorous testing is done only on a small sample volume, a close monitoring at the production line by CDAC is essential to ensure the quality. For this a relations may kindly be put in place with the production agency.



## Aakash Project Status Report – May 30, 2013

Eight batches of upgraded Aakash II tablets received from IIT Bombay till date.

1. 08-10-2012 – 25 nos – (Serial nos – 10001060-69, 71-79, 85-90)
2. 27-12-2012 – 40 nos – (Serial nos – 10002059-98)
3. 25-02-2013 - 50 nos – (Serial nos – 10003061-90, 10002801-20)
4. 02-04-2013 - 150 nos
5. 15-04-2013 - 100 nos
6. 25-04-2013 - 100 nos
7. 29-04-2013 - 100 nos
8. 09-05-2013 - 100 nos

It may be noted that the dispatch slips generated by Aakash Support Team do not correspond to the consignments received through C-DAC, Noida. The list of dispatch slips generated and the actual quantity received is as given in Annexure –I.

Some of the Tablets in the 5<sup>th</sup> and 7<sup>th</sup> batches had broken display screens (appears to have been damaged in transit). A total of five Tablets were damaged. Also, some of the Tablets are dead and do not turn ON. A total of about 12 Tablets are dead out of the sample of 500 numbers we have opened so far.

The packages received contain only Tablet and charger and no cables/adaptors. The tablets also do not have any serial number affixed on them.

A new variant of the Tablet viz. “Nuclear –pfdq88c” was found in some of the batches, other than the earlier models of “Nuclear X3”, “Nuclear Evb” and “A13MID” from “Softwinners”. Also another model of tablet; “RK2926” from “Rockchip” was found among the new batches received.

Performance testing of first 3<sup>rd</sup> batch of tablets is completed and testing of 4<sup>th</sup> and 5<sup>th</sup> batches in progress. Since, we have received a bulk of the tablets in the months of April /May (550 nos) and comprehensive testing of each tablet is done, we are unable to give a report for the entire volume of tablets received till date.

We are in the process of developing a semi-automatic test setup for testing the Tablets which would help reduce the time for testing.

Test results of the 3<sup>rd</sup> batch of tablets (Sl. Nos 10003061-90 and 10002801-20) are recorded and attached. ([Akash\\_Test\\_Report.xls](#)).

The problems found during the preliminary evaluation of the tablets tested so far are listed below:

- Power adaptors of some are not working. Arcing sound as well as some liquid discharge found in some of the power adaptors.

- Boot problems found in some of the tablets. Tablet does not boot up, only continuously displays the Android logo in a loop.
- Some of the Tablets automatically power-ON while connecting the charger.
- Extreme heat generation (above 42 deg C) found in some while charging and after usage for 30 mins.
- “android.process.acore has stopped unexpectedly” errors occur frequently in some of the Tablets.
- Display screen of the Tablet gets garbled due to EMI, when in close contact with certain mobile phones when signal is active.
- Case locking not proper, leading to partially open cover.
- Misalignment of micro-USB connector, preventing insertion of cable.
- Misalignment of SD card slot, preventing insertion of card.
- Screen of some of the tablets are badly scratched.
- Ripples observed on LCD screen of some tablets on movement and tapping.
- Dead pixels observed in some of the Tablets.
- Battery performance of some found not upto the mark. Only gives about half the backup time compared to other tablets in the same series.

Environmental tests as per IEC/ BIS standards carried out with ERTL (South) laboratory. Mechanical tests consisting of impact and vibration test were performed. Environmental tests comprising of dry heat test, cold test and humidity tests were also performed. Report of the same attached ([ERTL\\_test\\_report.pdf](#)).

Also identified test equipment needed to undergo some of the tests in-house itself and their procurement is in process.

As informed earlier since rigorous testing is done only on a small sample volume, a close monitoring at the production line is essential to ensure the quality. For this a relation may kindly be put in place with the production agency.

Requested IIT, Bombay to facilitate in opening a contact window with M/s Datawind and also the production agencies. Manufacturing and delivery schedule still not intimated.

Also, yet to receive the detailed specification, internal details, reliability data of critical components and test QAP document from M/s Datawind.



S. Krishnakumar Rao

30-05-2013

**Annexure - I**

<b>Dispatch Slip</b>		<b>Tablets Received</b>	
<b>Dated</b>	<b>Quantity (nos)</b>	<b>Date</b>	<b>Quantity (nos)</b>
20-02-2013	50	25-02-2013	50
01-04-2013	20+20+40+30 = 110	02-04-2013	150
09-04-2013	20+30 = 50	15-04-2013	100
18-04-2013	20+40+10 = 70		
22-04-2013	60		
23-04-2013	40	25-04-2013	100
30-04-2013	26+22+18+19+14 = 99	29-04-2013	100
03-05-2013	1	09-05-2013	100
22-05-2013	2+65+8+85+40 = 200		
29-05-2013	50+50 = 100		

**ELECTRONICS REGIONAL TEST LABORATORY (SOUTH)**  
**MINISTRY OF COMMUNICATIONS AND INFORMATION TECHNOLOGY**  
**THIRUVANANTHAPURAM**

**TEST REPORT ON: Aakash Tablet PC**

REPORT NO.	DATE	PAGE NO.	NO. O F PAGES
ERTL (S)/R/4428	15-4-13	1	5

1. Indenter : M/s CDAC  
 (Name & address of the  
 Organisation ) Vellyambalam  
 Trivandrum
2. Indenter's Reference : SRFNo.4428 dt 28-3-13
3. Description & Identification of the item : Aakash Tablet PC : 2 Nos.  
 Sl.No. 10001074,10002064
4. Applicable Specification : As pes IS 9000
5. Test done : 1.Dry Heat test  
 2. Cold test  
 3. Damp heat test  
 4. Impact Test  
 5. Vibration Test  
 6. Functional check
- 6.

Equipment used	model	Traceability	Validity
Programmable humidity Test chamber Weiss Technik	WK 11 1000	ETDC Bangalore	28-2-2014
Electro Dynamic Vibration Shaker System	Saraswathi Dynamic	ERTL(S)	02-07-2013



**ELECTRONICS REGIONAL TEST LABORATORY (SOUTH)  
MINISTRY OF COMMUNICATIONS AND INFORMATION TECHNOLOGY  
THIRUVANANTHAPURAM**

**TEST REPORT ON Aakash Tablet PC**

REPORT NO.	DATE	PAGE NO.	NO. OF PAGES
		2	5

**7.0 Test results :**

Sl. No	Test condition	Specification	Qty tested	Result	Remarks
1.0	Functional Check	As per Annexure -A	Two	Complied	Nil
2.0	<u>Dry heat test IS 9000 part-III/Sec.5-1977</u>  (UUT in unpacked and power off condition) Temperature: $55 \pm 2^{\circ}\text{C}$ Duration : 16 Hrs	Shall be Conditioned	Two	Conditioned	Nil
2.1	Functional check after recovery	As per Annexure -A	Two	Complied	Nil
3.0	<u>Cold Test( IS 9000 Part-II/Sec 4-1977</u> <u>(UUT in unpacked and power off condition)</u> Temperature: $-10 \pm 3^{\circ}\text{C}$ Duration : 2 Hrs	Shall be Conditioned	Two	Conditioned	Nil
3.1	Functional check after recovery	As per Annexure -A	Two	Complied	Nil
4.0	<u>Damp heat test(IS 9000 part-V /Sec.-1-1981</u> <u>(UUT in unpacked and power off condition)</u>  Temperature: $40 \pm 2^{\circ}\text{C}$ Humidity : 95 % Duration of cycle: 24Hrs (16+8 hrs) No. Cycle : 2 Total Duration of the test : 48 hrs	Shall be Conditioned	Two	Conditioned	Nil



**ELECTRONICS REGIONAL TEST LABORATORY (SOUTH)**  
**MINISTRY OF COMMUNICATIONS AND INFORMATION TECHNOLOGY**  
**THIRUVANANTHAPURAM**

TEST REPORT ON Aakash Tablet PC

REPORT NO.	DATE	PAGE NO.	NO. OF PAGES
ERTL (S)/R/4428	15-4-13	3	5

Test results :

Sl. No	Test condition	Specification	Qty tested	Result	Remarks
4.1	Functional check after recovery	As per Annexure -A	Two	Complied	Nil
5.0	<u>Impact test(Drop test)( IS 9000 Part VII/Sec 3-1979,clause no. 9.2)</u> Drop height : 22 mm (Dropping on to a face) No. of drops: 4 (Test carried out on concrete surface instead of steel plate reinforced surface due to facility limitation)	Shall be Conditioned	Two	Conditioned	Nil
5.1	Functional check after recovery	As per Annexure -A	Two	Complied	Nil
6.0	<u>Vibration test( IS 9000 part VIII )</u> Frequency : 10 – 55 Hz Acceleration : 1g Sweep rate : 1 octave No. of Axis : X,Y,Z Duration : 45 minutes in each axis Total Duration of the test : 2 hrs 15 minutes	Shall be Conditioned	Two	Conditioned	Nil
6.1	Functional check after recovery	As per Annexure -A	Two	Complied	Nil



**ELECTRONICS REGIONAL TEST LABORATORY (SOUTH)  
MINISTRY OF COMMUNICATIONS AND INFORMATION TECHNOLOGY  
THIRUVANANTHAPURAM**

TEST REPORT ON: Aakash Tablet PC

REPORT NO.	DATE	PAGE NO.	NO. O F PAGES
ERTL (S)/R/4428	15-4-13	4	5

**8. General remarks:**

8.1. This test report is applicable only to the sample identified at Sl.No.3.

8.2. Test graphs of the sine vibration are attached.

ISSUED BY

HEAD, C S C

**SHAJI. K. S**  
Scientist 'E'  
ERTL (S), Govt. of India  
Ministry of Communications & Information Technology  
DeitY, STQC Directorate  
Sreekariyam, Thiruvananthapuram-17



ELECTRONICS REGIONAL TEST LABORATORY (SOUTH)  
MINISTRY OF COMMUNICATIONS AND INFORMATION TECHNOLOGY  
THIRUVANANTHAPURAM

TEST REPORT ON: Aakash Tablet PC

REPORT NO.	DATE	PAGE NO.	NO. O F PAGES
ERTL (S)/R/4428	15-4-13	5	5

Annexure A

Functional Test Procedure

Device shall be powered ON and allowed to boot. Working shall be checked with the display of the home screen.



## Aakash Project Status Report – July 08, 2013

A total of 965 Aakash Tablets received in 10 batches till date as given below:

1. 08-10-2012 – 25 nos – (Serial nos – 10001060-69, 71-79, 85-90)
2. 27-12-2012 – 40 nos – (Serial nos – 10002059-98)
3. 25-02-2013 - 50 nos – (Serial nos – 10003061-90, 10002801-20)
4. 02-04-2013 - 150 nos
5. 15-04-2013 - 100 nos
6. 25-04-2013 - 100 nos
7. 29-04-2013 - 100 nos
8. 09-05-2013 - 100 nos
9. 31-05-2013 - 200 nos
10. 11-06-2013 - 100 nos

The list of dispatch slips generated by Aakash Support Team and the actual consignments received through C-DAC, Noida is given in Annexure –I.

The latest three batches of Tablets (batches 8,9 & 10) received during May-June have been inspected and some were found with broken displays, some were dead and do not turn ON and the power adaptors of some were faulty. The details of the inspection are given in the attached test report ([Aakash\\_Test\\_Report\\_08-07-2013.pdf](#)).

As reported for the previous batches, the packages contain only Tablet and charger and no cables/adaptors. The tablets also do not have any serial number affixed on them.

The batches received contain a mix of Tablet variants, comprising of “Nuclear-pfdq88c”, “Nuclear Evb”, “MID”, “A13MID” from “Softwinners” and “RK2926” from “Rockchip”.

Performance testing of 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> batch of tablets has been completed and testing of 7<sup>th</sup> and 8<sup>th</sup> batches is in progress. Other tests including functional tests and battery performance tests are also being carried out. A test report containing a summary of the results and observations is also given in the attached report ([Aakash\\_Test\\_Report\\_08-07-2013.pdf](#)).

The problems found during the preliminary evaluation of the tablets are listed below:

- Some of the Tablets are dead. Do not turn ON even with power adaptor connected or after charging.
- Some of the Tablets do not get charged.
- Power adaptors of some are not working. Some of the power adaptors have blown up while switched ON.
- Some of the power adaptors are faulty and the Tablet turns OFF when it is connected.

- Tablets take a longer time to charge with some power adaptors.
- Some of the Tablets intermittently produce a tick sound and then turn-off.
- Arcing sounds are heard in some Tablets while touching / scrolling the screen (with the power adaptor connected).
- Boot problems found in some of the tablets. Tablet does not boot up, only continuously displays the Android logo in a loop.
- Some of the Tablets experience frequent operating system freeze.
- Erratic OS behaviour with automatic invoking and closing of apps, menu clicks etc. experienced in some of the Tablets.
- Extreme heat generation (above 42°C) found in some while charging and after usage for more than 30 mins.
- Misalignment of micro-USB connector, preventing insertion of cable.
- Ripples observed on LCD screen of some Tablets.
- Vertical line also present in display of some Tablets.
- Touch sensitivity of some of the Tablets are very poor.
- Some other problems like touch being insensitive in certain areas of the screen and touch press staying persistent in some points of the screen were also observed.
- USB port of a few Tablets were found to be not working
- Wi-Fi of some of the Tablets have failed.

A consolidated report for the entire volume of tablets received till date shall be prepared when the tests are completed.



S. Krishnakumar Rao

### Annexure - I

<b>Dispatch Slip</b>		<b>Tablets Received</b>	
<b>Dated</b>	<b>Quantity (nos)</b>	<b>Date</b>	<b>Quantity (nos)</b>
20-02-2013	50	25-02-2013	50
01-04-2013	20+20+40+30 = 110	02-04-2013	150
09-04-2013	20+30 = 50	15-04-2013	100
18-04-2013	20+40+10 = 70		
22-04-2013	60		
23-04-2013	40	25-04-2013	100
30-04-2013	26+22+18+19+14 = 99	29-04-2013	100
03-05-2013	1	09-05-2013	100
22-05-2013	2+65+8+85+40 = 200		
29-05-2013	50+50 = 100	31-05-2013	200
		11-06-2013	100

## Aakash Tablet Test Report (July 08, 2013)

### 1. Result of Testing completed on 3 batches of Tablets received in April, 2013

Tablet batches:

Batch 4: (Sl. nos: 10001 – 10150) – 150 nos

Batch 5: (Sl. nos: 10201 – 10300) – 100 nos

Batch 6: (Sl. nos: 10301 - 10400) – 100 nos

Total no. of Tablets tested: 350 nos

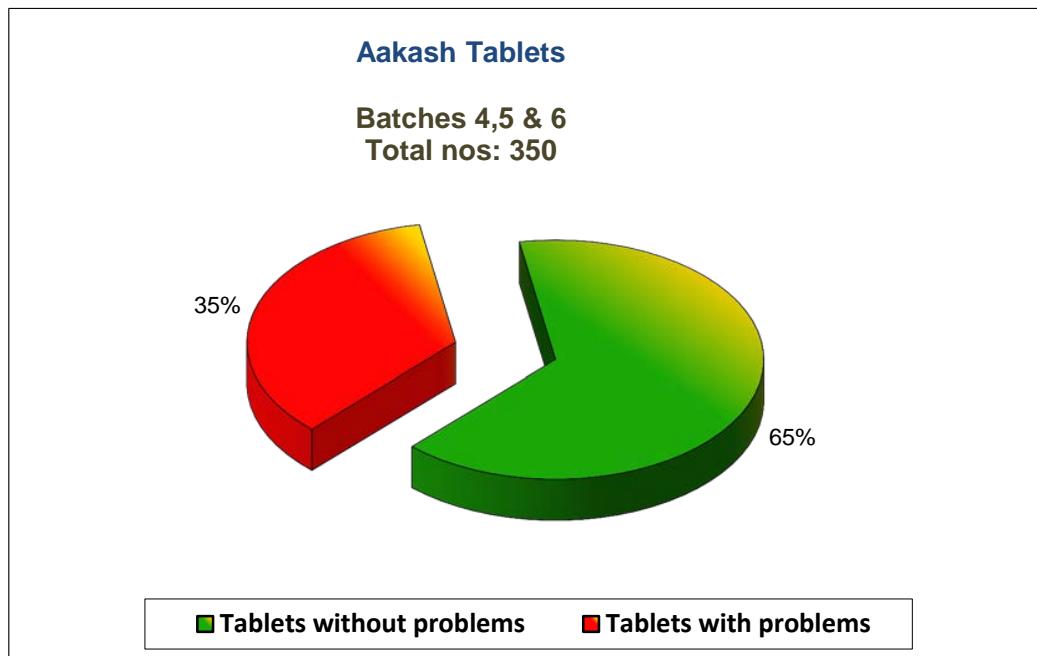
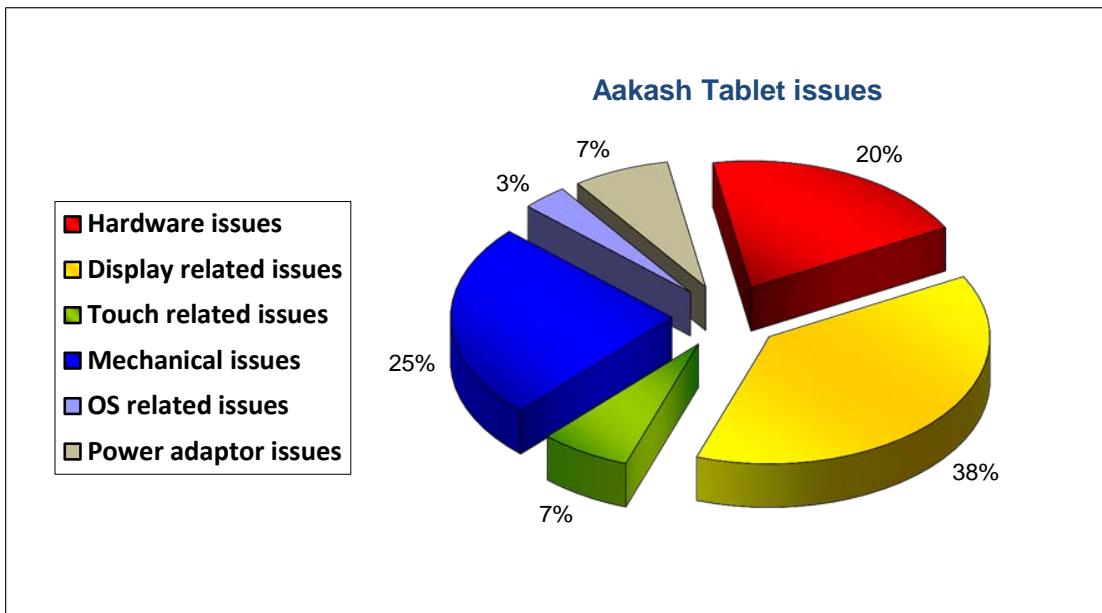


Chart: 1.1

**Chart: 1.2**

Testing of 4 <sup>th</sup> , 5 <sup>th</sup> & 6 <sup>th</sup> batch of Tablets – Total nos: 350		
Issues found	No. of Tablets	
<b>Hardware issues</b>		
Tablet dead – does not turn-ON even with power adaptor connected or after charging	7	
Tablet does not get charged – Tablets works from power adaptor but battery does not get charged	21	
USB port not working	2	
Wi-Fi not working	1	
Earphone socket not working	1	
Volume button not working	1	
Arcing sound produced while touching or scrolling the screen (with power adaptor connected)	5	
Tablet produces tick sound and turns off intermittently	3	
Tablet automatically switches ON when power adaptor is connected	4	
Over heating – tablet becomes extremely hot (above 42°C) during charging and usage	3	

<b>Display related issues</b>		
Ripples produced in display screen*	92	
Vertical line present in display screen	1	
<b>Touch related issues</b>		
Poor Touch sensitivity	11	
Touch insensitive in certain areas of the screen	4	
Touch press persistent in some points of the screen	1	
<b>Mechanical issues</b>		
Tablet case not properly sealed – partially opened cover	14	
Tablet assembly not intact	16	
Misaligned micro-USB port – prevents / hinders insertion of cable	12	
Misaligned SD card slot – prevents insertion of SD card	5	
Misaligned earphone socket – poor contact with earphone jack	13	
Screen extensively scratched*	57	
<b>OS related issues</b>		
Boot problem – Tablet does not boot up, only continuously displays the Android logo in a loop	2	
Erratic OS – erratic OS behaviour causing automatic invoking and closing of apps, menu clicks etc.	4	
Frequent Operating System freeze – system hangs intermittently	2	
<b>Power adaptor issues</b>		
Power adaptor not working	7	
Power adaptor blown up while switched ON or after short time	3	
Faulty adaptor – Tab turns-off when connected	1	
Adaptor with slower charge rate – longer charge time	3	
Adaptor LED misaligned – indicator not visible	3	

**Table: 1.1**

\* This issue has not been considered as a major problem and is not accounted in Chart 1.1

Application related observations		
Office suite not pre-installed	327	
PDF reader not pre-installed	112	
Flash player not pre-installed	23	

**Table: 1.2**

## 2. Results of Performance tests of 3 batches of Tablets received in April, 2013

Tablet batches:

Batch 4: (Sl. nos: 10001 – 10150) – 150 nos

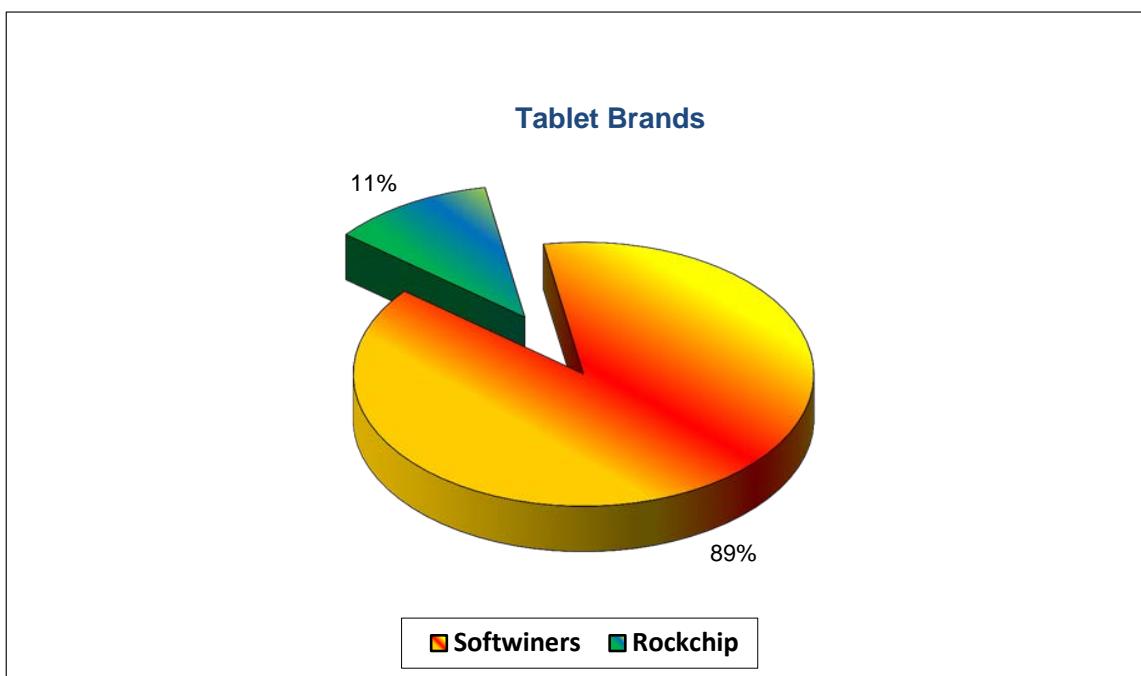
Batch 5: (Sl. nos: 10201 – 10300) – 100 nos

Batch 6: (Sl. nos: 10301 - 10400) – 100 nos

Total no. of Tablets: 350 nos

The Tablets received in these 3 batches are of different models containing different hardware and different builds of OS.

The distribution of Tablet brands, models, hardware and OS are shown below:



**Chart: 2.1**

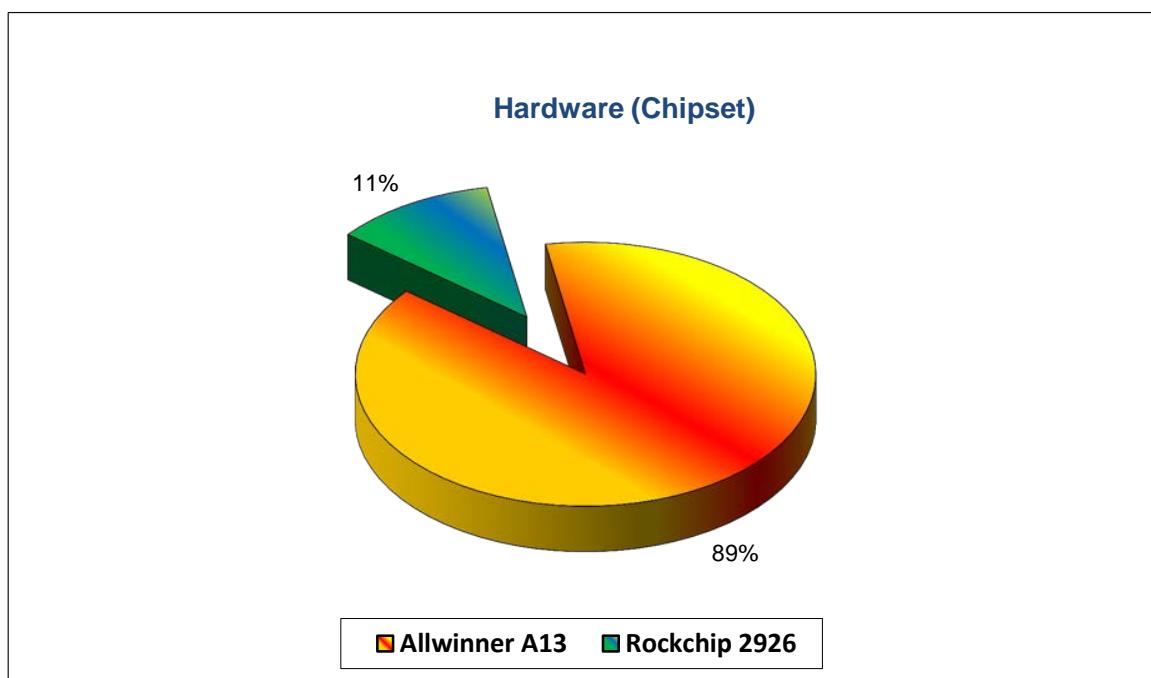


Chart: 2.2

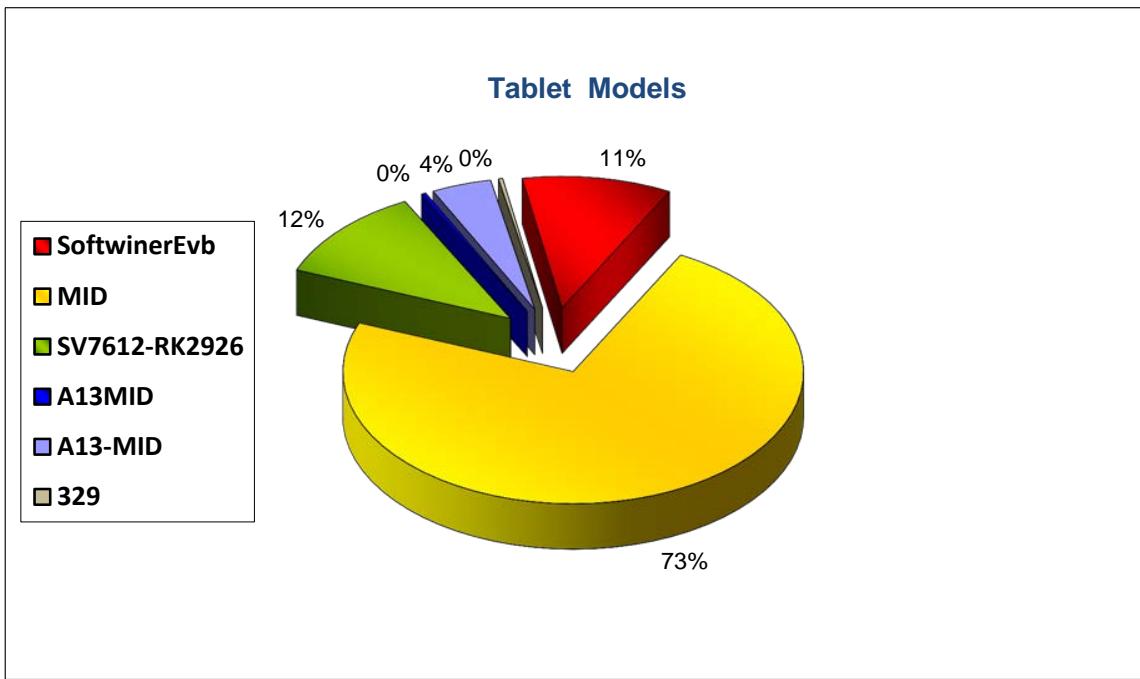
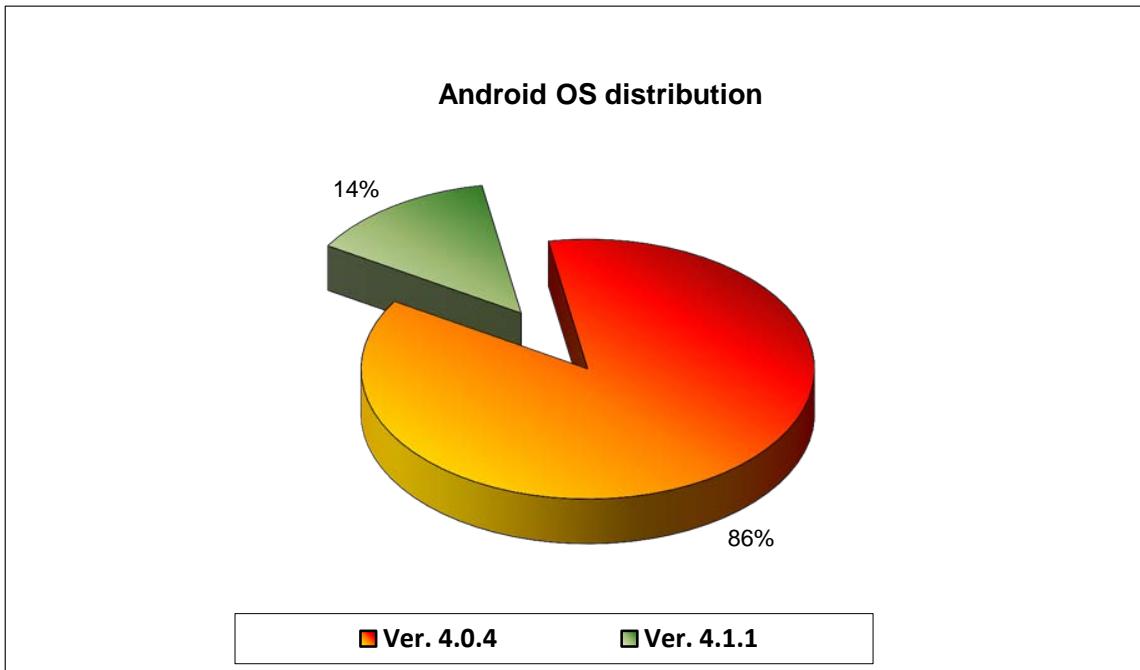


Chart: 2.3



**Chart: 2.4**

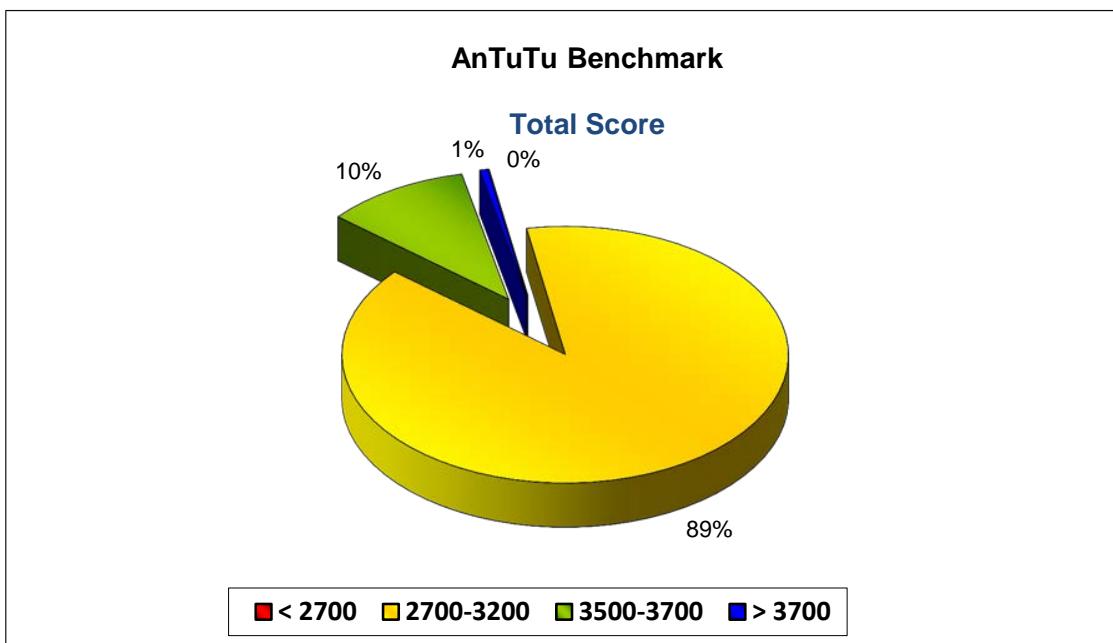
As shown in the above charts 89% of the total Tablets tested in these batches are from Softwiners which consist of the Allwinner A13 chipset and 11% of the Tablets are from Rockchip which consist of the Rockchip 2826 chipset.

The performance for Tablets with the Rockchip chipset was found to be better which constitutes 11% of total Tablets tested. This has been reflected in the scores obtained for the various benchmark tests conducted as given below.

**AnTuTu Benchmark:**

AnTuTu is an Android system benchmarking tool. AnTuTu tests CPU, RAM, graphics, database, and SD card components and provides scores for each component as well as an overall score. It gives completeness, providing tests for memory performance, integer processor speed, floating point processor speed, 2D and 3D graphics performance, SD I/O speeds and a generalised database test.

The overall scores obtained for AnTuTu benchmark is shown below:

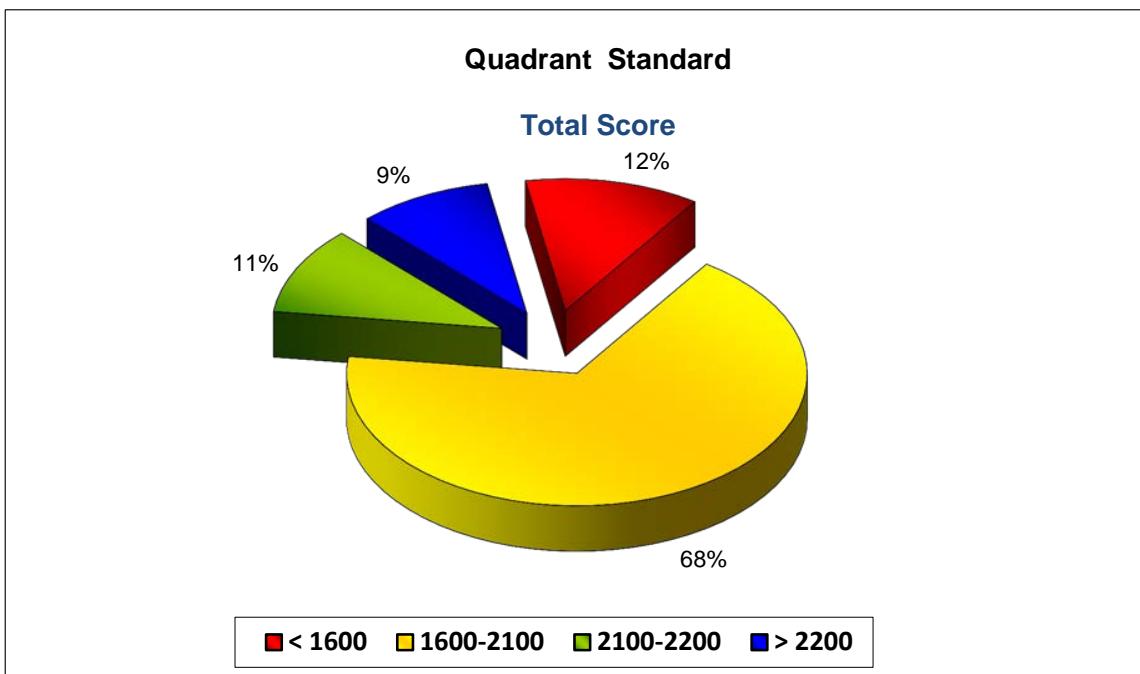


**Chart: 2.5**

#### Quadrant Standard

Quadrant is another system test that benchmarks CPU, memory, graphics and I/O. The Standard Edition computes the total score and benchmark results through the internet.

The total scores obtained for Quadrant Standard are shown below:



**Chart: 2.6**

## Passmark

PassMark is a comprehensive test that objectively benchmarks the Tablet using a variety of different tests totaling seventeen standard benchmark tests that are categorised in four test suites as follows:

CPU Tests - Mathematical operations, compression, encryption, etc

Disk Tests - Reading and writing files to internal and external storage

Memory Tests - Read and Write tests

2D Graphics Tests - Simple & Complex Vectors and image rendering and filters tests

3D Graphics Tests - Simple bouncing ball test and complex scenario.

