Ubiquitous Clicker application for
Heterogeneous Devices in a Distributed
Environment

M.Tech. Project Stage-1 Report

Submitted in partial fulfillment of the requirements
for the degree of

Master of Technology
in
Computer Science and Engineering

Submitted By
Pankaj Kumar, 133050076

Under the Guidance of
Prof. Deepak B. Phatak

Department of Computer Science and Engineering
Indian Institute of Technology Bombay
Powai, Mumbai, India 400076
October 15 2014
Abstract

We are living in an age of science and technology. We use different devices in our daily lives, such as Laptop, Tablet, Smart-Phone, PCs, with latest technology. In this paper we describe the adaptation of heterogeneous devices in distance education for a multiple classroom environment. Distance education concerns local center and multiple remote center, distance education is becoming increasingly popular. These device have enabled us to real time interaction between the instructor and the remote class-room through the use of a Student Response System. We discuss the design and development of a distributed architecture for the implementation of clicker application for conducting online quizzes to work seamlessly with other devices and also enhance the user interface for handling scientific mathematical expression.

Keywords—Distance education, clicker application, client-server, Central-server, TCP/IP, Distributed Environment, Virtual Scientific Keyboard
ACKNOWLEDGEMENT

I wish to express my sincere gratitude and whole hearted thanks to my Guide Prof. Deepak B. Phatak for his guidance and constant encouragement. I am greatly in-debted to him for guiding me whenever I faced difficulty regarding the topic.

I would like to thank Mr. Nagesh Karmali for his valuable suggestions during meetings and discussions. I would also like to thank Firuza Aibara for proofreading this report.

Pankaj Kumar
M.Tech. Second Year
Department(CSE)
IIT Bombay
Contents

1 INTRODUCTION 4
   1.1 Problem statement ................................... 5

2 LITERATURE SURVEY ........................................ 6

3 OUTLINE OF PROPOSED RESEARCH WORK 11
   3.1 System Architecture ................................. 11
      3.1.1 Server ........................................... 11
      3.1.2 Client Clicker .................................. 11
      3.1.3 Scientific Virtual Keyboard .................... 12
   3.2 A system must meet the minimum following requirements . . . 14
      3.2.1 Clicker Configuration ............................ 14
      3.2.2 Clicker software is to be configured at different levels . 14
   3.3 Proposed Algorithm ................................. 14
      3.3.1 Hardware Student Response System ............... 16
      3.3.2 Software Student Response System ................ 16
      3.3.3 Proposed System Architecture ................... 16
   3.4 Project Planning .................................... 17
      3.4.1 Project Chart ................................... 18

4 CONCLUSION .............................................. 19
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Present System [3]</td>
<td>5</td>
</tr>
<tr>
<td>3.1</td>
<td>TCP/IP Network</td>
<td>12</td>
</tr>
<tr>
<td>3.2</td>
<td>Virtual Scientific Keyboard</td>
<td>13</td>
</tr>
<tr>
<td>3.3</td>
<td>Virtual Scientific Keyboard</td>
<td>13</td>
</tr>
<tr>
<td>3.4</td>
<td>Proposed Algorithm</td>
<td>15</td>
</tr>
<tr>
<td>3.5</td>
<td>Proposed System Architecture [3]</td>
<td>17</td>
</tr>
<tr>
<td>3.6</td>
<td>Project Planning</td>
<td>18</td>
</tr>
</tbody>
</table>
Chapter 1

INTRODUCTION

We are living in an age of science and technology. We use different devices in our daily lives, such as Ipod, Laptop, Tablet, Smart-Phone, PCs, Clicker with latest technology. We describe the adaptation of heterogeneous devices in distance education for a multiple classroom environment. Distance education is increasingly being seen as a cost-effective solution to the universal problem of providing high quality and low cost education to growing numbers of students. It has been trying to improve and maintain the quality of the distance learning system. Now in this paper build architecture a next-version web based Clicker application for conducting on-line quizzes, to work seamlessly with other devices as well as handling scientific mathematical expressions. We describe a solution to facilitate real time interaction between the instructor and the remote classroom students through the use of a student response system involving heterogeneous devices. We designed and developed a distributed architecture for a student response system. The lectures were transmitted via web to remote centers in different cities all over India. Participants at the local center and remote centers able to access clickers as well as heterogeneous devices, Which are Ipod, Laptop, Tablet, Smart-Phone, PCs, Clicker with latest technology. The receivers could communicate to a server located in the central classroom over the inter-net. The instructor was able to collect and compare the responses to various questions posed during the lectures from participants in various remote centers.
1.1 Problem statement

Clicker application acts all special task and related information in system and it is devices works for any environment. This kind of system will reduced of learning cost and also student will have not faced device constant problem, Because it system does support for any kind of devices such as Smart-Phone, PCs, Laptop, Ipod ,Tablet, Clicker. In the existing system has not feature of write big equation and scientific equation so that it is also include of my problem statement. Each problem I would implement for make a better and effective system because teacher and student learn and they use in efficient way.