The total scores obtained for System, CPU, Memory, Disk, 2D and 3D graphics are shown below:

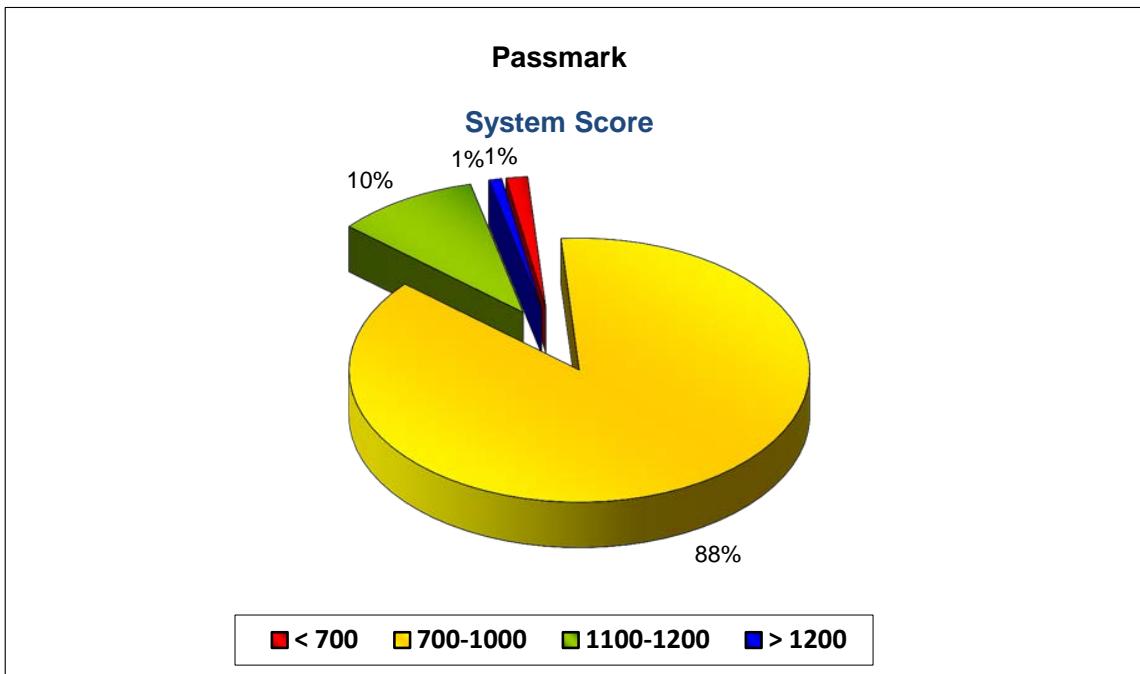


Chart: 2.7

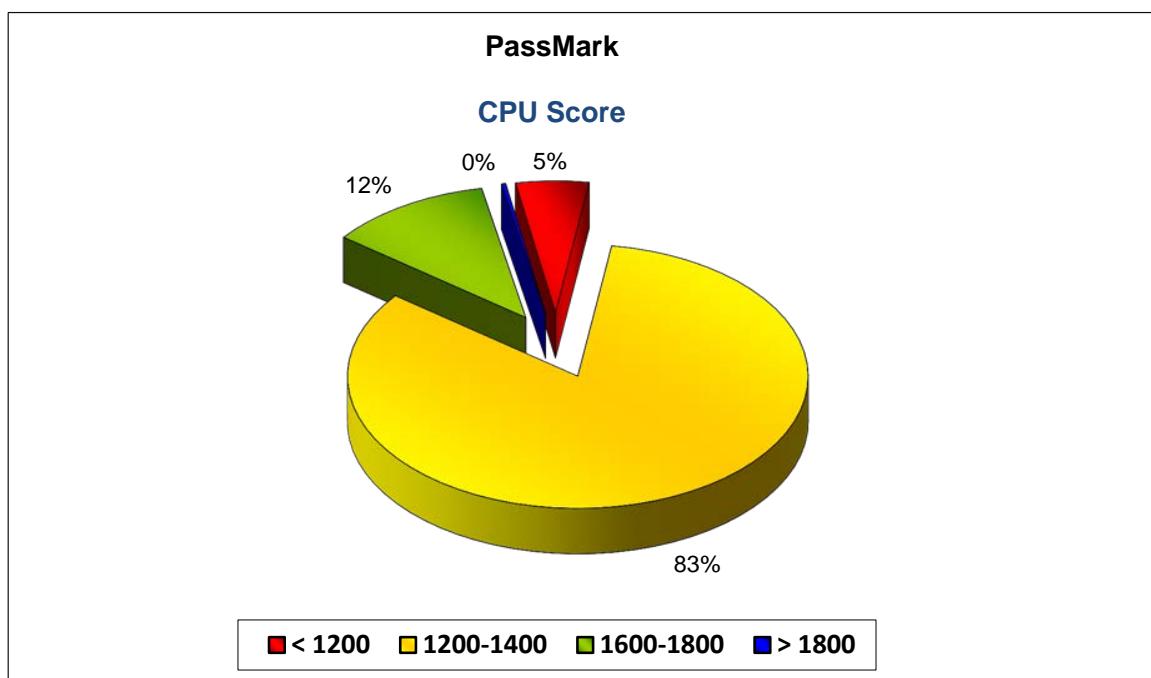


Chart: 2.8

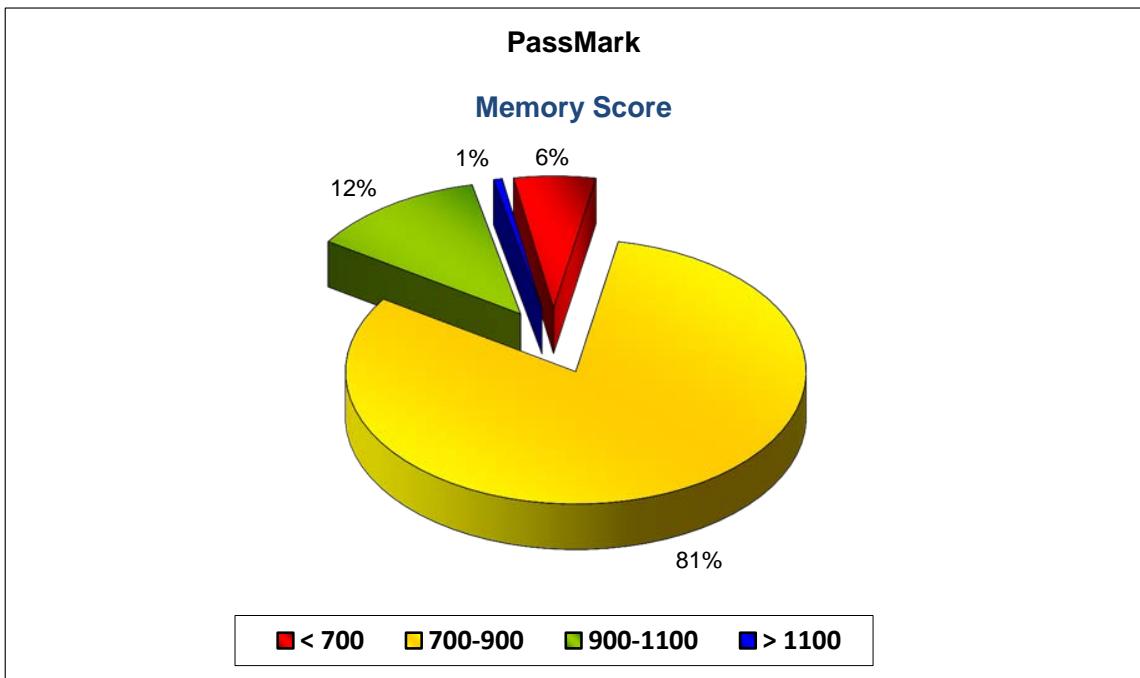


Chart: 2.9

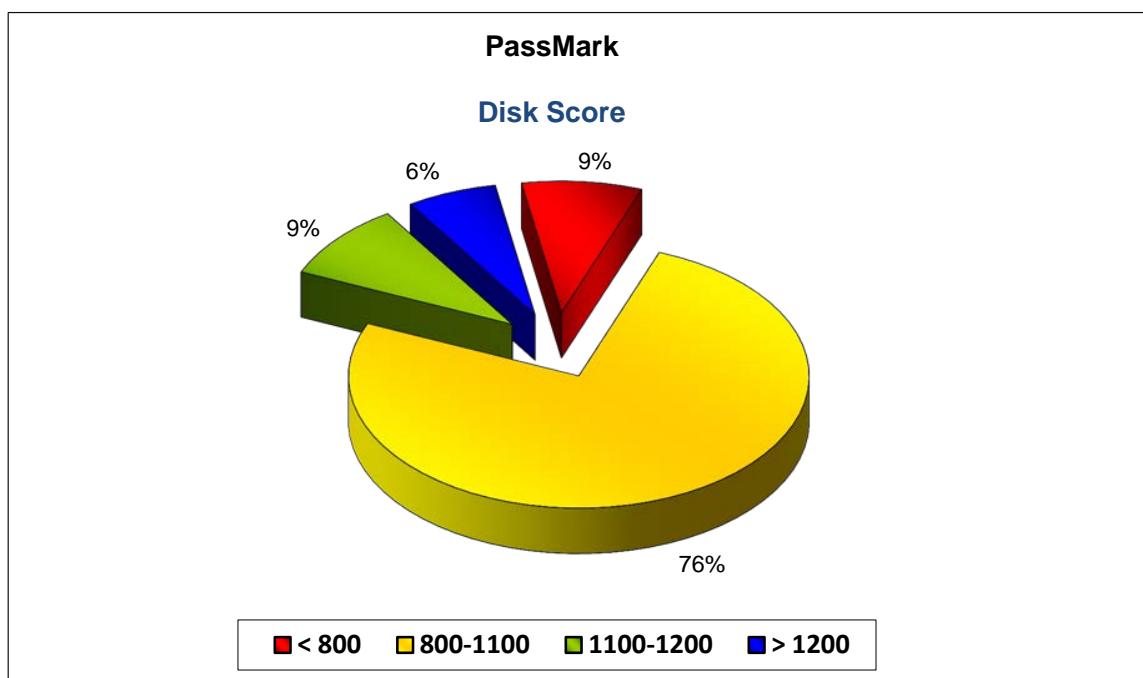


Chart: 2.10

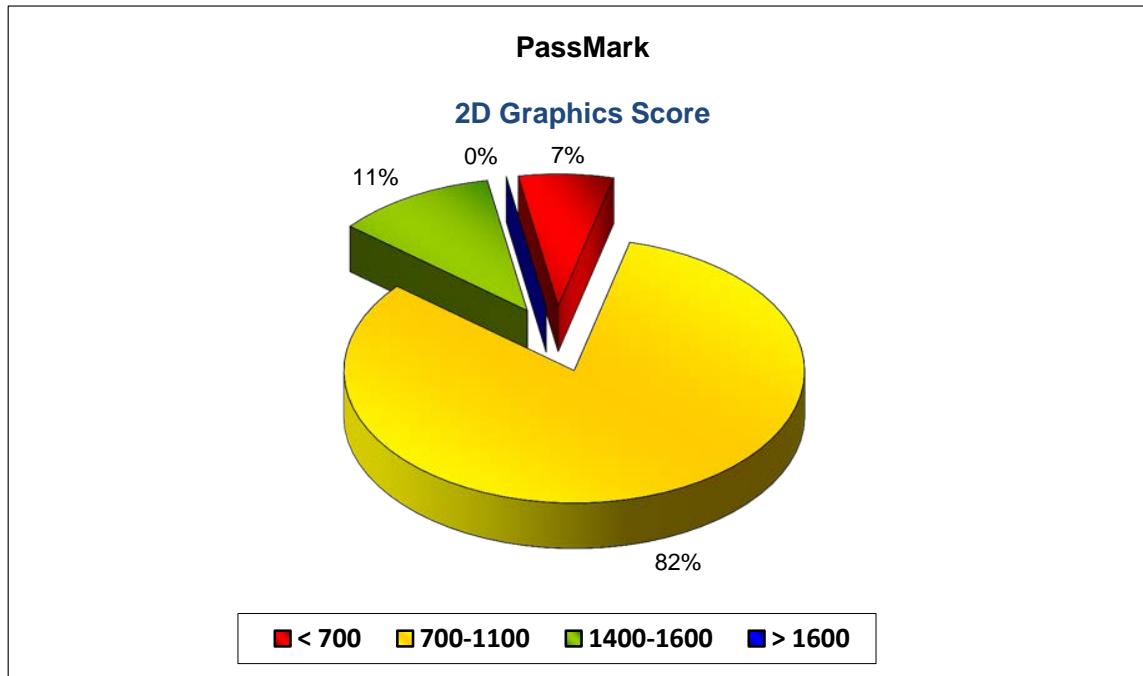
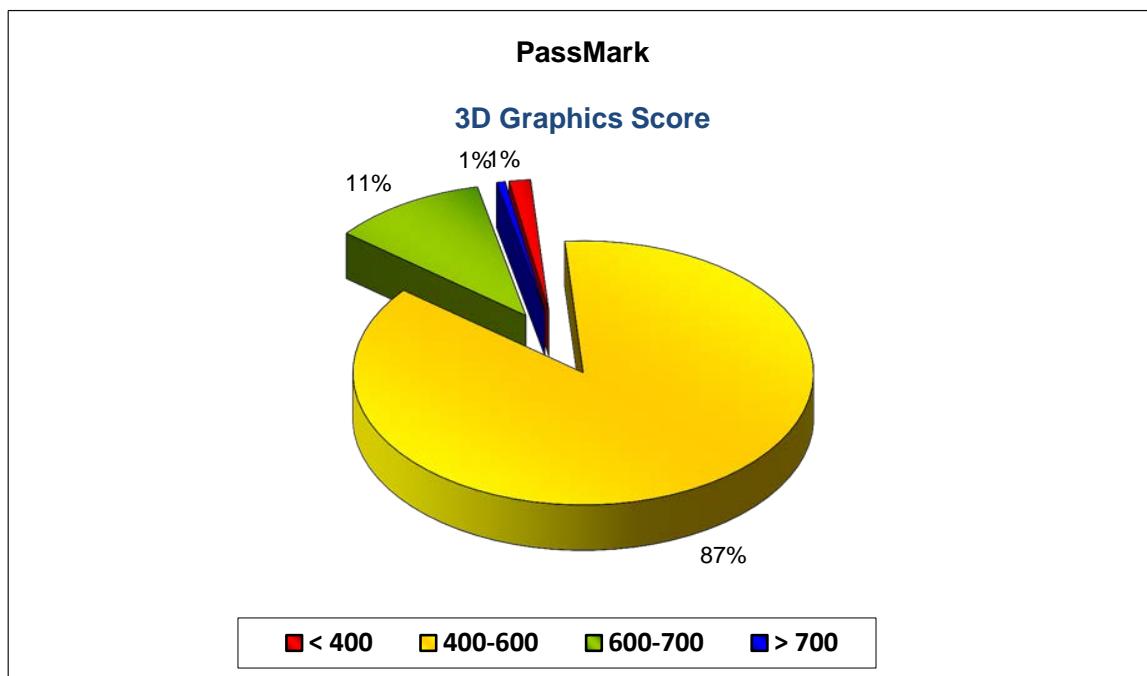


Chart: 2.11

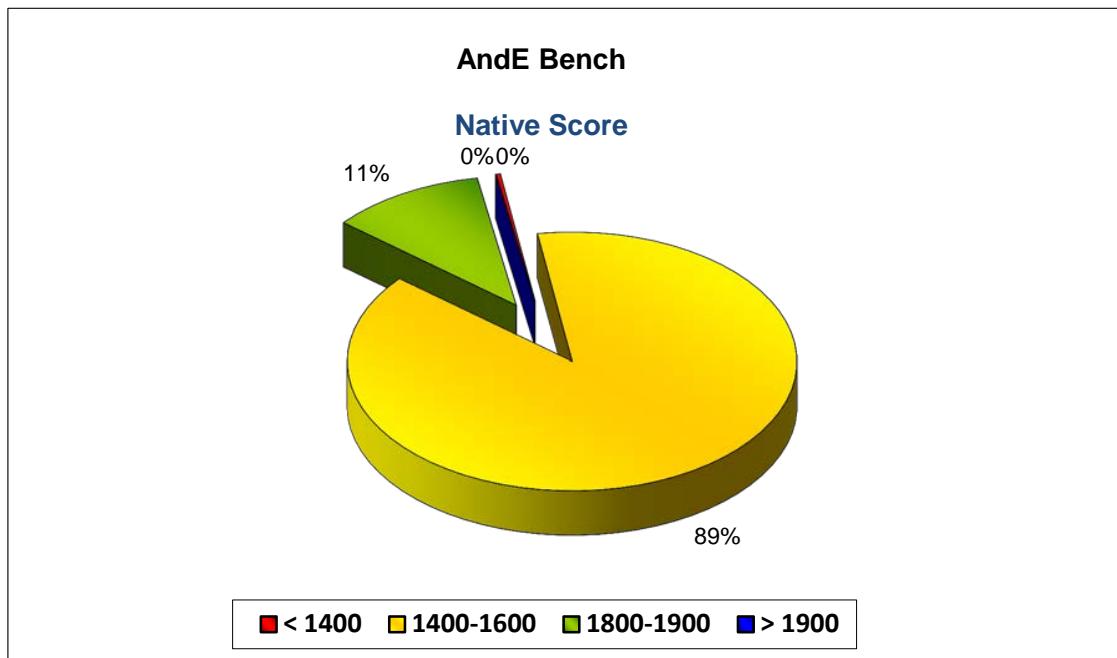


**Chart: 2.12**

#### AndEBench

AndEBench benchmark is a standardized, industry-accepted test for evaluating the Android platform performance of the Tablet.

The AndEBench scores obtained for both Native platform and Java platform are shown below:



**Chart: 2.13**

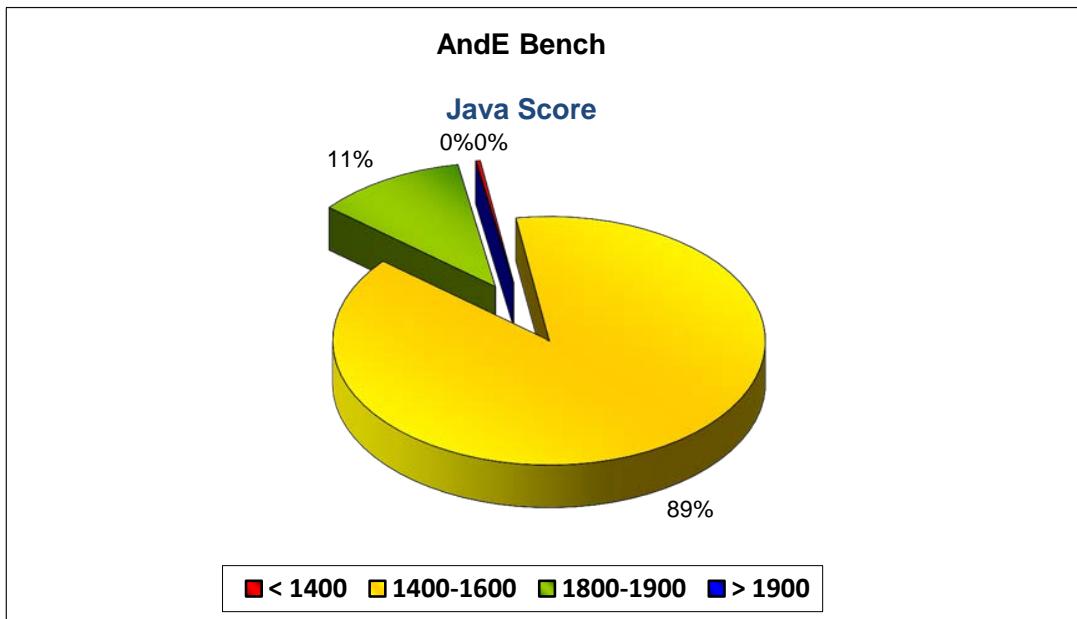


Chart: 2.14

### LinPack

Linpack is a test that measures the Tablet's CPU performance. Linpack measures how fast the Tablet's CPU can calculate a series of linear algebraic equations. These calculations measure the Tablet's ability to perform floating-point calculations. Linpack results are reported in millions of floating-point operations per second (MFLOPS).

The scores obtained for Linpack with both Single threading and Multi-threading are shown below:

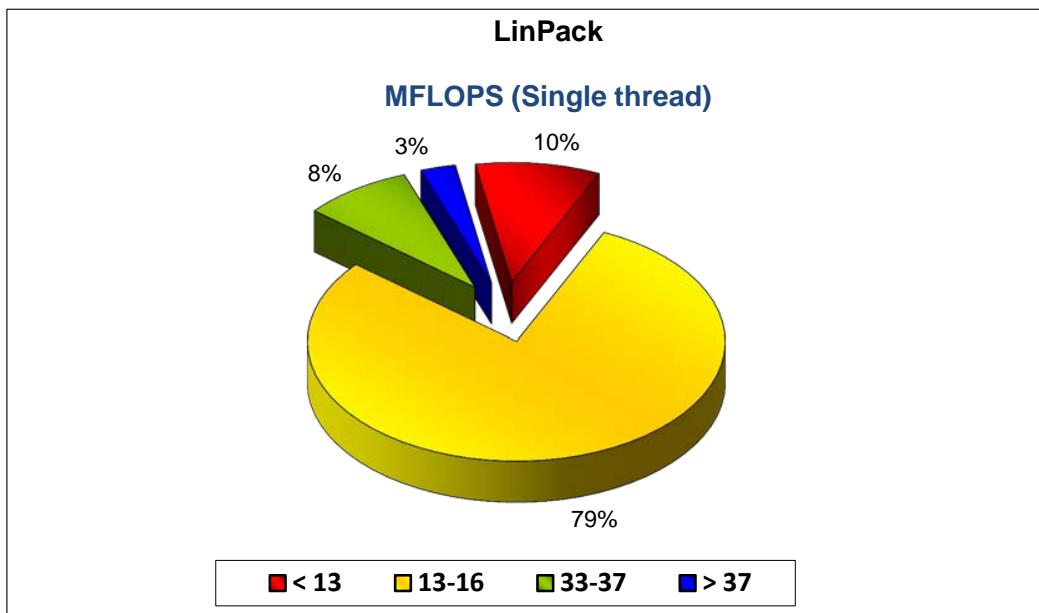
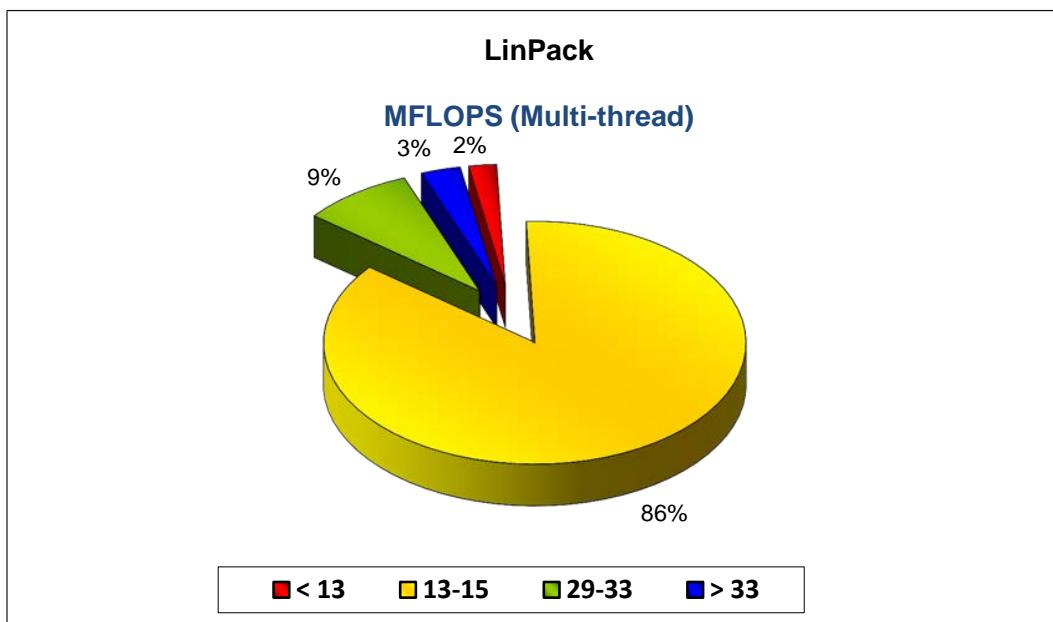


Chart: 2.15



**Chart: 2.16**

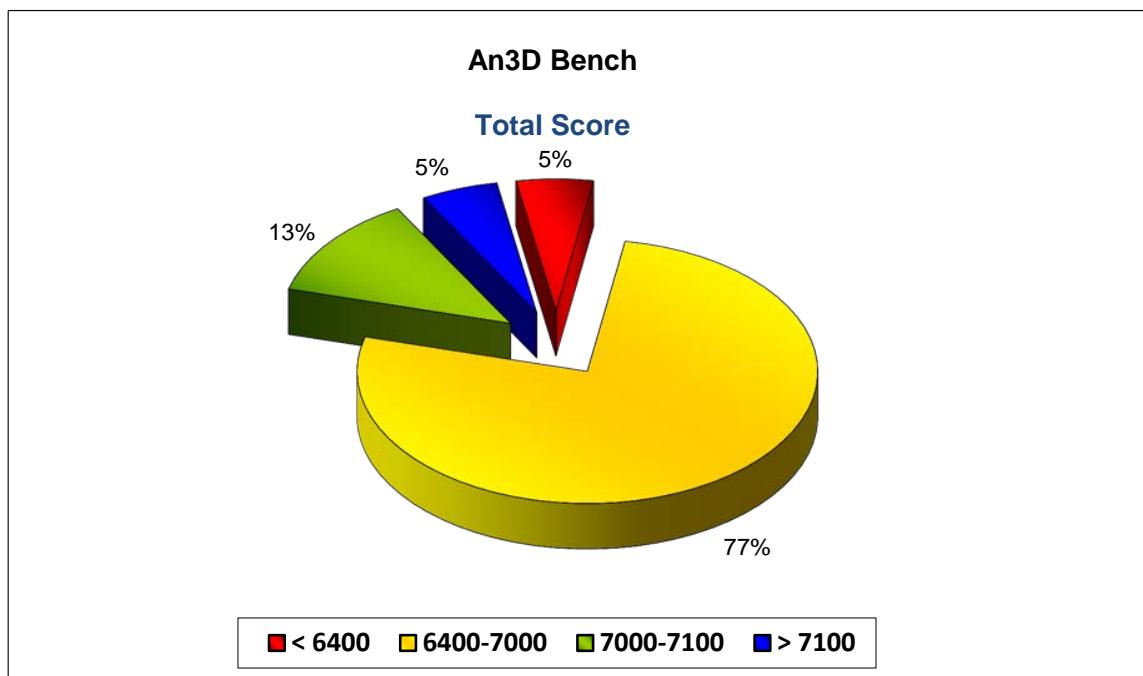
### An3DBench

An3DBench is a test that measures the Tablet's 3D-graphics performance. An3DBench measures how fast an Android Tablet's graphics engine can render a series of seven 3D scenes of varying complexity, titled thus:

- Single texturing fillrate
- Multi-texturing fillrate
- High object count
- Multiple light sources
- High polygon count
- Keyframe animation
- (Simulated) Game level.

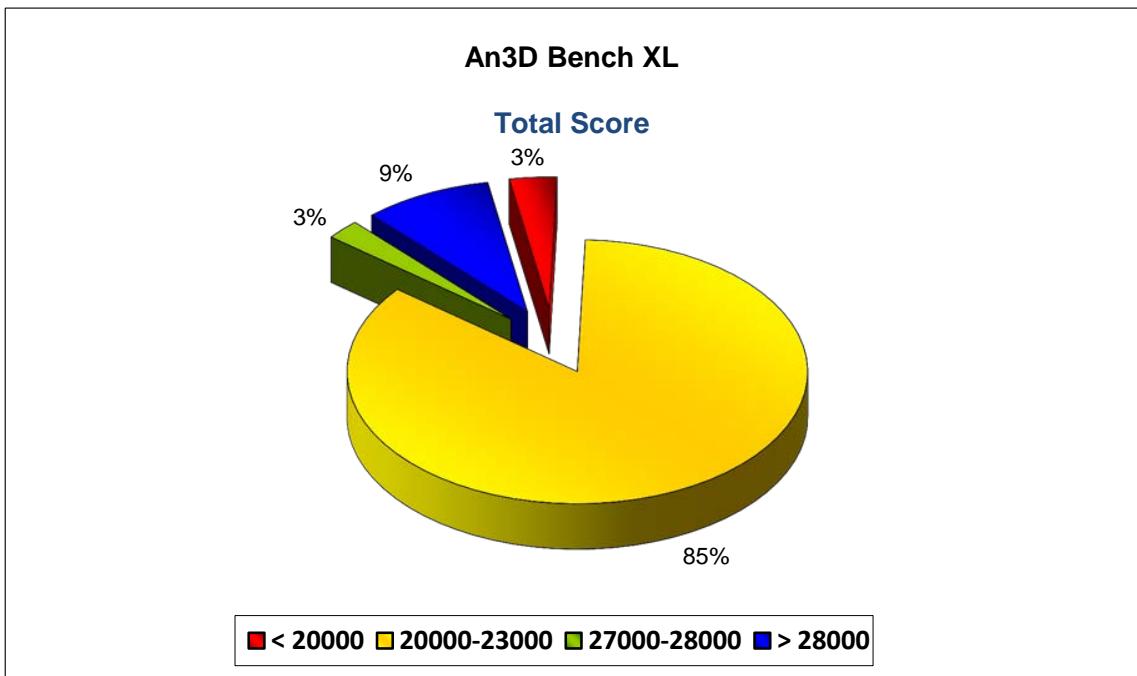
Each of the seven individual tests generates scores that are reported either in megapixels per second (MP/Sec) or frames per second (fps). The overall score is a proprietary numeric score, calculated from the seven individual tests.

The overall scores obtained for An3DBench is shown below:



**Chart: 2.17**

The total scores obtained for An3DBench XL which is a more robust and enhanced version of the An3Dbench are also shown below:



**Chart: 2.18**

### NenaMark2

NenaMark2 is an OpenGL ES 2.0 benchmark with advanced graphical effects and high resolution graphics.

NenaMark measures performance using realistic scenes that are taken from a typical game and presents the result in frames per second (fps).

The scores in fps obtained for NenaMark2 are shown below:

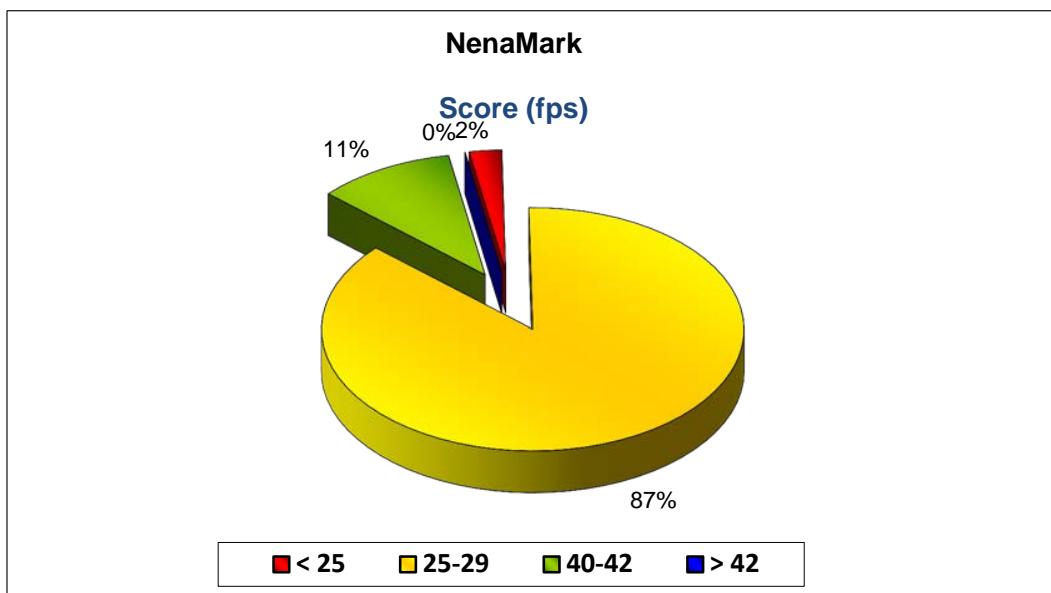


Chart: 2.19

**Result of Inspection done on latest 3 batches of Tablets received in May and June, 2013**

Tablet batches:

Batch 8: (Sl. nos: 10501 – 10600) – 100 nos

Batch 9: (Sl. nos: 10601 – 10800) – 200 nos

Batch 10: (Sl. nos: 10801 - 10900) - 100 nos

Total no. of Tablets: 400 nos.

Total no. of Tablets inspected	400
Tablet with broken displays	3
Dead Tablets	9
Faulty power adaptors	27

**Table: 3.1**



## Chapter 6

# Results of Field Trials for Development and Testing

As mentioned in our proposal, we have conducted extensive field trials, albeit with some changes in the distribution profile.

Since we now have a large number of Aakash Project Centres (APCs), we have distributed between 130 and 280 tablets to each centre. The AADLs established by Prof. Jhunjhunwala, are also included in this list given in chapter 3. Instead of massive deployment at 10 Institutions as originally envisaged, we have limited this only to IIT Bombay and IIT Kharagpur. We have maintained sufficient stock to distribute to additional centres as these get established in regions with less number of APCs.

Each APC is engaged in the following activities:

a) Teachers participating in the T10KT workshops, conducted during vacation period, are given these tablets for use during the workshop, for conducting quizzes and for accessing e-learning contents of the workshop.

This usage has already been successfully tested in the workshop on DBMS, with over 9000 registered participants at 250 Centres.

b) Tablets are given to final year students, for projects related to further development of applications and contents.

This usage has also started. Early reports have been received from some colleges. These are included in a separate chapter. More usage will be reported within coming month, when the semester begins.

c) Tablets are given to a selected class of that college. The usage in and outside the classroom is monitored.

This usage has been extensively tested at IIT Bombay, and the results are very encouraging. Such usage in other APCs will begin with the new semester.

More importantly, a number of tablets have been deployed at IIT Bombay and the five AADLs at sister IITs for extensive development of applications and content. This amounts to very extensive field testing. These efforts include the research projects done at the level of M. Tech. dissertations.

## **6.1 Training and Orientation**

The team at IIT Bombay acquired the necessary expertise in development of applications and content within the first 3 months of the project. Similarly teachers started using Aakash tablets in their classes in the academic year 2012-2013. In order to create a large community of teachers and students with similar expertise, the project decided to conduct training and orientation programs on a large scale.

## **6.2 Orientation Program for Teachers**

This orientation program was conducted on 10,11 November 2012. Over 13,000 teachers from the APCs, participated in this program. On this occasion, Aakash 2 was formally launched by Hon'ble President of India, Shri. Pranab Mukherjee, on 10 November 2012. Hon'ble HRM Dr. Pallam Raju, Hon'ble Ministers of State Dr. Shashi Tharoor and Shri. Jitin Prasada, and Secretaries from MHRD, were present during this launch.

## **6.3 Training Program for Students**

In order to train teachers and students of these colleges, we planned two training programs. The first was a 2 day orientation program for teachers, which was conducted on 10, 11 November 2012. Over 13,000 teachers from the APCs, participated in this program.

An Aakash Research Fellowship Award contest was announced for participating teachers. They were asked to form teams, and write essays on how best to utilize Aakash tablets to enhance the effectiveness of learning process, and to improve quality of education in engineering colleges. More than 2000 submissions have since been received. These are being evaluated through a peer review process.

A training program for students from these colleges, was similarly planned and conducted over 2 weekends: 23-24 February 2013, and 3-4 March 2013. More than 30,000 students originally registered for this training program. Because of the restricted lab facilities in our Remote Centres, we could accommodate only about 8,000 of these to attend the program and complete all quizzes and assignments, and they were awarded certificates. The program was greatly appreciated by the participants.

The following topics were covered in the workshop

1. Java Basics for Android
2. Introduction to Android
3. Android Environment: Installation Creating AVD
4. Eclipse IDE

5. A Simple Android Application
6. Android Building Blocks
7. User Interface and Controls
8. Resources and Supporting Multiple Screens
9. Data Storage
10. Basics of Image Handling and Media
11. Developing Web Apps on Android OS
12. Publishing your Android App
13. HTML5 on Android
14. Version control, Documentation, and various software licenses
15. Advanced Android Debugging
16. Introduction to Animation a) View Animation b) Property Animation
17. Android Canvas
18. Interactive Educational Animations on Aakash Tablet
19. Android Internals
20. Android Policy Framework
21. Android Security
22. Efficient Energy Utilization
23. Authentication Mechanism on Android
24. Handling Low Memory Scenario in Android
25. Android Permission Model
26. Data Visualization Issues on Aakash Tablets

Additionally, we also announced an Aakash Android application development contest. More than 700 students have registered for the contest, and 250 project ideas have been submitted.

## 6.4 Training Program for Interns

Like each year, good students from different colleges are invited to work at IIT Bombay during summer months as interns. This year, the Aakash project announced a large scale internship program. Over 3,000 students across the country applied. A total of 160 students from 80 colleges in the country were admitted to the internship program.

All these students were given extensive training in Android application development. Covering all the topics listed in the previous section.

In the following months, teams of interns developed several useful applications. These have been added to the Aakash repository of Open Source applications.

## **6.5 Development of Training Material**

The video recording of all our training sessions is now undergoing post production editing. All examples and sample code used during training, is similarly being compiled on the project Moodle. Entire training material will be released on the project portal in Open Source. This will enable the learning community across the country to freely access the material and develop expertise on their own.

As planned, the content and applications developed on Aakash are released in Open Source, under creative commons license. Subsequent chapters describe the work done in this regard.

## Chapter 7

# Aakash Project Summaries (IIT Bombay)

### 7.1 M.Tech Theses Abstracts

#### List of Research Projects Completed between July 2012 and June 2013 by B.Tech/DD/MTech Students

Coordinated By  
**Nagesh Karmali**

**Preamble:** 26 research projects on Aakash have been successfully completed. The primary research focus was on wide range of cutting-edge solutions to various upcoming technological problems in integration, content synchronization, performance benchmarking, issues in small-powered devices, effective utilization of small-computing devices in education, energy-efficient solutions for tablets, and other relevant areas. Apart from these, the focus has also been on inter-disciplinary research and development in education and teaching pedagogy.

All detailed reports along with the history of each of the projects is available at the following wiki:  
<http://www.it.iitb.ac.in/arndg/dokuwiki/index.php>

#### 1. Maximising the Shared Bandwidth for Classroom Quiz Conduct Scenario in Wireless Environment

by Pramendra Singh

**Abstract:** In 802.11 Wireless LAN, performance of the network starts degrading with increase in number of clients. As the number of STAs increase beyond 40, performance starts degrading significantly because of increase in interference and collision. Due to this, network stops supporting any more clients. To resolve this problem, we have proposed a random batch-mode connectivity algorithm. The proposed scheme can be used for the classroom quiz conduct scenario. In this scheme, we have used the fact that in quiz scenario, STA dont need persistent connectivity with AP and the data to be transferred is of small size. With our scheme, large number of clients can be supported using a single AP. We have tested this scheme on real test-bed and results show that performance is increased many folds. Hence, in order to support large number of clients for quiz conduct, our solution can be efficiently used.

## 2 Content Synchronization in Aakash Tablets

by Debashee Tarai

**Abstract:** This project aims at developing an application for Aakash Tablet that will automatically synchronize content between tablets inside institution as well as in between institutions. This report describes about Content Synchronization which is a data distribution methodology, where selected data are automatically delivered to Tablets in real time at prescribed intervals. Proposed architecture for content synchronization application aims at synchronizing all the information and data kept in a pre-specified directory of a tablet to and only to the authorized tablets along with keeping a back up in the central server, thus establishing consistency among data contained by individual tablets.

## 3 Content Synchronization Architecture for dissemination of Media Contents between Institutional Hubs and Student Tablets

by Gyanranjan Shial

**Abstract:** The aim of this project is to synchronize student's and teacher's files with each other. For this I am developing an android application which is using a secure FTP server for central storage i.e. institutional hub and some number of tablets and a teacher's PC for this architecture. Here the application will help students and teachers to share their question papers, assignments and answer sheet and tutorials(may be video file or presentation slides) via a FTP(vsftpd) server. The application is also providing all the features and security for student's as well as teacher's contents.

## 4 End-to-End performance Analysis and Scalability of Tablets

by Deepak Jayanth

**Abstract:** The Growing popularity of wireless devices such as tablets, smartphones demands more advancement in the wireless LAN technologies. Although these wireless routers are rated at a throughput of 54Mbps,100Mbps,etc., the maximum throughput observed is typically of range 20 to 30 Mbps and it keeps on decreasing as the number of connected people to it increases. Wireless classrooms applications are limited simply by the wireless router's speed that can be guaranteed to simultaneously connected wireless users. This paper identifies the bottlenecks in connecting large number of wireless users(typically of 100+) in situations such as wireless classrooms to a single access point. This paper also examines possible approaches to reach that target.

## 5 Experiments and Testing Clicker application on Aakash using WiFi

by Abhishek Zanane

**Abstract:** This project aims at testing and experimenting Clicker application on multiple Aakash tablets in WiFi environment. It endeavour to facilitate connectivity of maximum number of tablets in wireless medium for conduct of Clicker quiz by using various network topology. Detailed testing experiments were carried out for measuring throughput for Clicker application on WiFi tablets and laptops. Effects of interference from other existing Bluetooth

devices and Wifi Access point in the vicinity were also considered during communication. The available TP-Link wireless router was also compared with other D-Link wireless router to compare of the throughput of the router. In the project Clicker code was also analysed and some improvements are suggested to improve throughput of the application. Clicker quiz was conducted in real time environment for various occasions to observe transmission and reception of Clicker data to all Aakash tablets (maximum of 100) participating in the quiz. Access Points and Wireless routers were tested for its features like Maximum data transfer rate, Channel utilisation Received Signal strength. Various topologies for connecting wireless routers in quiz hall were also tested to provide reliable connectivity to all tablets.

## 6 Classroom teaching using handheld devices

by Neeraj Dhariwal

**Abstract:** Considering the increasing class sizes and rapidly improving technology, the use of handheld devices can add great value to classroom teaching. This project aims at introducing the use of tablet PCs in the classroom for the purpose of teaching and learning and to replace the traditional whiteboard based teaching system with this new system. This document describes a new classroom teaching system with the use of tablet PCs without using whiteboards. The idea is based on the growth of hand-held devices e.g. tablet PCs which can be used to make notes during a class by directly writing on screen with the help of a stylus pen. The system provides an alternative for both whiteboard and notebooks, as it facilitates the students to see what the teacher is teaching on their own tablet PCs at any point of time. At the same time, it allows them to make notes on their own screen on top of the teaching material received from the teacher. The project aims at enhancing the students' ability to concentrate while attending classes by making them free from copying the contents of whiteboard in order to make overall classroom teaching more effective. It also attempts to reduce teachers' overheads, e.g. taking attendance. It allows the teachers to monitor each student's progress individually, and testing any students at any point of time by sharing his screen with the students.

## 7 Prediction of Endsem Marks and Grades

by Pavan Kotha

**Abstract:** Education today is influenced by technology evolution on one side and requirements of society on other side. The main mission of our educational research is to solve the problems of society and give better education to everyone. To satisfy the increasing demand for technical education, computers and web are being harnessed. Currently there are many e-learning platforms which provide online education. No current e-learning platform is concentrating on improving the performance of student. This survey provides some key insights of improving the performance of students by predicting endsem marks and grades apriori and discusses about designing aspects of an effective online course.

## 8 Automated Segmentation and Tagging of Lecture Videos

by Ravi Raipuria

**Abstract:** Now a days, Many universities provide free lecture videos for distance learning education. It is very difficult to browse within those videos for a particular topic of interest. Generally, video lecture duration ends up about 90 to 120 min. To make best use of this, an efficient content retrieval mechanism is required for searching the keyword in lecture videos. However, The problem is not to find lecture in video archive rather than finding the proper position of desired keyword in video stream. Our aim is to develop a content-based retrieval tool for providing efficient browsing within lecture videos.

## 9 Intelligent Tutoring System in SCORM Framework

by Subhasmita Mahalik

**Abstract:** An intelligent tutoring system (ITS) is a computer system that aims to provide immediate and customized instruction or feedback to learners, usually without intervention from a human teacher[1]. Sharable Content Object Reference Model (SCORM) is a collection of standards and specifications for web-based e-learning[2]. It defines communications between client side content and a host system called the run-time environment, which is commonly supported by a learning management system. SCORM also defines how content may be packaged into a transferable ZIP file called "Package Interchange Format". Communication module of ITS falls under the SCORM RTE, SCORM SN together with SCORM CAM can handle the functionalities of the pedagogical module. Student model can be implemented through Tracking Status Model and SCORM RTE Data Model.

## 10 Information Visualisation on Tablet PC - Implementation & Issues

by Sanobar Nishat

**Abstract:** Visualization is an abstract representation of data element and information in some semantic form. Information visualization techniques have been studied by many researchers and are developed in many forms for medium to large size display devices. Increasing demand of hand-held devices (e.g. Tablet PC, PDA (personal digital assistant), smart-phone etc.) necessitate the development of innovative visualization techniques suited for small display devices. Though, these devices pose several limitations to transport the existing visualization techniques on Tablet PC, PDA and mobile phones. Some of the limitations of these devices are small screen size, limited computation power, and limited memory. This work provides a brief overview of the information visualization techniques and interaction mechanisms, designed for hierarchical data for medium to large display size. The work also explains issues and modification in transporting the existing information visualization technique, on small screen devices, particularly on Tablet PCs. An experimental approach is used to compare four well-known visualization techniques including Space Tree, Hyperbolic Tree, Icicle Plot, and Treemap, for displaying hierarchical data. The designs are evaluated on three criteria i) task completion time, ii) task correctness, iii) user interaction and satisfaction, and iv) understanding of design topology. The result suggested that Space Tree visualization is preferred over other visualization for searching tasks while treemap is preferred for topological and comparison tasks. The work also demonstrates the implementation of a browser-based tool for visualising hierarchical data on discussed visualisation techniques. The tool allows

user to share, explore, and analyse data. A file uploading feature is also incorporated in the tool where user cannot only view data from database but also from an external file. Currently, only the excel file format is supported by the tool.

## 11 EMMO Implementation for Proxymity

by Anurag Sharma

**Abstract:** e-learning is becoming a revolutionary force for improvement in education standards and quality. Present availability of e-learning is in the form of repositories for educational content which encode the content of presentation and video but not the information the content conveys, resulting in lack of learning personalization. This dissertation discusses the use of structured model, EMMO as a basis for semantic based multimedia content sharing. It is cumbersome for students to search through an entire video, or across many videos, in order to find portions of their immediate interest. It is desirable to have a system that takes user-given keywords as query and provides links to not only the corresponding lecture videos but also to the section within the video. It should also allow the teachers to author new educational content. An attempt has been made to make a system which could store the lecture videos in a tagged format and make it available to the learners over the World Wide Web. The system also provides the user the ability to author new content in the form of lectures and courses.

## 12 Design of Compressed Cache in Android

by Subbanjaneyulu Reddy

**Abstract:** Abstract Android is a software platform and operating system for mobile devices, based on the Linux kernel. Memory is a scarce resource in embedded systems like Android. The complexities and resource demands of modern embedded systems such as Android smart phones are constantly increasing. Increasing memory often increases packaging costs, cooling costs, size, complexities and power consumption. At low memory situations Operating System swap some of the pages to swap device, usually secondary storage to find some free memory in RAM. Android does not have swap space as the secondary storage is Flash memory, which suffers from wear leveling property. When there is a scarcity of memory, Android Low Memory Killer kills some of the processes to free the memory. Compressed RAM is a technique where pages are compressed and stored in the RAM itself. Objective of the Compressed RAM project is to use part of the RAM as swap device. The pages swapped to this device are compressed and stored. Hence the effective memory of the device increases. This Thesis investigates traditional Compressed RAM approach and designed a new approach for Compressed RAM called as enhanced Compressed RAM. We have simulated both the approaches where we are able to double the number of pages stored in compressed area than in traditional approach.

## 13 Security issues in NFC and its countermeasures

by Arpit Jain

**Abstract:** The aim of the project is to make Near Field Communication(NFC) more usable by finding the security issues in NFC and the countermeasures available. First stage of the project includes the survey of relay and other attacks in NFC and the methods such as network location awareness, Distance protocol etc used to mitigate such attacks, and also

studied various applications where NFC can be used effectively. Earlier NFC is used for transaction purposes as it provides secure transaction because of shorter range, but this shorter range can also be used for more precision in Indoor navigational system. This is the main focus of second stage of project, to come up with the new Indoor navigational system which finds the user location using NFC receiver and based on that helps the user to navigate inside building. At the initial stage, surveyed various other technologies like Wi-Fi fingerprinting, GPS, Network location provider etc used for navigational purposes, but GPS cannot be used inside building and the other two methods are not good if the precision is very high, as the technology used for user location works on a larger range. At this point NFC is the best approach that can be used with location error of +/- 5cm which is very less.

## 14 A Policy Enforcement Framework for Android

by Kaustubh Keskar

**Abstract:** In this project, our aim is to design and implement a context-aware, multi-user policy enforcement framework for Android. User should be allowed to define fine-grained context-aware policies using this framework. Context-aware policies depend upon various context attributes like time, location, battery, etc. The framework should be implemented in such a way that only trusted third parties (schools, teachers, parents) should be able to define policies for the device. Trusted third parties are to be considered at different priority levels to decide which policies to enforce in case of policy conflicts. In some of the existing frameworks, policies can be defined and enforced remotely using mediums like SMS, Bluetooth and WiFi. SMS is a paid service, Bluetooth has very limited range and use of WiFi requires continuous polling to the server, which drains the battery quickly. Our enforcement framework should make use of push-based solutions like GCM, to allow users to enforce policies remotely.

## 15 Enhancing Permission Model of Android

by Nitin Satpal

**Abstract:** The Project aims to change the Permission Model of Android to make it protected from the attacks from the third party apps. The current Permission model is coarse-grained and is vulnerable to various attacks. A new privacy mode has been made to appropriately modify an app's access to the various private information stored in the phone. By using the model proposed by "TISSA", user will be able to control an untrusted app's access in a manner to specify what types of private information are accessible to the app. User can change the legitimate permission to "Bogus" or "Empty" so that the bogus or empty result will be returned to app respectively. Other than this, we are also concentrating on various Attack detection mechanism in Android Phones. We will compare various mechanisms on the scale of performance, time, efficiency etc. and will propose a new efficient solution for attack detection.

## 16 User Authentication Mechanisms on Android

by Anshita Agarwal

**Abstract:** This project aims at developing an application for Aakash Tablet that will perform continuous authentication based on Face Recognition to authenticate the user of the tablet. The application will ask the user to first train the face recognizer by capturing certain number of images. Once this is done, the application will then check whether the trained

face matches with the face of the user currently using the tablet or not. If the face doesn't match the application will lock the device. The user will then have to enter a passcode to be able to use the device again. The application performs recognition automatically after the intended duration of time preventing the illegitimate user from using the device even after device has passed the initial unlock challenge.

## 17 Energy Efficient applications for low powered devices

by Anjali Singhal

**Abstract:** The smartphones, now a days, are not only used for the basic purposes such as calls, etc. but also for many different applications for many different purposes releasing everyday for navigation etc, hence constraint on energy consumption has become huge bottleneck. We study various techniques to improve the battery life focusing on application level so that developer of each application can build the application such that energy consumption of his application can be optimized reducing the burden on battery of the device. Researchers have provided many solutions to optimize energy consumption that includes detection of energy bugs, battery virtualization, also various optimizations for different kind of applications. We also study for network intensive applications, CPU intensive applications, etc many approaches to optimize the energy consumed, considering energy-performance trade-off. For these optimizations, developer should have clear idea of where the energy is spent inside his application so we also discuss various tools and techniques available to model energy consumption. Hence, our project aims to detect the energy bugs present in the android application precisely by using IFDS/IDE Solver and provide further algorithms so that these bugs could be taken care by the users as well.

## 18 Page Replacement Mechanism for Small Foot-Print Database in Android Devices

by Pratik Patodi

**Abstract:** Android devices are becoming popular due to their lower cost and increased integration with Google services. Open Source Andriod-SDK encourages the development of variety of applications for mobile devices. Mobile devices uses flash drives as their memory resource. Considerable amount of data needs to be stored and organized for these applications. Flash drives have certain limitations for writing data. Database logging adds a major bottleneck against the fast response time of update transactions, especially for large update transaction, since a large amount of log should be flushed during commit. In this report, we propose a new page replacement technique and compares it with existing approach used by androids native database, SQLite. An overview of adaptive logging approach is also provided in the report which can be further used as an enhancement.

## 19 Effective Handling of Low memory Scenarios in Android

by Rajesh P.

**Abstract:** Android contains so many Empty applications inside RAM. Activity Manager Service and Low memory killer kills some of the applications in low memory scenarios. My project objective is to reduce number of applications gets killed in low memory scenarios and reduce the response time of user interested applications. So we implemented an application named Apps Logger which helps to capture list of user interacting applications and

periodically predicts a list of applications which are more interested to user based on recency and frequency(last one week). We modified the android source code of Activity Manager Service(AMS) to provide features like do not kill user interested applications (received from Apps Logger application) till free memory is less than some threshold and one more feature like consider the free memory size before killing an application. Android memory management unit also plays vital role in great success of android among other operating systems. Memory is a very limited resource especially in embedded systems like phones and tablets. Android contains modified Linux kernel for handling low memory scenarios and other issues. Out Of Memory (OOM) killer in linux kills some of the processes in low memory scenarios. This report gives details on different set of problems in OOM killer. Activity Manager Service(AMS), Low Memory Killer(LMK) in android kills some of the applications in low memory scenarios along with OOM killer. In low memory scenarios we should not kill user interesting or user frequently accessing applications. If we kill any user frequently accessing applications, then we need to load those applications, if user wants to access those applications in future. Load operation is costly, it takes nearly 3-5 sec to load an application, as it varies from one application to others. So if we can predict user interesting or future accessing applications using user log history, we can reduce number of applications gets killed in a period of time. We developed AppsLogger application, which predicts the user interesting applications using log history. We modified traditional AMS source code in android 4.2, such that AMS do not kills user interesting applications received from AppsLogger. We are succeeded to reduce x% number of application gets killed in a period of time using log history as compared with traditional approach. We are succeeded to reduce avg response time of accessing any application as y% , z% in log based exponential,linear approaches as compared with traditional android approach.

## 20 Minimizing Boot Time of Android Based Devices

by Nimit Kalaria

**Abstract:** Smart devices are becoming popular day by day due to its different features. These different features have their own initialization time which affects the boot time of the device. Boot time of the device should be minimal. Smart devices like phones, tablets are used by different people of different fields like industries, entertainment, students, etc. Where devices should boot quickly. Thus, it is necessary to minimize the boot time of smart devices. Boot time of the device can be minimized by either using a better hardware, or by optimizing the device boot sequence. Boot sequence contain Zygote class preloading, package scanning and starting of system and third party application by Activity Manager. We will optimize the device boot sequence by optimizing these individual part. For experimental setup we have selected an Open Source Android based emulator.

## 21 Finding Issues in Clicker and Suggesting Solution Approaches

by Arpit Jain and Sailee Jain

**Abstract:** Clicker is a student response system used to capture responses from a live audience in real time. It is a quiz application which helps teachers to evaluate students as well as to give them feedback regarding their performance by generating the reports based on the previous records of quizzes of every student. There are certain networking issues and functioning problems clicker which lessens its usefulness. This report focuses on these problems and their solutions proven with the help of experiments conducted. Also major

part of work includes the integration of clicker with moodle in order to improve its usability and accessibility. We present an application that provides access to moodle not through web but via android interface.

## 22 Encouraging class participation using Tablet-PCs

by Raj Agrawal and Naveen Bansal

**Abstract:** The diminishment of class participation among students is the aftermath of various factors like cultural diversity, class size, gender difference etc. Efforts have been made to introduce computer technology, particularly the use of Table-PCs in education system to encourage participation. The conventional way of students' participation and evaluation is only limited to objective approach, in which the students are only asked multiple choice type questions (MCQs). Whereas subjective type discussion, where complete information flow among students can be achieved has not been encouraged due to overhead in evaluation and other logistic constraints. Experiments are conducted to demonstrate the importance of class discussion and improvement in students understanding. The approach is to present a student discussion forum which will provide an automatic evaluation method of students, participated in the discussion. The purpose is to obtain the students class participation rate and understand their academic need. Certain limitations of this approach have also been discussed in the report.

## 23 Database Recovery Mechanism For Android Devices

by Raj Agrawal

**Abstract:** Android devices are becoming popular due to their lower cost and integration with Google services. Open Source Andriod-SDK encourages the development of variety of applications. Considerable amount of data needs to be stored and organized for these applications. Flash Memory is well adapted to store any type of data and provides secure services in a mobile devices. But many cases of application failure, can corrupt data in flash Memory. This report compares two most popular recovery algorithms used in Database Management Systems, i.e. shadow paging and log based. The report also highlights the benefits of using shadow paging for flash memory devices. An overview of adaptive logging approach is also provided in the report.

## 24 Graphics On Tablet

by Dhananjay Ambekar

**Abstract:**Tablet computers have grown enormous number of users in last few years. These slate styled devices use touch screen as main user interaction component. Tablets provide more mobility and comfort when compared to laptops. Tablets have become users premier choice device for information access. As a part of information visualization, Graphics on tablets and related technologies have become one of the important aspects in the field of tablet computing. This report discusses different visualization techniques along with method of implementation. Later part contains a discussion on visualization tool and Study of technologies in Aakash II tablet.

## 25 Small footprint Database on tablet

by Nilesh Birari

**Abstract:** Advancement in technologies lead more use of mobile technology. In recent technological advancement in devices and communication technology makes the way for data-driven applications, where these applications can access data from anywhere, anytime. However many technical challenges are there. In this report, we will study architectural model of the mobile database system, and will identify the requirements for a mobile database and introduce the design consideration for critical requirements. On the basis of this, we analyze the functionalities of existing commercial databases, and state the consideration of some features for Small footprint databases.

## 26 Issues in Performance of Wireless Routers & Open Source Firmwares

by Sukh Deo and Prashant Kumar Singh

**Abstract:** Wireless router is a device, that provides Internet connection without using wired link. It performs as a wireless LAN. But, problem is how to increase the performance of a wireless router? First, we discuss the main issues that is related to performance of a wireless router. Second, we can choose good wireless router based on the requirement. Third, we can extend the wireless protocol for increasing the performance of wireless router.

To increase the performance of wireless router, we can upgrade the firmware. Firmware is a piece of software that provides services to hardware. We can simply say, it is a piece of software for some hardware. When we purchase any router, its hardware may be capable of providing many features but the manufacturer simply decides not to provide these wide range of features just to keep things simple and they sell the routers with these features at a much higher price.

## 7.2 Arterial Pulse Analyzer

In the virtual lab project, we have developed a low-cost Arterial Pulse Analyzer which provides run-time display of arterial pulse waveforms during the test, as well as provides analysis of the waveforms in digitally storable format. Several parameters are computed from the waveforms, which serve as indicators of cardiac health. In this way, the device serves as a low cost alternative to an ECG. The setup is portable, and consists of 2 straps, one each for the radial and brachial artery, with piezoelectric sensors mounted on them. Signal processing and analysis is done using Python on the Aakash. This system is portable, requires minimal power, and costs less than Rs 1000, and the technologies employed are free or open-source. We intend to deploy this as an automatic cardiovascular screening device for public health centers in developing countries; such centers typically lack access to medical experts and diagnostic devices for cardiovascular diseases. The device is undergoing extensive testing at public health centers in rural Maharashtra and at major hospitals in Mumbai including KEM, Hinduja, and Tata Memorial Hospital. A youtube video on this device, may be found at <http://youtu.be/YR46jAflfUI>

## 7.3 Microscopy on the Aakash

In virtual lab project, we have also managed to interface low cost digital microscopes to the Aakash; this has excellent potential as a learning device for school children who wish to learn about structure and morphology in biological samples and of different materials. The microscope is a Chinese make, available at a cost of Rs. 4,000. It has been interfaced using arduino board on the Linux operating system, running on Aakash. We have conducted pilot workshops in schools, where the children used this device to see the details of leaves, feathers, etc. The school children really liked this device. A youtube video of this is available at <http://www.youtube.com/watch?v=xd2SPvf ejRA>

## 7.4 Galla-on-Aakash

Galla, developed by the Developmental Informatics Laboratory(DIL) at IITB, is designed to empower small (kirana) retail stores with the tools of information technology, to conduct their business more efficiently and flexibly. It supports tasks such as billing, cash flow, customer credit tracking, inventory, and vendor account management. Galla lets the shopkeeper retain his current business practices such as personalized service and credit to customers, while harnessing the benefits of information and modern practices for decision making in traditional shops. Several prototypes have been tested in scores of shops, and a proof-of-concept system has also been developed on the Akash platform.

## 7.5 GATE on Aakash

This year, for the first time, we did away with the printed version of the verification lists for the GATE exam in the IIT Bombay zone. A verification list is the set of candidate data including photographs and signatures, against which the invigilators can check suspect Admit cards. It is the authoritative copy of the candidate data for the GATE exam. By using a custom developed Android application for Aakash, the IIT Bombay zone saved printing 15,000 pages of paper, besides the added advantage of being able to search for specific candidates with one click, based on various parameters such as candidate name, date of birth, etc.. Paper lists

have to be searched sequentially. All users reported a positive experience with this application. The GATE team is now planning on implementing this across the country, in the future.

## 7.6 ekShiksha

<http://www.it.iitb.ac.in/ekshiksha/>

Bringing to life content prepared by the best minds (NCERT textbooks) with interactive exercises and experiments, is the primary objective of this initiative. Any school/institution can register with the site and download content for distribution to their students through their own labs provided they agree to provide us valuable feedback. All students can access the content absolutely free of cost.

Additionally, the initiative attempts to provide a ready to deploy methodology for companies and philanthropists to directly benefit the students in a measurable manner. The activity believes that government alone cannot meet the needs of 400 million children under the age of 18 and we need a concerted public/private initiative to provide a glimmer of hope to millions of underprivileged children. All the active lessons developed under this initiative are being ported to Aakash. All of these work on a browser.

## 7.7 OSCAD

<http://oscad.in>

Oscad is an open source EDA tool for circuit design, simulation, analysis and PCB design. It is developed by the FOSSEE group at IIT Bombay. Oscad is built using open source software, such as KiCad, Ngspice, Python and Scilab. One can do the following using Oscad : create a circuit schematic, generate netlist and simulate it; do PCB design and generate Gerber files; add models and subcircuits; generate differential equations of analog circuits and solve them through Scilab.

Oscad runs on Ubuntu Linux and a few flavours of Windows (XP and 7, at present). We have written a book that explains the use of Oscad. The book, Oscad examples and Spoken Tutorials that explain the use of Oscad are all available for free download from <http://oscad.in>. Oscad runs on Aakash, the world's lowest cost tablet.

## 7.8 Spoken Tutorials

An article written by Prof. Kannan Moudgalya, in the communications of CSI, best describes the spoken tutorials. All spoken tutorials have been ported on Aakash, and work seamlessly on the device. The article is reproduced below.

A spoken tutorial is a an audio-video tutorial that explains an activity performed on the computer. An expert explains the working of a software, by demonstrating it on the screen, along with a running commentary. A screencast software makes a movie of the entire activity, both the screen and the spoken part. This movie is the spoken tutorial. The running commentary can be in English or in any other language.

Spoken tutorial is a recording of an actual session. As a result, it can capture every step that is required to explain an activity. This completeness, combined with an accompanying audio-video tutorial makes the spoken tutorial the best way to document and to explain a software or a computer based activity. Creating a document in any other way is inefficient. A ten minute video, for example, can have about 100 screen transitions. Imagine the work involved in taking screen shots and using them to create a pdf document.

The size of the video created is of the order of 1MB per minute, for a 800x600 screen size in normal resolution. The file size needs to be small for transmission through low bandwidth and also to pack a large number of tutorials on a CD, meant for countrywide circulation.

We have been using this methodology to create a series of tutorials in open source software families, such as LaTeX, Scilab, GNU/Linux, ORCA and Python. We have selected the duration of a typical spoken tutorial to be about ten minutes long. Although only a small topic can be covered in ten minutes, by stringing them together, one can come up with study plans that are capable of teaching advanced topics as well.

Our approach involves the creation of a script before creating the video, just as a movie is based on a script. It is possible to translate the script into other languages and use it to change the audio part only - screen shots continue to be in English. The effort required to change the audio is only about 5% of creating the original. For example, visit [http://spoken-tutorial.org/Xfig-Spoken\\_Tutorials](http://spoken-tutorial.org/Xfig-Spoken_Tutorials) and see the Gujarati link for Simple diagrams. This method has the potential to reach out to people weak in English, while not compromising on the employability.

Spoken tutorials can also be used to bridge digital divide. For example, one can use it to explain how to write emails, how to buy train tickets online, and how to open a bank account. One can explain how to do a web search and locate low cost agricultural loans. We can also make available information on primary health care and first aid. Finally, unlike print ads, the Internet based ads can be more easily located. The government has mandated all government agencies to issue Internet based ads for recruitment. In my opinion, not having access to IT makes one a second class citizen. Spoken tutorial has the potential to empower every child in our country.

The target audience for a spoken tutorial is a remote child, working alone at midnight without anyone to help her. This is the only time when she will get time to study, after completing all her chores. In order to make this technology accessible to her, we restrict ourselves to free and open source software (FOSS) only. The low cost tablet PC to be launched by MHRD soon, will make the required hardware also within her reach.

The task at hand is huge. Creation of 10,000 original spoken tutorials and to dub them into 20 Indian languages seems to be a good target to set. We have an honorarium of ' 5,000 to create one original tutorial and Rs. 1,500 to dub it into a local language. Required funds are available through a generous grant from the Ministry of Human Resources Development (MHRD).

Although extremely easy to create, quality has to be ensured to make the spoken tutorials useful. Thus the targets make the spoken tutorial project a mammoth task. To do this in a reasonable time, participation by many people in a collaborative manner is indispensable. How to ensure quality when the creators could be disparate people, such as students, housewives and unemployed, seems to be a good R&D problem to address in the area of educational technology. This is a problem our group has been working on for the past three years.

I will now highlight the collaborative nature in creation and use of spoken tutorials. Let me begin with the creation. The sequencing of the tutorials and their content is to be decided by an expert. The script for an individual tutorial can be written by a person who knows that activity well - she need not be an expert in the entire software. Novice check of the script is an important requirement of our process. A novice who has validated a script can create the tutorial through screencast, and also get paid for it. Our project must be one of the few that pays a person to learn.

Using a novice to do the check and to encourage them to create the tutorial increases the number of people available for the project. Moreover, this makes even the beginners wanted and actively helped by the experts. Contrast this with the procedure to interact in FOSS forums, where the beginners are nobody and a wrong question could invite the wrath of the experts and may even force the novice to leave FOSS completely for good.

We came up with the idea of novice check after interacting with the office bearers of the Web and Coding Club at IIT Bombay. Although there are more than 1,000 members in this club, not more than about 5% are experts. It will be interesting to try our methodology and see if we can encourage a large number of beginners to become experts in select areas. The above discussed problem of expert- novice interaction is universal and hence our model can be deployed in any college, for example.

Let me now talk about translation and dubbing. We need people who have a good command over a language to do the translation. We have found the people from the previous generation to be mature and capable of providing good translations. Unfortunately, they are not necessarily comfortable in giving the voice and dubbing, as this involves the use of technology. This is where our younger generation comes in. Although may not be good in translation, they are quite comfortable in speaking and using modern technologies. We have honoraria of ' 1,000 and ' 500, respectively, for translation and dubbing of a ten minute spoken tutorial.

This approach allows difficult technologies also be made available to languages with low population, such as Sanskrit and Boro. One need not have experts in the domain. What is required is for one to translate only the spoken part. I would like to point out another form of collaboration that has happened in dubbing. The creator of PHPacademy has agreed to give his video tutorials on PHP/ MySQL to be used by our project. Our PHP programmers, who hail from rural areas, have found it difficult to transcribe and create the script of these tutorials, as the accent is difficult to follow. The school going IIT Bombay campus children have had no difficulty in transcribing, however. The fact that they are raised in a city and exposure to English from early childhood makes them eminently suitable for this task. As a matter of fact, they also dubbed the tutorials in Indian English. These tutorials can now be used by anyone who aspires to be a web designer, irrespective of their command over English and irrespective of the quality of teachers they have. This shows the effectiveness of collaboration - contribution by a few people, even children, can help the entire society.

How does one learn through these tutorials? Open the tutorial, reduce the size of the screen and keep it in one corner of the desktop. Open the target software by the side. Listen to a command in the tutorial, pause and practise on the software. If the command works, go to the next one. If not, rewind and listen to it again. Repeat until the entire tutorial is completed. One needs a head phone and a computer for this type of learning. It allows every participant to learn at their own pace and in their own language. As these tutorials are created for self learning, the domain expert need not be present to conduct the workshop. The organiser of the workshop only needs to know how to use this material. As a result, anyone can conduct these workshops. We have validated this approach through student club organised workshops in a college in Alwar, Rajasthan and SASTRA university in Thanjavur. We provided the instructional material through a CD and moral support through Skype. We also conducted online exams, before and after the workshops and gave certificates. The Alwar students showed an 85% improvement after the workshop. Moreover, all of them passed the second test.

Using ORCA spoken tutorials, our staff member Krishnakant Mane conducted a workshop for visually impaired children at IGNOU, Delhi. Although there were a lot of chaos in the morning, such as computer not booting, head phone not working, etc., in the morning, there was a pin drop silence in the afternoon, as everyone was learning on their own. Those who lagged behind would have completed the unfinished tutorials on their own, at home. For the last three weeks, we have conducted spoken tutorial based workshops at IIT Bombay. We ran the LaTeX workshops every day, from 6 pm for two hours. More than 200 students went through these workshops, half of them being Ph.D students. We have now started linux workshops. Once again, there is an enthusiastic response from the campus community.

A word about the conduct of these workshops is in order. We have come up with a set of instructions to be followed in the workshop. The participants have to follow them strictly. For example, we ask the participants to use the command pdflatex only to compile the LaTeX documents. If instead they try the command latex and get stuck because TeXNicCenter does not know how to locate the resulting dvi file, we claim helplessness. In view of this, one can say that our process is rigid. But if one wants to learn LaTeX in two hours, there seems to be no better way. Moreover, this approach allows non-experts also to conduct the workshops, an important requirement for scalability. This approach will also allow one person to handle a large number of participants. The only help the organiser has to give is to point out what instruction is not followed and to ask the participant to start the 10 minute tutorial from scratch. If the organiser gives domain dependent answers, we need to worry about their competence. Moreover, as there could be many types of questions and difficulties, many experts are required in every workshop.

We have completed about 400 tutorials. We are now trying to get partners who will share our enthusiasm to create the content and to organise workshops. We are now working with a startup at IIT Madras and an NGO in Bengaluru. We hope to generate at least 600 more tutorials and conduct 100 spoken tutorial based workshops by 31 March 2012, the last date for funding by MHRD. But there are indications that this project will continue, as the National Mission on Education through ICT that is funding this project is likely to continue in the next plan period as well.

We invite all readers to participate in our project. We also need the state of the art technologies. A summary of this project is available at [http://spokentutorial.org/What\\_is\\_a\\_Spoken\\_Tutorial](http://spokentutorial.org/What_is_a_Spoken_Tutorial).



## 7.9 Aakash Lab

### Aakash Lab

#### PROJECT STATUS

##### Outline

Aakash Lab is dedicated to developing software applications for the Aakash Tablet.

Our team at Aakash Lab has been involved in activities ranging from:

- Benchmark testing of the first lot of Aakash tablets
- Design and development of android based software applications for the Aakash tablets
- Conducting training workshop on Android Application programming.

##### Implementation Plan

1. **Requirements-gathering** from various stakeholders including faculty members.
2. **Software** design and collaborative software development on GitHub.
3. **Testing** including usability tests for user interactions.
4. **Porting** of applications from Android 2.3 to 4.0 ICS.

##### Team

The task distribution within current team size of 12 members is as follows:

**Project Manager:** Parag Tiwari

**System Admin:** (Saurabh)

- Maintain the Aakash Lab server and take periodic backups.

**Software Engineers:** (Ajay, Vivek, Ninad, Pradnya, Raeha, Tushar, Nilesh, Praveen, Sreelekha and Arun)

- proxyMITY and proxyMITY-WiFi: Raeha, Nilesh, Ninad
- proxyMITY web publish (HTML5) on desktop: Ajay, Vivek
- Robo Controller on Aakash: Nilesh
- DiaSlate on Aakash: Arun, Ninad
- Video Chat Application on Aakash: Pradnya
- Aakash Tech Support Portal: Tushar
- Aakash Developer Portal and HTML5 based activities: Nilesh
- XML Edit tool on Aakash: Sreelekha
- Video Transcoding application: Vivek

- MOOC prototype based on edX: Ajay, Vivek, Praveen

##### Current Status

- **Aakash Android Application Programming Workshop:** We successfully conducted a 4 day workshop for engineering students of 245 Remote Centers across the nation in March 2013.

- Student participation in the workshop:

Registered Participants:	30,119
Confirmed Participants:	17,564
Certificates awarded:	8,252

As a part of this workshop, we have an ongoing Android App Development Contest which will end on 24<sup>th</sup> July 2013.

Students registered for the Contest:	1,475
Teams Registered:	708
Project Outline submissions:	250

- **Aakash Tech Support Portal:** We have implemented an automated ticket based issue tracking system to handle technical queries related to Aakash Tablets. We are currently in User Acceptance Testing (UAT) phase.

- **edX based MOOC prototype course:**

We have installed the edX Platform on local servers, and hosted a 2 week dummy course to explore in-built functions and features provided by edX.

We are helping Prof. Ganesh to implement a Data Analysis course using edX for his Anganwadi initiative.

- **proxyMITY on Aakash Tablet:**

proxyMITY enables students to access quality lectures of reputed teachers, for effective personalized learning: anytime and anywhere. proxyMITY has two versions : sd-card version and Wi-Fi version. Lectures are tagged for topic wise navigation, and there are features like Bookmarks, Subtitles, and Lecture video transcripts.

## 7.10 Clicker

### Clicker for Aakash Tablets

#### PROJECT STATUS

##### Outline

Clicker software is a student response system in which the instructor can make presentations, launch a quiz, conduct live polls, and generate results on bar graph. Using this system, students can write exams, ask questions, and view results instantly.

The purpose of this software project is manifold:

- To develop two different versions (web-based and native) of clicker software on Aakash. The web-based version is further classified into two different forms: local mode and remote mode; whereas native is further classified into with Wi-Fi and without Wi-Fi (using Wi-Fi Direct).
- To Benchmark both the versions and constantly monitor the output.
- Prepare user manual and videos to guide the users of clicker software.

##### Implementation Plan

1. Interact with the faculty to understand their teaching methodology.
2. Prepare and integrate modules within the project according to the discussion.
3. Test the newly added features with faculty students, staff, and participants of workshop, for usability.
4. Analyze the feedback and modify/optimize the code.

##### Team

Project Manager: Rajesh Kushalkar

The current team size is eight, coordinated by Tushar Kamblia

The task distribution is as follows:

UI Designer: (Hitesh)

- Create UI Design as per existing code flow.
- Discuss and finalize the UI design with other team members.

Programmers: (Varun, Dipti, Rajavel and Gobinath )

- To work on each module of the project independently and later integrate it with the project.
- Discuss the issues which emerge while testing the application and resolve them.

- Optimize the code.
- Commit the code to the clicker server using svn through eclipse.
- Assign/Monitor tasks related to form layout and adding other features of the application to Chetan, Sachin ,Harshvardan and Kirti.

##### Current Status

The third version (Clicker Ver. 3) of this software has been launched.

Initially, we tested our software with CS101 students at IIT Bombay.

Later, it was made available for all 250 remote centers. Out of these, more than 180 remote centers configured the software successfully.

We have collected response from more than 1000 tablets simultaneously.

Benchmarking of the software on Aakash, happens at regular intervals which further helps us eliminate issues related to Wi-Fi.

Currently, the native version of our software is under development which uses technology of tablet-to-tablet communication without using Wi-Fi access point. It integrates audio plug-in instead of typing the query on Aakash.

Currently, the team is preparing user manual and videos related to configuring clicker software, which will be later made available to all remote centers.

A completely new UI of version 3, is under development.

## 7.11 3D Animation Content for Aakash Tablets

### 3D animation content for Aakash tablets

#### PROJECT STATUS

##### Outline

The purpose of the team is three fold:

- Investigate the type of 3D animated content, which can be used on Aakash, (in terms of pedagogy and technology)
- Test various methods for the content creation
- Publish about the successful methods for easier replication by others

##### Implementation plan

1. Interact with the teachers to understand their teaching plan
2. Shortlist the concepts/activities which 'require' 3D content
3. Prepare a teaching plan for the selected concepts
4. Create paper prototypes and test with teachers and students for usability
5. Create actual 3D content and port it on the tablet to test it
6. Analyze the feedback and create the final content for the tablets

##### Team

Current team size is six members. This includes three animators, two programmers and one manager.

The task distribution is as follows:

**Animators:** (Sneha, Amit, Pankaja, Yashodeep, Bipin)

- Create paper prototypes and test them with sample population
- Create final 3D imagery

**Programmers:** (Nitin and Pooja)

- Provide the desired interactivity options to the respective 3D animations
- Devise optimization techniques for displaying smooth motion on the tablet
- Suggest guidelines for the animators for modeling and texturing of 3D models

**Manager:** (Ajit, Sameer)

- Provide pedagogy and visual design inputs
- Facilitate the infrastructure and logistic support
- Oversee the content creation process and document it for further reference

##### Current status

Meeting with the teachers in the respective schools was held on 10<sup>th</sup> June 2013. The teaching plans were discussed, and a few suggestions were recorded.

However, prior to the meeting, few sample animations have been initiated to test the 3D interactivity on android tablets. These are based on the content created already for Project OSCAR, to save on creation time. These topics are:

- Magnet attracts objects made of iron
- Circuit for explaining the flow of current
- Structure of some sample molecules (HCl, CO<sub>2</sub>, Mo(CO)<sub>6</sub>)

The tests are being conducted for the topics mentioned above on Aakash as well as Google Nexus, to see the comparison. We propose to test the display issues based on the complexity level of the 3D models. This will help in coming up with guidelines for creating 3D content for android tablets.

Two topics emerged out of the discussion with the teachers from the schools at Pandharpur. These are:

1. Working of human ear
2. Construction of an atom

Currently, the team is busy in studying information about these topics from available resources (free and paid, both). Later, a pedagogy strategy would be decided for the 3D content to be created.

Implementation plan, as mentioned earlier would be followed for creating the content.

## 7.12 School Education

### Aakash R&D Group

#### PROJECT STATUS

##### Outline

- Digitization of school textbooks using ePUB3 technology
- Testing of ePUB3 readers for digitized textbooks
- Using Aakash in schools
- Development of school textbooks for Maharashtra Govt.
- Teachers' training for using Aakash in schools
- Audio transcription of lectures, using software

##### Implementation Plan

- Select subjects and standard. Evaluate ePUB, or find alternatives. Work with other organizations for regional language support, and ePUB technology.
- Test and evaluate readers such as Aldiko, Ginden, SASTRA (PUSTAK) and Helicons.
- Identify schools for training their teachers. Coordinate with other stakeholders like CDAC, MKCL
- Plan for using our workshop and Aakash remote centers to train school teachers from nearby schools.
- Evaluate the accuracy of transcription software, to determine the manual effort required to complete the transcription.

##### Team

**Manager:** Dr. Madhuri Sawant

Team members: Ganesh Hegde, Pankaj Patil, Yougansh Sharma, Barani M., Charu Chaudhari.

##### Current Status

- Currently two team members are working on interactive books for SSC Board IX std. science and math in ePUB3. Due to unavailability of good ePUB reader for Aakash, we have shifted from ePUB3 to HTML5 with good results. Video, quiz, images are embedded in the text, making it interactive. We have also been able to insert flash files in .swf format.

- Aldiko supports only ePUB2 books. Ginden, an open source reader supports ePUB3 but has other issues. SASTRA University's PUSTAK reader has potential, but needs further work before we can port it to Aakash as ePUB3 reader. We also tested Helicons Books trial version. It also has a lot of limitations, and needs improvement.
- We identified four schools in Pandharpur in Maharashtra for the pilot. We conducted a workshop for the teachers on 10 June 2013, at IIT Bombay. This was to understand their present teaching methodology. WE have held meetings with CDAC and MKCL for development of interactive lessons on Aakash before the commencement of the pilot project in July.
- The Education department of Maharashtra state is interested in teachers' training on difficult topics of science, math, and English. We have a Remote Center in Pandharpur, and we have interacted with the schools through it. WE can use A-VIEW technology for this. Addl. Chief Secretary is discussing this entire project with Balbharati (State Textbook Bureau), and SSC Board Chairman.
- We are using Dragon Tool software to transcribe lectures. This software requires "speaker training" for increasing the accuracy. We are trying this with prerecorded lectures of known speakers.

## 7.13 Pilot projects in schools

As mentioned in the project proposal, IIT Bombay has already embarked on deploying Aakash tablets in selected schools, to study their use in school education. Three separate segments have been chosen for this pilot study. The ongoing efforts are briefly described below.

### 7.13.1 Shikshan Pandhari

This is the flagship effort of the school pilot. It attempts to deploy and use Aakash tablets in four schools near Pandharpur, a well known pilgrimage town in Maharashtra famous for its Vitthal Mandir. Class 9 students of 4 schools in villages near Pandharpur, have been chosen for these trials.

It is interesting to note the strength of technology infrastructure in this region. National Knowledge Network (NKN) has established high-bandwidth connectivity through a node at an engineering college ‘SVERI’ in Pandharpur, and also a very powerful Wi-Fi connectivity to cover ‘last-mile’ to these four schools. An initiative led by Dr. Kakodkar and Prof. Takawale, is attempting to reform education in rural areas in Maharashtra. I had suggested to both Dr. Chindambaran and Dr. Kakodkar that, the Aakash pilot deployment can be dovetailed to these efforts. Use of tablets in schools, for possible distance learning, was first demonstrated at the first conference on NKN, held at IIT Bombay. 10 tablets each were distributed in the four schools. An interactive lecture was delivered to the students, from the conference venue. At the end, an on-line live quiz was conducted, which the students in different schools answered using Aakash tablets. Their responses were collected through the NKN network, collated, and presented to the conference attendees in less than 10 seconds after the quiz ended. A brief report on the activities in the Pandharpur pilot is produced below.

#### 7.13.1.1 Aakash Pandharpur School Pilot Project

The project is led by Dr. Madhuri Sawant, Sr. Research Scientist and In-Charge Aakash School Project

##### Project description

MHRD sponsored Aakash school pilot project aims to enhance quality of education in rural schools through use of Aakash tablets as a teaching/learning tool for teachers and students. This pilot project is confined to ninth standard students of SSC board four Marathi medium schools and sixth standard students of another school to improve performance in primarily Science and Math subjects. The tablets are given to all the teachers teaching one of the above mentioned subjects and to all the students. The tablets are loaded with curriculum based interactive text books lessons in eBook format along with other content comprising of videos, animations, quizzes and test papers. These rural schools from Pandharpur region of Sholapur district of Maharashtra state were selected for this pilot project mainly because of the availability of the high speed internet. All these schools are connected by 1 GBPS NKN network. Access points were deployed in the schools to create Wi Fi environment within classrooms.

##### Project Coordinators

Prof. D.B. Phatak - PI of All India Aakash Project

Dr. Madhuri Sawant : In-charge -Aakash School Project

### **Tablet distribution**

Total 285 tablets were distributed in Rural Pandharpur area as per the chart given below.

Sr. No	School Name	Tablets Delivered
1	Lotus English School, Kasegaon.	15
2	New English School, Anawali.	50
3	Shri Sitaram Maharaj Vidyalaya, Khardi.	70
4	Darling Vidyamandir, Chale.	75
5	Daulatrao Vidyalaya, Kasegaon.	75

Although it was decided to give one tablet each child and distribute total 300 tablets to students and teachers, due to excessive demand from all ninth standard students from all the schools finally the same number of tablets were shared among 577 students. In three schools two students shared one tablet but in two other, three students shared one tablet. When the news of Aakash tablet distribution spread in these villages, even students who left school after eighth standard again enrolled themselves in the schools and started showing lot of interest in learning syllabus.

### **Steps taken**

Before launching of this pilot, all the teachers were invited to attend one day workshop at IIT Bombay to understand their current methodology of teaching these subjects and the difficulties they faced during teaching abstract concepts. Based on their feedback, a training program was designed and content was prepared.

One day prior to launch, the team visited all the schools, tested Wi-Fi network, met with teachers and students and explained the intention of conducting this pilot in their school. We had to install Firefox browser on all the tablets since Aakash default browser couldnt connect to FTP server to access the content.

### **Launching of Aakash Pilot project**

The most ambitious Aakash school pilot project was finally launched on 9th July, 2013 in all the five schools on the same day. The tablets were distributed to all students and teachers. The half day training was conducted for all the teachers on use of tablet as a teaching device in a classroom.

The team visited every school and students were trained in batches on use of Aakash tablet to access the content ported in tablets internal memory as well as from the server using WiFi network. The learning curve of the students was very sharp as lot of students learned to download content from the server, read the text book lessons ported on the tablet and also learned to use other tablet features such as use of camera, video, audio recording etc. Their performance was far beyond our expectation. Overall it was a delightful experience for all the students and teachers to get connected to the world they had never seen before to extract the information of their choice.

### Performance measurements

- We have collected eighth standard annual report of each student, have given quizzes after each lesson, teacher will conduct quiz after completion of each lesson, the data will be collected and analyzed. These marks will be compared with their previous performance.
- We have given group projects to the students; they will use tablets to complete these projects and submit these projects in a months time. This will help us in knowing their ability to collaborate, cooperate and maturity in understanding of technology for learning. At the end of this academic year, based on these results, we will draw a conclusion that if use of tablet has improved their performance and overall development.

#### 7.13.2 Experiment for using Aakash in Hindi Medium School

We have selected a school in a small village ‘Bhikangaon’ in the state of Madhya Pradesh. This schools has a specialty ‘green-building’, for which the electricity needed is generated by solar energy. Prof. Chetan Solanki of the department of Energy Systems at IIT Bombay, has been experimenting with Solar-charged lamps for use by village children in that school and nearby villages. A large project for providing a Million such lights to village children, has been just approved with him as Principle Investigator.

At our request, Prof. Solanki has developed a solar chargers which will charge both, a lamp and an Aakash tablet. 1,000 such chargers and lamps have been ordered. These and the tablets will be deployed in the school for 5th and 9th standered students. They will be taught Mathematics and Science in Hindi. Content creation work for this task, has just started. An Aakash Project Centre is located nearby, in an engineering college in Borwan. This college has agreed to coordinate these efforts.

#### 7.13.3 Experiments in Unorganized School Education

It was felt that Aakash deployment should also be tried amongst children and who are unable to attend regular school, but are desirous of obtaining education. One such group was recently located in Hyderabad, Andhra Pradesh. Prof. —, who is an adjunct professor in IIT Hyderabad, runs a family trust which operates an informal School in a temple and students at various levels routinely learn there. It is planned to deploy up to 80 tablets in this School. Educational contents will be developed in Telugu, for this effort. Since IIT Hyderabad itself is an Aakash Project Centre, coordination is expected to be smooth.

### 7.14 Aakash Bazaar

Aakash Bazaar is an Android application for Aakash tablet specially meant for browsing application developed for Aakash. This is a client end which searches for updates or new applications on a server. The server is running F-droid server which actually hosts all the apks.

On client end we have a repository hierarchy. When started, it search for a local server, if a local server exist, it fetches application details like name, summary, description, icon etc and displays it in a form of list. A user can click on an application to see detail description like screenshots and ratings.

## 7.15 OSCAR

<http://www.oscar.iitb.ac.in>

Project OSCAR (Open Source Courseware Animations Repository) provides a repository of web-based interactive animations and simulations, that we refer to as learning objects (LOs). These learning objects span topics in science and engineering at the college level, and maths and science at the school level. Students and teachers can view, run and download these learning objects. A large collaborative community has been created to contribute to this Open Source repository. These animations are now being ported to Aakash.

## 7.16 Attachment for Aadhar Authentication on Aakash

Aadhar authentication is the process wherein the Aadhar number, along with other attributes (demographic/biometrics/OTP) is submitted to UIDAI's Central Identities Data Repository (CIDR) for verification; the CIDR verifies whether the data submitted matches the data available in CIDR and responds with a yes/no. No personal identity information is returned as part of the response. The purpose of authentication is to enable residents to prove their identity and for service providers to confirm that the residents are who they say they are' in order to supply services and give access to benefits. The purpose of the project is to make an optical assembly for Aakash tablet so that it can be used in place of the current fingerprint scanning devices and to get a clear image of a fingerprint by using the tablet's camera itself, and this fingerprint is in turn used for the authentication of the Aadhar Id, taking into consideration the cost of the optical device. Also an Image Enhancement Software is developed which will optimize the provided image. More specifically the system is designed in order to reduce the cost and to use the camera on the Aakash tablet for the purpose of fingerprint scanning. Once completed we will try for its application on other tablets and phones as well.

## 7.17 Linux on Aakash

Android uses the same Linux kernel optimized for embedded devices and excellent memory management. Though it has an easy to use GUI, it is generally not suited for everyone, especially students. This serves as a strong motive to port GNU/Linux on Aakash. Although GNU/Linux uses the same Linux kernel, its file system differs completely. It gives us complete freedom to explore every part of software as well as hardware. The best part is, the GNU applications allow the curious learner to read the code and find out the way the applications work. If one is dissatisfied with the application, one is free to download the source code and modify it to suit. He or she can even go on and share their modified code with the community, provided they acknowledge the original authors and attach the same GNU license with the code. This is where Android lags behind Aakash: most of the popular free apps are closed source in nature. The article written by Srikant and Sachin in communications of CSI is given in the subsequent pages.

Sachin Patil\* and Srikant Patnaik\*\*

\*Linux System Administrator in Indian Institute of Technology, Bombay  
 \*\*Research Assistant, FOSSEE, IIT Bombay

# GNU/Linux on Aakash

## Introduction

In the January 2013 issue of Communications of CSI, the article "Genesis of Aakash" had explained the events leading to the creation of Aakash; this has been explained by Moudgalya, Phatak, Sinha, and Varma. In this article, we will explain the work that we undertook to port GNU/Linux in native mode on Aakash.

Android is a great platform, it's free, and easy to learn. Most of us will acknowledge the use of Google's Android on Aakash, but not everyone. The reason is that Android is not designed to run GNU apps, although it is based on Linux Kernel. This means that one has to rewrite all useful apps on a new platform, using only Java programming language. Beside these restrictions, Android also tracks user activity, and apps may contain ads which are difficult to manage.

The first version of Aakash that we worked on came with the Android Ice-cream sandwich version. It looked nice with a visually pleasing user interface. It had multiple desktop support, efficient menu applications, perfectly suited for any touch based device. On scanning through, we came across the picture gallery, calendar, messaging, contacts, clock, etc. These applications come by default with any Android device. The first question that came to our mind was, 'Is this what will go to our students? What will they do with it?' Most school going children would be unaware of how to use these apps, and instead would play around with drawing tools, games, and other items, which they are familiar with. Sadly no Android device comes with preinstalled educational applications by default.

Furthermore, Android was not intended to serve educational purposes. It was created to serve as a mobile operating system. An operating system with GUI specially designed for calling and messaging, which improved as it evolved. Several applications in Android were written by developers across the world. With time, its user interface was optimized, making it easier to use. Until now, Android was largely used as an entertainment operating system. It is well

suited for those who just want their work to be done without knowing what goes within. In contrast, Aakash is specially meant for education: we don't want our student to stop with playing games; nor do we want to restrict them to the development of another 'Angry Birds' kind of game. We want them to learn, read, write, and carry experiments on their device. This device should be considered equivalent to any desktop we use today. We aimed to give them a full fledged device to help, play, and experiment without any limitations.

## Why GNU/Linux (where Android lags)

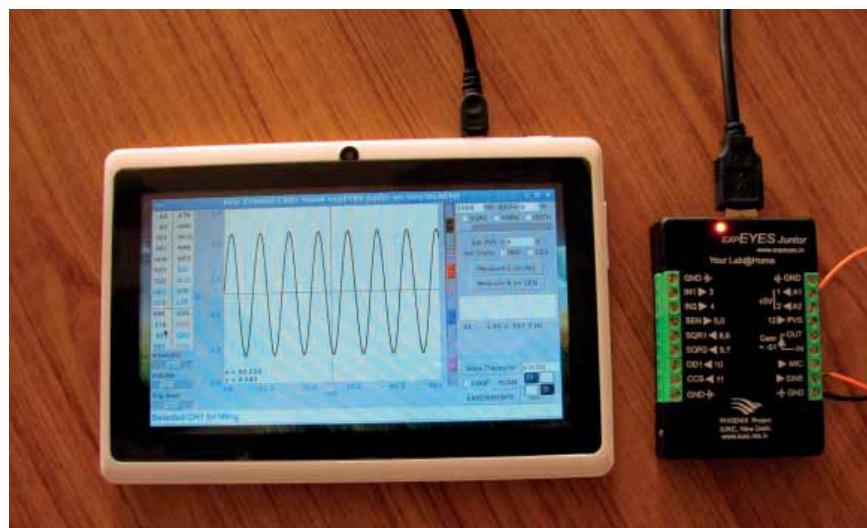
Android uses the same Linux kernel optimized for embedded devices and excellent memory management. Though it has an easy to use GUI, it is generally not suited for everyone, especially students, as explained above. This serves strong motive to port GNU/Linux on Aakash. Although GNU/Linux uses the same Linux kernel, its file system differs completely. It gives us complete freedom to explore every part of software as well as hardware. The best part is, the GNU applications allow the curious learner to read the code and find out the way the applications work. If one is dissatisfied with the application, one is free to download the source code and modify it accordingly. He or she can even go on and share their modified code with the

community, provided they acknowledge the original authors and attach the same GNU license with the code. This is where Android lags behind Aakash: most of the popular free apps are closed source in nature.

Moreover, because of the licensing restrictions, it is not possible for us to distribute useful Android Apps with Aakash, since we have to get permission from the creator of each App individually. Each one may want different agreement forms to be signed. A bigger problem is that most creators of popular Apps are difficult to locate and hence, the mails to them will go unanswered. GNU/Linux, on the other hand, is especially designed for such campaigns.

## Porting

On exploring the hardware of Aakash tablets: we realized that this relatively new SoC from All-winner has support for GNU/Linux, which although limited, was sufficient enough to start our work. In pursuit of a development board needed to start our work, we looked around and finally decided to open the device itself. We asked the vendor for pin numbers that were needed to obtain the transmit data(Tx) and receive data(Rx) pins out from CPU. This information is required for debugging. With the help of a USB to serial converter, we connected the pins to a computer using an USB port. Our hardware team managed to get those





pins out, after which our development device was ready. Without the serial out, it is difficult to track the booting process.

We had two choices, either to let the GNU/Linux boot from its internal memory(NAND flash) itself or to let the complete OS boot from an external SD-card. Fortunately the All-winner chip has a facility to boot the OS from the SD-card. Interested learners can boot GNU/Linux from SD-card without touching any part of Android.

We started compiling the boot loader. The boot-loaders on embedded system are different, and in Aakash the complete OS has to boot from the SD-card. Then we went on to compile U-boot. It is the uboot binary file on SD-card, which makes the SD-card bootable. After successfully loading, the uboot finally calls on the kernel to initialize hardware. We used minicom to view all booting processes. The next major challenge was the Linux kernel. It is the most important part, as all the hardware and applications ultimately depend on it. If the kernel successfully detects all the hardware, then we can proceed further to test the file system. If not, we need to fix it by analyzing Android kernel logs, keeping in mind all the hardware and configuring the same in our present kernel. Thanks to the open source community, we found forked versions of original Linux kernel maintained by All-winner team.

We used the default cross-compiler as suggested online. It gave compilation errors and the compilation process failed frequently. This is the same cross-compiler that is readily available in Ubuntu's repository. After many trial

we decided to use the Codesourcery's cross-compiler tool-chain. We have used these tool-chains in the past. To set up Codesourcery's tool-chain, one has to register before downloading its binary. After downloading, it has to be installed and a custom path to the tool chain has to be set in order to compile the kernel. We first used the Debian root file-system, which we got online. The script.bin file was not fully compatible with Aakash. It took us some time to extract Aakash's own script.bin file and to change its default parameters to make a running kernel and root file-system. Merely modifying script.bin file was not enough, some kernel modules like WiFi and touch have to be auto-loaded while booting. These changes have to be made in the file-system path /etc/modules to make them work. With all those changes, we had basic version running in a week.

On Aakash, GNU/Linux boots from micro SD-card and the file-system reside within the SD-card. Both Android and GNU/Linux operating systems are completely isolated from other. The good part is that we can access all the Android's content from GNU/Linux.

Enabling touch was a major challenge, as we have never worked on touch before. Initially when tried to interact with the tablet using touch on Debian, it didn't respond. We had to go through Android's log-cat and dmesg to identify the touch screen driver, which we found out was focal-touch(ft5x\_ts). When it was enabled as a module, it worked but we had to disable the multi-touch feature in the file. Currently Aakash has three

touch screen drivers, of which two work.

For an application like ExpEYES (explained below) and Arduino, which uses an USB-to-serial interface for interacting with the hardware, we had to enable kernel support for Communication Device Class(CDC) ExpEYES as ACM device. On the device level, it is detected as Abstract Control Model(ACM) drivers. The Linux kernel detects /dev/ttyACMO. Also for ACM to work, generic USB support should be enabled in the kernel.

On the desktop, we can pass arguments to the kernel, ask kernel to load some modules, disable misbehaving modules and so on. Similarly we can pass arguments to kernel on an embedded device using script.bin file. On Aakash, pre-customization, module loading for wireless networks, setting display resolution, loading touch drivers, etc., can be done using script.bin. Although script.bin is a binary file, actual editing can be done by converting it to fex format.

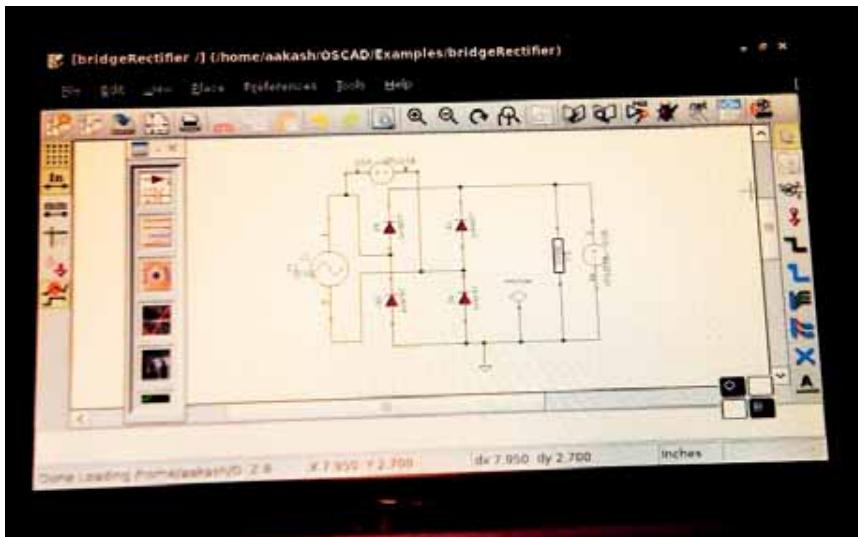
### Ubuntu as GNU/Linux Distribution

With the Linux kernel in place, now was the right time to decide upon file system. We tried Debian first, but due to lack of hard-float support in Debian Squeeze release, we dropped it. We also tried Debian Wheezy but we were uncertain about of pre-release versions. The best choice left to us was Ubuntu, which is known for being easy to use amongst newcomers and advanced developers alike. It has a great package-manager, using which one can install required packages both from command line and using graphical interface. Hence we agreed to use Ubuntu.

We started with Ubuntu-12.10 core arm hard-float distribution. When uncompressed, it consumes around 100MB only. We used the ch-root environment to configure package-manager, basic network tools, user applications and a desktop environment.

Before putting the file-system to actual use, the compiled kernel and its modules were placed in /lib/modules





directory of the file-system, where all kernel modules reside.

The next challenge was the Desktop environment. We tried Unity, KDE Plasma, XFCE, MATE, enlightenment (e17), and Gnome-3, all of which need around 120 MB RAM with some hardware acceleration, except e17. After considering the options we finally decided to go with LXDE(not Lubuntu).

The Ubuntu-core file-system includes only basic utilities and a package-manager (apt-get). Comparing with a Desktop version, it does not even have a basic networking tools like ping or root user utilities, such as sudo. Ubuntu Boot-splash screen, Desktop-Environment, screen savers, UbuntuOne sync, daemons, etc., consume a lot of memory. We compared memory consumption of each process before installing one in core file-system. For example, Ubuntu's default Desktop-Environment(Unity) consumed much more memory than LXDE. By discarding these overheads, we finally managed to boot Ubuntu in less than 50MB RAM. We also made a few customizations on openbox and gtk2.0 to make it touch friendly.

### Applications

We focused largely on educational applications. With repositories in the path, one can easily install any application of one's choice. We pre-installed some popular and useful applications. The first application we installed was Onboard, to serve as the virtual keyboard. Next we installed the LibreOffice pack. Although it's a bit heavier than AbiWord, its features make it worth installing.

Scilab-5.3.3 was also installed and tested. Both numerical and graphical calculations are executed much faster than on Android(<https://github.com/androportal/APL-apk>). More than 150 Scilab textbook companions (<http://scilab.in>) are now available in our latest builds. A Scilab textbook companion is a listing of code that implements worked out examples in standard textbooks. Arduino, an open source hardware with Gnoduino IDE, has also been tested and included.

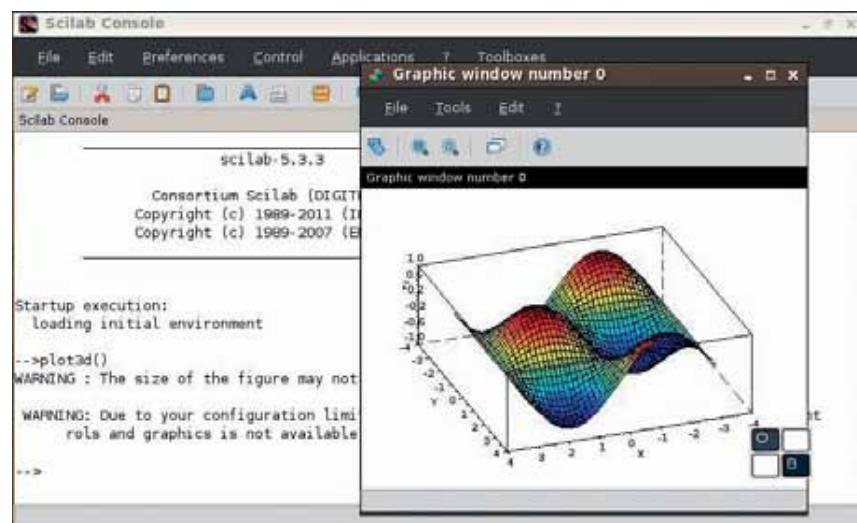
ExpEYES is a hardware and software tool for learning and exploring science experiments. It supports 50 experiments for high-school and above. For interacting with the hardware, we have a Debian package called ExpEYES Junior. This is a tablet version alternative for ExpEYES in desktop.

OSCAD is another open source EDA tool, acronym as Open Source Computer Aided Design. It has been developed using several open source tools like KiCad, Ngspice, and Scilab at IIT Bombay. Python-TKinter is used to program its front-end. Since tools such as KiCad, Ngspice, and Scilab already run on Aakash, OSCAD's installation procedure was similar to any other desktop running GNU/linux. Aakash's capability to run Electronic design tools is demonstrated by the fact that OSCAD runs on it.

We also installed iPython-notebook for scientific computing, and Mayavi2 for 3D visualization of data.

### Conclusion

After these customization process, we now have Ubuntu 12.10 with Linux kernel version 3.0.57 working on Aakash. It is suitable for educational as well as entertainment purposes. For programming and development one can attach an external keyboard and mouse, if one is not comfortable with virtual keyboard. One can see all the features and application of a typical desktop computer on Aakash. With ExpEYES and Arduino working, one can perform hardware interfacing with any other hardware. GNU/Linux on Aakash provides opportunities to experiment on a portable device. With 1 GHz processor and 512MB memory, it has the potential to run any other GNU applications. Currently we have image targeted for 8GB SD-card of which first 16M FAT partition is dedicated to bootloader(uboot.bin) and script.



bin file. 1GB is used as swap file-system in case if the actual RAM gets used up. The entire file-system along with install applications and other utilities consumes around 3GB space. Approximately 3.5 GB is left free for storage and other installation to user. The capacity of the SD-card can be expanded up to 32GB.

### Contributing to Project

We look forward to seeing GNU/Linux enthusiasts contribute to this project. Please visit our github page for detailed documentation on porting of Aakash. There are many open issues, such as, brightness control, sleep mode, touch drivers, etc. We have documented our work at <http://androportal.github.com/linux-on-aakash/>.

### Aakash Application Development Competition

In January 2013 issue of Communications

of CSI, we had announced a competition based on Aakash, for both Android and GNU/Linux operating systems.

This competition aimed to encourage students and individuals across the country to come up with innovative applications that could be used on Aakash. The source code of each application will be released as free and open source. The Application can be Android or GNU/linux based.

More than 1600 participants registered for the Aakash application development competition. These participants are from various engineering colleges and universities across India. We asked those participants to re-group in teams consisting of maximum 5 people, and re-submit their project proposal. On the basis of project description, we have shortlisted 140 teams, whose work will be developed further. Any updates related to competition will be posted on <http://aakashlabs.org/compete>.

Traditionally all applications running on GNU/linux desktop should also run on GNU/linux on Aakash. But one must ensure that the application is touch friendly and consumes minimum RAM. The Aakash team at IIT Bombay is willing to help the participants: for example, the participants: for example, the participants can send their application to us for testing.

We still have many open issues on GNU/linux port. Before contributing, we expect the participants of the competition to go through our GNU/linux porting documentation on github page <http://androportal.github.io/linux-on-aakash/>.

We are in need of developers who are interested in GNU/Linux system. They must have sound knowledge of Linux kernel and working of various GNU/linux distributions.

### About the Authors



**Srikant Patnaik** He is a developer, teacher and motivator. His first contribution to FOSS came as a simple 8051 Programmer for Linux, available at sourceforge. He served as a Lecturer at Loyola academy, Hyderabad. Later joined IIT Bombay as a Research Assistant in FOSSEE project. He contributed in Porting of GNU/Linux on Aakash and also associated with Android app to run Scilab and other programming languages. His interests include blogging, designing circuits, bridging software and hardware.



**Sachin Patil** is currently working as a Linux System Administrator in Indian Institute of Technology, Bombay. Apart from System Administration, he has also gained some experience in Android and embedded systems. He, along with Srikant Patnaik, has ported Scilab — a software for Numerical Computation on 'Aakash', a low cost access device project funded by NMEICT, Govt. of India. He is also interested in customising GNU/linux distributions. Beside Ubuntu, his other favourite GNU/linux distro is Slackware, which he likes to work on because of its simplicity and robustness.

## 7.18 8051 Emulator

8051 Emulator application is an integrated development environment bringing together a variety of resources required for embedded systems. Intended audience for emulator are students learning embedded systems specifically 8051 microcontroller.

Students can use 8051 Emulator for learning 8051 microcontroller. This application facilitates the student to interface different circuits on ports of the microcontroller, write assembly code as per requirements, and execute the code written. After execution of code, virtual hardware displays behavioural animations, which is in close resemblance to the real 8051 Board. This application helps students to learn basics of 8051 microcontroller without buying actual 8051 development board.

## 7.19 Interactive Lesson Builder My Point

The Interactive Lesson Builder is developed for the teachers and students to teach/learn concepts of Cartesian coordinate system to plot the values in graphical format through interaction using Aakash. The product is divided into five basic modules namely C-Plane, plotting, scaling, line and quiz-it. C-plane denoting Cartesian Coordinate Plane is explained in this module, further it includes practical life example to explain the concept of graph, x and y axes and quadrants explanation. Plotting module explains process of plotting a point on Cartesian Coordinate System. Scaling explains process of finding and using scale for a graph. Line module explains different process of plotting a point on Cartesian coordinate system such as using equations, using slope etc. Quiz-it module provides a vast number of randomly generated questions. It has choice for two levels of quizzes i.e. basic and advanced. It comprises of interactive quiz, multiple choice quiz. It also generates a test report on the submission of the quiz in the form of a pie-chart. It also has provision for teachers to test the students on the concepts learnt. The tests can be conducted at any level that the teacher desires i.e. basic or advanced. This ensures that the student has understood basic concepts very well before moving on to advanced concepts.

## 7.20 Audio video classroom interaction

It creates the interactive classroom environment between instructor and students using audio and video (A/V) using Aakash tablet. Students can raise their doubts using AV at any time and this tool becomes very handy for large classroom interaction.

## 7.21 Clicker Native Application

It provides instant feedback to teacher in on-going lecture in classroom by conducting quiz, raise hand, poll. Report statistics is useful to analysis of students performance.

## 7.22 Peer-to-Peer Communication

It creates peer-to-peer communication between student's tablets and instructor tablet using WiFi-direct. They can share the files and can do instance chat between group owner (instructor) and clients (students). This will reduce the overhead of extra hardware (server and WiFi setup) and its maintenance.

## 7.23 Visual Programming for Android using Blockly

The motive of this project is developing ideas and logic for coding among school children interested in DIY electronics or new to embedded programming. It enables students to implement a code using jigsaw puzzle like blocks with no worry about syntax. Presently it supports Arduino boards.

## 7.24 All Terrain Vehicle with Data Acquisition System and GPS tracking

Development of Multi-Terrain vehicle capable of detecting environmental conditions with the help of multiple sensors attached. Aakash tablet interface can control the robot as well as can monitor sensor data with video streaming. Further development includes terrain adaptation and stabilising of the vehicle.

## 7.25 proxyMITY

proxyMITY helps users to get access to quality lectures of reputed teachers, for effective personalized learning. They have the flexibility of studying anytime, anywhere, and at their own pace. proxyMITY has two versions : sd-card version and Wi-Fi version. Lectures stored on a sd-card or on a local server can be viewed respectively with these versions. Other than viewing the lectures, there are certain other functionalities for effective learning like Tree functionality to view the contents of the lecture, Bookmark feature to tag a particular part of the lecture for further reference, Transcripts to view the text file of the lecture along with the video.

## 7.26 DiaSlate(Slate Application)

The DiaSlate application true to its name is developed as a digital equivalent of a real time slate. It is an amalgamation of UML Diagrams and Slate. DiaSlate is an Android Application that implements an intelligent canvas interface that aids learning, work and fun. It has 2 parts, one emulating the slate and the second a user-friendly way of drawing UML diagrams. It aims to replace the handheld slate and chalk. The application caters to all age groups.

## 7.27 Video Conferencing

The software Video Chat is an application that will be used by general users to do chat, file share, voice calls and video calls using Aakash tablet. Also audio and chat conferencing facility has been provided. To make a call both the users need to be registered at the server. This communication is via wi- and will incur no expenditure to the end users. Communication between any two users will be enabled as long as both are logged-in at the server.

An application Server is required to register the users and maintain the information regarding the MAC and current IP addresses of all the logged-in users. The clients may be connected to same network . Server may be connected to either wi- or LAN.

## **7.28 Aakash Developers Portal and Enhancements to Aakash Tech Support Portal**

The Aakash Portal is an online Portal, which is divided into two modules, Aakash Tech Support and Aakash Developer Portal. Aakash Tech support provides an Aakash tablet users a platform to discuss the technical problems that they face with the tablet. Discussion Forum, FAQ, Chat, Submit-Issue, View-Issue, Report-generation and feedback features are provided to the users to help him/her to solve their problem.

The Developer Portal is an online platform which brings developers together and facilitates application development and improvement. Developers can view and help in existing Aakash project or provided new ideas and discuss on them .Discussion-forum for developer ,Developer-blogs,Video-lecture and Study-material,Platform to share your new idea ,also you can view existing project and Downloads provide application file developed by Aakash Project Team.

## **7.29 Mathematics Playground**

Mathematics playground is a project that aims at creating interactive activities for basic mathematics concepts through computer animations. Mathematics being the biggest hurdle for maximum number of children, we try to make their learning easier by having interactive interfaces using notes, coins, images, sticks, bundles and many more. This is thus achieved by developing an interactive platform, where students shall be provided with a Virtual classroom / lab environment.

## **7.30 Online Physics Laboratory**

Online Physics Laboratory aimed to provide high quality interactive content for school education. By means of this project we aimed at designing Interactive Physics activities using Action Script 3 (PIE FRAMEWORK) for the school which going kids. is happening around us. From Rising of Sun to Cooling of Fan, From Changing seasons, to walking on ground, From Mirrors to Electricity everything is Physics. Extention of PIE to PIE 2.5 and then created a viewpoint so that any experiment can be seen from any place with help of camera by setting its position, thus created 3D motion. Another provision which we created is to make text drag and droppable anywhere on the screen so that the text we use is visually pleasing.

## **7.31 Explore Chemistry**

The Virtual Chemistry lab is an interactive simulator of a chemistry lab. It lets a user perform experiments, by making use of actions like pour, wash, heat etc on standard laboratory equipment like bottle, flask, pipette, beaker etc, in a manner similar to how they are performed in a real laboratory. It allows the user to set up an experiment, by dragging equipments and/or chemicals from store and dropping them onto the workbench. While the user performs an experiment all his actions get saved in an XML file. Lastly, VCL lets a user play demonstration experiments, for the purpose of learning, with options to pause, resume, forward step and back step the demo. In these we have developed 69 interactive learning objects.

## 7.32 Living Biology

The project included the conversion of NCERT biology lesson of various classes into interactive HTML pages for better learning. Based on the textbook content various interactive flash activities using the PIE Framework also have been developed to help the student visualize the concepts and take fun quizzes.

Once the student goes through the concepts, the next purpose of the project was to develop a question bank through which we present questions to test the knowledge acquired in the school for all standards in a particular topic. The software developed allows the questions to be presented under a topic tree where a student can select any of his/her favorite topic and can also be used by teachers for adding new topics and questions. Thus overall contribution from the society is encouraged in the project Moreover, new functionality has been implemented to make the interface more user-friendly.

## 7.33 Know Our World

In this we have developed interactive learning objects to explain the biological concepts in a easy and playful manner. For testing and observing the learning graph, a adaptive testing module is also developed. Standard testing provides an interface which allows the customization of the test by the user. The questions are presented to the user based on his specifications of topic, number of questions of each topic and the difficulty level. This helps the user to test his ability across various sections and topics in various difficulty levels. User can also time the test and check his efficiency in various topics.

## 7.34 Graphical interpreter - Buddhuram Dumbo in action

The Graphical Interpreter is intended as an educational tool that helps students better understand basic computer architecture. The application is intended to initially execute C commands. The architecture of the system is intended to be neutral in order for the application to be extensible. The application is intended to be a stand-alone application that will function without the use of a server. It is also intended as a cross platform tool that can be run over a variety of platforms.

## 7.35 Robot Application

The application is developed to control the FIREBIRD V Robots motion, using the AAKASH tablet. The use of virtual joystick in the application, makes the control smooth and efficient. An IP camera mounted on top of the FIREBIRD V Robot gives continuous video streaming, and the video can be seen in the application window. Simultaneously we can control Robots motion

## 7.36 Aakash Programming Lab

Aakash Programming Lab (APL), provides programming environment for C, C++, Python, and Scilab on the tablet. It allows the users to write, open, save, compile, and execute programs of C, C++, python, and scilab. The program when executed generates and displays the output

on the screen. This gives the user the flexibility of performing programming tasks on the fly (without using a Personal Computer).

### 7.37 GNUKhata

GNUKhata is a Free Accounting Software which can be deployed by both profit making and non-profit making organisations. The advantages of GNUKhata are:

- It is lightweight and scales up with large volumes of data
- It is robust and can be used on a wide variety of data categories
- It is modular, thus facilitating addition of extensions for different tasks
- The user interface is designed to be intuitive and friendly even for beginners
- The reports are displayed on browser and can be printed or saved to PDF
- Deployers will find the implementation easy to achieve.
- GNUKhata is a free software, sometimes referred to as free and open source software or FOSS

### 7.38 Aakash Business Tool

Aakash Business Tool is a portable accounting platform on Android intended for Accountants and Students. It provides an easy to use interface specially for students and newbies who have just started accounting. This initial version covers basic account management, creating vouchers and report. Its back-end is based on Python framework. Some features of Aakash Business Tool:

1. Managing Organizations
2. Maintaining books of accounts
3. Recording, cloning and editing transactions
4. Recording of transactions under particular project
5. Generating reports such as Ledger, Trial Balance(Net, Gross, Extended), Profit and Loss Account, Project Statement, Cash Flow and Balance Sheet
6. Bank Reconciliation
7. Rollover
8. Export report in PDF/CSV format
9. Import/Export of organization data to other device

## 7.39 FOSSEE - Free and Open Source Software in Education

FOSSEE is an acronym for Free and Open Source Software in Education. Through this funded project, a few faculty members at the Indian Institute of Technology Bombay have been promoting the use of open source software in India. We have been promoting open source software, such as Scilab [1], Python[2], OpenFOAM [3] and COIN-OR. We have also created an open source Electronic Design Automation tool called Oscad [4],[5]. We create instructional material and conduct workshops [5] for students of higher educational institutions. All the instructional material and the content required to conduct the workshops can be downloaded from the above mentioned resources free of cost.

We briefly explain some of the activities of the FOSSEE team here. Scilab is an excellent open source alternative to Matlab. We have created a large number of self learning videos called Spoken Tutorials [6] and trained a large number of students using them. We have created about 200 Scilab Textbook Companions that provide Scilab code to all the worked out problems of 200 standard textbooks. We have extended the above approach for many other open source software systems, such as Python, Oscad (open source alternative to OrCAD), OpenFOAM (open source alternative to Fluent), etc. We also help with the migration of labs from proprietary software packages to open source alternatives. We have organized many Python conferences in India. We have trained close to 150,000 students in the past two years in some open source software or other, absolutely free of cost.

- [1] <http://scilab.in>
- [2] <http://python.fossee.in>
- [3] <http://cfd.fossee.in>
- [4] <http://oscad.in>
- [5] Y. Save, R. Rakhi, N. D. Shambulingayya, R. M. Rokade, A. Srivastava, M. R. Das, L. Pereira, S. Patil, S. Patnaik, and K. M. Moudgalya, *Oscad: An open source EDA tool for circuit design, simulation, analysis and PCB design*. Shroff Publishers, Mumbai, 2013.
- [6] <http://spoken-tutorial.org>

## 7.40 Textbook Companion on Aakash

The Textbook Companion effort at IIT Bombay, funded by NMEICT, creates code for solved examples of standard textbooks using Free and Open Source Software, FOSS. These are created by students and the faculty of colleges from different parts of India. Students who create these books are given an honorarium of Rs. 10,000 for each companion and their teachers who helped review are given an honorarium of Rs. 5,000 per companion. This effort is coordinated by the Free and Open Source Software in Education (FOSSEE) group at IIT Bombay. FOSSEE and Aakash teams have many common staff members. The FOSSEE team has created a submission portal that allows the code for each example to be uploaded individually. It is possible to download from the Scilab website maintained by the FOSSEE team (<http://scilab.in>) the code for one or more examples individually or for an entire book, absolutely free of cost. Textbook companion is a valuable resource for educational community. From the view point of convenience, web based Scilab engine has been created by FOSSEE.

For enhanced performance and safety, this facility has been ported by the FOSSEE team to the GARUDA Grid, with the help from the GARUDA Team at CDAC, Bengaluru, see <http://cloud.scilab.in/>. The Aakash team has ported the Scilab Textbook Companion to

Aakash. Now Aakash tablets can be distributed with 200 Scilab Textbook Companions. Assuming that each textbook companion has code for 100 worked out examples of a standard textbook, we can provide Aakash tablets with  $200 \times 100 = 20,000$  sets of code, all in a micro SD card costing less than Rs. 200. It is possible to extend this strategy for several other FOSS as well, some examples being Python and Oscad.

## **7.41 Methodology to create optimized 3D models using Blender for Android devices**

Authors: Nitin Ayer, Pooja Bhawar, Sameer Sahasrabudhe.

Submitted at: T4E 2013, IIT Kharagpur

Use of Low Cost Access Devices (LCADs) using Android platform is on the rise for educational purposes. A lot of (proprietary) 3D animated content for LCADs is available. Open source content would be useful in dissemination of knowledge. 3D open source content for desktops comprises of high-poly models providing realistic visuals. Since LCADs have lower hardware configuration, these models (having high mesh-density) cannot be used.

Methodologies to port 3D content to LCADs are primarily used in the gaming industry. These are unsuitable for educational visualizations, as they hamper functionality and precision of the objects. Instead, building the models from scratch, with an objective to use them for LCADs is desirable. We present a methodology to create optimized 3D models for LCADs. We present preliminary test results of reduction in file sizes and mesh-density of the models. We also present data for the reduction of loading time on LCADs.



## Chapter 8

# Aakash Projects at RC Colleges

The project description submitted by the teachers of the Remote Centers(RCs) have been last acquired on 25 July 2013. As most Remote Centers have received the tablets only towards the end of the previous academic year, a lot more work is expected in the coming year.

### 8.1 Categories of Projects

A total of 173 projects are being done at various RCs. The table given below, lists the number of projects in different application categories.

No.	App Categories	Count
1	eBooks/Learning	28
2	Security and Authentication	10
3	Physical Safety	3
4	Robotics Controlled / Hardware	6
5	Mathematics	9
6	Science	12
7	Network	8
8	Graphics (Drawing / Designing)	5
9	Utilities	42
10	History / Geography	1
11	Language	9
12	Image / Video	3
13	Speech / Signals	4
14	Quiz	8
15	Finance	3
16	Others	24
<b>Total</b>		<b>175</b>

Table 8.1 Application Count

## 8.2 Summaries of Project Descriptions

These summaries are compiled from the Moodle Forum created for the uploading project related information by RCs. The same order has been used. The given order does not have any other connotation. These submissions are collated as submitted by the Remote Centres

### 8.2.1 Kalyani Government Engineering College

RC-1212

by Kousik Dasgupta - Wednesday, 7 August 2013, 2:14 PM

#### 8.2.1.1 Design of User Authentication Modle for Bluetooth Piconet/WiFi Using Aakash Tablet

The main objective of this research is to design and implement a user authentication application for Bluetooth piconets/WiFi that can be used to address the issue of the device being a security risk when the device owner losses it.

- i) To highlight on architecture of the Bluetooth/WiFi so as to understand the core protocols and how they work.
- ii) To identify security risks and vulnerabilities associated with Bluetooth piconets/WiFi and their mitigation mechanisms.
- iii) To design a user authentication model for Bluetooth piconets/WiFi users.
- iv) To implement user authentication at the application level.

Team Leader : GOPA MANDAL (Enrollment Number: 22901)

Members :

- 1) DEBABRATA CHOWDHURY (Enrollment Number: 23257)
- 2) SUPRIYO BANERJEE (Enrollment Number: 23218)

#### 8.2.1.2 Development of User Interace in Aakash Tablet for Online Sharing of Mechanical Department Resources

Intranet in the Mechanical Engineering Department may be set up with a departmental server, and Aakash Tablets would be connected to that. Any student or any other person of the college may use departmental e-resources like under graduate and post graduate projects and theses, conference proceedings, various other reading materials as would be made available from teachers and other sources, etc. Detailed Plan:

1. One departmental computer would be chosen as the server in which all the available soft copies of undergraduate and postgraduate projects and theses, conference proceedings and other open source reading materials will be stored.
2. Provision for updating e-resources from time to time will be incorporated.
3. Then User Interface as an Android apk for accessing the resources will be developed.
4. Then they will be tested and installed in the Aakash tablets.
5. Provision of WiFi will be made covering the Mechanical engineering Department through the funding of IIT Bombay.
6. After completion of the above steps, a presentation based on the use of e-resources through Aakash Tablets will be given to the students.
7. After that, access to these e-resources through Aakash Tablets will be facilitated.

Team Leader: Dr. Santanu Das (Enrollment No. :27797)

Members:

- 1) Arijit Dutta (Enrollment No.:32063)
- 2) Sirsendu Mahata (Enrollment No.:36924)
- 3) Arup Kumar Biswas (Enrollment No.:26628)

## **8.2.2 SIES Graaduate School Of Technology**

RC-1217

by preeti Godabole - Thursday, 25 July 2013, 3:15 PM

### **8.2.2.1 Intelligent Tutor**

Teaching and learning process can be improved using intelligent tutoring system (ITS). ITS will help in teaching a concept to students through problem solving with his/her pace. ITS can be used for personalized teaching. ITS will present a problem to student to solve and guide at each intermediate step by giving feedback, hence keeping the record of student progress. Android app designed to solve the problems on "finding LCM of 2 numbers" and further plans to design tutors for booth's algorithm for multiplication of n-bit binary numbers to aid the students understands the algorithms.

## **8.2.3 Sasurie College of Engineering**

RC-1044

by Selva Brindha S. - Monday, 15 July 2013, 3:49 PM

### **8.2.3.1 Design of a Humanoid Robot Controlled using the Aakash Tablet**

A Humanoid robot is a robot with its body shape built to resemble that of a human body. They are used as a research tool in several scientific areas. It is a perfect substitute for a human to perform tasks like personal assistance, at homes and in factories wherein working conditions for humans can be fatal. But controlling module for the humanoid robot though its wireless nowadays but comes in large size and is difficult for transportation. In this project, the controlling of the humanoid robot is done using wireless technology, with Aakash tablet used as a controlling module for the humanoid robot. The proposed idea if implemented will be the first official humanoid robot controlled by the Aakash tablet.

### **8.2.3.2 College Phonebook**

This report discusses the result of the work done in developing COLLEGE PHONEBOOK on android platform. It aims at the development of the application framework for providing information of students studying in a particular department. It displays the name of the student, phone numbers of each individual student studying in the department, and the integration of various tools developed during the execution of the project. In the recent trend mobile-phones have become soul-mates for public. They are making use of mobile-phones for every single need. Right from calling, texting, tracking, listening to music and so on. Many new applications and technologies have come into existence these days, which people are using very effectively. Still many are looking forward for new technologies in mobile-phones as we know android is an open source.

### **8.2.3.3 Bus information**

The application we are developing is about Bus information. It is an android application used to find out the details of bus number. This application is used to get the bus details along with the distance between the source and destination and the frequency of buses. Usually people may not have idea about all the bus timings and bus numbers. Hence this android application is used to make easy search. It saves a lot of time. This application is very much useful for people who have no information about buses. All this information is available offline and no internet connection is required. All we have to do is to store the information in database. This project is based on the database in which we can store and retrieve all the information regarding the route numbers and what all we require.

### **8.2.3.4 Employee Monitoring System**

It is an application which can able to trace the location where the employee is located and show them on maps. The main objective of this application is to locate the employees and trace them on maps so, it is very flexible and it is also user-friendly application. In this app the service application which runs on the background is installed on the employee mobile, and at the admin side the monitoring of employee and tracking the location on maps will be done. The Broad caste receiver, maps service concepts are implemented. As soon as admin sends message on the employee mobile application, that application will get the message and sends back the longitude and latitude values and admin application will get the values and displays the location of employee on the map. In client side mobile (i.e., the employee mobile) the service application will be installed to get the longitude and latitude values in such scenario from the admin side the details of particular employee will be stored in the database, when a particular message from the admin application is sent to the employee mobile the service application will rectify the message of admin application.

### **8.2.3.5 Citizen Card System**

The Project ‘Citizen Card System’ gives us the information about the citizen in any country. A Citizen has unique Id to find out the personal information in each and every department or service wherever a citizen goes. This information can be found out by the unique Id of the citizen. If any citizen wants to utilize the services or utilities by the Government or Private organizations, he has to go to each and every department with different Id for that particular department. Instead, a citizen card helps in having all the utilities and services under one unique Id. This system not only help us to know the information about the services or utilities but also it gives the information about the character of the citizen in credit rating. This System consists of the modules like Personal Information, Credit Rating, Banking, Insurance, Tax, Provident Fund, Electricity, Telephone, Gas, Movies, Municipality, RTO, Voting, Passport, Travel Agency etc.

### **8.2.3.6 Friend Mapper**

In current system, in order to find out the location of friends, user need to call and ask friend about his whereabouts. The proposed system will help user to find out friends locations as well as the distance from users location. The proposed system will also allow user to see all friends on Google map as well. The application Friend Locator on Mobiles solves all these problems. It offers below services:

1. Allows user to select friend for his location updates.

2. Uploads users current location at specific frequency.
3. Get friends current location
4. Shows friends location on Google Map.
5. Shows distance in kilometers for friends away from user
6. Socio Travel

Android based vehicle sharing application for mobiles. People traveling to same destination can share their vehicles with others using this application. Very useful in a country like India where people are facing Fuel Price Hike frequently. So vehicle sharing can help save some fuel, also helpful for environment protection as well as people can meet people of their interest using this application.

#### **8.2.3.7 Vehicle Tracer**

This topic handles the tracking and identification of the vehicles which a user needs to track, by providing the simple parameters such as registration number or the unique entities of the particular vehicle. This android application makes the tracking in two stages, in the primary stage the application gives the instant information about the vehicle by providing the initial detail of the registration number of the vehicle.

This initial service can only identify the place at which the vehicle is registered and this is just an offline procedure in which we dont need a network connection and the network connection is only required when the secondary stage of the application, which gives the whole basic details of the vehicle such as owner name and address, vehicle model, registration year and other details. This android application can be elaborated by connecting this to the GPS and pinpoint the location of the required particular vehicle.

#### **8.2.4 Rajalakshmi Engineering College**

RC-1138

Place: Chennai

by Benedict Jayaprakash Nicholas - Monday, 15 July 2013, 10:41 AM

##### **8.2.4.1 An Enhanced Learning and Assessment Tool for Visually Impaired**

###### **Team Members**

Bhuvaneswaran B

Poonkuzhal S

Swaminathan B

Benedict Jayaprakash Nicholas

**Project Summary** This proposed project strengthens the visually impaired people's learning and assessment capabilities using Aakash Tablet and addresses the problems that visually impaired people have on navigating and reading information from the web pages. In addition to that, reading contents from the web page, this project involves an exclusive text editor and a cost efficient smart Braille keyboard. This will be implemented by using a multi-modal approach of combining visual and audio technologies. The first prototype of these interfaces has been developed based on the results of the user requirements capture conducted with visually impaired people. This project uses interactive blind editor and an economic Braille keyboard with dual keyboard and Multi language support. It also comprises of an automatic alert system that increases usability and minimizes the occurrence of errors.

### **Hardware Requirements for Development**

Processor : Intel Dual Core and above  
 RAM : 2 GB  
 HDD : 100 GB  
 Speaker : Normal Multimedia Speaker

### **Software Requirements for Development**

Operating System : Linux  
 SDK : Android  
 IDE : Eclipse

### **Hardware Requirements for Deployment** Tablet : Aakash

RAM : 4 GB  
 Keypad : Numeric (Optional)  
 Cable : USB

#### **8.2.4.2 SAVIOR:Speed, Accident Detection and Emergency Service System on Android Smartphones**

##### **Team Members**

Anand Raj A  
 Arthi R  
 Hariharan R.

##### **Supervisor Name**

Rajesh Kannan G.

##### **Project Summary**

The Commission on National Road Safety reveals that at least 13 people die every hour in road accidents. Rash driving has claimed many a number of innocent lives. Thus, there is an acute need to look into this issue. Keeping this point in perception, our project proffers to reduce these accidents by exploiting the advent of the new technologies. This application named Savior is basically an android application that is GPS based which calculates the speed at which the vehicles are moving and intimates the drivers whenever they exceed the safe speed limit. It also produces an alarm that alerts the people walking on the road side. The main feature of Savior is that it detects the accidents and makes an automatic call along with the information about the approximate location of the accident to the ambulance service, police station and the person of concern (whose number is stored and preconfigured in the mobile). Accidents hurts but safety does not. The salient features of the application helps to reduce accidents and if it occurs (at adverse conditions) it at least facilitates an immediate medical assistance with a low latency.

#### **8.2.4.3 Cafe Internet(Restaurant based Application)**

##### **Team Members**

Harish S.  
 Harivignesh S.  
 Kabilash P.M.

### Project Summary

Customer satisfaction is the key to success for any business. In a restaurant, the traditional hand-waving method for calling services is inefficient often leading to many complaints. The Restaurant Management System increases operational efficiency through use of an intentional wireless communications system and a statistical data processing unit. The communications system increases customer satisfaction by leaving electronic devices at each table which the customer can use to request for a server. A data processing unit allows managers and owners to easily monitor restaurant functions and employee progress. To make this system a reality, Android devices such as tablets or mobile phones are placed at tables which are connected to WIFI Hotspot at the restaurant. The Wi-Fi enables local area communication with all devices in the restaurant with the system where admin work with. The Android application at phone enables the place orders and tracking them. The Web based admin part handles the request from android app. The System provides a new trend of changing technology and enables higher degree of satisfactions to restaurant.

#### 8.2.4.4 QuizApp: An quiz application for board examination students

##### Team Members

M. Anandraj  
T.M. Sridhar  
P. Ramadevi  
Rajesh Murugesh

**Project Summary** This proposed project strengthens the students and increases the interest for their board examination and various competitive examination preparation using Aakash Tablet. The students can both attend the quiz off line and online, by online the student can participate competition with the other students for the self assessment and also to be monitored by the teacher. The quiz works with three time attack slow, medium, and Rapid fire, for the students not to get bored by attending the quiz the options and question will be selected randomly from the question bank stored in both online and offline database.

#### 8.2.5 B. H. Gardi College of Engineering and Technology

RC-1275  
Place: Rajkot  
by Prashant Maheta - Saturday, 13 July 2013, 7:10 PM

##### 8.2.5.1 Home Makeover

Home Makeover is aimed for comforting the common people. As the name suggest home makeover that means renovation of home in different way. Home Makeover is android based application in which user can modify their home in their own way.

User can place the objects like sofa-set, frame, maze, change color of tiles and walls etc in their own way as they want. This project also provides import/export facility along with camera. In this project the 2D pics is converted into 3D pics through converter to give the view of home. The software used in this project for 3D view is Googlesketchup and Creo2.0.

Guided By: Prof. Prashant D. Mehta, Team Members : Arima Sharma, Drashti Raval

### **8.2.6 Sarvajanik College of Engineering and Technology**

RC-1043

Place: Surat

by Keyur Rana - Wednesday, 10 July 2013, 6:33 PM

#### **8.2.6.1 Tracking the object using Multiple Access Points**

Project work, identifies location of object, which is equipped with embedded hardware, attached with it, using surrounded multiple access points, in indoor scenario. It scans signal strength of multiple access point in vicinity and compares, these values with earlier stored values, at virtual grid points on map of building/floor. It also sends such details to server, which is connected via Wifi network and one of the access points surrounded to it. So device runs matching algorithm which is based on calculating minimum Euclidian distance from various grid point measurements and hence identifies optimal grid point. This grid point is finally displayed as location of device/object. The positioning algorithm is based on the above deterministic Method which comes under the category of Location Fingerprinting Method. Server calculates location and displays on map. At server side php as programming language and My SQL data base is used to store data of object to be located.

Guide : Prof. Niteen B. Patel, Team members : Shah Rajvi, Patel Bhakti, Agarwal Simple, Parekh Shailja.

#### **8.2.6.2 MyELib**

Main objective of this project, MyELib, is to provide library members with ease of access to library formalities from anywhere at anytime. This project is all about the library. Only the library members will be able to use its functionality, as members need to login to access the system. MyELib application will list members details along with books list issued by them. Library members will be able to view, search, demand/request for books. If the book is not available then they can request for the book and the books will be allotted on the bases of first come first serve. Book should be issued by next 24 hours of request or demand. Fine management will also be there. The book availability and the fine remainder will be given either through SMS or Email. Library members will also be able to give suggestions and complaints.

Team Members : Ms. Hawagauri Mulla, Ms. Eva Kapopara

#### **8.2.6.3 CrackIT**

CrackIT is first-of-its kind tablet application in its category with facility to practice any competitive exam (Of MCQ Format). Its really an outstanding way of preparing own self for any kind of exam.

It is a platform where with a predefined formatted question-set, you can prepare yourself for any MCQ based exam. One can load content from various question banks now exclusively available across the Internet using this Android app. CrackIT is solely built in such a way that user has the provision to create exam on his own and can rate him or her self by giving those exams into this incredibly simple and amazingly helpful app. One can track his progress by seeing the previous results. CrackIT is beautifully designed and having a pleasing interface. Here, Students have one more reason to love their Android Tablets!

Subject teacher can prepare question bank file and give it to students to perform their self evaluation. This can be equipped with MAC bound so that only Aakash tablets can use that

question bank. Features

Create the exam from the question paper.

Choose the timeline of exam by yourself.

Get your results and track your progress after every test youve attempted.

Take timed and un-timed tests.

Featured question banks are handpicked by user himself to let him practice by his own level.

On-the-go it can be furnished with few amazing features like Online Test and Multimedia questions based test.

Developed by : Mr. Rahu Kalkani, III Year Student, Computer Engineering Dept, SCET, Surat.

### **8.2.7 Government College of Engineering**

RC-1003

Place: Salem

by Salma Mehajabeen.S - Wednesday, 10 July 2013, 3:18 PM

#### **8.2.7.1 Learning Through 3D Cooperative Environment**

The proposed module is to teach the kindergarten children through 3D cooperative environments. The environment is planned such as to create high-quality interactive e-learning content which can be published on the Internet, Learning Management Systems (LMS), CD-ROMS and other devices. It would determine the important elements of learning skills. The module will have 6 sets which would teach on I can. By the end of the course the kindergarten kids will be able to collaborate and cooperate the course. The module teaches the kids such as I can Share I can tidy up I can Say sorry I can be quiet I can say please I can say thank you These might seem to be simple but it is very essential. The module is framed such that the 3D cooperative environment may be with both British as well as U.S. accent and with their sign languages. Its done in a play mode.

### **8.2.8 BRCM College Of Engineering and Technology**

RC-1168

Place: Bahal

by Narender Kumar - Tuesday, 9 July 2013, 2:59 PM

#### **8.2.8.1 Aaksah Tablets for School Education**

In the project we will create tutorials for the subjects like Hindi, Science and History, Math for High School Education. These tutorials will help the students for better learning and shows improvement in secondary education. This will make the students think beyond and apply the skills in the development of new project work.

Implementation Strategy: It's easy to implement by assigning group of student's one subject each group and monitoring weekly their progress.

#### **8.2.8.2 Aaksah Tablets for Engineering**

In Embedded System (ESD) Lab : Most of the ESD Labs exp. are done in 8051, PIC Micro Controller's Assembly Language by using suitable program. By Loading Cross Assembler of 8051 Micro Controller, simulation program may run, for ADC, DAC, Stepper Motor, DOT

LEDs etc. For Connection to actual Hardware for demonstration purpose, USB port of Aakash may be connected to Hardware boards having USB Compatibility.

**Implementation Strategy:** We have to make an complier for Android but as new Aakash capable enough to work on ubuntu So we easy make complier for Embedded System (ESD) Lab.

#### **8.2.8.3 Aaksah Tablets For Farmer**

Progressive information to Rural Farmer in the fields of Horticulture, Seasonal Crops Development and Vegetable Farming.etc. **Implementation Strategy:** For this we required Reliable information of various crops in our area. For this information we have Haryana Agriculture University (Hissar) which will provide us all the required information. Next step will make an interactive android application which will provide all information required for the crop development. We also make provision in that application to interact weekly with Agriculture scientist of Haryana Agriculture University (Hissar). This Application also make possible interactive Lect. Series to educate the Rural farmer. The role of Aaksh doesnt end here but it also provides an interactive platform to interact agriculture scientist directly through Aakash. This is like "Krishi Darshan" (An Popular TV Programme on DD National) but more interactive and Informative.

#### **8.2.9 Federal Institute of Science And Technology**

RC-1077

Place: Kochi

by Bejoy Varghese - Saturday, 6 July 2013, 9:54 AM

##### **8.2.9.1 Smart Class**

Smart Class is a complete e-classroom solution , this application can be used for doing evaluation activites such as tests , quiz , assignments etc . and teachers can also give notes by this application. This applications works in moodle server . Moodle server is hosted in a server and the admin can add the teachers , students and courses . So teacher can do a online course and enroll their students and give them the material and online tests etc..

**Target Audience:**This app is mainly aiming at students and teachers at secondary and higher secondary levels .

##### **8.2.9.2 First Aid**

The First Aid app is a simple android app that provides initial care that might be taken as first aid in case of any emergency. The app presents a list of symptoms and set of actions that might be performed for the illness or injury The application has a search bar which provides the user option to search for the particular illness. The search bar also houses a auto complete feature which provides a list of commonly entered queries. Once the user touches the search button the details about the injury, its symptoms and care to be taken are presented to the user.

**Target Audience:**Anyone

##### **8.2.9.3 Wikimedia Search**

The "wikimedia search" is an android app that attempts to bring together the various different services provided by the wikimedia such as the wikipedia, wikibooks, wikiquote etc. The app has a search bar where the user enters the query and a set of buttons corresponding to different

sites where the query can be searched such as wikipedia,wikibooks etc. After entering the query, the user touches the button where he or she wants to search the topic. The app dynamically fetches the content from the internet and presents to the user.

Target Audience:anyone

#### **8.2.9.4 Baby Care**

Baby Care is a guide for mothers . This app will give necessary information about cares and diets during pregnancy periods . And diets and vaccination details for babies after birth This application run with a static database and gives necessary information on clicking the corresponding buttons.

Target Audience:This application is aimed at women who are pregnant and have small babies.

#### **8.2.9.5 Tastebuds**

It is a cook book, with a large collection of both indian and Italian foods, that can be done at homes, for a great time with the family. Its pretty simple, u can open the app to a menu where u can select either Indian or italian, from there u get an index, of which u need to search the recipe in the search box, drop down menu and then “next” gives the detailed recipe. It has the ingredients required, and procedure.

Target Audience:Budding cooks- house wives and children who love to experiment.

#### **8.2.9.6 Assignment Support**

This application helps to share an assignment to a batch in a common WiFi network easily on the click of a button. this also enables a common discussion platform for teachers and students have a UI based on mobview of html page, type the data on the form in the application and press sent button, it will share everything entered to all in the wifi network.

Target Audience:teachers and students

#### **8.2.9.7 Linux Tutorial**

An application that helps one understand about basics and advanced features of GNU-UNIX based operating systems Various options are provided on the home screen of the application.To understand about any feature of linux based systems,user can choose and browse through the required options.

Target Audience:Anyone using linux based operating systems will find this application useful to get information on various basic and advanced features of linux.

#### **8.2.9.8 Attendance**

An application that allows teachers to mark and store attendance records of various batches Add a new batch in the menu. Select required batch and date Record the roll number of students where absent Save the record Previously saved records can be viewed also.

Target Audience:All teachers in any institution

#### **8.2.9.9 Wolframalpha Math**

Wolframalpha math is a free android application that generates answers to questions in real time by doing computations on wolframalphas own vast internal knowledge base.The main aim behind this application is to make all systematic knowledge immediately computable and

accessible to everyone. The app mainly focuses on simplifying mathematical computation and or serving as a mathematical reference source. The app has a very basic layout with a text box ,where queries can be entered in, and an option to download a mathematical keyboard for easier query input.once the user gets the keyboard he or she can now use it to easily enter in queries into the text box.once the query is entered the query is sent to the wolframalpha servers where it is computed and the result is immediately displayed to the user.

Target Audience:Students,Teachers or anyone in need of an answer regarding Maths.

#### **8.2.9.10 Advanced Calculator with Graph Plotting**

Advanced calculator that does scientific calculations with maximum accuracy and the plotter that comes along is very helpful for plotting the curves for the scientific functions Calculations can be done as a normal calculator. To plot graph go to menu->Advanced. Type your function here (with the help of variable x). Now goto Menu->plot. You will be prompted to set initial value , final value and step value. Now click submit that's it.

Target Audience:Students, common people

#### **8.2.9.11 NPTEL Client**

NPTEL provides E-learning through online Web and Video courses in Engineering, Science and humanities streams. This application can be used as a client to access NPTEL. Switch on the app with internet connection. You will see the courses available and names of IITs. You can choose between IITs and courses. Now you will be prompted to list of available videos. Click on any video]. That's it.

Target Audience:Students, Educational enthusiasts.

#### **8.2.10 VIT University**

RC-1129

Place: Vellore

by Rajasekar Natarajan - Friday, 5 July 2013, 3:11 PM

#### **8.2.10.1 Simulation Methods and Tools for Biologist using Aakash Tablet**

This project focusses on the development of multi-scale, multi Physics modeling and simulation methods and tools that help biologists build,simulate and analyze complex biological systems, simulate their dynamics and analyze their functions. Typical biological models include gene expression models, Protein interaction networks and cell cycle models.

#### **8.2.10.2 Development of Android Application using Aakash for Switching between AC Power Line and Solar to Charge a Notebook Battery**

Aakash based power switching between ac Power line and solar to charge a notebook battery.It is proposed to develop android application using Aakash for switching between ac Power line and solar to charge a notebook battery.Real time ECG monitoring using Android based mobile devices.It is proposed to develop android application using Aakash for real time ECG monitoring.

#### **8.2.10.3 Development of Job Portal Application using Aakash Tablet.**

In the case of the Job application instead of finding friends the user is trying to locate a temporary job in the vicinity, so they can work for a few hours and make some money. The premise is that employers looking for temporary/ permanent help have entered available jobs, descriptions, hours, and offered wages in a web-based that is accessible. Using Aakash tablet android application anyone looking for a few hours work can use the job portal application to access that database look for jobs in the immediate area, communicate with friends about potential employers and potential jobs and call the employer directly if they are interested in the position.

#### **8.2.10.4 Home Automation System Design Using Aakash Tablet**

A home automation system integrates electrical devices in a house with each other. Devices are connected thro a computer network to allow remote access from the internet. Through the integration of information technologies with the home environment, systems and appliances are able to communicate in an integrated manner which results in convenience, energy, efficiency, and safety benefits. This task is taken as objective and solution is attained using Aakash Tablet.

#### **8.2.10.5 Business Plan Assessment tool design using android for Aakash Tablet**

The tool aimed to be developed will be a comprehensive questionnaire from the perspective of the investors in small business. The relevant questions pertaining to the business plan of the aspiring entrepreneur will be put in a quiz format. After answering all the questions related to a Particular section each section will be rated. Each section will have a rating on a five point scale. After all he ten sections of the business plan have been answered on the basis of the question answered. The interpretation of the final score will indicate the preparedness of the plan to be presented for pitching before the investors.

#### **8.2.10.6 Air pollution Monitoring System**

The Air Quality Monitoring system designed using Aaksh tablet is targeted for the measurement of a specific gas. Also the scope of accessibility of this system is focused to the users with proper internet connectivity. The system serves best to the users with proper internet connectivity as well as an Android device or a web browser.

#### **8.2.10.7 Creating Demo Model for Electrical Subjects**

Various aspects of basic semiconductor devices their operation and applications in microelectronics Can be taught with the help of teaching aid to the students. Hence, I hereby proposing to Develop an Android based app that has embedded Animations and virtual demos for electrical engineering subjects. The Project will be done in the frame as mentioned in the undertaking and will be released as a open source app thro Creative Commons license.

#### **8.2.10.8 Bat Inspired Micro Air Vehicle**

The primary objective of this research project is to Develop a flapping wing aircraft that is inspired from nature, especially from BAT. This flapping wing MAV can have many significant advantages Over fixed and rotary wing systems. Small size MAV is capable to fly in caves, tunnels, buildings, Stairwells, shafts and thus can be significant value in military as well as non-military purposes. This work is carried out using Aakash Tablet.

### **8.2.10.9 Design and development of health state monitoring of infants**

Based on the challenges presented to the sensor designer in the health state monitoring of infants there is tremendous need for developing a novel heart beat and pulse monitoring system with high reliability, accuracy, and cost effectiveness. In this regard, there is a new proposal to develop a demo model for the proposed system using the application of Akash tablet for signal display to the user by developing a suitable apps for the tablet.

### **8.2.10.10 Design and Development of Tier Pressure Monitoring System for Automotive Applications**

Based on the challenges presented to the sensor designer in the automotive industry there is tremendous need for developing a novel tier pressure monitoring system with high reliability, accuracy and cost effectiveness. In this regard there is a new proposal to develop a demo model for the proposed system using the application of Akash tablet for signal display to the end user by developing a suitable apps for the tablet.

## **8.2.11 Rajarambapu Institue of Technolgy**

RCID-1139

Place: Islampur

by Savita Prashant Patil - Friday, 5 July 2013, 12:01 PM

### **8.2.11.1 Students Attendance Application**

Students Attendance Application will be an android application to be developed for daily student attendance in schools, colleges and institutes. It facilitates to access the attendance information of a particular student in a particular class. The information is sorted by the operators, which will be provided by the teacher for a particular class. This system will also help in evaluating attendance eligibility criteria of a student.

Here the first module is admin which has right for creating space for new batch, any entry of new faculty, updating in subject if necessary, and sending notice. The second module is handled by the Subject teacher which can be an operator. A teacher has a right of making daily attendance, generating report.

### **8.2.11.2 Students Assessment Application**

At the institute, there are so many activities happening in between the student and the teacher. There is continuous assessment of the students through different assessment methods. These evaluation marks are needed to be accumulated and converted to give final marks and grades for the student.

So, we develop an application where a teacher has an access to information of batch of students. The teacher requires filling the information about the evaluation of the student. This information will be getting saved on the server. The final grading can made available as a report for the teacher.

### **8.2.11.3 Implementing MANET using Aakash**

Aakash tablets are basically wireless smart devices. The devices are able to join communication networks using WiFi. A mobile ad-hoc network (MANET) is a self-configuring infrastructure less network of mobile devices connected by wireless. Each device in a MANET is free to move

independently in any direction, and will therefore change its links to other devices frequently.

So, we can build a Mobile Adhoc NETwork (MANET) of Aakash tablets for collaboration in academic environment for various purposes.

Presently MANET research community largely depends on network simulators like NS2, OP-NET, QualNet for experimentation of various research ideas in MANET. The Aakash tablets being mobile wireless devices can be used as MANET nodes. This can make practical implementations of research ideas possible.

The work is in planning phase to build MANET of Aakash tablets. Each Aakash tablet device is having unique identity which can be used as address of the device. The standard routing protocols like DSR will be implemented in these devices for routing purpose.

### **8.2.12 KIIT College of Engineering**

RC-1209

Place: Gurgaon

by Preeti Aggarwal - Friday, 5 July 2013, 7:19 AM

#### **8.2.12.1 Development in Android Overflow UI Widgets**

Coverflow Widget is a widget that enables a graphically impressive way of representing images and thumbnails. It was first introduced in the apple iOS and also exists as a separate class in iOSs Standard Development Kit that can be extended and used. The basic coverflow widget is a horizontal scrolling list of child images which are beautifully arranged.

In Android there is no such predefined APIs for designing a coverflow.

In this project two widgets are developed till now, Vertical Coverflow and Semicircular Coverflow, which are different versions of a widget used in the apple iOS known as coverflow.

##### **Hardware**

This project can be used in any android enabled phone with the following minimum hardware:  
Processor above 500 MHz, should be ARMv5 or higher version of it.

256 MB RAM

256 MB Memory storage

##### **Software**

This project can work on the following version of android:

Android 4.2 and Android 4.1 "Jelly Bean"

Android 4.0 "Ice Cream Sandwich"

Android 3.0 "Honeycomb" not available (since it was not a public open-source release)

Android 2.3 "Gingerbread"

Android 2.2 "Froyo"

Android 2.1 "Eclair"

All the work has been done in Java Programming Language and xml by using the Eclipse Integrated Development Environment (IDE). We use the Android Software Development Kit (SDK) which includes a variety of custom tools that help us develop mobile applications on the Android platform. The most important of these are the Android Emulator and the Android

Development Tools (ADT) plug-in for Eclipse.  
Gaurav Kotwal B.Tech Final Year

### **8.2.12.2 Delhi Metro Alert**

This is an application in android, the Google operating system for mobile devices. The design of such an application is made in slightly modified Java. The purpose of the final application is to develop an android application of Delhi metro i.e. Delhi Metro Alert. Application DELHI METRO ALERT is based on Global Positioning System (GPS). Using this software application an android phone user who is travelling in a metro can set Alarm from his/her source which will ring exactly 1km before arrival of destination. It will give alert notification with a text message indicating that destination is about to arrive. This application is useful for the people who sometimes sleep or the people listening songs through their headphones while travelling in the metro. This project also provides the Fare calculator feature through which user can calculate the fare from his/her source to the destination. It also provides a route map through which user can see the route of all metro stations. Using its search module User can search any ATM, School, Hospital, Restaurant, Mall near any metro station within one an half km or near current location.

Technology Used

JAVA

Android SDK

Tools to build Client Application

API console

Eclipse IDE

Android SDK

Real time ADB Device(Emulator)

Sakshi Khurana B.Tech Final Year

### **8.2.13 Techno India**

RC-1263

Salt Lake, Kolkata, West Bengal

by Soumitra Sasmal - Thursday, 4 July 2013, 9:44 AM

### **8.2.13.1 Online Information System for Educational Institutions**

Monday, 8 July 2013, 12:41 PM

The objective of this project is to make updates on college/school notice boards to be available instantly on Aakash tablet via an Android application. Any update will be spontaneous available on the application. Along with this, this application will also host a plenty of other information like academic calendar, syllabus, results etc. The application will be able to filter information belonging to different departments so that a student will get only relevant updates.

### **8.2.13.2 English Learning Apps Development for Slum area Literacy Programme**

The apps will be used in learning the letter and vocabulary using Aakash. The English Language Apps (ELA) will look like animated graphics with figure how the alphabet look like, the apps will also provide audio out how the alphabet is pronounced and also how it can be written in

there vernacular language (for students who know their vernacular language). For Example The Letter A by a Bengali student will be heard as Ae and he will also know how it is written and also how it looks like and its Bengali word. The letter is written in Bengali using Flash Cards. The same thing can be done in any local language but the preliminary testing will be done in Bengali only. Once this Apps is successfully developed, our 1st year students will be engaged in literacy campaign programme under NSS curriculum.

#### **8.2.13.3 Content Based Training on Introduction to RDBMS**

Storyboard design is used to design the CBT. For each page in the project, there is an individual story board layout. Each page contain text, image, audio, video, animation that will be used to make the CBT more interactive. Each page describes the individual topic of RDBMS. At last after each topic there is a practice session that is used for self evaluation purpose. The complete CBT helps the target audience to learn basic introduction to RDBMS without any physical presence of faculty member.

#### **8.2.13.4 Self Learning and Evaluation Strategy in Distance Education using Aakash Tablet**

Initially subject wise course materials will be digitized and loaded into respective memory cards and before use it should be loaded into Akash Tab. We also load our progress monitoring software in the tablet memory.

After study of a particular module the self learning and self evaluation monitoring system can be activated through menu based options. The options will highlight Statistical measures indicating lessons completed and lessons pending. In statistical measures a student can have self analysis of course coverage.

#### **8.2.13.5 Data Structure Simulator DSS 1.0.0**

Data Structure simulator 1.0.0 (DSS) is an application where all the data structures with all its functionality are graphically demonstrated . The application will also contain descriptions of all the data structures in two different languages namely Hindi and English. The codes in the description are also written in two technical languages namely C and JAVA. The applications objective is to teach all the students how different data structures works and to give them a crystal clear concept of its working. It can also be used by teachers as manual for teaching purpose.

DSS 1.0.0 will contain all the data structure (linklist,stack,queue(circular and fifo),tree) graphically demonstrated.

#### **8.2.13.6 Akshar**

Akshar is a project dedicated to develop an intuitive JAVA IDE for basic programming learner at Secondary and Higher Secondary Level in Top-Down modular fashion. It is basically a GUI based IDE that provides an environment with which even a beginner can learn programming. For Instance...If you have to create an object of Rabbit Class you just have right click the specified IDE area where you will get an option for 'Add Object', clicking which you will an editor with some IDE generated codes and instruction or even you can just drag and drop some predefined objects already available. Later you can see how GUI component and the core codes working together and compare them for interactive learning.

Usability of project:

1. An Intuitive Java programming environment for students and teacher.
2. Different package and learning module for each level(Self Tutor).

### **8.2.14 Jaypee Institute of Information Technology**

RC-1251

Place: Noida-128

by Dr. Devpriya Soni - Wednesday, 3 July 2013, 4:44 PM

#### **8.2.14.1 UML Generator**

Objective: UML is very powerful modeling language. Through UML diagrams we can provide users with ready-to-use, expressive modeling examples. UML can be applied in many areas like embedded systems, web applications, commercial applications etc. UML can be used for modeling the whole system independent of platform language. UML is a graphical language for visualizing, specifying, constructing and documenting information about software-intensive system. UML Generator is an android app that supports three types of diagrams which are Class Diagram, Activity Diagram and Use Case Diagram with the Unified Modeling Language (UML), which is the industry standard general purpose modeling language for software engineering. Students developing projects can use this application for the generation of UML diagrams.

### **8.2.15 Srinivas Institute of Technology**

RC-1214

Place: Mangalore

by Ravishankara Kulamarva - Wednesday, 3 July 2013, 9:20 AM

#### **8.2.15.1 ANDRO-EAR**

Objective: To develop an android application for the hearing impaired by converting speech (of the person communicating with the hearing impaired) to text. It is mainly focused on aiding the hearing impaired. It covers a wide range of functions/applications that are indeed helpful for the hearing impaired in their day to day life. The most important of them being the application's ability to convert from speech to text and vice versa, thereby enabling the hearing impaired to listen to human speech as easily as others do. The application allows quick switch between both the conversion modes.

The application allows the person speaking to the hearing impaired to speak with any accent of English and of more than 75 other world languages including Spanish, Italian, French, Arabic and many more. The application is developed in such a way that the user is not required to learn any foreign accent.

Another innovative idea is to provide a hearing test using which the user gets an idea about his hearing capacity, which in turn enables him to customize the application in accordance with his personal requirements (his hearing capacity). The application contains a set of inspirational quotes which encourage the physically challenged.

The application provides links to blogs and community sites dedicated to the physically challenged and specifically the hearing impaired. Finally, the application comes preloaded with a few videos teaching the Hand Gesture communication method.

Note: The project won First Prize in the 27th CSI Karnataka student convention held at Reva Institute of Technology and Management, Bangalore on 20th April 2013.

Members of the Project Team:  
Mr. Jaseem Abbas and Mr. Jose Baby, VII Semester Computer Science and Engineering.

### **8.2.16 St. Margaret Engineering College**

RC-1031  
Place: Neemrana, Alwar, Rajasthan  
by RamNiwas Gurjar - Tuesday, 2 July 2013, 11:07 AM

#### **8.2.16.1 Village Information and Knowledge Centre (VIKC)**

There is need of a system that can provide needed information and knowledge to villager so that they can be benefited themselves to fast growing word of information. Village Information and Knowledge Centre (VIKC) will be a key enabler and a vital component of the new knowledge based information revolution. Village Information and Knowledge Centre (VIKC) is a place to render multiple services to villager through use of server having internet connection, WiFi access point and Aakash tablets. The purpose of setting up of a VIKC is to bring access to a range of services, content and information to people living in remote villages i.e. govt schemes, bus/train/air ticket reservation, nutritional information including primary processing of fruits and vegetables, rural sanitation, preventive and curative aspects of health and hygiene, skill development and linkage with market requirements and demands, capacity building among village based organisations and people or on any issue that the rural communities would desire.

Use of Aakash tablets in Village Information and Knowledge Centre:  
Senior Citizens will be benefited with facilities i.e. Govt schemes, old age pension, bus/train reservations, banking, paying insurance premiums, medical help etc. Villagers/Farmers will be able to know about Govt schemes, agriculture loans, agriculture equipment, seeds, fertilizers/pesticides, grain/vegetable market rates, weather reports, cold storage, talk/chat to expert, seeing demonstration videos etc. Ladies/Girls will also able to know about Govt scheme for ladies/girls, vaccination, child-mother care, pre and post natal care, home care, cosmetics, various cooperative schemes. Students/villagers will be highly benefited by knowing information about Govt schemes, scholarships, education loan, access to e-books, e-newspaper, video lecture by experts, online form fill-up, examination and related information, learning by watching videos i.e. rhymes, stories, cartoons, interactive games, e-painting etc. Able to connect to e-governance portals i.e. online jamabandi, land record information, BPL, Aadhar, MNREGA information etc. Villagers can access govt portal for govt schemes and scholarships, audio-video information using internet and from server maintained at VIKC.

### **8.2.17 Maharaja Agrasen Institute Of Technology**

RC-1238  
Place: Delhi  
by Namita Gupta - Monday, 1 July 2013, 10:40 PM

#### **8.2.17.1 Guru**

This app will make the classroom learning more interesting. Guru is an XML based application that will not require any external web server. Application would itself run on the tablet and multiple users can connect to the main application through Wi-Net software. This module Wi-Net is capable of converting ones own device as a hotspot, where several devices can connect to

it and communicate with each other. There is no need for an external router to communicate with other devices. In this app, the teacher will create quiz on his/her tablet or will import the quiz created by him/her on the desktop. The quiz files are in xml format. The teacher can analyze the performance of students on per-question basis using bargraphs, piecharts, stacked bargraphs, line graphs and textual summary. If large number of students fails to answer the same question correctly, the teacher would come to know that he/she needs to explain the same topic again in the next lecture. This would ensure that students do not leave their preparation for the last minute and discourage the practice of rote learning before exams.

Project Guide- Dr Namita Gupta, Mr Alok Sharma

Students - Mahima Kukreja, Vageesh Vyas, Ankit Popli, Abhinesh Kaushik, Arpit Goel

Guru has won FIRST prize in Project competition held in May 2013 by GuruGobind Singh IndraPrastha University (Dwarka, Delhi).

### **8.2.18 Knowledge Institute of Technology**

RC-1146

Place: Kakkapalayam

by Karthikeyan Thangaraj - Monday, 1 July 2013, 3:02 PM

#### **8.2.18.1 Knowledge Management System**

The Knowledge Management System (KMS) is the project done with open source Learning Management System Moodle. This KMS is an effective tool to implement a fully computerized learning methodology. This project comprises to two exclusively dedicated servers privately intended for the Intranet Video conferencing and LMS to handle e-classes throughout the college Intranet. The Moodle server will provide a Virtual learning environment which encourages students to use computers effectively. It can be used as a Staff-Student portal to share the materials. Even it can be used as a forum for discussions. Provisions are given to use it as intranet social networking site. The Video conferencing server is used to conduct e-classes by video conferencing. It has options to record and playback the sessions so that students will never miss the classes. These two servers are effectively working in all terminals of our college network including android tablet devices connected to the WIFI router.

### **8.2.19 Govt.Engineering College**

RC-1187

Place: Thrissur

by Dileesh E D - Monday, 1 July 2013, 11:34 AM

#### **8.2.19.1 GEC Live An Event Notifier**

The Gec Live event notification app is a small scale network developed on and for the Android environment. An event notification tool is a powerful tool which allows individuals to share information with each other on the go using their android devices. They help in bridging the geographical boundaries separating the users and creating a truly united campus. The features implemented are : Enable users to create and inform other users about events

Notify through calls and emails

Filter the contents of event description

Categorize notifications General events and blood donation requests

Future extensions:

Develop a system which enable users to form groups

Deploy an SMS based system for blood donation

Tracking the location of the users.

#### **8.2.19.2 Project Dequeue- A Wi-Fi based mobile ticketing cum monetary system**

The project was on providing a software alternative to the present physical queue system. An online web-portal, a local server application and a mobile application was developed to implement the system.

The mobile application was developed on and for the AAKASH tablet. The application acts as a window to the developed local server application and the device is connected to the local server through Wi-Fi. The mobile user logs in to the local server through the mobile application and communicates with the server to serve the ticket generation. The application also provides storage for the downloaded QR based ticket.

The Wi-Fi connectivity of the AAKASH tablet was found to be efficient and avoided the risk of disconnection in between communication which was critical for our application .The AAKASH tablet was found to be suitable and efficient for Android application development.

#### **8.2.19.3 Project Tracker for Civil Engineers in Android using Aakash Tablet**

Project Tracker for Civil Engineers in Android using Aakash tablet is an android application which can coordinate and administer the works of civil engineers at different construction sites. Aakash tablet enhance our application with all our required demands. This situation led us to implement the proposed system using Aakash. We utilized the tablet in almost every phase of our development, from design to testing and implementation. We used Android SDK with latest APIs for development and performed USB debugging on Aakash. The features that we proposed were:- Estimate Calculation  
Cost Evaluation  
Schedule Notification  
Integrated Calculator

We implemented all the above features successfully and wish to extend its functionalities further more.

#### **8.2.19.4 4Slide Presentation Controller for Aakash Tablets**

The project was based on an application which was intended to provide a remote control over the slide presentation using the Aakash tablet. Since, Aakash is a future tool for lecturing and studying purposes, applications involving teaching enhancement will be in huge demand in future. This situation led us to implement the proposed system. We utilized the tablet in almost every phase of our development, from design to testing and implementation. We used Android SDK with latest APIs for development and performed USB debugging on Aakash. The features that we proposed were:- GUI for connection establishment with server.

Controls for slide-by-slide navigation

Highlighter for marking purposes

Among these, we successfully implemented every feature, except the highlighter. In the proposed time of 3 months, this was a fair achievement for us.

As future extension we are concentrating on:-

Implementing the proposed highlighter

Current system is suitable only for Linux systems, so another proposal is to extend it to windows systems

### **8.2.20 SASTRA University**

RC- 1140,

Place: Tanjavur

by: Shankar Sriram - Sunday, 30 June 2013, 5:07 PM

#### **8.2.20.1 AAKASH pustak (An E-Book Reader for AAKASH)**

This application is developed in two phases. Phase 1 focuses on developing an ebook reader application (along with the application architecture) that would be well suited for the AAKASH tablets. The application allows the user to choose the required class and subject. The corresponding book is downloaded from the central server to the AAKASH tablet. The application also provides a search facility that searches for a term/phrase in all the books and lists the results. The second phase of the project focuses on converting the existing books to epub format that the ebook reader will read. The epub format is chosen for the reason that it is light weight and will be best suited for Tablets. To start up with, conversion of CBSE books to epub format is done for class 1 to 12. This Ebook reader helps the school students to have their books in the tablet, thereby reducing the school bag size.

#### **8.2.20.2 Career Counseling for High School Students on Aakash Tablet**

This application has the following functional requirements

Advising students and parents on high school programs and academic curriculum, preparing them for college application and admission . Arranging dual/concurrent enrollment and Advanced Placement credits to prepare students for the rigour of postsecondary education. Planning and preparation for college admissions tests, SAT and ACT. Informing students about postsecondary financing that can be used to support advanced education and training. Developing career portfolios, which include test and grades results, examples of student work, and resumes and cover letters to prospective employers. Arranging job shadowing, work placements, and community-based learning programs to allow students to directly experience workplace situations.

### **8.2.21 Textile and Engg. Institute**

RC-1008, 21781

#### **8.2.21.1 Tutorial on Hormonic Analysis of one dimensional signals using SCILAB**

by Jayashree Vaddin - Thursday, 4 July 2013, 9:09 PM

The application that we are developing is intended to be used as an e learning tool for hands on practice on the Digital Signal processing subjects inside the classroom or in the lab to develop

interest of the slow learners and weak students. This report illustrates a basic scilab tutorial on analysis of noise affected audio signal. Tutorial is carried out in two parts i.e., priorly on the simulated complex signal and secondly on the real time audio signal. Fourier spectrum and power spectrums of these signals were studied, plotted and analyzed. Further the quality of these signals was computed using PSNRs. PSNR result are -56 dB and -109dB for simulated complex signal and noise added real audio signal respectively. In the last step of this tutorial an appropriate method was adopted to extract the original signal from noise embedded audio signal. This tutorial can be extended for analysis of other kind of noise embedded signals such as square, triangular etc. The steps involved for the analysis of the signal are stated along with the result images.

First Post:

by Jayashree Vaddin - Saturday, 29 June 2013, 5:53 PM

This report illustrates the basic scilab tutorial tutorial on analysis of noise affected signal. Tutorial is carried out in two parts i.e., priorly on generated complex signal and secondly on the real time audio signal. Fourier spectrum and power spectrum of these signals were computed, plotted, studied and analyzed. Random noise was added n audio signal. Further the quality of the signal was estimated using PSNRs. PSNR result obtained are - 56 dB and -109 dB respectively for simulated complex signal and the real time audio signal. In the last step of this tutorial, original signal embedded in noise was extracted by adopting a reverse procedure. This tutorial can be extended for the analysis of noise embedded signals such as square, triangular etc and real time vibration, medical signals. The steps involved for the analysis of the signals are stated along with result images.

### **8.2.22 Sarvajanik College of Engg. and Tech**

RC-1043

Place: Surat

by Keyur Rana - Saturday, 29 June 2013, 4:08 PM

#### **8.2.22.1 Tracking the object using multiple Access points**

Project work, identifies location of object, which is equipped with embedded hardware, attached with it, using surrounded multiple access points, in indoor scenario. It scans signal strength of multiple access point in vicinity and compares, these values with earlier stored values, at virtual grid points on map of building/floor. It also sends such details to server, which is connected via Wifi network and one of the access points surrounded to it. So device runs matching algorithm which is based on calculating minimum Euclidian distance from various grid point measurements and hence identifies optimal grid point. This grid point is finally displayed as location of device/object. The positioning algorithm is based on the above deterministic Method which comes under the category of Location Fingerprinting Method. Server calculates location and displays on map. At server side php as programming language and My SQL data base is used to store data of object to be located.

Guide : Prof. Niteen B. Patel, Team members : Shah Rajvi, Patel Bhakti, Agarwal Simple, Parekh Shailja.

#### **8.2.22.2 MyELib**

Main objective of this project, MyELib, is to provide library members with ease of access to library formalities from anywhere at anytime. This project is all about the library. Only the

library members will be able to use its functionality, as members need to login to access the system. MyELib application will list members details along with books list issued by them. Library members will be able to view, search, demand/request for books. If the book is not available then they can request for the book and the books will be allotted on the bases of first come first serve. Book should be issued by next 24 hours of request or demand. Fine management will also be there. The book availability and the fine remainder will be given either through SMS or Email. Library members will also be able to give suggestions and complaints. Team Members : Ms. Hawagauri Mulla, Ms. Eva Kapopara

### **8.2.23 Rajalakshmi Engineering College**

RC-1138

Place: Chennai

by Benedict Jayaprakash Nicholas - Saturday, 29 June 2013, 1:19 PM

#### **8.2.23.1 An Enhanced Learning and Assessment Tool for Visually Impaired**

Team Members :

Bhuvaneswaran B

Poonkuzhali S

Swaminathan B

Benedict Jayaprakash Nicholas

##### **Project Summary:**

This proposed project strengthens the visually impaired peoples learning and assessment capabilities using Aakash Tablet and addresses the problems that visually impaired people have on navigating and reading information from the web pages. In addition to that, reading contents from the web page, this project involves an exclusive text editor and a cost efficient smart Braille keyboard. This will be implemented by using a multi-modal approach of combining visual and audio technologies. The first prototype of these interfaces has been developed based on the results of the user requirements capture conducted with visually impaired people. This project uses interactive blind editor and an economic Braille keyboard with dual keyboard and Multi language support. It also comprises of an automatic alert system that increases usability and minimizes the occurrence of errors.

##### **Hardware Requirements for Development**

Processor : Intel Dual Core and above

RAM : 2 GB

HDD : 100 GB

Speaker : Normal Multimedia Speaker

##### **Software Requirements for Development**

Operating System : Linux

SDK : Android

IDE : Eclipse

##### **Hardware Requirements for Deployment**

Tablet : Aakash

RAM : 4 GB

Keypad : Numeric (Optional)

Cable : USB

### **8.2.23.2 SAVIOR:Speed, Accident Detection and Emergency Service System on Android Smartphones**

Team Members:

Anand Raj A

Arthi R

Hariharan R.

Supervisor Name: Rajesh Kannan G.

Project Summary:

The Commission on National Road Safety reveals that at least 13 people die every hour in road accidents. Rash driving has claimed many a number of innocent lives. Thus, there is an acute need to look into this issue. Keeping this point in perception, our project proffers to reduce these accidents by exploiting the advent of the new technologies. This application named Savior is basically an android application that is GPS based which calculates the speed at which the vehicles are moving and intimates the drivers whenever they exceed the safe speed limit. It also produces an alarm that alerts the people walking on the road side. The main feature of Savior is that it detects the accidents and makes an automatic call along with the information about the approximate location of the accident to the ambulance service, police station and the person of concern (whose number is stored and preconfigured in the mobile). Accidents hurts but safety does not. The salient features of the application helps to reduce accidents and if it occurs (at adverse conditions) it at least facilitates an immediate medical assistance with a low latency.

### **8.2.23.3 Cafe Internet(Restaurant based Application)**

Team Members:

Harish S.

Harivignesh S.

Kabilesh P.M.

Project Summary:

Customer satisfaction is the key to success for any business. In a restaurant, the traditional hand-waving method for calling services is inefficient often leading to many complaints. The Restaurant Management System increases operational efficiency through use of an intentional wireless communications system and a statistical data processing unit. The communications system increases customer satisfaction by leaving electronic devices at each table which the customer can use to request for a server. A data processing unit allows managers and owners to easily monitor restaurant functions and employee progress. To make this system a reality, Android devices such as tablets or mobile phones are placed at tables which are connected to WIFI Hotspot at the restaurant. The Wi-Fi enables local area communication with all devices in the restaurant with the system where admin work with. The Android application at phone enables the place orders and tracking them. The Web based admin part handles the request from android app. The System provides a new trend of changing technology and enables higher degree of satisfactions to restaurant.

#### **8.2.23.4 QuizApp: An quiz application for board examination students**

Team Members:

M. Anandraj  
T.M. Sridhar  
P. Ramadevi  
Rajesh Murugesh

Project Summary:

This proposed project strengthens the students and increases the interest for their board examination and various competitive examination preparation using Aakash Tablet. The students can both attend the quiz off line and online, by online the student can participate competition with the other students for the self assessment and also to be monitored by the teacher. The quiz works with three time attack slow, medium, and Rapid fire, for the students not to get bored by attending the quiz the options and question will be selected randomly from the question bank stored in both online and offline database.

Note: Other projects for aakash tablet will be uploaded by 1st July 2013.

#### **8.2.24 Sardar Patel Institue of Technology**

RC-1229

Place: Mumbai

by Dayanand Ambawade - Friday, 28 June 2013, 4:36 PM

#### **8.2.24.1 Indian Monuments and Achievements of India**

Developed by: Vaibhav Kohli (ME-CMPN,SPIT)

Objective of the Project: To help teachers to teach students about various Historical Heritage Sites of India.

Brief Description of the Project:

We would like to make an Android application which will contain description about important monuments and achievements of India. It will also contain important ways to safeguard our endangered Cultural heritage sites as per UNESCO and the list of all the Indian heritage sites issued by UNESCO. It would be help to students to learn about various monuments of India and ways to safeguard them.

Project Category:Educational

Usability of project: In classroom teaching of History/General Knowledge Subject.

System Requirements: Hardware and software requirements of the project like:

Android 4.0.3

5 MB approx will be the application size.

### 8.2.24.2 Project Title: A Trip To Zoo

Project Member: Mangesh Shinde  
Himanshu Gupta  
Hetal Raut  
(MCA-SPIT)

Project Description:

A Trip To Zoo is a GAMIFICATION app! It is the best source of Educating Kids in a fun and animated way in users pocket. It's a mobile platform for teaching and educating small kids.

Objective:

A Trip to Zoo is developed to Provide Real Wildlife experience to kids, it Enable kid to Learn about animals in fun and animated way. Aim of this project is to provide all the necessary facts and trivia about animals, Give Challenges using games to keep the kids interest in learning, Track progress and performance of the kid which can be shared with parents. This application is developed for kids of the age group 2-6 years dont have the opportunity to visit a zoo and experience wildlife.

System Requirements :

Developer Perspective :

-Hardware Specification: RAM : 2 GB

Processor: 600 MHz and Above.

-Software Specification:

Android 2.3 (Ginger bread) and Above

JDK 1.5. and Above

SQLite.

Eclipse IDE.

User Perspective :

-Hardware Specification: RAM : 512 MB and Above

Processor: 600 MHz and Above.

-Software Specification:

Android 2.3 (Ginger bread) and above

-Permission:

Internet Connection

### 8.2.25 DCR University of Science and Technology

RC-1064

Place: Murthal

by Darshna Hooda - Friday, 28 June 2013, 3:23 PM

### 8.2.25.1 Aakash:Testing Environment for Video Encryption Techniques

Under this work we are trying to use Aakash as testing platform for Video Encryption techniques to measure performance of video encryption in constrained environment. Encryption is the proven technique to offer security but conventional encryption algorithms consume computing resources significantly and are not effective in current scenario of multimedia consumption through hand held devices. So our purpose is to offer convenient testing environment to measure

performance of video encryption on the parameters : power consumption, CPU utilization and time consumption.

Looking forward for valuable suggestions.

### **8.2.26 Maharaja Institute Of Technology Mysore**

RC-1097

Belwadi

by Ashwin H.m. - Friday, 28 June 2013, 3:05 PM

#### **8.2.26.1 Paper Less World (Go Green)**

Paperless world is an exclusive customized android based Write Book application to support hand writing feature in Aakash. This application has to be developed in the line of Write Pad for ios/android, Lecture Notes for windows, Samsung note etc. This application will support non English languages to support diverse cultural languages in India.

In todays Education context single digitized ebook for reading and writing is very demanding. The use of Tablet PCs application can fulfill the changing demand of the education system in this world. The Aakash tablet helps every human in serving his/her demands in a modern way. This article highlights the new idea of using AakashTablet for writing purpose within our education system. The Write book application for Android devices seems to be the perfect application to assist students with advanced note-taking. Every student to carry only one book for his/her entire KG to PG education. For whole of his life, he will carry only one book for reading and writing.

Uses :

Write book Application (Read and Write feature)

Digital Written Examination

Hand writing recognition for Non English Languages

Aakash adapting to new languages

e-Teaching

### **8.2.27 RK University School of Engineering**

RC-1137

by Rajani kanth - Friday, 28 June 2013, 11:34 AM

#### **8.2.27.1 K. S Patel Scholarship Exam Block Arrangement**

This application is basically for 12th science students. This application is to make students seat Number and block Number allocation process easy and accurate. As it is an open scholarship exam so number of students are very high. This application provides the feature to allocate student's seat number, managing seating arrangement and provide supervisor duty chart. It is an android based application for Aakash Tablet. It is a centralized and serialized application for managing student's seat number and block number. Database is required to run the application and to manage all the details of the students.

#### **8.2.27.2 Online Notice Board**

ONLINE NOTICE BOARD is an application that is based on Aakash Tablet. It can provide all notices and events and important information to students and staff members uploaded by HOD or administrator. This will help everyone to get the updated information. It also provides the feature of control access to provide different access permission to different group people. Security measures are applied for providing proper authentication.

#### **8.2.27.3 Survey On Various Issues**

This is a research based concept to change the platform of Aakash Tablet which will enhance the security measures and improves its capacity to run more number of applications. Linux platform provide security to passwords, encryption of data and control access to specific files. It helps to run number of application on tablet with high security. It will provide multi-tasking without affecting the speed of processor. Using Linux will enhance the performance of tablet by inheriting its features.

#### **8.2.27.4 E- Learning**

E-Learning application is basically for Aakash tablet to make learning easier and comfortable for students and teachers. It can run through Bluetooth and GPRS. It will help them to share study materials and important information. It can easily transfer large the files by sending it into parts. E-Learning is suited to distance learning and flexible learning. It includes numerous types of media that delivers text, audio, images, animation and streaming videos.

#### **8.2.27.5 Knowledge Hunt**

KNOWLEDGE HUNT is an application that helps to groom up the knowledge of the student by getting all the related information of the subjects at one place. It provides the basic concepts of the subjects and helps students to get all the related study material at one place. It can also help to connect the application to internet to access more information from outer world. It also provides the feature to append more information for further use.

#### **8.2.27.6 Notification Apps**

NOTIFICATION APPS is an application for Aakash Tablet for maintaining and scheduling the assignments, their submission dates and reading time table etc. it keeps all the necessary documents and notify the deadline date for submission of the assignments. It will maintain grades of the students. It is very helpful for teachers as it maintains the record of the student and generates the cumulative grade for every student. As different account is required for students and faculties, control access privileges are provided for authorized access and security parameters are applied.

#### **8.2.27.7 E- Tube**

E- TUBE is an application that is based on educational criteria and it provides different types of tutorial in video format. It also provides e- books for all subjects that help students to get all important books at one place. It has the feature to convert the format of the video if not matched by connecting the application directly to internet. User can easily upload more videos to E- TUBE. Database is provided to store the videos for further use. to resize the video file it uses convertor to change the file format and quality of the video.

### **8.2.27.8 Multipassword Locker**

Multi password locker is an application for maintaining security of a particular application. It is named multi password since we not only use one password but we are going to add more password to provide high security. By this we can set two passwords for single application. So basically it is a multi password multiuser application. It increases security to rescue it from unauthorized access.

### **8.2.27.9 Oops Solution**

OOPS SOLUTION is an application that is based on user queries and their solutions. This application is managed by administrator. Users can create their account and upload their queries and also provide the answers of others queries. This will provide notification if users receive their answers for their query. It provides number of solution of a single query. As it is maintained by administrator so security measures are provided for authenticated users.

### **8.2.27.10 Quiz Application**

QUIZ APPLICATION is an application that helps to improves students knowledge by using quiz application. It can help them to solve more questions in less time. It also provides study material for students. This application is managed by the administrator. Access control privileges are provided for security purpose. It is a GUI application which is interactive and easy to use.

### **8.2.27.11 Standard Elements Data Generator**

STANDARD ELEMENTS DATA GENERATOR is an application which is used to get the standard dimension of various mechanical components. It requires various mechanical name as an input according to which this application will provide standardized dimensions and 2D drawing of component depending on standard value. It is also very helpful for designing these components.

### **8.2.27.12 Design of Knuckle Joints (Mechanical Based)**

Design Of Knuckle Joints is an application where aakash is used for designing of knuckle joint it also requires parameters which give final dimensions and 2D scale drawing of knuckle joint. It also has offline design where authorized person can only give the input parameter. Numerical based design check can be done with this application where design can be get at jpg image or pdf file. It can share with both connectivity either Wi-Fi or internet.

### **8.2.27.13 IT Quiz**

IT Quiz is an application developed on Aakash Tablet based on Quiz competition, where not only quiz is conducted but also much competition has been added. In this application we only need to sign in so that we can be a part of the competition. The features that have been added in the particular application are all easy to use and understand. Through bluetooth connectivity more than two person can play this quiz simultaneously.

**8.2.27.14 Spell Regulator**

Spell Regulator is an application to check wrong spelling detection and correction. Here students can easily spell out the complex spelling, synonym and antonym. Spell regulator may be stand-alone, capable of operating on a block of text, or as part of a larger application. It scans the text and extracts the words contained in it. The main objective of this project is to detect wrong words, sentences and correct it.

**8.2.27.15 Mobile Attendance**

MOBILE ATTENDENCE is an application which is a mobile based application that helps to maintain attendance record in mobile. It is easy to keep attendance and maintain it in mobile. It helps to generate aggregate attendance and number of absentees per day, per week, per month. It can maintain monthly attendance record. Attendance can be shared among the faculties and can be transferred through e-mail or SMS if internet connection is not there.

**8.2.27.16 CGPA and SGPA Calculator**

CGPA AND SGPA CALCULATOR is an application which helps for calculating aggregate marks in different format like CGPA and SGPA. It helps to easily calculate CGPA and SGPA and it also helps to convert it from one format to other format. It provides graphical view of the results to show the performance of every student. It provides result of every semester and students can get the result through mail.

**8.2.27.17 Security Camera Monitor**

SECURITY CAMERA MONITOR is an application which is based on android. It connects to security camera server and gets the video streaming of security camera. It also works with multiple camera system like in university or in organization. It can also control the position of camera and different view of camera and can switch between multiple cameras.

**8.2.27.18 Activity Log Tracker**

ACTIVITY LOG TRACKER is an android based application. This application runs in the background. It can easily be installed on anyone's mobile and extract all the logs of that mobile phone. The data can be easily sent through email or SMS. If there is no internet connection on phone to send the data through mail then user can use the other alternative by transferring log file through SMS.

**8.2.27.19 RKU News**

RKU NEWS is an application managed by administrator. All the information is updated on the application by the administrator. This will help student to get the updated information from the college about the events, cultural fests, exams dates, results and other important information. Access control privileges are provided for security purpose. Students and staff can make their own account, can participate and register themselves in different events. Newsgroups and forums can be added for healthy conversation among the members about an agenda.

**8.2.27.20 ERP**

This application stands for enterprise resource planning in which all the necessary details and additional features are added. In this case ERP of a college is taken in which registration;

details regarding the students, staff, college curriculums, and gallery are maintained. With this features all the students staff members can access their information any time. It is a centralized application, any changes made by any member is updated in all departments.

#### **8.2.27.21 SNAPEDIA**

This application created serves the purpose to make the search of any text or image by easy and fast means by capturing an image of it. Clicking a photo will give the information about the captured photo. Not only the text but also the related images are also provided simultaneously. It gives an easy use and quick information about any information and text.

#### **8.2.27.22 College Notification**

This project notifies information regarding college management, faculties, HODs, exam dates, exam result dates to the students. Also the submission dates, extra lectures and other important notices by HODs, along with notification for new books and reading vacation book issue date by college central library. The Placement office notifies about interview dates and college account notify about fees and payments. This application is for the faculties and HODs to post, the students cannot post any messages.

#### **8.2.27.23 TODOPRI- an Android Application**

This application is a robust task list maker for those who need reminders for the things to get accomplish. This application is helpful who makes list regularly by managing different type of lists and different fields. It also allows creating repetitive tasks to enter once even if it is to be done on multiple days. There is one touch access to schedule a task of calling, messaging, emailing a contact off your list or visiting website.

#### **8.2.27.24 Draw- Ipad**

This is the graphical application which enables to draw the diagram and design in an easy and efficient way. It also encourages students to draw in different pattern and style in an accurate way. All the difficult and complex drawings can easily be made on this tool which also provides some extensible features and options to enhance and modify the drawing.

#### **8.2.27.25 Educational Video Sharing**

This Application is for sharing the video lecture for educational tutorial. This application shares the videos for easy learning in an Interactive manner. This becomes easy for students to learn because learn because by videos they can grab more and sharing videos enable them to learn new and different things which is good as a point of education.

#### **8.2.27.26 Bunk Snapper**

This application is developed to save money, time and provide awareness to the students about his attendance. It involves filling of the leave report and inform students about their attendance. Accordingly they can check their attendance and apply for leave. It becomes easy for them to check and apply simultaneously.

**8.2.27.27 Equation Solver**

This application was created for the students to solve the problems in an efficient and a quick way. It provides better solution for mathematical problems. Also the suitable steps are accompanied to students for better understanding. It becomes fun for students and generates more interest in the subject.

**8.2.27.28 Quiz Time**

This application developed for those students to improve their general knowledge. This is an automated quiz generated for the students for their quick assessment. Also it increases the general knowledge for primary students only. Since it is a GUI application, its interactive and look and feel is also good.

**8.2.27.29 Time Table with Notification**

Application created to aware students for their regular study schedule. It alerts the students about their lectures, break timings and the subject slots and lot more. It is a useful tool for the students as it notifies them about their daily time table wherever they are present. It becomes easy for them to look into the time table and plan as soon they read up the notifications.

**8.2.27.30 Mobile ERP**

This is an application made as ERP module for mobile. This helps to check results, attendance for the students. Also it notifies the updates regarding the date of exams. Time schedule, extra classes, holidays by the university. Also the updates from the placement cell, central library, and accounts section are also notified on the mobile ERP.

**8.2.27.31 Speak and Learn**

SPEAK AND LEARN is an application which will help the user to learn how to speak a sentence and make them understand in local language. It uses translator APIs specifically to understand each word. In this dictionary also there this provides each word meaning and easy detail about entered word. Different dialects and scripts of various languages are added in the dictionary so that the translator APIs converts the source language to the target language.

**8.2.27.32 Math Tables**

This application is made to collect all the mathematical tables that a user needs for his calculations. It includes logarithmic tables, trigonometric tables and steam tables. The aim of the application is to provide a single destination for students who will require these tables for the calculations to solve related problems.

**8.2.27.33 Periodic Table**

This Application would contain all detail of each element in periodic table which could help a student while solving problems related to chemistry. It will contain the details like name, symbol, atomic number, atomic weight, color, classification. It is an offline application which gives detail about all the minute details of each element.

#### **8.2.27.34 Roidsource**

It is an application that will provide users to download and upload, request different source code of different languages like C, C++, JAVA. It serves as a medium to get to know the different programming styles and format and ways to execute a same thing. Also it connects developers to upload, share, learn new coding skills and provide virtual learning for coders.

#### **8.2.27.35 QRXCHANGER**

QRXCHANGER is an application that acts as a medium for the information exchange in an easy and convenient way. It helps users to gather information from different users through this exchanger. Also it allows different information of the same subject to be exchanged among users simultaneously.

#### **8.2.27.36 Voice Applications**

Different voice applications are developed which includes voice dictionary in which user can search particular words by voice. Also it includes voice mail and SMS which send messages through internet to any mobile device and mail system through voice respectively. Several other applications like voice translator, voice Google search, voice changer and voice calculator are also included.

#### **8.2.27.37 I-TECH**

I-TECH is an application which provides information about materials and used full website to the students. In this the total estimate of the materials is done and recorded for the students so that they get a clear idea about materials used.

#### **8.2.27.38 Help Me**

HELP ME is an application which is made with an aim to stop women abusing and harassment. This will help females to alert the person that she is getting abused or is in danger with just the start of an application via mobile carrier. This alert is in form of message which is sent to the person whose number is stored and the message describes where the person is located so that it becomes easy to reach to her.

#### **8.2.27.39 IC HUB**

IC-HUB is an application which provides complete description of the IC which the user enters as an input. The use of this application is for electronic and electrical engineers who get the complete information about the IC for their projects. This consists of library from where the information can be stored and retrieved at any time.

#### **8.2.27.40 Picture, Gestures And Face Lock Password**

It is an application develops for security purpose where user can use their face, gestures and pictures to lock and unlock. In this application, Face recognition is used as a default setting. Face lock lets user choose to protect individual application. It provides high security level and it uses 2.6 new face detection optimization.

#### **8.2.27.41 Generic Calculator**

Generic Calculator is an application which simplifies students difficulty in calculation. It has the property of calculating the gases, generation of waves, simple calculations, scientific calculations etc. The main advantage of this application is that, it can be used by those people who have no basic knowledge of equations or formulae. It is not only used by the students but can be used by any person with no much idea of calculation.

#### **8.2.27.42 Binary Converter**

Through this application we can learn binary conversion with less time. Special bit patterns are sometimes used for a sign or for other indications. Conversion of octal to binary, hexadecimal to binary, and octal, decimal can be performed. It helps in easy calculation even though the input is large.

#### **8.2.27.43 Math Genius**

It is an application developed on Aakash Tablet. In this application user will be able to perform any mathematic application in easy way. Where a sets of equations are provided in which the user have to select the equations according to their own needs, once the equation is selected you just have to enter the values thants it, instantly without any waiting time you will be getting your result.

#### **8.2.27.44 Cam Profile Generator**

CAM Profile Generator is an application that gives the output as acceleration and velocity in the format of jpg and pdf. Objective is to generate CAM profile where only radial cam is considered. CAM profile generator is very useful to the designers and engineers where students can also check answers of the numerical problems which they solve. It is developed using JAVA Programming.

#### **8.2.27.45 Easy English Learning**

The main objective of easy English learning application is to improve ones English. It can be used by everyone both professional and nonprofessional who helps in speaking English with correct grammars. The way of learning is level by level where tutorials will also be provided both audio and video.

#### **8.2.27.46 Account Tracker**

This application is based on Aakash Tablet. It is an Android application which allows user to track of current balance in different bank accounts held by the user and the transactions of those accounts. Some of the major operations include updating the account, search transactions by date and amount, deleting and adding transaction, showing all the details of single user etc.

#### **8.2.27.47 Edu.Link**

Edu.Link is an application that provides certain number of links to the user according to their needs based on what topic and which subject they are looking for, where the content may be in image for or video or txt form. The main objective is to abridge time wastage of user in searching their content of requirement and give them more flexibility towards their need.

#### **8.2.27.48 English World**

This application is basically based on Aakash Tablet. The main objective of easy English-World application is that it provides dictionary to improve ones English. It can be used by everyone both professional and nonprofessional who helps in speaking English with correct grammars. The way of learning is level by level where tutorials will also be provided both audio and video.

#### **8.2.27.49 Dictionary**

This application Developed serves like a dictionary in which all the information is gathered in the alphabetical manner. This acts like an e-dictionary where a person can search the meaning of the words electronically. This replaced the headache of maintaining the paged dictionary since it can be saved as an application of small size.

#### **8.2.27.50 Audio Dictionary**

This application is mainly designed for the education knowledge purpose. In this along with the meaning student can learn the pronunciation of the words in an easy and interactive way as a educational purpose it is an excellent tool in which students can learn how the word can be spelled and pronounced.

#### **8.2.27.51 Message Blocker**

This application is created to block or hide the message from other persons. It acts as a privacy application that provides security from the persons other than the user himself. To see the message a person has to know the password then only he is liable to look into the messages. It blocks the message to be displayed when proper password has not been used.

#### **8.2.27.52 Auto Tune Swapper**

AUTO TUNE SWAPPER is an application that automatically changes the user ringer profile as on the predefine day/time. This feature helps the user not to worry about the location of the user. It is an android application which knows when to change the mode of the profile. It is easily accessible due to its user friendly features.

#### **8.2.27.53 Picture Password**

This is the application created to make password sight very strong that one cannot easily unlock the password. In this user selects one picture from the pool of pictures, followed by selection of three coordinate points. The user with selected points in hand can unlock the phone by tracing the password. It maintains the authenticity and provides security with the help of image coordinate points.

#### **8.2.27.54 Battery Saver**

It is an application to save the battery and power of the device. It can constantly put the device to deep sleep mode while screen off. During deep sleep mode, wifi, 3G are turned off, it stopped the background apps also. It can set a battery threshold which will automatically help to conserve battery as the device reaches that point.

#### **8.2.27.55 RAR (ZIP) File**

RAR (ZIP) FILE is an application which is used to compress the files and images to reduce its size. It uses a compression technique to split up the files into smaller chunks and allow them to be easily shared. To extract the original file, it needs to unzip it. It helps user to copy, delete, move, unzip/unpack, compress, encrypted ZIP supported, search, and organize your files, music, pictures, and folders.

#### **8.2.27.56 Mp4 to Mp3 Converter, Mp4 to 3gp, Avi, flv,ogg etc. Format**

The application is developed on Aakash Tablet used to convert in any format, where we can also convert any avi,flv,ogg etc to the format we wish too. The main advantage of this particular application is to convert the whole format to another format without any changes to the original file. An Mp4 can be converted in to Mp3 file and converted into some other audio format.

#### **8.2.27.57 Kids Maths App**

KIDS MATHS application is a simple application. Its a kids game for calculating simple mathematics problems and some more interesting games to increase the kids IQ level. It is a GUI based application providing interactive features that make it interesting for kids to use and learn it in an easy way. It provides alternative solution for playing game which helps kids to play.

#### **8.2.27.58 Kids Corner**

KIDS CORNER is an application useful for kids to increase their basic knowledge by providing alphabets, numbers, colors, animals etc. It will help to create their interest and to make them learn easily. It is a very attractive application to create the interest in kids. Its a GUI based application, very user friendly and easy to use.

#### **8.2.27.59 Document Scanner**

DOCUMENT SCANNER is an application which scans the document and image. It is easy and simple to use. It can take the photograph of book and graphs and images. It can also convert the file into pdf. It receives the document from the phone camera to scan it. It is a portable scanner. It can share, edit and manage all the contents on all devices. It is a very easy way to convert a document into a pdf file to share it with other devices.

#### **8.2.27.60 Math's and Physics Unit Conversion with Math's Fun**

It is an application developed on Aakash Tablet where it converts all the related math and physics unit in to all possible units with fun and innovative way to practice math. The content is highly interactive. Here the main aim is the conversion of Maths and Physics Unit with maths fun which helps in easy to understand and use.

#### **8.2.27.61 Buddy Messenger**

Buddy Messenger is an application that connects your buddy with the help of phone numbers where each of them has a unique number for connecting. Here we also make an account in which it also has a property of adding friends number by sending a request to the particular person. Apart from this it allows chatting and photo and video sharing.

### **8.2.27.62 Format Factory**

Format Factory is a type of application in which we can change or convert to any type of format we required. This particular application helps in conversion to a supportable format which also helps in easy to use; here we can convert videos, images, audio file in any supportable format according to our need.

### **8.2.27.63 Widgets**

This application named Widgets is a combination of applications within an application. The main purpose behind this application is to make access of any feature quickly, like current temperature, location, small music player, gallery etc. Apart from this features the application also adds small utilities like calculator, barcode reader, OR reader.

### **8.2.27.64 Money Manager**

Money Manager is an application which helps to manage the expenditure per day, per week, per month and per year. It can alert user if there is any changes in the rate of expenditure or exceeding limits of expenditure by giving notification. Also it gives suggestions to manage money and to decrease the expenditure. It can also help to manage budget and in any case if it will go beyond budget, this application will notify the user and provide option to manage it.

### **8.2.27.65 Social Messenger**

Social Messenger is an application that helps to connect the people who are in different social network like face book, twitter etc. This helps to create a user account and help them to include other networking account in it. Users can share the files, images, videos with other users from different social network. User can use different account simultaneously from social messenger and can easily use the features of those sites.

### **8.2.27.66 Translator**

Translator is an application that is self explanatory by its name. It can help to translate one language to other. It includes some Indian languages like Guajarati, Marathi, Tamil, telgu and other languages like English, Chinese, Japanese, German, and Spanish etc. It will help user to convert any text into any other language. It can also help to learn other language very easily. It also includes idioms, phrases to convert into a target language.

## **8.2.28 MES's IMCC**

RC-1034

Place: Pune

by Ravindra Padmakar Vaidya - Thursday, 27 June 2013, 6:29 PM

### **8.2.28.1 Educational Tool for displaying Science Project**

The application that we are developing is intended to be used as an educational tool for explaining the principles of science through step-by-step demonstration of practical experiments for school students in the rural areas around Pune. This will help in Chhote Scientist programme jointly organized by KPIT, Pune and Jnanaprabodhiny, Pune  
 ( Visit <https://www.facebook.com/pages/Chhote-Scientists/268507279947989> ) Cchote scientist activity includes visiting various schools and explaining scientific experiments step by step

to the students. We are trying to make this process very easy and user friendly by presenting various experiments in text, video and interactive animation format. In the application teacher will add category wise experiments has valid username and password. Students can view the experiment and try them hands-on. Experiment can add along with their respective steps and detail, this part is controlled by teacher only. Export and import module has functionality to import or export experiments according to the needs. This application comprises of four distinct modules and each module is to be executed as a separate project.

1. Teacher Module (intended for administrators)
2. Student Module
3. Export / Import Module.

We are having 3 different teams assign for these 3 modules. Periodic Table on android with animated chemical reaction Learn the details about all the elements present in periodic table by using Android application. The app has following features

Tabular representation of periodic table  
Search the elements by name  
Custom Dialog to show the features of Elements  
Details view will show more than 20 facts about elements.

User can drag one element on another and all possible combinations can be seen between those two elements. The application will help to the students and teachers to learn the properties of the periodic table very quickly and easily. The student can check the reactants and products of the compound by using this application.

#### **8.2.28.2 Falling Number game to learn Basic Arithmetic**

Falling numbers is an interactive application that will allow user to perform mathematical calculations in time bound manner to enhance their calculation skills. In todays world, you have to do every task within a certain time period so our application will help you to enable in performing calculations in quicker duration. It can be used by anyone but mainly developed for educational purpose. There are 4 levels,all the operations will be time bounded . In this, numbers will fall and at the same time ,timer will also start. By default textbox will generate random numbers and operator. You have to answer it.

#### **8.2.28.3 Mathematical Formulae LIVE WALLPAPER**

School students find it difficult to remember the mathematical formulae. At the same time, in todays world of Mobile devices, students spend considerable amount of time using smartphones. When you flash these mathematical formulas on home screen, it will automatically get registered in photo memory of human brain. Instead of taking special efforts to learn mathematical terms, it will slide unknowingly into your brain. When you start your application, it should allow setting the wallpaper. The application will allow user to create his own wallpaper. The formula based wallpaper will be shown on screen for stipulated time duration.

#### **8.2.28.4 Teaching Data Structure for Higher Education Student**

Now a days understanding DATA STRUCTURES / ALGORITHM is necessary task because it is an root of any software implementation. For example When creating O.S.software .This App helps teachers and students to know about how data structure implements / works. This app shows GRAPHICAL representation of STACK and QUEUE data structure operation so

students makes easier to understand concept of data structure. We also provided some helpful example about stack and queue with there effective operation like PUSH ,POP,PEEP so students also get little idea about data structure operations with less effort. This APP requires So much less memory and its a so much easier and user friendly APP so any one can handle or used easily. This project contains Graphical Representation of Data Structures like STACK and QUEUE that shows how STACK and QUEUE works or implement sequentially. After this scenario user will be able to enter in an interactive section in which he/she have to answers some questions based on last scenario and try to make varies structures such as stack of books, stack of plates etc.

#### **8.2.28.5 Human Skelton Application**

Human skelton application contains all the information about skelton its anterior view, posterior view, muscular anterior view, muscular posterior view and a jigsaw puzzle game related to skelton study.All the views are implemented using pinch zoom/zoom control to study detail about skelton body.Jigsaw puzzle is an interesting activity which help to study with fun.Human anatomy is also one of the striking feature of this application, it contains nervous system, male reproduction system,female reproduction system etc which are the important human activities which are held day to day.This application is helpful for all the categories of the people that from non-biological background,biological students,doctors etc because human skelton is realted to every human body in the world.

### **8.2.29 Thiagarajar College of Engineering**

RC-1173

Place: Madurai

by Karthikeyan Periasamy - Thursday, 27 June 2013, 5:24 PM

#### **8.2.29.1 Wordposer**

We have developed this app for improving the vocabulary skills of learners. This app is designed to work in different modes. This app has arround 5 small different exciting modes in each round. the main intention for this type of design is to entertain the users and at the same time the users don't get bored of playing the same game for different levels. All the five modes have user interactions and sufficient hints to the users. This game continues until the lives given to each user interactions and sufficient hints to the users. This app tests the general knowledge of the players in the last level of each round to complete the round. This app mainly focus the English vocabulary skills.

#### **8.2.29.2 Science Helper**

This app is designed to simulate the science lab experiments. Through this, the school students (6th, 7th and 8th standard) are able to learn the experiments on their own with or without the help of teachers. some schools may not have sufficient lab apparatus and materials for doing the experiments. By this simulated way of teaching/learning the lab experiments, the laboratory operational cost is also comes down. Students can experiment and learn them as many time as he can without any chemicals handling fear. It enables the analogy based simulation in learning the lab experiments. It is also planned to enhance the app with automates the lab instructions for simulated science experiments and evaluate the performance of students based on different testing methodologies.

### 8.2.30 Saveetha Engineering College

RC 1045

Place: Chennai, Tamil Nadu

by Nagappan Govindarajan - Thursday, 27 June 2013, 3:37 PM

15 Android Project Initiatives for IITB Aakash

Submitted by

G. Nagappan

SEC Aakash Co-ordinator

1045-Saveetha Engineering College

Chennai , Tamil Nadu

#### 8.2.30.1 Bharathi- Hand Written Tamil Character Recognizer

This project ‘BHARATHI’ is aimed at developing software utility which will recognise hand-written characters of Tamil language script and can be accessed through an Input Method Editor. With rising touch enabled smart-phones and tablet market in India, there is strong need to develop software that provides native language support. This utility enables native users to overcome language barrier in access to technology, by recognizing Tamil characters and numerals. It is also helpful in recognizing special symbols. It engulfs the concept of neural network. One of the primary means by which computers are endowed with human-like abilities is through the use of a neural network. Neural networks are particularly useful for solving problems that cannot be expressed as a series of steps, such as recognizing patterns, classifying them into groups, series prediction and data mining. The neural network which is trained for classification is designed to take input samples of a hand written data pattern, which then attempts to classify them into groups to determine if the input data matches a pattern that it has memorized.

This project is targeted on Android based Aakash tablets and concerns detecting free hand-written characters through touch gestures. It can be further developed to recognize the characters of different languages.

#### 8.2.30.2 Biometric Web Security

Face recognition based security for accessing web services such as banking transactions on aakash / any android devices. This project focuses on the use of unique human characteristics to recognize the users and provide a secured access to web services that are restricted, using a mobile phone with Internet connection. The mobile phone is used as a biometric capturing device, which is later used for recognition too.

In this growing era, mobile devices have both the network access and computing capacity to provide users with a diverse range of services. So, with increasing functionality and access to personal and sensitive information, there is an essential need for enhancing/advancing the authentication mechanisms. Hence, this project proposes to present mobile phone application architecture to capture and send the biometric to the web server based on the use of embedded web browsers.

#### 8.2.30.3 Car Parking

An Android App to identify availability of vacant Car parking space in the car parking area of shopping malls / hospitals / apartments.

The available car parking space detection using Background Subtraction method is used to detect the engaged and free parking space in the parking lot using webcam. They always monitor events from recorded videos. Background subtraction is a computational vision process of extracting foreground objects in a particular scene. The input video is divided into slots and it checks whether the parking slot is occupied or not. If the slot is occupied then indicate the slot with red color else if the slot is vacant then indicate the slot with green color. The data about engaged and free slots in each parking lot are updated into the database automatically. Android application collects all information from server through database. This application shows graphical view of engaged and free slots and it validates information continuously to the web server. The main purpose of this project is to detect the vacancy of parking lot round the clock from anywhere and secondly to track the cars that comes in and out of the parking lot without any manual disturbances.

#### **8.2.30.4 Anti Theft Privacy**

If your Aakash tablet / android phone is stolen and tried to be accessed, this Anti theft privacy software will invoke itself and take a photograph of the user and happenings with the camera and send mails to the owner.

The Project THEFT SMS TRACKER AND LOCATION TRACKER is essentially software that allows person to track his stolen Aakash / mobile. Here the stolen mobile acts as a child mobile and substitute mobile acts a parent mobile.

All incoming and outgoing calls, texts and multimedia messages can be seen and interrupted when the parent mobile has been stolen or lost. And also the location of the parent mobile can be tracked when it is being stolen by the theft .

It happens only when the GPS (GLOBAL POSITIONING SYSTEM) is being enabled on the parent mobile.

Our aim is to develop an efficient and improved geographical asset tracking

Solution and conserve valuable mobile resources by dynamically adapting the tracking scheme by means of context-aware personalized route learning techniques. This system uses Android based mobile phones for the software to be run.

The alerts are also stored in the centralized server like the details of incoming call, text and multimedia messages and the timely location update of the stolen mobile. Owner may later login into the centralized server and view the details of his stolen mobile.

#### **8.2.30.5 Treasure Hunt A Game of Knowledge**

Android based Gaming application to enhance childrens knowledge about continents, countries, monuments and places on various locations all around the globe.

Web-app Gaming has been a revolution over the years, and attracted million of users all around the world. Online games are an emerging market with many opportunities and challenges for game developers. While developers have expertise in designing and developing game experiences, they require additional knowledge about the business and technology implications of online games in order to maximize their chances for success in a growing and evolving marketplace. Recent research proved that, knowledge oriented gaming helps students to gain knowledge by activity based learning.

Treasure hunt is an innovative application that contributes to enhance Geographical knowledge as well as puzzle cracking skills. Gaming mode also helps to switch between difficult levels of puzzle solving. The Game concentrates on enriching the Geographical knowledge of the Gamer through the generic Gaming concept. Scores will be awarded based on the ability to crack the Geo-location within the stipulated time.

The Gaming Environment also feeds knowledge about the factual information about various places, monuments and Man-made artifacts. It test puzzle solving, tracking location and time management skills of the gamer.

The complete gaming experience is visualized through the ease of Graphical user Interface. The updating feature enables the gamer to play without losing interest in playing.

#### **8.2.30.6 Location Tracking**

This Location Tracking App will help you to connect yourself with a group of friends / colleagues / invitees coming to attend a meeting / party and track their locations until they reach the venue.

In current system, in order to find out the location of friends, user needs to call and ask friends about his/her location. The proposed system will help user to find out friends location. The proposed system will also allow user to see all friends on Google map as well. The application Friend Mapper on Mobiles solves all these problems. It offers below services

Allows user to select friend for location updates. Uploads users current location at specific frequency. Get friends current location. Shows friends location on Google map. This project presents a mobile application based on providing Location Based Services (LBS) using Global Positioning System (GPS) as location provider. The main objective of this work is to design and implement a client server system that help users to locate their family members and receive alerts when friends are nearby. The GPS is a most efficient positioning technique. It was developed mainly to be used in navigation systems. Because of the reduction in the size of the GPS receivers and because of the integration of GPS with some mobiles; GPS because one of the most important service providers in the LBS. They are not many projects that are carried out in the LBS field. This is because this type of application was somehow exclusive for mobile service providers because they use mobiles cells information to get the location of the mobile and then provider service to get it. But the information of GPS in this field will make designing and implementing LBS services open to researchers all over the world.

#### **8.2.30.7 Speak India - a Voice Translator**

An Android App to translate and convert your speech in any of the 10 languages into text and voice in any of the 8 languages such as (english, tamil, hindi, french, spanish etc..)

SPEAK INDIA - A VOICE TRANSLATOR is an Android application that can be installed in any Android devices to translate voice from one language to another. In this the user gives the voice input in his own language and gets the translated output in the form of both text and voice. Thus it helps the user to get familiarized with the languages that he does not know. This also helps the user to know the proper pronunciation of the words in the language that he doesn't know. This project also helps in conversation between two users who are from different natives. This also helps students who are curious in learning new languages. This also helps business men who have their establishments all over the world. There is an added advantage where the translated words will be stored in History and these words can be reviewed for later use. Hence the user can get more knowledge about the words that are being used for translation. The user can also obtain the output in Indian languages which is a new feature. There are not many languages that will give the output in Indian languages in the form of voice. But this application enhances this criteria. The use of Google app-engine has made this phenomenon possible. However, for foreign languages we use Bing translator which is a freeware.

### **8.2.30.8 Buzzzone App**

This App will help students to register in order to share their study materials, discuss on forums, download interesting contents and publish their articles / inventions / ideas.

Students have become Technology Lovers. Android Phones stand prior in the list. Apart from entertainment, they also help the students community for reaching out to educational purposes. This application is developed with a motive to provide an interactive interface which lets the students to effectively interact with an institution.

The system is an online application that can be accessed throughout the organization and outside as well with proper login provided. This system can be used as an application for the students to share and gain knowledge through forums, test their knowledge through aptitude tests, calculate their GPA using GPA calculator, and know about the events happening in the institution.

### **8.2.30.9 Anti Plagiarism Tool**

The presence of textual materials in electronic format has made plagiarism easier than ever. Copying and pasting paragraphs or even entire text can now be accomplished with a few mouse clicks.

An Android App to effectively detect and thereby prevent plagiarism. It is a versatile tool to deal with World Wide Web copy-pasting information from the assignment of authorship.

The term plagiarism is defined as the practice of taking someone else's work or ideas and passing them off as one's own. This project aims at developing an android application to detect plagiarism that exists between documents.

This could help a lecturer to easily find the genuineness of the students in case of assignment submission where each student in the class is expected to come up with his own perspective on the topic put up.

The main goal of this project is to develop the PLAGIO app on Android Platform in AAKASH TABLET using Eclipse, android SDK and ADT Plug-in to view the text files present in the SD-Card comparing them and identifying the plagiarised documents while displaying the percentage of the plagiarised content. Android SQLite database is used for storing the registration and login details.

### **8.2.30.10 Saveetha Social Networking**

Saveetha social networking App will be a platform to build social networks or social relations among all people working or studying in Saveetha group of institutions, for example, share interests, activities, backgrounds, or real-life connections among various departments and Alumni.

This app will consist of a representation of each user (often a profile), his/her social links, and a variety of additional services which allow users to share ideas, pictures, posts, chat, activities, news, placements, events, and interests with people in their network.

Using E-Learning feature students can download books for their studies and using forum students can discuss about certain topic. Using placement information students can get information about company requirements and interview process.

### **8.2.30.11 Principal Office Automation**

This App will help students and staff to send online request to principal for getting letters / certificates / applications / forms of any kind to be approved and signed by him.

On approval of HOD, the corresponding document will be automatically generated after proper verification and validation and sent to principal for signing.

The requester will get intimation about the delivery status of the document once it is ready to be obtained.

The process goes like this. Student who needs certificate has to enter into our College Portal, where the certificate icon is presented. Once the person clicks that certificate icon, the type of certificates will be displayed and from that list one certificate type has to be selected, that selected content should be added with that predefined template which we created already. The letter should be mailed to the HOD where HOD can open and view the mail, and can approve and sent it to Principals mail. Once the Principal approved that request, it will be forwarded to the Admin. The Admin checks and send the confirmation to the student. The secret key is generated. Using the secret key fill the details in the form displayed and send it to the Admin. Now, the Admin has to generate the certificate and issue it to the students.

#### **8.2.30.12 Gui Password for Android**

Passwords and Pattern based authentications have failed due to attacks such as key logging or shoulder surfing.

This image based GUI Password system will secure your Android devices.

Object Drop-GUI Password for android system is an authentication application that can be used in the android operating systems. This security system provides a more secure way of handling the data. This application is mainly designed for the handheld device which is becoming more popular nowadays. This application provides a user interactive environment which makes it easier and user friendly. In this application the user can select their desired object as password; initially the user selects the required object and then set a particular location for each object selected which in turn get stored at the database linked to it. The selected object should have particular sequences such that the same sequences and position should be used to release the lock. This sequence is used because the object in the lock screen will get randomized. This randomization is used to increase the security of the device. The device can be more secured by adding more number of objects. As the user can forget the position of the object there is a way to unlock the device. A combination of numbers is used as code which is pre-set by the user itself. That code will be entered to unlock the device as alternative. This code can also been retrieved by using the Mail id.

#### **8.2.30.13 Click to Contact**

This Android App CTC will help you to create a new contact in your device just by taking a snap of a Visiting card or Address board or a banner display.

Object Drop-GUI Password for android system is an authentication application that can be used in the android operating systems. This security system provides a more secure way of handling the data. This application is mainly designed for the handheld device which is becoming more popular nowadays. This application provides a user interactive environment which makes it easier and user friendly. In this application the user can select their desired object as password; initially the user selects the required object and then set a particular location for each object selected which in turn get stored at the database linked to it. The selected object should have particular sequences such that the same sequences and position should be used to release the lock. This sequence is used because the object in the lock screen will get randomized. This randomization is used to increase the security of the device. The device can be more secured by adding more number of objects. As the user can forget the position of the object there is a way to unlock the device. A combination of numbers is used as code which is pre-set by the user itself. That code will be entered to unlock the device as alternative. This code can also been retrieved by using the Mail id.

#### **8.2.30.14 Talk Free using Wifi**

This android application will help you to communicate through phones without sim cards using the WiFi facility.

The use of Wi-Fi enabled cell phones to access internet away from the pc is increasing day-by-day. This proposed model is a form of telecommunication that allows data and voice transmissions to be sent across a wide range of interconnected networks. The models, which are Wi-Fi enabled and have ANDROID platform, can be used to communicate channel WITHOUT THE USE OF SIM CARD. Since this is a free channel, security is a priority. In order to engender security, the packets of data may be encrypted in the header and payload by different encryption techniques. However even the security is a concern only within the specific network, the communication is completely safe from external attacks external to this local network. Each mobile device connects to a WLAN router and identifies itself in the routing table. Calls can be placed by a user by sending the packets to the router, which then tries to find the destination. The destination must also be connected to WLAN. Since the communication is only capable of being affected by an inside influence, it is provided with complex cryptography techniques, which engenders high security. This model will be a prototype of different devices communicating through in the Wi-Fi bandwidth and will reduce the communication cost in large organizations.

#### **8.2.30.15 Placement Portal**

Placement portal aims at providing the facility to automate and simplify the process of registration and list generation of eligible students for placement.

This system provide facility to staff to do all their work regarding placement like collecting student records , registering the suitable students , to check the number and percentage of placed and unplaced students ,and important announcements regarding placement.

Faculties can easily communicate with the students, and can keep records of every student easily and efficiently. The proposed system could be accessed from any corner of the world.

The system consists of two modules. (a) Admin panel (b) User Panel.

In Admin Panel the faculties search for the eligible candidates for placement and send information regarding the upcoming placements. In User Panel the students have to enter their details to keep in track with the placement activities and recruitments.

Project has a big scope to do. Students can maintain their information and can update it. Notifications are sent to students about the companies. Students can access previous information about placement. This application can be modified from time to time as per the changing requirement of the user with lesser cost also the backend of the application can be changed as per the storage requirement of the application and to provide more security level features.

#### **8.2.30.16 Learn Music**

An Android App for helping even layman to learn music for example about Ragas, Thalas with help of karnatic / cine songs / album.

It will help user to convert his text into song in particular tune.

First 15 projects are initiated as Final year projects and were completed to a level and the 16th project Learn Music is under process by II year CSE students.

### 8.2.31 Loyola-ICAM College of Engineering and Technology (LICET)

RC-1228

Nungambakkam, Chennai

by Gopalakrishnan K - Wednesday, 26 June 2013, 9:47 PM

#### 8.2.31.1 ARLabs Education with no boundaries

Project ARLabs is where the 3D model of the apparatus found in Physics and Chemistry laboratories are overlaid on top of the observation books which contains the apparatus pictures, by means of Clic AR a software platform developed by Deepak John .J (CSE) which is available for the iOS App, Android App and the Web platform. These 3D models are created by the student community themselves which is headed by Abishek .R (CSE), utilizing the Google SketchUp software, which is an intuitive tool which helps in the creation of 3D models. The video tutorials created and the Professor in-charge is Dr. Caleb Chanti Raj. Project ARLabs was initiated as Physics and Chemistry labs where mandatory for a student during their 1st year of Engineering, where the student would learn for a year and then later on write his semesters. The problem here is unlike Computer Science labs where one can practice the program at a computer from his/her home, here the student is dependent on the apparatus. Hence Project ARLabs allows the students to view these models of the apparatus and also it comprises of the relevant experiment video which demonstrates how the experiment should be performed. Therefore the student can recollect these experiments and work with them. Due to the availability of the Aakash tablets the project impact is more than 1.5Lakh students per year just for the state of Tamil Nadu. Project ARLabs team believes that 20% of the population in the world comprises of Indians, hence a problem here affects the entire world and a solution found here is an impact to the entire world, as one would say "The future is Now".

### 8.2.32 Sir Padampat Singhania University (SPSU)

RC 1132

Place: Bhatewar

by Jinesh Singh - Wednesday, 26 June 2013, 10:06 AM

#### 8.2.32.1 Student out-pass system

The purpose of this project is to develop an android application for managing student out-passes using the Wireless access device such Aakash which has Android OS. The out-pass management system is designed to work primarily on smart phones and tablets only and would allow users to make an outing request, check request status, update a request and maintain a record of last 10-15 outing requests using their smart phones and tablets.

The web interface is provided by the application to put the login detail for student. The login is then checked with the university/hostal database server for authentication and further processing. Once login is done the student can submit the details for the generating the outpass. The application will be connected to SPSU database and will work in coherence with the previously working out pass management system.

The web page will have four links:

1. Home
2. Request Outpass
3. Check status
4. logout

### 8.2.33 St. Xavier's Catholic College of Engineering

RC-1026

by Edwin Jose R. - Wednesday, 26 June 2013, 9:37 AM

#### 8.2.33.1 Android Controlled Helicopter

In this project a model Helicopter is used which is controlled by the aakash tablet. The Interface in the tablet will have five buttons. Four button are used to move in the four different directions namely left, right, forward, backward. The fifth button is used for launching the helicopter. The helicopter chip is programmed using the Arduino software for movements based on the commands from the tablet. The signals are send to the helicopter through the wifi. In the helicopter there will be a wifi chip which will accept the signals and convert it to rf signals.

### 8.2.34 Vels University

RC-1177

by Gowri Shankar - Tuesday, 25 June 2013, 12:39 PM

#### 8.2.34.1 Solar Powered Battery Backup for Aakash Tablet

We have developed a 9V/10W solar panel, which provides a constant 5 V charge for Aakash tablet which lasts upto 4 to 5 hours. The system comprises of solar panel, a removable battery pack which can be connected to either solar panel for charging or to Aakash tablet for powering the device. If we have two such battery packs, one can be used for charging while the other for powering Aakash tablet, thus ensuring uninterrupted usage.

Interested Aakash enthusiasts can contact us for their ideas, suggestions and contributions for this project. If you are interested in this charger, do contact us for futher details.

In addition to the above project, we are also working on several other ideas through our students, which shall be updated in subsequent posts.

#### 8.2.34.2 Customisable and Downloadable Moodle Courses for Android

We are in the process of completing an android version of moodle courses, which can be downloaded onto the tablets. This frees the students from having internet connectivity all the time. We are working on aggregating an Engineering Mathematics Moodle Course, and annouce its availability shortly. This project also looks at server side modifications, which enables courses to be connected and downloaded in tablets. Kindly send in your suggestions, ideas, interest in contributing to this project. This way we can collectively create a pool of resources capable of utilising Aakash tablet in creating and distribution of e-content.

#### 8.2.34.3 Wireless Data Projector Interface for Aakash

This project aims to develop a wireless interafce for data projection connected to Aakash tablet. This makes an invaluable classroom lecture delivering tool, as it allows teachers to move freely and still be able to control the display and interaction of the Aakash tablet used by the teacher.

We are trying to build a bluetooth device to achieve this connectivity with the tablet using a wireless display hardware. The device driver for this is in the development stage and we hope

to complete it by September 2013. We plan to launch this product through this forum, for the benefit of all who have Aakash tablet.

As with our other posts, your ideas and suggestions are most welcome.

#### **8.2.34.4 Interactive Book Authoring Tool on Aakash**

(similar to Ibooks in iOS) This project aims to create an app which can create interactive content by teachers easily using Aakash tablet itself.

The ebook is modelled on Ibook authoring tool available in iOS. Users can annotate, meaning draw lines, highlight, create balloon text etc., on top of an existing pdf document or a blank page. The audio spoken by the teachers for explanation shall be inserted in the book through specific audio icons, which users can click and listen to. Provisions to include videos and animations in similar way is also envisaged, thus making this form of content development handy in the classroom scenario, while teaching sessions can be captured with ease.

We plan to build this tool by integrating many available open source nuggets, to speed up the development process. Any ideas, suggestions in this direction is most welcome.

#### **8.2.34.5 Low cost stylus for Aakash tablet**

We have experimented a low cost stylus as described in several DIY videos in youtube. We are planning to make a mould, and manufacture in volumes, and make it available to all users of Aakash tablet.

This natural writing interface, coupled with innovative applications like Abook Author, as described in our earlier post, is sure to revolutionise the use of Aakash in day to day classroom activity.

If you want to be a part of it, do strengthen our endeavour with your support in the form of ideas, suggestions and usage when we announce its delivery in this forum.

#### **8.2.34.6 Content Annotating Tool**

We have pages of pdf text and hours of video learning material available on the internet for creating highly effective moodle courses. This app allows us to annotate any required portions in contents (pdf text pages and video clips) with text strings. This way of marking our portions of interest with relevant text it will help us to search quickly rather than seek through viewing the entire content.

Mechanisms to create such annotations as URL links which can be added to a moodle course in a moodle server is attempted. We shall announce this tool shortly, which we are extensively using in our moodle course aggregation. Your participation by the way using this tool, and letting us have your feedback will make creation of moodle courses quick and effective.

#### **8.2.35 Amrita School of Engineering**

RC1070

BANGALORE

by Veeresh Kumar G B - Tuesday, 25 June 2013, 11:32 AM

Amrita School of Engineering, Bangalore is undergoing an exciting, and sometimes challenging, metamorphosis as technology has become an integral part of everyday teaching and learning and AAKASH Tablet has helped from problem solving and critical thinking to collaboration. The expanded capability makes AAKASH an important tool across the curriculum,

supporting science, math, and engineering coursework, in addition to providing the toolset for reading, writing, online research, and content creation [CAD] and viewing. Until April 2013 we had only 40 tablets and we have strived for the maximum exploitation of the available resources to carry out the following activities.

Students are taught to use AAKASH to draw and annotate diagrams, solve math equations. Development of an institution app, which provides information about our college facilitates, staff, co-curricular and extra-curricular activities, interaction with course mentors, academic activities and so on. The application has been named as Its my amrita and it is made available in playstore for free. The link is: <https://play.google.com/store/apps/details?id=out.inandhl=en>. The app supports ANDROID 2.2 and all above versions. More than 600 students and parents have installed this app on their smartphones and their personal tablets. Students are taught the use of tablet to solve problems in Engineering Mechanics using AUTODESK FORCE EFFECT. Students are taught the use of tablet for Developing mechanical systems with moving parts using Autodesk ForceEffect Motion Students who were interested in creating artistic pictures made utilized of the tablets for creation of sketches using AUTODESK Sketchbook express. Training for faculties on using the tablets for implementation in classroom. Training teaching assistants [Lab assistant] to create awareness about the usage of technology in labs. Students have started to use tablets for running MATLAB programs, after MATLAB have been made available on android from April 2013. Further we are trying to engage students to a) develop learning based games which might be helpful for kindergarten and primary school children. b) develop app similar to Its my amrita which will help other institutions/ schools to create or customize the available app to their needs c) to develop apps for the under privileged childrens d) to develop an app for teacher-student or student-student or teacher-teacher interaction regarding academics. Some of the faculties are learning to create quiz using the clicker app, based upon the tutorial available from the moodle. Finally we extend our gratitude towards the AAKASH project team for providing us with an additional 200 tablets, which really has boosted our intentions and morale to explore and exploit more options in creating technology enabled learning in the campus.

### 8.2.36 Sona College of Technology

RC-1157

by Thangaraj Kesavan - Tuesday, 25 June 2013, 9:42 AM

#### 8.2.36.1 eAssignment

Managing and grading programming assignments always takes a lot of effort including accepting submissions, checking timestamps of files, grading and publishing grades. Our e Assignment idea that is designed for the purpose of automating the entire procedure of managing and grading programming assignments. With the help provided by our project, grading programming assignment becomes incredibly easy for instructors. The only thing that instructors need to do is setting up an assignment by providing information such as assignment name, due date, cutoff date and testing cases, and letting our project will take care of the rest. eAssignment Management System collects the submissions from students before cutoff date, compiles and executes the programs, and then verifies for the correctness of the results. Students could check their grades after the grading. Our project is a perfect tool for instructors who need students to submit programming assignments. Since there is no similar tool could provide similar functions which are managing student information and grading Java programming assignments, our

project actually fills in this gap.. Grading programming assignments written in more languages is the future work.

### 8.3 Feedback on Aakash Tablets from Remote Centres

All Remote Centres were requested to provide immediate feedback regarding the problems faced, if any with Aakash tablets

The table given on the next page gives the details of the faults reported by the Remote Centers. It is seen that **only a total of 319**, out of 1,00,000 tablets delivered, have manufacturing defects or transit damage. Different types of faults identified are given below.

1. Screen damaged
2. Tablet does not charge
3. Infinite Booting
4. Wi-Fi(Networks do not get detected or does not switch on), MAC Address
5. Touch(not responding or less responsive)
6. Buttons/Parts damaged
7. Pattern locking problem
8. Chinese Language Keyboard
9. Tablet becomes unresponsive

Tablets with defects have been returned to M/s. Datawind for replacements. Others are being collected from Remote Centers and will be dispatched to Datawind, well within the warranty period.

Although, the number of defective tablets found by RCs is very small, a detailed report has been compiled listing all the problems. This is more for the sake of completeness of the report.

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1001	Maulana Azad National Institute Of Technology, Bhopal	N	-	-	-
1002	Amal Jyoti College Of Engineering & Technology, Kanjirappally	Y	5	-	ANDROID Software
1003	Government College Of Engineering, Salem	N	-	-	-
1004	National Institute Of Technology, Calicut	Y	1	1004 1013	Screen damaged
1005	Anna University	N	-	-	-
1006	National Institute Of Technology, Tiruchirappalli	N	-	-	-
1007	Amrita School Of Engineering - Kollam				Workshop Centre
1008	D.K.T.E Society`s Textile & Engineering Institute, Ichalkaranji	N	-	-	-
1009	Veermata Jijabai Technological Institute, Mumbai	N	-	-	-
1010	Sardar Vallabhbhai National Institute Of Technology, Surat	N	-	-	-
1011	Jaipur Engineering College, Kukas	N	-	-	-
1012	G H Raisoni College Of Engineering, Nagpur	Y	6	1012 1070	charging
1012				1012 1043	charging
1012				1012 1029	Not Starting
1012				1012 1012	Screen
1012				1012 1054	Not Starting
1012				1012 1033	Not Starting
1013	Mepco Schlenk Engineering College, Sivakasi	Y	2	1013 1004	-
1013				1013 1015	-
1014	P. V. P. Siddhartha Institute Of Technology, Kanuru	N	-	-	-
1015	Vidya Pratisthan College Of Engineering, Baramati	N	-	-	-
1016	K. J. Somaiya College Of Engineering, Vidyavihar	N	-	-	-
1017	Pvg`S College Of Engineering & Technology, Pune	N	-	-	-
1018	Samrat Ashok Technological Institute - Vidisha				Workshop Centre
1019	Bengal Engineering & Science University, Shibpur - Howrah				Workshop Centre
1020	Don Bosco College Of Engineering & Technology, Azara	N	-	-	-
1021	Nerist, Nirjuli	N	-	-	-
1022	Shri Sant Gajanan Maharaj College Of Engineering, Shegaon	N	-	-	-
1023	Pandit Deendayal Petroleum University, School Of Solar Energy, Raisan - Gandhinagar				
1024	Vivekanandha College Of Engineering For Women	N	-	-	-
1025	National Institute Of Technology, Warangal	N	-	-	-
1026	St. Xaviers Catholic College Of Engineering, Chunkankadai	Y	18	1026 1073	Charging
1026				1026 1215	Screen Touch .
1026				1026 1199	Screen Touch .
1026				1026 1208	Screen Touch .
1026				1026 1195	Screen Touch .
1026				1026 1083	Power/Volume Button Missing/Broken.
1026				1026 1051	Not Booting.
1026				1026 1120	Screen Broken.
1026				1026 1140	Screen Broken.
1026				1026 1016	Not Booting.
1026				1026 1021	Not Booting.
1026				1026 1127	Wi-fi not switching ON.

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1026				1026 1185	Display .
1026				1026 1187	Display .
1026				1026 1240	Screen Broken.
1026				1026 1238	Screen Broken.
1026				1026 1236	Screen Broken.
1026				1026 1201	Not Booting.
1027	Sudharsan Engineering College, Sathiyamangalam	N	-	-	-
1028	Tatyasaheb Kore Institute Of Engineering & Technology, Warananagar	N	-	-	-
1029	Terna Engineering College, Nerul Navi Mumbai	N	-	-	-
1030	Nielit - Formerly Doeacc, Srinagar	N	-	-	-
1031	St. Margaret Engineering College, Neemrana	Y	9	1031 1102	not Booting
1031				1031 1107	not Booting
1031				1031 1022	Charger
1031				1031 1026	not Booting
1031				1031 1030	not Booting
1031				1031 1021	Charger
1031				1031 1027	Empty Box
1031				1031 1040	not Booting
1031				1000 1917	not Booting
1032	Muffakham Jah College Of Engineering & Technology, Hyderabad	N	-	-	-
1033	Manipal Institute Of Technology, Manipal	N	-	-	-
1034	M. E. Society`S Imcc, Pune	N	-	-	-
1035	Srinivasa Institute of Engineering & Technology	N	-	-	-
1036	Kakinada Institute Of Engineering & Technology, Kakinada	N	-	-	-
1037	Jabalpur Engineering College, Jabalpur	N	-	-	-
1038	Vishwabharati Academy's College Of Engineering - Ahmednagar	Workshop Centre			
1039	Ips Academy, Indore	N	-	-	-
1040	College Of Engineering, Pune	N	-	-	-
1041	Shri Mata Vaishno Devi University, Katra	N	-	-	-
1042	Saintgits College Of Engineering, Kottayam	N	-	-	-
1043	Sarvajanik College Of Engineering & Technology, Surat	N	-	-	-
1044	Sasurie College Of Engineering, Vijayamangalam	N	-	-	-
1045	Saveetha Engineering College, Thandalam	Y	2	1045 1001	Wifi
1045				1045 1010	Wifi
1046	Sagar Institute Of Research & Technology - Excellence, Bhopal	N	-	-	-
1047	S.D.M. College Of Engineering & Technology, Dhavalagiri	N	-	-	-
1048	Royal College Of Engineering & Technology, Akkikavu	N	-	-	-
1049	PDE Association College Of Engineering	N	-	-	-
1050	Prasad Engineering College, Jangaon	N	-	-	-
1051	Pacific Institute Of Technology, Udaipur	Y	1	-	Display
1052	Noorul Islam Centre For Higher Education, Thuckalay	N	-	-	-
1053	NIELIT - Formerly DOEACC - Chennai	Workshop Centre			
1054	National College Of Engineering, Muruthakulam	Y	2	1054 1002	DC chargers port defective
1054				1054 1009	ANDROID Software

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1055	Mar Baselios College Of Engineering & Technology, Nalanchira	N	-	-	-
1056	Malla Reddy College Of Engineering & Technology, Maisammaguda	Y	1	-	Unfortunately, PokeTALK has stopped
1057	Madhuben & Bhanubhai Patel Women`S Institute Of Engineering, Anand	N	-	-	-
1058	Goa College Of Engineering, Farmagudi Ponda	N	-	-	-
1059	Gf Gharda Institute Of Technology, Lavel	N	-	-	-
1060	Ebet Group Of Institutions, Nathakadaiyur	N	-	-	-
1061	Er. Perumal Manimekalai College Of Engineering, Krishnagiri	N	-	-	-
1062	Dungarpur College Of Engineering & Technology, Dungarpur	N	-	-	-
1063	Dr. D.Y. Patil Institute Of Engineering & Technology, Pimpri	N	-	-	-
1064	Deenbandhu Chhotu Ram University Of Science & Technology, Murthal	Y	6	1064 0028	Screen Broken & Locked
1064				1064 0029	Android
1064				1064 0032	Screen Broken & Locked
1064				1064 0039	Screen Broken & Locked
1064				1001 0085	Android
1064				1064 1158	Not Charging
1065	Finolex Academy Of Management Technology, Ratnagiri	N	-	-	-
1066	Shrinathji Institute Of Technology & Engineering, Nathdwara	Y	25	1066 1019	ANDROID Software
1066				1066 1032	ON/OFF Switch is not working properly.
1066				1066 1222	Continuously Showing Android Screen
1066				1066 1124	Continuously Showing Android Screen
1066				1066 1051	Continuously Showing Android Screen
1066				1066 1123	Continuously Showing Android Screen
1066				1066 1009	Continuously Showing Android Screen
1066				1066 1095	Continuously Showing Android Screen
1066				1066 1236	Continuously Showing Android Screen
1066				1066 1227	Continuously Showing Android Screen
1066				1066 1198	Continuously Showing Android Screen
1066				1066 1210	Continuously Showing Android Screen
1066				1066 1049	Continuously Showing Android Screen
1066				1066 1026	Not Starting/Booting
1066				1066 1091	Not Starting/Booting
1066				1066 1145	Not Starting/Booting
1066				1066 1149	Not Starting/Booting
1066				1066 1083	Power ON/OFF S/w not working
1066				1066 1004	Charger not working, Too many Pattern Attempts
1066				1066 1024	Too many Pattern Attempts

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1066				1066 1090	Password Lock
1066				1066 1114	Pattern Lock
1066				1066 1156	Pattern Lock
1066				1066 1005	Screen Broken
1066				1066 1092	Screen Broken
1066				1066 1014	Screen Broken
1067	St. Francis Institute Of Technology, Borivali West	Y	21	1000 1585	charging
1067				1067 1011	scilab
1067				1167 1181	Booting
1067				1167 1206	Booting
1067				1167 1210	Booting
1067				1167 1171	Booting
1067				1167 1110	Booting
1067				1167 1090	Booting
1067				1167 1037	Pattern Lock (OK)
1067				1167 1060	Battery
1067				1167 1151	censor
1067				1167 1059	Booting
1067				1167 1199	Not Starting
1067				1167 1031	Cracked
1067				1167 1089	Cracked
1067				1167 1067	Cracked
1067				1167 1061	Booting
1067				1167 1133	Upper Porting of touch Screen not Working
1067				1167 1199	Not Booting
1067				1167 1083	Damage, Not Start
1067				1167 1167	Touch Screen
1068	Thakur College Of Engineering & Technology, Kandivali (E)	N	-	-	-
1069	Alluri Institute Of Management Sciences, Warangal	Y	16	1069 1020	booting
1069				1000 1704	booting
1069				1069 1167	booting
1069				1069 1169	booting
1069				1069 1055	power switch
1069				1000 1703	booting
1069				1069 1009	cracked screen
1069				1069 1037	booting
1069				1069 1159	booting
1069				1069 1001	cracked screen
1069				1069 1002	cracked screen
1069				1069 1007	cracked screen
1069				1069 1012	cracked screen
1069				1069 1017	cracked screen
1069				1069 1090	screen defective
1069				1069 1186	cracked screen
1070	Amrita School Of Engineering, Bangalore	N	-	-	-
1071	Amrita Vishwa Vidyapeetham, Amritanagar	N	-	-	-

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1072	Angadi Institute Of Technology & Management, Belgaum	N	-	-	-
1073	Bannari Amman Institute Of Technology, Sathyamangalam	N	-	-	-
1074	Caarmel Engineering College, Ranni-Perunad	N	-	-	-
1075	D. Y. Patil College Of Engineering & Technology, Kolhapur	N	-	-	-
1076	Devi Ahilya University, let, Indore	N	-	-	-
1077	Federal Institute Of Science And Technology, Mookkannoor	N	-	-	-
1078	Galaxy Global Group Of Institutions, Dinarpur	N	-	-	-
1079	Geeta Institute Of Management & Technology, Kurukshetra	N	-	-	-
1080	Griet, Kukatpally	N	-	-	-
1081	Gvit, Bhimavaram	Y	1	-	Screen Broken
1082	Hindustan Institute Of Technology And Management, Agra	Y	1	-	Wifi
1083	IIIT Hyderabad	N	-	-	-
1084	Institute Of Road And Transport Technology, Erode	N	-	-	-
1085	Nirma University, Institute Of Technology, Ahmedabad	Y	6	1085 1022	Screen Broken
1085				1085 1104	Doesn't move ahead after Android Logo
1085				1085 1056	Screen Broken
1085				1085 1002	Screen Broken
1085				1000 1806	Doesn't move ahead after Android Logo
1085				1000 1805	Screen Broken
1086	JNTU College Of Engineering Hyderabad	N	-	-	-
1087	Joginpally B. R. Engineering College, Yenkapally	N	-	-	-
1088	K K Wagh Instituite Of Engineering Education Research	N	-	-	-
1089	K.L.E. College Of Engineering & Technology, Chikodi	N	-	-	-
1090	K.C.E. Society, Coeit, Jalgaon	N	-	-	-
1091	KMM Institute Of Technology & Science, Tirupati - Chittoor	Workshop Centre			
1092	K.I.T. College Of Engineering, Gokul Shirgaon	N	-	-	-
1093	LDRP Institute Of Technology & Research - Gandhinagar	Workshop Centre			
1094	Lourdes Matha College Of Science & Technology, Trivandrum	Y	8	-	NO WIFI, RELOADING AGAIN AND AGAIN (NOT STABLE), DISCHARGING Battery very fast (only 18mins)
1095	M. S. Bidve Engineering College, Latur	N	-	-	-
1096	Mahakal Institute Of Technology, Ujjain	N	-	-	-
1097	Maharaja Institute Of Technology, Belavadi	N	-	-	-
1098	Marathwada Institute Of Technology, Aurangabad	N	-	-	-
1099	Medi-caps Institute Of Technology & Management, Pidgamber	N	-	-	-
1100	Mes Pillai`S Institute Of Information Technology, New Panvel	Y	-	-	-
1101	Mksss Cummins College Of Engineering, Karvenagar	Y	2	1101 1013	Android
1101				-	keeps on switching screens and applications all by itself
1102	Mother Teresa Institute Of Science & Technology, Sathupally	N	-	-	-
1103	NMIM MPSTME Shirpur	N	-	-	-
1104	NIE Institute Of Technology - Mysore	Workshop Centre			
1105	Nitte Meenakshi Institute Of Technology	N	-	-	-
1106	Nitttr, Chandigarh	N	-	-	-
1107	Poornima College Of Engineering, Sitapura	N	-	-	-

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1108	R. C. Patel Institute Of Technology, Shirpur	Y	2	1108 1012	Displaying Chinese language
1108				-	Android
1109	Rajiv Gandhi Proudyogiki Vishwavidyalay, Bhopal	N	-	-	-
1110	Regency Institute Of Technology, Adivipolam	Y	1	1110 1008	Procedure to Install APL.
1111	Rvs College Of Engineering And Technology, Coimbatore	N	-	-	-
1112	S. V. U. College Of Engineering, Tirupati	N	-	-	-
1113	S. B. Patil College Of Engineering, Indapur	N	-	-	-
1114	Sangam University, Itm, Bhilwara	N	-	-	-
1115	Shivaji University Kolhapur	N	-	-	-
1116	S. G. S. Institute Of Technology & Science, Indore	N	-	-	-
1117	Shri Vaishnav Institute Of Technology & Science, Indore	Y	1	-	Android
1118	Sri Jayachamarajendra College Of Engineering, Mysore	N	-	-	-
1119	Ssbt`S College Of Engineering And Technology, Bambhori	N	-	-	-
1120	St. Aloysius Institute Of Technology, Jabalpur	N	-	-	-
1121	Svp Engineering College, Visakhapatnam	N	-	-	-
1122	Techno India Njr Institute Of Technology, Udaipur	N	-	-	-
1123	Thakral College Of Technology, Bhopal	N	-	-	-
1124	Truba College Of Engineering & Technology, Indore	N	-	-	-
1125	Turbomachinery Institute Of Technology & Science, Patancheru	N	-	-	-
1126	Vignan Institute Of Technology And Science, Deshmukhi	N	-	-	-
1127	Vishwakarma Institute Of Technology, Pune	Y	1	1127 1031	Screen Broken
1128	Visvesvaraya National Institute Of Technology, Nagpur	N	-	-	-
1129	Vit University, Vellore	N	-	-	-
1130	Walchand College Of Engineering, Sangli	N	-	-	-
1131	Walchand Institute Of Technology, Solapur	Y	1	1131 1009	Screen touch
1132	Sir Padampat Singhania University, Bhatewar	N	-	-	-
1133	National Institute Of Technology, Agartala	N	-	-	-
1134	National Institute Of Technology, Kurukshetra	N	-	-	-
1135	Periyar Maniammai University, Vallam	Y	3	-	Touch
1136	Psg College Of Technology, Coimbatore	N	-	-	-
1137	Rk University, School Of Engineering, Kasturbadham	N	-	-	-
1138	Rajalakshmi Engineering College, Chennai	N	-	-	-
1139	Rajarambapu Institute Of Technology, Islampur	N	-	-	-
1140	Sastra University, Tirumalaisamudram	N	-	-	-
1141	Government Engineering College	N	-	-	-
1142	Government Engineering College, Sreekrishnapuram	N	-	-	-
1143	Indur Institute Of Engineering & Technology, Siddipet	N	-	-	-
1144	Sushila Devi Bansal College Of Engineering (Kcb Technical Academy), Indore	N	-	-	-
1145	Kmea Engineering College, Aluva	N	-	-	-
1146	Knowledge Institute Of Technology, Kakapalayam	Y	6	-	Wifi
1147	Kongu Engineering College, Perundurai	N	-	-	-
1148	Krishna Institute Of Engineering & Technology, Ghaziabad	N	-	-	-
1149	Lenora College Of Engineering, Rampachodavaram	N	-	-	-
1150	Sou Sushila Danchand Ghodawat Charitable Trust`S Sgi, Atigre	N	-	-	-
1151	Srm University, Kancheepuram	N	-	-	-

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1152	St. Joseph`S College Of Engineering & Technology, Palai	N	-	-	-
1153	Tezpur University, Tezpur	N	-	-	-
1154	Thanthai Periyar Government Institute Of Technology, Vellore	N	-	-	-
1155	Yeshwantaro Chavan College Of Engineering, Wanadongri	N	-	-	-
1156	NITK, Surathkal - Dakshina Kannada				Workshop Centre
1157	Sona College Of Technology, Salem	N	-	-	-
1158	National Institute Of Technology, Durgapur - Barddhaman				Workshop Centre
1159	Agni College Of Technology, Thalambur	Y	9	-	Wifi
1160	Anna University Of Technology, Madurai	N	-	-	-
1161	Anurag Group Of Institutions, Cvsr College Of Engineering, Ranga Reddy	N	-	-	-
1162	Asia Pacific Institute Of Information Technology Sd India, Panipat	N	-	-	-
1163	Avinashilingam University For Women, Coimbatore	N	-	-	-
1164	Bhagwan Parshuram Institute Of Technology, Rohini	N	-	-	-
1165	Bharati Vidyapeeth College Of Engineering, Navi Mumbai	N	-	-	-
1166	Bhilai Institute Of Technology, Durg	Y	18	1166 1025	Wi-Fi Connectivity Issue
1166				1166 1032	Touch Screen
1166				1166 1036	Wi-Fi Connectivity Issue
1166				1166 1001	software, charger has to give
1166				1166 1008	software
1166				1166 1040	software, charger
1166				1166 1045	software, charger has to give
1166				1166 1003	charger
1166				1166 1039	button missing
1166				1166 1025	wi-fi issue
1166				1166 1027	damage
1166				1166 1030	damage
1166				1166 1031	software
1166				1166 1032	damage
1166				1166 1063	power button
1166				1166 1091	software
1166				1166 1111	software
1166				1000 1505	usb port, charger
1167	Birla Vishwakarma Mahavidyalaya Engg. College, Vallabh Vidhyanagar	Y	19	1167 1181	Booting
1167				1167 1206	Booting
1167				1167 1210	Booting
1167				1167 1171	Booting
1167				1167 1110	Booting
1167				1167 1090	Booting
1167				1167 1037	Pattern Lock
1167				1167 1060	Battery
1167				1167 1151	censor
1167				1167 1059	Booting
1167				1167 1199	Not Starting
1167				1167 1031	Cracked

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1167				1167 1089	Cracked
1167				1167 1067	Cracked
1167				1167 1061	Booting
1167				1167 1133	Upper Porting of touch Screen not Working
1167				1167 1199	Not Booting
1167				1167 1083	Damage, Not Start
1167				1167 1167	Touch Screen
1168	Brcm College Of Engineering & Technology, Bahal	N	-	-	-
1169	Cape Institute of Technology, Levengipuram - Tirunelveli				
1170	Chittkara University, Chandigarh	N	-	-	-
1171	Dmietr, Sarod Hirapur	N	-	-	-
1172	Theem College Of Engineering, Boisar East	N	-	-	-
1173	Thiagarajar College Of Engineering, Madurai	Y	6	1000 1720	Wifi
1173				1173 1052	On Button
1173				1173 1054	On Button
1173				1173 1132	On Button
1173				1173 1061	On Button
1173				1173 1138	Power on
1174	Toc H Institute Of Science & Technology, Arakkunnam	N	-	-	-
1175	Truba College Of Science & Technology, Bhopal	N	-	-	-
1176	University B.D.T. College Of Engineering, Davangere	N	-	-	-
1177	Vels University, Pallavaram	N	-	-	-
1178	Vidyabharti Trust Institute Of Technology & Research Center, Umrakh	Y	-	-	-
1179	Viswajyothi College Of Engineering & Technology, Vazhkulam	Y	3	1179 1011	Display
1179				1179 1022	Touch Screen
1179				1179 1019	Screen Broken
1180	Yagyavalkya Institute Of Technology, Sitapura - Jaipur				
1181	Vivekananda Institute Of Technology, Jagatpura	N	-	-	-
1182	NK Orchid College Of Engineering Technology Hippuraga	N	-	-	-
1183	Vignan's Institute Of Information Technology, Duvvada - Visakhapatnam				Workshop Centre
1184	National Institute Of Technology	N	-	-	-
1185	Amrutvahini College Of Engineering, Sangamner - Ahmednagar				Workshop Centre
1186	Dhirubhai Ambani Institute Of Information & Communication Technology - Gandhinagar				Workshop Centre
1187	Government Engineering College, Thrissur	N	-	-	-
1188	IIT- Allahabad, Jhalwa - Allahabad				Workshop Centre
1189	National Institute Of Technology - Jalandhar				Workshop Centre
1190	Symbiosis Institute Of Computer Studies & Research, Pune	N	-	-	-
1191	Sinhagad Institute Of Technology & Science, Narhe - Pune				Workshop Centre
1192	MGM s College Of Engineering	N	-	-	-
1193	Prof. Ram Meghe Institute Of Technology & Research, Badnera	Y	4	1193 1060	Charger, USB Cable, USB Extension
1193				1193 1061	Charger, USB Cable, USB Extension
1193				1000 1942	Charger, USB Cable
1193				1193 1002	Charger, USB Cable

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1194	Gandhi Engineering College, Badaraghunathpur	N	-	-	-
1195	Bansal College Of Engineering, Mandideep, Bhopal	Y	1	1000 1885	android
1196	Balaji Institute Of Technology & Science, Narsampet	N	-	-	-
1197	G. H. Raisoni Institute Of Engineering & Technology, Wagholi Pune	N	-	-	-
1198	Mata Raj Kaur Institute Of Engineering & Technology, Rewari	N	-	-	-
1199	G. H. Raisoni Institute Of Engineering & Management, Jalgaon	Y	1	1199 1026	Wi-Fi Automatically Switch off after 2 Seconds
1200	Les College Of Technology, Bhopal	Y	5	1200 1013	Damaged Screen
1200				1200 1158	restrating
1200				1200 1189	restrating
1200				1200 1055	restrating
1201	Islamic University Of Science And Technology, Aawantipora	Y	1	1201 1011	android
1202	Ratnavel Subramaniam College Of Engineering And Technology, Dindigul	N	-	-	-
1203	Gnanamani College Of Engineering Namakkal	N	-	-	-
1204	Sai-Sudhir Institute Of & Technology For Women, Kundanpalli - Ranga Reddy	Workshop Centre			
1205	Mahatma Gandhi Missions College Of Engineering & Technology, Noida	N	-	-	-
1206	Bansal Institute Of Research & Technology, Bhopal	Y	1	-	android
1207	Jawaharlal Institute Of Technology, Borawan	N	-	-	-
1208	Anna University Of Technology, Tirunelveli	N	-	-	-
1209	Kiit College Of Engineering, Bhondsi	N	-	-	-
1210	Gogte Institute Of Technology, Udyambag	N	-	-	-
1211	Sri Shanmuga College Of Engineering Technology	N	-	-	-
1212	Kalyani Government Engineering College, Kalyani	N	-	-	-
1213	St. Peter`S Engineering College, Hyderabad	N	-	-	-
1214	Srinivas Institute Of Technology, Valachil, Mangalore	N	-	-	-
1215	G L Bajaj Group Of Institutions, Akbarpur	N	-	-	-
1216	Bsa College Of Engineering & Technology, Mathura	N	-	-	-
1217	Sies Graduate School Of Technology, Nerul, Navi Mumbai	Y	1	-	android
1218	Bansal Institute Of Engineering Technology	N	-	-	-
1219	Prestige Institute Of Engineering & Science, Indore	Y	1	1000 1988	Not Booting Hang
1220	Kurukshetra Institute Of Technology & Management, Kurukshetra	N	-	-	-
1221	N.P.R. College Of Engineering & Technology, Natham	N	-	-	-
1222	Chameli Devi Group Of Institutions	N	-	-	-
1223	Rbs Engineering Technical Campus, Bichpuri	N	-	-	-
1224	Reva Institute Of Technology & Management, Yelahanka	N	-	-	-
1225	Bms College Of Engineering, Bengaluru	N	-	-	-
1226	Skp Engineering College, Tiruvannamalai	N	-	-	-
1227	J.J. Magdum College Of Engineering	N	-	-	-
1228				1228 1003	Wifi
1228				1228 1008	Wifi
1228				1228 1015	Wifi
1228				1228 1002	starting
1228				1228 1106	booting

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1228	Loyola-icam College Of Engineering & Technology, Chennai	Y	14	1228 1171	top position of the touch was auto responsive
1228				1228 1214	touch screen and system unresponsive
1228				1000 1945	booting
1228				1228 1003	mac-id not able to detect
1228				1228 1008	mac-id not able to detect
1228				1228 1015	wi-fi not switching on
1228				1228 1101	wi-fi not switching on
1228				1228 1078	usb not working
1228				1228 1165	top position of the touch was un responsive
1229	Sardar Patel Institute Of Technology, Andheri	N	-	-	-
1230	Vidya Vikas College Of Engineering & Technology, Tiruchengode	Y	1	-	ANDROID Software
1231	Bhajarang Engineering College, Thiruvallur	N	-	-	-
1232	Jayalakshmi Institute Of Technology	N	-	-	-
1233	P E S College Of Engineering - Mandya				Workshop Centre
1234	Meghnad Saha Institute Of Technology, Uchhepotra	Y	2	-	Camera is not working 2nd one, WiFi is not working
1235	Dr. Mahalingam College Of Engineering & Technology, Pollachi	N	-	-	-
1236	Excel Engineering College, Komarapalayam	N	-	-	-
1237	Mewar University, Gangrar	N	-	-	-
1238	Maharaja Agrasen Institute Of Technology, Rohini	N	-	-	-
1239	Mohandas College Of Engineering Technology	N	-	-	-
1240	Shri Shankaracharya Institute Of Professional Management & Technology, Raipur	N	-	-	-
1241	Nri Institute Of Information Science & Technology, Bhopal	N	-	-	-
1242	K.L.E. Society`S College Of Engineering & Technology, Belgaum	Y	28	1242 1002	ANDROID Software
1242				1242 1016	ANDROID Software
1242				1242 1241	1.Not Charging , 2. Charger Not Working
1242				1242 1169	Screen Blinking and switching On
1242				1242 1233	Rebooting Frequently
1242				1242 1078	Touch Screen
1242				1242 1156	Touch Screen
1242				1242 1093	Rebooting Frequently
1242				1242 1094	Touch Screen
1242				1242 1103	Touch Screen
1242				1242 1080	Not Booting
1242				1242 1210	Blured and unclear screen
1242				1242 1125	Touch Screen
1242				1242 1196	Blured and unclear screen
1242				1242 1198	Rebooting Frequently
1242				1242 1200	Switching On
1242				1242 1226	Rebooting Frequently
1242				1242 1046	Switching On
1242				1242 1081	Rebooting Frequently
1242				1242 1085	1. Screen broken and touch screen , 2. Charger not working

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1242				1242 1124	Rebooting Frequently
1242				1242 1052	Switching On , Power Switch
1242				1242 1152	White screen with lines
1242				1242 1126	Touch Screen
1242				1242 1096	Switching On
1242				1242 1005	Booting
1242				1242 1016	Touch Screen also it is cracked
1242				1000 1951	Booting
1243	National Institute Of Science & Technology, Berhampur	N	-	-	-
1244	Archana College Of Engineering, Palamel	Y	5	1000 1933	Pattern Lock
1244				1244 1002	ANDROID Software
1244				1244 1004	ANDROID Software
1244				1244 1010	ANDROID Software
1244				1244 1017	ANDROID Software
1245	Stc School Of Engineering & Research Technology, Khamgaon	N	-	-	-
1246	C U Shah College Of Engineering Technology	N	-	-	-
1247	School Of Management Sciences, Technical Campus, Kasimpur Biruha	N	-	-	-
1248	Shri Sant Gadge Baba College Of Engineering & Technology, Bhusawal	N	-	-	-
1249	Sri Ramakrishna Institute Of Technology, Coimbatore	Y	8	-	Unable to Connect to Wi-Fi.
1249				1000 1519	ANDROID Software
1249				1000 1520	ANDROID Software
1249				1249 1056	No MAC Address
1249				1249 1214	Advance Option Not Available
1249				1249 1107	Display
1249				1249 1168	Not Working
1249				1249 1063	Not Working & Charger
1250	Sharad Institute Of Technology College Of Engineering, Yadrap	N	-	-	-
1251	Jaypee Institute Of Information Technology, Noida-128	N	-	-	-
1252	Narayana Engineering College, Nellore	N	-	-	-
1253	Ssm College Of Engineering, Komarapalayam	N	-	-	-
1254	Raj Kumar Goel Institute Of Technology For Women - Ghaziabad	Workshop Centre			
1255	Mount Zion College Of Engineering & Technology, Lena Vilakku	N	-	-	-
1256	Sree Dattha Institute Of Engineering & Science, Hyderabad	N	-	-	-
1257	Hctm Technical Campus, Kaithal	N	-	-	-
1258	Om Institute Of Technology & Management, Hisar	N	-	-	-
1259	N.D.M.V.P. Samaj's K.B.T. College Of Engineering, Nashik	N	-	-	-
1260	S.K.N. Sinhgad College Of Engineering, Pandharpur	N	-	-	-
1261	MET Institute Of Engineering Nashik	N	-	-	-
1262	Apex Institute Of Technology & Management, Pahala, Bhubaneswar	N	-	-	-
1263				1263 1208	Not Booting, No Display
1263				1263 1109	Tab Hanged

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1263	Techno India, Salt Lake Kolkata	Y	13	1263 1238	Charger
1263				1263 1065	OS
1263				1263 1156	Touch Screen & Charger
1263				1263 1071	Not Booting, No Display
1263				1263 1181	Touch Screen & Charger
1263				1263 1094	Battery
1263				1263 1128	Not Booting, No Display
1263				1263 1122	USB Not Working
1263				1263 1176	Not Booting, No Display
1263				1263 1106	Not Booting, No Display
1263				1263 1143	Screen Crack
1264	Shoolini University, Solan	N	-	-	-
1265	Madhav Institute Of Technology & Science, Gwalior	N	-	-	-
1266	Netaji Subhash Engineering College, Technocity, Garia	N	-	-	-
1267	Sri Shakthi Institute Of Engineering & Technology, Chinniyampalayam	N	-	-	-
1268	Techno India College Of Technology, Rajarhat Kolkata	Y	4	1268 1001	Wifi
1268				1268 1005	Wifi
1268				1268 1007	reboots
1268				1268 1010	Wifi
1269	Iercem Institute Of Information Technology, Banipur	N	-	-	-
1270	University Of Petroleum & Energy Studies, Bidholi - Dehradun	Workshop Centre			
1271	Jawaharlal Nehru National College Of Engineering, Shimoga	N	-	-	-
1272	Mangalayatan University, Beswan	Y	2	1072 1186	TFT damaged
1272				1072 1094	USB and USB adapter
1273	Gudlavalleru Engineering College, Gudlavalleru	Y	6	1273 1011	Damaged - screen broken
1273				1273 1040	Damaged - screen broken
1273				-	ANDROID Software
1273				-	Damaged - screen broken
1273				-	Glass Broken
1273				-	Not Charging
1274	Svs Group Of Institutions, Hanamkonda	N	-	-	-
1275	B H Gardi College Of Engineering & Technology, Rajkot	Y	2	1275 1024	Data Cable is not there
1275				1000 1830	Screen Broken
1276	Sankalchand Patel College Of Engineering, Visnagar	N	-	-	-
1277	Technology Education & Research Integrated Institutions, Kurukshetra	Y	1	1277 1064	USB Hub Missing
1278	S.D.M. Institute Of Technology, Ujire	N	-	-	-
1279	Mandsaur Institute Of Technology, Mandsaur	N	-	-	-
1280	Priyadarshini College Of Engineering Nagpur, Nagpur	N	-	-	-
1281	Sveri`S College Of Engineering, Pandharpur	Y	7	1281 1001	Cracked Screen
1281				1281 1002	Usb cable missing.
1281				1281 1178	Noise from Speaker
1281				1281 1110	Touch Screen
1281				1281 1011	Screen Damaged
1281				1281 1094	Booting
1281				1281 1140	Screen Damaged
1282	Sri Eshwar College Of Engineering, Coimbatore	N	-	-	-

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1283	Kanksa Academy Of Technology & Management, Panagarh	Y	5	1283 1005	Non accessibility of Wi-fi
1283				1283 1006	Non accessibility of Wi-fi
1283				1283 1008	Non accessibility of Wi-fi
1283				1283 1010	Non accessibility of Wi-fi
1283				1283 1015	Non accessibility of Wi-fi
1284	Saroj Mohan Institute Of Technology, Guptipara	N	-	-	-
1285	Siddaganga Institute Of Technolgy, Tumkur	N	-	-	-
1286	U V Patel College Of Engineering, Kherva	N	-	-	-
1287	Rayat-bahra Innovative Institute Of Technology & Management, Ganaur	N	-	-	-
1288	Vidyalankar Institute Of Technology, Wadala	N	-	-	-
1289	B K Birla Institute Of Engineering & Technology, Pilani	N	-	-	-
1290	Cdac, Noida	N	-	-	-
1291	Indian Institute Of Technology - Kharagpur				Workshop Centre
1292	Sagar Institute Of Science Technology Engineering	N	-	-	-
1293	Seacom Engineering College	N	-	-	-
1294	Geethanjali Institute Of Science & Techonology, Gangavaram - Nellore				Workshop Centre
1295	Gitam University Hyderabad Campus	N	-	-	-
1296	Nagole Institute Of Technology Science	N	-	-	-
1297	Sardar Patel Institute Of Technology, Piludra - Mehsana				Workshop Centre
1298	Sardar Vallabhbhai Patel Institute Of Technology	N	-	-	-
1299	Dronacharya College Of Engineering	N	-	-	-
1300	Kurukshetra University Electronic Science Department	N	-	-	-
1301	K L E Institute Of Technology	N	-	-	-
1302	Sree Buddha College Of Engineering	N	-	-	-
1303	Sree Narayana Gurukulam College Of Engineering Kadairuppu	N	-	-	-
1304	G.H. Raisoni College Of Engineering And Management - Ahmadnagar				Workshop Centre
1305	Kavikulguru Institute Of Technology & Science, Ramtek - Nagpur				Workshop Centre
1306	Shree L R Tiwari College Of Engineering	N	-	-	-
1307	Gandhi Institute For Technology, Bhubaneswar - Khurda				Workshop Centre
1308	Roland Institute Of Technology, Berhampur - Ganjam				Workshop Centre
1309	Silicon Institute Of Technology, Bhubaneswar - Khurda				Workshop Centre
1310	Silicon Institute Of Technology - Sambalpur				Workshop Centre
1311	Arunai College Of Engineering	N	-	-	-
1312	DMI College Of Engineering, Palanchur - Chennai				Workshop Centre
1313	K.S. Rangasamy College Of Technology, Tiruchengode - Namakkal				Workshop Centre
1314	Kathir College Of Engineering	N	-	-	-
1315	Selvam College Of Technology	N	-	-	-
1316	Dronacharya College Of Engineering	N	-	-	-
1317	Government Engineering College, Bikaner	N	-	-	-
1318	Amity University Haryana	N	-	-	-
1319	Mukesh Patel School Of Technology Management Engg	N	-	-	-
1320	Sri Balaji Technical Campus - Jaipur				Workshop Centre
1321	Coimbatore Institute Of Engineering & Technology - Coimbatore				Workshop Centre

<b>RC</b>	<b>RC Name</b>	<b>Rpt</b>	<b>Qty</b>	<b>Tablet ID</b>	<b>Problem</b>
1322	Charusat University Of Science Technology	N	-	-	-
8000	IIT Bombay DBP Account	N			
8001	IIT Kharagpur	N			
8002	Reliance IITM Telecom Centre of Excellence	Y	3	8002 1034	Android
8002				8002 1040	Android
8002				8002 1049	Android
8003	Indian Institute of Technology Guwahati	N	-	-	-
8004	IIT Mandi	N	-	-	-
8006	MHRD	N	-	-	-
8007	C-DAC, Trivandrum	N	-	-	-
8008	Indian Institute of Technology Hyderabad	N	-	-	-
8009	Indian Institute of Technology Gandhinagar	N	-	-	-
	<b>Total</b>	<b>319</b>			



## **Chapter 9**

# **Aakash Application Development Labs**

Prof. Ashok Jhunjhunwala started Aakash Application Development Labs at some of the selected IITs. Tablets were distributed to them. This distribution is reflected in the distribution report. All the reports of the work done at these labs has been compiled by Prof. Jhunjhunwala and is included in the following pages.

**PROGRESS REPORT OF  
AAKASH APPLICATION DEVELOPMENT  
LABS (AADL)**

**JUNE 2013**

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IIT MADRAS  
IIT KANPUR  
IIT KHARAGPUR  
IIT MANDI  
&  
IIT GUWAHATI

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# PROGRESS REPORT OF AAKASH APPLICATION DEVELOPMENT LAB, IIT MADRAS

## I. AAKASH TABLET- USER FEEDBACK

**1. Total number of tablets received so far: 270**

**2. Feedback on Aakash Tablets**

Positives:

- Processor speed is reasonably good. Able to access applications developed in AADL as well as other applications without any issue
- Battery stands long time for lightweight applications
- GPU is good enough
- OS is good except for some application crashing
- Handy and supports many applications
- Screen resolution is good
- The performance is good when compared with other tablets in the price range
- Touch response is very smooth

Issues:

- Touch events are not performed well
- USB device is not connected programmatically. Shows "Permission denied" error
- No auto focus in camera, due to lack of this feature QR scanning is not possible
- Battery drains faster, does not have a powerful battery backup
- The tablet gets heated up within an hour of continuous usage.
- Doesn't have support for hardware encoder/decoder for web rtc videos
- Single core processor is very slow for big applications.
- Suddenly, some of the applications crash.

## II. APPLICATION DEVELOPMENT AND STUDENT INVOLVEMENT

### Application Development

As a part of the activities in the AADL, the following educational technologies are being developed that can supplement and complement existing educational content and teaching methods:

**1) Interactive digital Book:** An application that provides educational content in a graphically rich manner. Like any conventional textbook, it divides a lesson into chapters and topics and each section's core text material is augmented with short video clippings explaining the topic, images, animation, quiz modules, presentations, reference links, dictionary for reference, translation.

### **Plan for usage of eBook:**

- **Working with Students:** To develop interactive eBook for 2 courses on Biochemistry and data structures. Over the next 2 months, 4 student interns (2 from Dept. of Biotechnology and 2 from Dept. of CSE) from IIT Madras will be working at the AADL to develop the eBook for the above mentioned courses.
- **Working with Faculty:** 2 professors who will be involved in converting their course material (text, recorded video lectures, lab assignments, quizzes, ppts etc) into eBook format to use from the next term onwards (July-Aug). The courses are: Digital Signal Processing (Dept. of Electrical Engineering) and Classical Mechanics (Dept. of Physics).

**2) eQuiz 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 where 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 4<sup>th</sup> examiner.

**3) Exam Management Application:** 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 Aakash tablets in which the exam will be 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.

- 4) 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, Raise Hand for asking doubts
- Group chat (lecturer and institute co ordinator)
- Classroom chat

- 5) Tutorial/ Collaborative learning Module:** 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.

## Student Training

We have conducted 3 student Android training workshops so far, where students were trained on the basics of Android application development.

Workshop I: One day workshop consisting of 30 students

Workshop II: Two-day workshop for 15 students

Workshop III: Two-day workshop for 40 students

- Based on feedback from the first workshop, we have re-designed the course to stretch over two weekends. After part I of the workshop, the students are given quizzes and assignments to work over the week before they get back for part 2 of the workshop on the following weekend.
- A conscious focus is on imparting training to students from not just computer science background. We are encouraging students from Electrical Sciences, Chemical Engineering, Biotechnology and other streams (with basic programming knowledge) to participate in these trainings.
- At the end of the training, the students are given application ideas apart from the ones they come up with and in a couple weeks time we conduct sessions where the students present the applications developed by them to their peers.
- The long-term plan is to involve the trained students in the application development as a part of AADL
- More sessions have been planned for the following months

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# PROGRESS REPORT OF AAKASH APPLICATION DEVELOPMENT LAB, IIT KANPUR

## **I. AAKASH TABLET- USER FEEDBACK**

**1. Tablets Received:** A total of 120 tablets have been received.

**2. Comments on Aakash tablets:**

- All the tablets we used/tested so far work
- Build quality is poor and inconsistent
- Some of the tablets come incorrectly configured to Chinese keyboard
- Battery life is poor
- Response to gestures is OK
- Audio is poor
- Video playback and Internet connectivity is OK

## **II. APPLICATION DEVELOPMENT AND STUDENT TRAINING**

### **Application Development**

#### **1) PortMagic - Teaching electronics with Aakash Tablet**

##### Design and Implementation of a Mobile Platform for Embedded Programming

The modern day portable devices like smart phones and tablet PCs are powered by processors whose specifications and performance are much higher than those which were used in computers for complex programming in the late 90's. These powerful hand-held devices provide the user, a multi-dimensional platform catering his needs such as functions of personal digital assistant (PDA), gaming, web browsing, navigation, multi-media entertainment and to keep the user aware and updated with the current scenarios like weather, news and so forth.

At a tangible direction, enormous experiments, developments, applications and market growth can be witnessed in the embedded system field. To learn, understand and experiment in this field a lot of hardware knowledge as well as programming skills are required. In addition to these, a setup also needs to be installed either on a computer or on a laptop with the supporting hardware accessories, which may not be feasible/economical from user point of view. Furthermore, the smart phones or the tablets are as well specific outcome of a well-planned combination of hardware and software components, which is nothing but the embedded system.

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. The following are the major works undertaken during the course of this thesis:

1. In the initial stages of this thesis, the aim was towards optimizing capabilities of the smart phone with the help of a serial communication built over RS 232 protocol.
2. A prototype Application "ThunderPort" was built for Android OS, which provided a platform for understanding and establishing of serial communication protocols. It also offered a serial communication between the application and the external hardware, which is controlled with the help of a microcontroller. This also included programming of an AVR microcontroller for controlling the additional hardware.
3. An Android application "PortMagic Version 1.0" was built, which provided the user with limited set of commands to program ATmega 328 microcontroller through USB port, with a master program running on the microcontroller.
4. The 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.

## 2) 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. Modern touch pads and smart phones have the potential to transform children's education, because almost all children are attracted to them, and their interface is inherently more usable than that of a traditional desktop computer. However, apps to teach children only succeed if they are designed with an understanding of how children learn. This is especially true for children with special needs.

Here are some advantages of using Tablets for children with special needs:

- The touch screens are easier for the children to use when compared to the mouse and keyboard.
- Touch screens also make learning more direct, something that is vital for these children.
- Children who are non- verbal often find it easier to communicate through a tablet.

### Purpose of the Apps:

- The apps will be created to improve the functional development of the children in the following areas: Communication, social skills, life skills, functional literacy and Numeracy.
- Most of the apps will be created in Hindi with Hindi audio support.
- The contents, symbols or picture images will be created according to the local regional culture and their daily practices.
- Some basic level educational curriculum (specially designed for special education) will also be included in the program.

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.

Our initial experiments with the 7" tablets show that a larger tablet will have greater utility for this kind of applications.

### **Student Training**

We have conducted 6 workshops so far – 5 at IIT Kanpur and one at Institute of Technology, Kanpur University. About 300 students were trained in these one-day workshops on writing apps for Android. These were very well received and there are many requests to do more of these training workshops.

Date	Location	Number of attendees
01-Sep	IITK	54(CS724 students + RAs)
08-Sep	IITK	65(CSE Dept. students)
15-Sep	UIET	49 (3rd year cse students of UIET – Kanpur University)
29-Sep	IITK	50 (Students of IITK)
30-Sep	IITK	45 (Students/RA's of IITK)
6-Oct	IITK	45 (Students of IITK)
15- May	IITK	8 (Summer interns – students of IITK)

A project work on “Teaching Embedded Electronics with Aakash Tablet”, as a Master Thesis, is also completed successfully by Lt Cdr Ashwin M Rao, CSE Dept., IIT Kanpur, under the guidance of Prof. T.V. Prabhakar. The abstract is reproduced below:

The modern day portable devices like smart phones and tablet PCs are powered by processors whose specifications and performance are much higher than those which were used in computers for complex programming in the late 90s. These powerful hand-held devices provide the user, a multi-dimensional platform catering his needs such as functions of personal digital assistant (PDA), gaming, web browsing, navigation, multi-media entertainment and to keep the user aware and updated with the current scenarios like weather, news and so forth.

At a tangible direction, enormous experiments, developments, applications and market growth can be witnessed in the embedded system field. To learn, understand and experiment in this field a lot of hardware knowledge as well as programming skills are required. In addition to these, a setup also needs to be installed either on a computer or on a laptop with the supporting hardware accessories which may not be feasible/economical from user point of view. Furthermore, the smart phones or the tablets are also specific outcome of a well planned combination of hardware and software components, which is nothing but the embedded system.

This thesis explores how the computing power of the modern mobile devices can be utilized for developing a mobile application platform for the embedded world. During the evolution of the thesis, the complex coding of the microcontrollers is abstracted from the user thereby making it easy for someone interested in venturing the embedded field. The thesis also provides a physical medium through which the powerful sensors and actuators of the mobile device can be utilized for external interface. As the part of the thesis, a prototype software toolkit was developed on the Android Open Source Mobile Operating System for Arduino, an Open Source Electronic development platform. This application can be used as educational toolkit for teaching and testing of functioning of various electronic components, sensors and other devices through the microcontrollers. The application also provides a strong platform for developing and implementing microcontroller based projects on Arduino platform for the advanced developer and hobbyists.

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# PROGRESS REPORT OF AAKASH APPLICATION DEVELOPMENT LAB, IIT KHARAGPUR

## **I. AAKASH TABLET- USER FEEDBACK**

- 1. Total Number of Aakash Tablets received:** 40
- 2. Comments on the Aakash Tablets:**

The tablets are very effective and useful. However, some of the important issues that need to be addressed are:

- Very weak Wi-Fi reception
- Non standard battery life
- The chargers are not reliable and are turning non-functional soon
- The speaker gain should be enhanced
- The touch screens are not all equally sensitive
- Many of the tablets received had a broken or severely scratched touch screens
- For the developers, it will be very useful to have the drivers (such as touch-screen drivers etc.) accessible.

## **II. APPLICATION DEVELOPMENT AND STUDENT TRAINING**

### **Application Development**

The following applications have been developed:

#### **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/>

#### **2) 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.

### 3) 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.

### 4) Development of an Online Portal for Student Developers from the IITs for Aakash Project

A web portal <http://www.aadl-forum.nltr.org/> is developed where students volunteers from different IITs, who are developing applications based on Android platform, can register their names. The registration will allow them to access the web forum where the developers can share their development ideas, experiences, any sort of technical queries and possible solutions. The forum along with the web portal is maintained by an administrator from IIT Kharagpur.

#### Applications under Development:

1. **Web-Browsers for the Disabled:** Aakash based browsers for the differently abled (sightless as well as those with neuro-motor disorders) are being developed
2. **Text to Speech for Bangla:** Text to Speech for Bangla is being developed for Aakash
3. **Note Maker in Android:** This application will allow students to prepare class notes using different applications. The tool is capable of capturing different text or image documents from different sources and places them together in a single document with proper reference.
4. **Video Lecture Organizer:** Video Lecture Organizer allows a student to go through well-organized category of videos and find the course videos he/she wants to see. There are video links from a variety of sources NPTEL, MIT OCW,

and other open course ware of other leading universities). Most of the Video Lectures are indexed; hence a student can either watch the whole lecture video or go directly to the part he/she wants to refer to. There would be online streaming of videos, with an option to mark down a part of the video for future referencing. It also has a parallel Google/wiki search so that students can directly search any term or concept which they haven't understood in the lecture.

The courses will be easy to search through as they will be categorized based on subject and topic. No external applications or players such as the YouTube player will be required to play the video. The GUI will be clear, simple and easy to use, facilitating quick searching and organizing. A student can benefit from this app vastly. It will help improve student productivity as students will no longer have to spend time searching for video lectures on the internet. The quick parallel search feature will allow students to quickly look for reference on the topics discussed in the lectures. The search will also be useful in quick translation of any terms used in the lectures to local languages, thus promoting a larger outreach of video lectures.

5. Application to help users in qualitative analysis of salts in Chemistry lab based on predefined tests.
6. **Science Timeline:** An application which will display history of science as a timeline of various events.
7. **C4You:** This app will help you to understand the Programming Language C. It will contain-
  - a. History of C
  - b. Basics of C
  - c. Importance of C
  - d. Important Algorithms
  - e. C -compiler
8. **Math4Droid:** This app is basically for students of class 9th to 12th. It will contain:
  - a. Important Formulas along with derivations
  - b. Various trigonometrically and Geometric Theorems
  - c. Everyday's problem
9. **Chemistry Experiment tool:** This tool will assist students to know about compounds, physical properties, structure and other stuff.
10. An interactive game to increase vocabulary in a particular language.

11. **Virtual Lab** for Physics Experiment Related to Kinematics, Laws of Motion, Systems of particles.
12. **SciMaze:** Application will enable user to test his knowledge of science. User will have to find two connected things in a maze and answer a question about the connection between them to gain points and advance to next level. After answering the question user will be displayed with brief information about the topic.
13. Interactive application which helps students to perform simple science experiments related to their respective curriculum. The application will provide steps to do the experiment using materials easily available at home. It will explain various concepts and provide brain teasing questions on the concepts taught by the experiment. The student will learn to interact with their surroundings and observe scientific events happening around them in day to day life.

### **Student Training**

Two android training workshops have been conducted in Indian Institute of Technology Kharagpur and Jadavpur University, Kolkata. The workshops were targeted towards students from engineering and technical disciplines such as, B. Tech, M. Tech, M.Sc., and MCA. The instructors were chosen from students and research scholars of IIT Kharagpur and professionals from SNLTR, Kolkata, who had a good knowledge in android development. They were screened through a personal interview. Each workshop was of 16 hours duration spanning over two days. Total 112 students have been trained in the two sessions; the distribution is as follows:

<b>Workshop -I</b>	
Place	IIT Kharagpur
Total Students	60
Students from IIT Kharagpur	40

Students from other Institutes	20
<b>Workshop-II</b>	
Place	Jadavpur University, Kolkata
Total Students	52
Students from IIT Kharagpur	16
Students from other Institutes  (Jadavpur University, Bengal Engineering and Science University, Shibpur and West Bengal University of Technology).	36

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# PROGRESS REPORT OF AAKASH APPLICATION DEVELOPMENT LAB, IIT MANDI

## **I. AAKASH TABLET- USER FEEDBACK**

### **1. No. of Tablets received:**

Number of Tablets Received	Date	Comments
10	Oct 2012	Pre-installed software, no major problem with the tablets
40	April 2013	Default language was Chinese, many chargers did not work and few tablets just did not start
200	May 2013	Few tablets did not start up at all and few became dead after sometime.

### **2. Comments on Aakash Tablets:**

IIT Mandi' AADL team is quite happy with the tablets. Following are our observations:

#### **Hardware:**

- The processor speed is quite good.
- All applications run smoothly without slowing down.
- The battery is fine, works for around 2-2.5 hrs with WiFi on and tablet in constant use.
- The touch screen is excellent and at par with other tablets / phones in market.
- The only problem encountered while using Aakash tablet is that sometimes it hangs. It appears to be an operating system problem.

#### **Software (Pre-supplied Applications):**

- The applications currently on Aakash are all quite nice.
- The C, C++ and Python programming environment is easy to use and has sufficient features for students to practice programming.
- Other applications like proximity (Video Lecture Player) are very useful too.
- In addition to applications currently available, it was easy to install any new application on the tablet.

Few issues which came up with the tablet appears to be more with the second lot than with the first one. Some chargers just stopped working and the tablet started with the interface in Chinese rather than English.

## **II. STUDENT TRAINING AND APPLICATION DEVELOPMENT**

### **Application Development**

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.

### **Student Training**

As a first step, the self-motivated group of few students gave "Beginners workshop" to around 40 students for getting started with Android application development. After that competition about the ideas for developing applications for Aakash was floated. Good ideas were selected and students started working on the applications.

After receiving more tablets we organized workshop for the Government Engineering College in the neighborhood, called Jawahar Lal Nehru Govt Engineering College. Lots of hands on practice were given to the students to give them a good feel of the android application development as well as use of Aakash tablet.

To reach out to students in nearby private engineering colleges, few interns from Shoolini University, Solan (HP) were taken. Just to mention, Shoolini University at Solan had received Aakash tablets from IIT Bombay and students had undergone the training about how to use the tablet. We trained these interns and workshop on application

development on Aakash has been planned at Shoolini University in the month of August where their own student trained with us will help us in parting the training.

Recently, few students from NITs who had interest in android application development also have got involved with AADL, IIT Mandi and working for applications on Aakash.

<b>Workshop at Location</b>	<b>Date</b>	<b>Comments</b>
"Android Development Workshop for Beginners" at IIT Mandi	August 06, 2012	Workshop covered various aspects of app development such as java programming, XML designing and basic designing of an app.
"Competent use of Aakash Tablet and Android Development" at IIT Mandi	May 05, 2013	It was a very successful workshop. It motivated many participants for android development for Aakash tablet.
Interactive session at NIT Jaipur	June 01, 2013	It encouraged Students to develop apps for Aakash tablet.
"Interactive Android App Development" at Shoolini University, Solan	Proposed date August 08, 2012	It will be a basic level workshop, so the prerequisite required will be zero.

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# PROGRESS REPORT OF AAKASH APPLICATION DEVELOPMENT LAB, IIT GUWAHATI

## **I. AAKASH TABLET- USER FEEDBACK**

- 1. Number of Aakash Tablets Received so far:** 249
- 2. Comments on Aakash Tablet:**

- **Battery Life:** The battery life of the tablets in general is low when compared with two other low-cost tablets (in range of Rs.4000-6000). Battery life when the device is on Wi-Fi is particularly low.
- **Operating System:** All tablets are not loaded with same version of operating system. Even though the version is same, all tablets do not have same set of Android tools. Some tablets for example do not have Wi-Fi Direct feature, some tablets do not have support for WEP security, cannot acquire IP address with DHCP, etc.
- **Wi-Fi interface:** All tablets do not seem to have same hardware capabilities. While some tablets detect an access point, the same could not be located with other tablets. In general, the Wi-Fi signal must be very strong for the tablets to detect. While other low cost tablets detect an access point, Aakash tablets cannot detect. Many tablets do not support WiFi Direct.
- **LCD Display:** Few tablets have bad display just as they are opened. Till now, we have 4 tablets with LCD display gone bad. Scratch guards must be provided for the screens.
- **Accessories issues:** Some connector cables are not working and some chargers are not working even for new lot. Cable length of the charger is very short.
- **Tablet Casing:** The quality of the casing is not of high quality. Chances of getting the LCD display damage are high even with slight falls or bend. LCD of at least 4 tablets have gone bad during transit.

### **Some software and usage related feedbacks from users:**

1. Date and Time need to be set whenever the device is restarted. Problem can be with CMOS battery or OS.
2. Device often hangs. Three devices crashed and are not usable any more.
3. There is no option to close default applications such as browser. They can be only minimized. For closing, you need to explicitly open the list of active applications and kill. Users tend to minimize or press back button resulting in many live applications in the queue. It may cause the device to get hung.

## II. APPLICATION DEVELOPMENT AND STUDENT TRAINING

### Applications Development

- 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 a 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.

### Applications under development:

- 6) **DocRevise:** This application takes a document and generates a set of fill-in-the-blank type questions from the content automatically using machine learning algorithms. The number of questions to be generated can be selected by the user and it determines the relevance of the questions. This application can be used by a student for self-assessment after reading a document.
- 7) **Examination Conducting System:** To develop a system that can enable a teacher to conduct an examination either in class or offline on the tablets. The system would help the teacher to create an examination paper using the application from a database of questions, start and finish the examination, and evaluate the answers. The examination can be conducted in both the online and offline modes would work for multiple choice, exact answers and short answers questions.
- 8) **Note Taking and Sharing Application:** The idea here is to create an application that can allow the students to highlight parts of electronic material (files either in text or pdf format) and save them for reading later. The application would allow the students or teachers to create notes from e-books. These notes can be indexed for searching by other users who are also interested to read similar content. This application would help students to learn important concepts directly from notes prepared by other students or

teacher. Such notes preparation would not require any additional effort on the part of the reader except the need to highlight and share the content.

- 9) **Discussion Forum for Collaborative Learning:** The idea here is to create a discussion forum portal that can be used by students attending any course to post questions and answers related to each topic or section of the course. The main challenge is to categorize the discussion based on topics or tags automatically and enable browsing through the forums in an easy manner. The discussion forum can be used by students to interact and learn from each other and can optionally have participation by the teacher as well. A chat application can also be integrated in this system to enable live interaction among the members of the forum. This discussion forum can be used by the students present across a campus network.

### **Student Training**

- First Brain Storming Session and Talk on Android Application Development conducted on 20 September 2012. (No. of participants: about 150)
- Second Brain Storming Session on possible pedagogical applications conducted on 15 February, 2013. (No. of Participants: About 60)
- Two-day workshop cum contest on Android Application Development on 6th-7th April 2013.



# **Chapter 10**

## **Enhancing Participation through Contests**

### **10.1 Contest for Teachers**

A novel contest was launched to encourage teachers to use Aakash as an effective educational tool. This was made open to all teachers of Aakash Project Centres (APCs), who attended the orientation workshop in November 2012. As a part of the workshop, participating teachers were required to submit a team assignment.

This assignment required each team to first think, imagine, and envision different ways of using Aakash, which can enhance quality of education, using Aakash. After summarizing these thoughts, the team was then required to consider one or more of these ideas, and formulate specific projects/activities, giving some details about how such projects could be implemented.

These reflections and ideas, as well as the detailed project proposals, were not to be limited only to engineering education. Teams were free to think about deploying Aakash in any level of the full spectrum of education, ranging from primary school, high school, colleges, to professional studies. This could include vocational education and adult literacy as well. The only expectation was that, one should be able to carry out the main components of the suggested project in our engineering colleges, with the collaboration and assistance of others outside the engineering education system, if required. For example, to implement a project idea for primary schools, one may need assistance from primary school teachers, local school board, NCERT, etc..

The contest for teachers is that the team submissions made are eligible for 'Aakash Research Fellowship' awards. These Fellowships will be given to the members of faculty teams, whose team assignments are adjudged as the best, amongst submissions made by participating teams. These submissions will be ranked on the basis of innovative ideas, detailing of the proposed projects, and the quality of the report.

The value for each fellowship, is Rs. 15,000 for each member of the winning team. Thus, if a team has 3, 4, or 5 members, the corresponding fellowship amount for the winning teams, will be Rs. 45,000, Rs. 60,000, or Rs. 75,000 respectively. The fellowship amount awarded to teams, is to be spent by each individual member of that team, only for any professional activity as desired by him or her. This could, for example, include attending a professional conference, buying consumables for research projects of students, etc.. Over 2,000 submissions have been received. Evaluation of the submitted entries, is being done through a peer-review process. Details of the announcement are given on the following pages.

**ISTE Workshop on 'Aakash for Education'  
Team Assignment**

**Date posted:** Thursday, 6th December 2012  
**Submission due on or before::** Wednesday, 9th January 2013

The file, 2012\_12\_06\_Aakash\_team\_assignment\_and\_fellowship.pdf, has been uploaded on the workshop Moodle.

**Assignment:**

In the workshop we introduced the Aakash tablet, and briefly saw the demonstration of some useful applications and content developed at IIT Bombay, for Aakash -2. We now have a preliminary idea on how Aakash can be deployed for our educational activities. In coming months and years, a lot more work will be done by all of us together, to make Aakash more effective in education.

This assignment requires each team to first think, imagine, and envision different aspects of such work which can enhance quality of education using Aakash. These thoughts should be documented and summarized in a section by the team. The team should then take one or more of these ideas, and formulate specific projects/activities, giving some details about how such projects could be implemented. These details should be reported in a separate section.

Your reflections and ideas, as well as your detailed project proposal, need not be limited to engineering education. You are free to – and in fact, encouraged to -think about deploying Aakash in any part of the full spectrum of education, ranging from primary school, high school, colleges, to professional studies. You may wish to include vocational education and adult literacy as well. The only expectation is that, one should be able to carry out the main components of the suggested project in our engineering colleges, with the collaboration and assistance of others outside the engineering education system, if required. For example, to implement a project idea for primary schools, one may need assistance from primary school teachers, local school board, NCERT, etc..

The team assignment submitted by you will be released in open source. It will also be eligible for 'Aakash Research Fellowship' awards, described in the annexure attached to this document.

**Report Submission:**

Your assignment report should consist of four sections.

**Section 1** will be limited to one page (the first page). It should contain the RC code, name of your Institution, city, and state. You should then give a title to your report. It may be indicative of the specific proposal(s) you have elaborated in the report.

Enrollment number and names of all team members should then be listed. The first name should be that of the team leader. Against each name, provide an approximate number of person-hours spent in the assignment activity, with total effort spent by the team given at the end of the list. Finally, a set of keywords or key-phrases should be listed which best describe the nature of your proposal. An illustrative list of such key-phrases is given below, only as possible examples:

- (1) Primary education, Tamil script rendering, teaching history.
- (2) High School education, science tutorial, Hindi.
- (3) Civil engineering education, finite-element analysis, Scilab.
- (4) Linux port, memory optimization.
- (5) Wi-Fi access, concurrent users.
- (6) Solar charging, battery optimization.
- (7) Pedagogy, learning enhancement.

Names of the team members must not occur anywhere else in the report.

**Section 2** should contain your general reflections on the possible use of Aakash in education. This reflection section is expected to present an argument -with rationale and justification - for an approach or perspective on deploying affordable Aakash tablets in our educational system.

**Section 3** should contain a detailed plan of possible work on any one task, chosen from the set of activities on which you have reflected in the first section. If you wish, you may choose to detail more than one task. You may expand on the use of Aakash in a class room; you may describe a specific R&D project to be done by students or even by senior researchers on a specific topic, or for improving Aakash and/or its usage; you may dwell upon the issues of educational pedagogy; you may wish to work out details of the infrastructure needed to deploy Aakash tablets in a school or college; or you may elaborate on any novel idea(s) you have, which have probably not yet been thought out by anybody else.

You should also try to work out an estimate of effort, time, and expenditure needed to implement the proposed project idea. These estimates should be included in a separate paragraph.

**Section 4 (optional)** It should mention brief observations about possible future work, beyond the suggested project work.

### **Appendices**

If there are any references cited in the text of your report, full details about them should be given in one appendix. Further appendices may be added, if necessary.

**Format of the Submission file**

The assignment is to be prepared in a file which is in an editable format (such as .odt, .doc, or .txt), and should be uploaded on the workshop Moodle by the team leader, on or before the due date. There should be only one submission per team. If your team uses Microsoft Office, please do not save your file in the .docx format. Please use the older .doc format. This is because at IIT Bombay, we have very limited licenses of the newer Microsoft Office.

**Important Notes:**

1. As mentioned in the workshop announcement, ISTE certificates will be given only to those participants who have attended the workshop, submitted on-line feedback, and complete this team assignment.
2. Since substantial funding is proposed for selected entries,

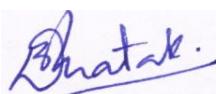
(a) All participants must agree to participate and contribute to the peer review process, which will be detailed after the submissions are received. This will entail an additional work of about 4 to 6 hours in the weeks following the submission date.

(b) Participants who qualify to get the Aakash fellowship award, must also agree to spend the amount only for professional activities, and to account for the expenditure as per the standard accounting/auditing procedure.

Participating teams not willing to agree to the above, are required to explicitly state their inability to comply, on the first page of their report. Such submissions will, of course, qualify for the ISTE certification; but will not be considered for the Aakash fellowship awards.

3. Like all academic institutes in the world, IIT Bombay considers plagiarism of any kind to be a very unethical activity. Since all your submissions will be released in public domain, it is absolutely important that the report should contain your own expression of thoughts. If you feel the need to refer to someone else's work, appropriate citation must be included in the text, and the corresponding reference must be provided at the end of section 4, in a separate list of references.

Noncompliance with the above, will immediately disqualify the submission, and the matter will be reported to concerned authorities.



(Dr Deepak B Phatak) 6<sup>th</sup> December 2012 In-Charge, Aakash project

## ANNEXURE

### Aakash Research Fellowships to be awarded by IIT Bombay to selected participants of the workshop on 'Aakash for Education'

#### General:

1 We, from Aakash project at IIT Bombay, are glad to announce the 'Aakash Workshop Fellowships'. These Fellowships will be given to the members of faculty teams, whose workshops assignments are adjudged as the best, amongst submissions made by participating teams. These submissions will be ranked on the basis of innovative ideas, detailing of the proposed projects, and the quality of the report. Evaluation of the submitted entries will be done through a peer-review process which will be described in detail, after assignments are submitted. Members of all the participating teams will be required to contribute to this peer-evaluation process, as directed by IIT Bombay.

2 The evaluation will be done in two stages. In the first stage, the top two teams will be identified at each Aakash Project Centre. These two winning entries from each centre, will then be assessed to determine the best 50 entries across the country, amongst all participating Aakash Centres.

3 The team which is declared as the best entry in each center, will be awarded the Aakash fellowship. In case there are more than 15 teams from a centre, then each of the top two entries will be awarded the fellowships.

4 The value for each fellowship, is Rs. 15,000 for each member of the winning team. Thus, if a team has 3, 4, or 5 members, the corresponding fellowship amount for the winning teams, will be Rs. 45,000, Rs. 60,000, or Rs. 75,000 respectively.

5 The Institutions to which the top 50 teams belong, will get a special 'Institutional Aakash Research Grant' of Rs 1,00,000. This is in addition to the research funding of similar amount being provided to each Aakash Center, for setting up the basic infrastructure for use with Aakash tablets.

6 The fellowship amount for winning team(s) at each Center, will be given to the Institute, and Head of the Institution, or a person designated by the head, will be in charge of disbursement to the individual faculty members of the winning team(s).

7 Norms for using the fellowship are given in the next section.

**Use of fellowship grant:**

1. The fellowship amount awarded to teams, is to be spent by each individual member of that team for any professional activity as desired by him or her. Some suggestions are given below:

- (i) Many faculty members wish to attend national conferences on subjects in their fields. Getting financial support for conference fees, travel, and stay, is often difficult for a faculty member to arrange, even if a paper written by him or her is accepted in the conference. Without a submitted paper, it is nearly impossible to get financial support, even though attending a specific conference may significantly add to one's professional knowledge. It is suggested that the fellowships be used for such funding support, for attending a conference of the choice of the faculty member. In case a faculty member chooses this option, it is expected that the faculty members discusses the Aakash project with other attendees of the conference, briefly describing our activities.
- (ii) The fellowship can be used for purchasing professional books, or for subscribing to research journals.
- (iii) The fellowship amount can be used for supporting other academic and research activities of the faculty member, or the activities of any student(s) being guided by him/her. Thus, purchase of equipment, consumables, accessories, etc., can be supported from the fellowship grant.

1 The above are only suggestions. The decision of the faculty member will be final in the choice of these or any other professional activities chosen by the faculty member. The only expectation of the project is that, through the professional activities chosen to be undertaken, the faculty member will try to promote the cause of using affordable tablets for effective education.

2 It is reiterated that the fellowship amount can only be spent for professional activities, and will be required to be accounted for, strictly through the accounting procedure applicable within the Institute, as per Government of India norms. Request for releasing an advance when required, such as for paying registration fees for a conference, or for booking travel tickets, etc., can be made to the Institutes; but such advances must be settled within prescribed time limits.



(Dr Deepak B Phatak)  
Aakash project, IIT Bombay

6th December 2012 In-charge,

## 10.2 Software Development Competition on Aakash Tablet

The competition was announced in December 2012. We received 192 project proposals by 25 April 2013, out of which, 149 projects were selected. 36 final projects were submitted by participants on 15 July 2013. The results will be announced on or before 15 August 2013, where the first prize winner will be awarded Rs. 50,000/-, second Rs. 25,000/- and third Rs. 10,000/-. Some of the feedback sent by the participants are given below:

**Soniya Singhal and Pooja Bhatnagar**

**16 July 2013**

*“Dear Aakash Team,*

*It has been a great experience participating in this competition. Not only did it improve my coding but I also got to learn new stuff especially GIT.*

*Regarding Aakash Tablet, i would say its a nice tablet to work on.*

*Thanking you again for organizing this competition and also hoping you would do so in near future.”*

**Sunil Bhoi**

**16 July 2013**

*“Respected Aakash Team members,*

*Its awesome experience to work with your team. Due to this Competition, my software development skill extends to ton. I feel proud to being part of this competition. Its my request to Aakash team please keep giving this type of opportunity in future. I look forward to being part of any event organize by Aakash Team in future.*

*Thanks a lot to Aakash Team.*

*Especially thanks to srikant sir, sachin sir for keep in touch with us and resolving every doubt occur during this app development. Again thanks from my bottom of heart to every person directly or indirectly involve in this competition.*

*with Regards,”*

**Vishalika Choraria**

**NIT Agartala**

**16 July 2013**

*“Respected Aakash Team,*

*It has been a nice experience throughout because this competition helped me to develop my technical skills. At every point when there is doubt or any clarity required the Google group of Aakash team really tried their best to help each of the participants. This competition should be kept going twice or thrice in a year because it motivates and also helps to improve their skills.*

*I have used the Aakash tablet and I really find it useful for the students.*

*Thanks to everyone involved in this competition.*

*Thanks and Regards,*

*Vishalika Choraria,*

*Student Representative*

*Training and Placement Cell*

*Master of Computer Application*

*National Institute of Technology, Agartala”*

**Godly T.Alias**

**NIT Calicut**

**16 July 2013**

*"Hi Aakash Team,*

*It was a great experience to participate in the competition. This competition helped to develop my coding skills as well as my knowledge in android developing a lot. I had learned a lot of things in the last three months through this application development project. Thanks a lot to the Aakash team who took the initiative for such a contest.*

*The Aakash tablet is also a nice device. It wondered me how a device of this much less cost can perform in a same level as the branded tablets do.*

*Thanks and Regards,*

*Godly T.Alias,*

*National Institute of Technology, Calicut"*

**Rahul Kalkani****16 July 2013**

*"Thank you Aakash Team for spotty Help during competition on group.*

*I wish there will be more events like this. And Tab is so good. its value for money.*

*I hope there will custom aakash rom for Tab.*

*Best Regards with you guys for more success in Aakash project"*

Visit <http://aakashlabs.org/compete> for more details

## 10.3 Android Application Development Contest for Aakash Tablet

### 10.3.1 Introduction

In the Android workshop, we introduced the Aakash tablet, studied how an application is developed in Android environment, and briefly saw the demonstration of some useful applications and content developed at IIT Bombay, for Aakash-2. We wish to develop a collaborative community of Open Source developers who will create Android applications and educational content for the Aakash Tablet, in order to maximize effective learning using Aakash tablets. This competition is targeted only for participants of the workshop conducted on 22, 23 February and 2, 3 March 2013. These participants must have

1. Attended the full workshop
2. Given the online evaluation quiz
3. Must have submitted the feedback form

### 10.3.2 Prizes

Depending upon the number and quality of entries, there will be up to 3 awards as follows:

First prize: Rs. 5000/-

Second prize: Rs. 3000/-

Third prize: Rs. 2000/-

Top entries from each Aakash Centre, will be further evaluated, and the top 50 among them, will get a prize money of 10,000/- each. All Android applications submitted in the contest, will be released in Open Source, with the names of the team members showcased to the world.

### 10.3.3 Rules of the Contest

1. You have to make a team of preferably 2 or 3 members.
2. A participant cannot be registered as a member in more than one team.
3. You are free to develop any Android application of your choice, that empowers students and teachers for effective learning.
4. As a part of submission, teams will need to submit the .apk file of your application, the entire source code, user manual and technical documentation.
5. Your application will be evaluated by using ‘peer to peer evaluation’. All participants must agree to participate and contribute to the peer review process which will be detailed after the submissions are received. This will require an additional work of about 10 to 12 hours in the weeks following the submission date.

To begin with, you have to register your team on

<http://www.it.iitb.ac.in/aakashcompetition>

The deadline for completing the team registration, is 5 p.m. 25 March 2013.

For instruction manual, visit

<http://www.it.iitb.ac.in/aakashcontest/teamregistration.pdf>

For Frequently Asked Questions, visit

<http://www.it.iitb.ac.in/aakashcontest/faq.php>

For further queries, visit

<http://www.it.iitb.ac.in/aakashcontest/contact.html>

## 10.4 IITB-IEEE Aakash Challenge

Institution of Electrical and Electronics Engineers(IEEE) is a globally reputed professional organization, with activities in all major countries of the world. Its past president Prof. Michael Lightner is currently the VP in-charge of educational activities. During his visit to India last year, Shri. Ashok Thakur, Secretary(HE), suggested him for a meeting with NME-ICT project leaders at IIT Bombay, with a possibility of engagement with Indian effort in using technology for higher education.

At Prof. Lightner's invitation, IIT Bombay participated in the IEEE students' congress of Region 10, held recently on July 11 to 14 in Hyderabad. Student leaders from over 26 countries in the Asia Pacific region participated in the event. An 'Aakash Challenge' was jointly announced by IIT Bombay and IEEE. About 160 tablets were distributed to students leaders from all countries, including India. The contest registration form and details are enclosed. Apart from the prize money, IEEE has also offered the winning students fully paid participation in one of the global IEEE student events.

### 10.4.1 Registration

Do You Have a Winning Idea for an Educational App?

The AAKASH Tablet App Challenge is a joint effort between IIT Bombay and IEEE, to identify, develop, and incubate ideas for mobile apps focused on all levels of education, including school education, through the university.

This is an opportunity for you to exercise your knowledge, skills and creativity in order to enhance the education of other students.

By Participating in the AAKASH Tablet App Challenge, you will:

- Learn how to apply engineering and business knowledge and expertise in order to develop a useful app and potentially see it employed on the AAKASH Tablet
- Gain critical teamwork and multi-disciplinary skill sets that are transferrable to the engineering workplace, and provide you with a competitive advantage
- Contribute to the educational process, by developing an app that benefits current and future students
- Receive an IEEE Certificate, and earn a chance to win various prizes and awards
- Please visit <http://www.it.iitb.ac.in/nmeict/AakashChallengeParticipant.do>, to see the list of Participants Registered.

#### **10.4.2 Timeline**

Entry Period: 12 Aug 31 Oct 2013

Judging Period: 1 Nov 6 Dec 2013

Winners Announced: 13 Dec 2013

#### **10.4.3 Eligibility**

Open to all students in IEEE Region 10. Student teams of 2 to 5 members (At least one team member must be an IEEE Student Member)

#### **10.4.4 Form for Enrollment to IITB-IEEE Aakash Challenge Registration**

1. Email
2. Retype Email
3. First Name
4. Last Name
5. Mobile Number

### **10.5 Ron Mehta Aakash contest**

Mr. Ruyintan (Ron) Mehta, is an alumnus of IITB (B Tech Chemical 1970). He was very impressed with the work done by IIT Bombay on Aakash and other national mission projects. He wanted to encourage more direct contribution from our students in these efforts. Towards this goal he donated an amount of US\$2500, to be used as prize money for a contest, exclusively for current IIT Bombay students at all levels. The contest is to develop innovative applications on Aakash.

The awards will be graded by a committee for 1st, 2nd and 3rd prize, for the three (3) best applications for the Aakash-2 tablet. The prize money is the equivalent rupee amounts of \$1,250 for 1st prize, \$750 for 2nd prize, and \$500 for 3rd prize. The prizes are named Ruyintan and Monica Mehta Aakash tablet Application Development Prizes. The Aakash project will give a certificate of participation to each student, and special certificates to winners.

It is a team contest. A team can consist of minimum 2, and maximum 4 students. Although not mandatory, it is strongly suggested that the composition of teams should have an interdisciplinary flavour. One of the team members will be the team leader who will be responsible for timely submissions as per the contest schedule. Aakash project will arrange for special training sessions on Android programming, for all participants. In consonance with the spirit of the national mission, all applications submitted for the contest, will be released in open source, under a creative commons license.

On-line registrations have been opened on the link:  
[www.it.iitb.ac.in/nmeict/iitbaakashcontest](http://www.it.iitb.ac.in/nmeict/iitbaakashcontest). Registration will close on the midnight of Monday, 5 August 2013. A training workshop will be conducted on Saturday 17 August 2013. Detailed proposals will have to be uploaded on or before 23 August 2013. Last date of submission of the developed applications, is currently planned as Monday 6 January 2013. It is believed that this contest will provide a unique opportunity for students of IIT Bombay, to display their creative talent, besides contributing to open source knowledge pool.



# **Chapter 11**

## **Conclusion**

### **11.1 Achievements**

We are happy to announce that the objectives originally envisaged in the project have been realized. We have managed to get significant upgrades to the hardware specifications than what we began with. The tablets procured under the project are comparable in specifications, to those available presently in the market, for prices ranging between Rs. 5,000 and Rs. 7,000. The prices of comparable tablets were in the range of Rs. 10,000 to Rs. 12,000 in May-June 2012. By pegging the procurement price for Aakash tablet at Rs. 2,263, Government of India can certainly take credit for anchoring the prices of the tablet in the market at a lower level. All the big players who shunned the invitation to participate initially, are now queuing up for collaboration.

It is instructive to note that the global sale of PCs has been constantly declining, and that of tablets is exponentially increasing. In the year 2011, 76 Million tablets were sold as against 155 Million PCs. In 2012, each of these sold about 145 Million units. Thus, the crossover from PCs to tablets, has already occurred. As per IDC, the forecast for 2013 and 2014 for tablet sales, is 229 Million and 287 million respectively, as against the PC sale forecast of 135 Million and 131 Million only. In 2017, PC sales are expected to be around 123 Million, as against 410 Million projected for tablets.

It seems that we have joined the rising tide at the right time.

The applications and content developed by IIT Bombay, and by hundreds of partner institutions, have made these tablets into a useful educational tool. This is acknowledged by everyone, students, teachers, and even global professional bodies such as IEEE. Our pilot efforts to use these tablets in schools have been very well received by school teachers and students.

The lab tests and field trials have thus proven beyond doubt that the Aakash tablets are contributing significantly to enhancement of quality of education. Reports from all the colleges about extensive use of tablets, clearly indicate that these objectives have been achieved.

### **11.2 Future work**

The project has moved to the second year of its operations. It is essential to build on the present achievements, and further expand on the gains from the project. The main activity will

clearly be to develop more applications and content, and to experiment more with the actual use of Aakash in various educational activities ranging from classrooms to assignments and self-study by students. The other equally important activity is to further optimize the tablet itself, and move towards greater indigenisation, including Indian manufacturing.

Android tablet devices are clearly becoming very popular, and an ecosystem will soon evolve across the nation, much like the mobile phone ecosystem. This project must continue to contribute to this movement

### **11.2.1 Educational activities**

We will now focus on appropriate pedagogy and best practices, to make the use of Aakash tablets more effective in education. Participating colleges will be encouraged to offer actual classroom teaching using Aakash. A large community of students and teachers, involved in development of applications and content, has been created. This community will be further expanded and empowered during the remainder of the project. The Aakash-Bazaar, which has been developed at IIT Bombay, will be further optimized and deployed. This permits automatic synchronization of updated applications from local servers, as also from national servers. Concrete feedback will be obtained on the educational effectiveness, through independent surveys by ISTE. IIT Bombay will continue to conduct and supervise these activities in the remainder of the project duration. Detailed plans will be presented to PRSG.

### **11.2.2 Optimization of Aakash tablet**

As regards the future versions of Aakash tablets, another committee has already framed specifications. These were notified for public comments, and have been frozen to define a new base model. DGS&D is expected to run a global tender soon, to obtain competitive prices and quantity discount for this model. It is expected that other ministries, notably DEITY, should lead the efforts on greater indigenisation of these tablets. CDAC and IIT Bombay have gained significant insights into design of hardware and software of these tablets. The best way forward is for these two institutes to embark on building reference designs for the tablet. It will not be out of place to cite the example of NIST, which developed the reference implementation for fingerprint systems and releases it in open source. This has led to a very large number of countries to develop their own adapted versions, including the Indian Aadhar system.

A project of this kind, run by CDAC and IIT Bombay for development and implementation of reference designs, will go a long way in building Indian design and manufacturing processes. Experience gained at other IIT, notably IIT Madras, can be effectively factored in such efforts. The nano-electronics group at IIT Bombay is keen to work on the design of an Aakash System on Chip, and to work towards an Indian Fab to manufacture these chips.

Due to the wise and timely initiative of the Government, India has achieved an early start in her efforts to use these devices in education. One hopes that we will continue to speedily and substantially build on these efforts, to make a significant difference to our education system.

# Acknowledgements

It has been a matter of privilege for IIT Bombay, to have been given the responsibility of this important national project. We have successfully executed the first phase comprising upgrade of specifications, procurement of 1,00,000 tablets, distribution of these to hundreds of engineering colleges in the country, and completion of testing in the labs and in the field. A very large number of individuals and organizations have helped in this successful execution of this project. We recognize the important contributions made by them, and gratefully acknowledge that without these, the project could not have accomplished its goals. It is impossible to individually list and thank all the people who supported the project. A few of these are acknowledged below:

Shri. N. K. Sinha, the then mission director of NMEICT, for conceiving the affordable tablet as a device to influence quality of education for masses in India. His commitment and support to the project has been primarily responsible for giving it the shape it is in today.

All the senior leadership of MHRD, including the Hon'ble HRMs Shri Kapil Sibal, and Dr. Pallam Raju, for providing unstinted support.

Prof. Prem Kalra, the then director of IIT Rajasthan, for taking up the project, when not many in the country believed that the tablet price could be kept below US\$50. IIT Rajasthan conducted the global tender successfully, discovering the price of US\$49.5.

Prof. Devang Khakhar, Director IIT Bombay, for supporting the initiative of IIT Bombay to carry the project further, when it faced some problems at the sister institution.

Senior colleagues at IIT Bombay, and heads of different administrative units, for always providing timely support when needed.

Prof. Rajat Moon, D.G. CDAC, for agreeing to partner with IIT Bombay for conducting all the lab tests.

Shri Ravindra Kumar, Dr Murthy, and other colleagues at CDAC, for providing excellent support in the project activities.

Prof. Ashok Jhunjhunwala, for setting up Aakash Application development labs at 5 other IITs.

Prof. Somnath Sengupta and his colleagues at IIT Kharagpur, for help in setting up APCs in their region, and for helping with logistics.

Thousands of teachers and students across the country, for validating Aakash as a useful educational tool, and for developing a large number of applications and educational content.

The dedicated team at IIT Bombay, which worked tirelessly with commitment and passion.