![Image of present system](image1.png)

Figure 1.1: Present System [3]
Chapter 2

LITERATURE SURVEY

Tittle:- Web based tools to sustain the motivation of students in Distance Education
Author:- Divya Tiwari, Richa Sehgal, Jayant Bansal and Sahana Murthy Indian Institute of Technology, Bombay

Distance education is increasingly being seen as a cost-effective, and providing high quality and low cost education to growing numbers of students. With the availability of new and better technologies [3]. Is it possible to embrace the implementation and benefits of student response systems for distance education. A similar solution was implemented by University of Oklahoma, College of Pharmacy for a dual classroom environment. According to the study, students and faculty members felt that the immediate feedback the automated response system provided was more beneficial during non-graded activities. Student response system developed by the Indian Institute of Technology IIT-Bombay in 2009. The system is intended to be used first in IIT-Bombay lectures, and then to be extended to all colleges and schools across India. Our distributed student response system is developed using open source software and easily available hardware components. The workshop was conducted via distance mode at one central location and 22 remote centers, with 473 participants spread across India. The lectures were delivered from a central location at our institute. The lectures were broadcast through EDUSAT, a satellite dedicated to the education sector by the Indian Space Research Organization (ISRO).
Hosei University in Japan has been conducting distance education programs with overseas institutions since 2003, and from 2006 it has incorporated inter-campus distance education [7]. With the Research Center for Computing and Multimedia Studies which we authors belong to, it has been trying to improve and maintain the quality of the distance learning system and its support system. So his system established the stable distance learning system structure, picture, image and audio sound runs without any uninterrupted even for a second during a lecture. It was necessary to developed a system, Which can encourage student participating in remote class-room. Hosei university introduced RFID T-age as a system to complement distance education. RFID is similar to the attendance managing system. The purpose of this system is to satisfy the teacher’s desire to know the name and clubs of the student in remote class-room. In 2006 university also used ICT for improve teaching method. Initially attempted the trial run of active learning. It system also support the heterogeneous device. E-Roster:- When student enter the remote class-room, the IDs of their RFID card are read by a handy-type RFID tag reader. The IDs thus collected are used to make a roster by Microsoft excel macro and the printed roster id delivered to the teacher within 30-months after his/her starting the lecture. RFID Card reader system. It is composed of non-contact reader and laptop pc with window-xp operating system the application was developed using visual C-hash 2008 and SQL server CE. ID read by the client system is stored into the SQL server together with the real time.

A Free Web Clicker System that can flip your classroom and have students voting in less than one minute at zero cost
Link:- http://webclicker.org/home/contact/

Class-room Response System, often called clickers, it promote active learning in a class room [4]. These are several name for such system including Student Response System Audience Response System Personal Response System etc. In class room clicker provides a mechanism for student to participant interactively learning activities anonymous, to express their own view and ideas without pressure. There are no hardware perchage no App downloads . It is absolutely no cost. It designed and development by teacher and ed-
ucation research for improve learning with effectiveness. This is a free web clicker system that can flip your classroom and have student voting is less then one minute at zero cost. Free web based clicker system that works on any Internet accessible device which is smart phone, ipods, pcs, and laptop with working browser. Teacher can create an account, for conduct class and smart voting under minute. Many other college/university student may required special care to there use control and provides protections. Because some college/university would not allow student name to limit only certain user can be registered.

**Title:** Peer Instruction: Ten years of experience and results  
**Author:** Catherine Crouch and Eric Mazur

Currently physics learner decreasing day by day. Because several investigators have carefully analyzed college physics students understanding of a variety of topics, courses do little to improve students understanding of the central concepts of physics, even if the students successfully learn problem-solving algorithms [2]. In this paper present the results of ten years of teaching the introductory physics courses for harvard university with Peer Instruction PI. Peer instruction modifies the traditional lecture format to include questions designed to engage students and uncover difficulties with the material. Peer Instruction engages students during class through activities that require each student to apply the core concepts being presented, and then to explain those concepts to students. We find in both the algebra- and the calculus-based introductory physics courses. That our students grasp of the course material improves according to a number of different measures. After some time in 1993 and 1994 find the set of Concept Tests and the in-class questioning/discussion strategy. In 1996, they introduced free-response reading assignments. Over the seven years of results reported from the calculus based course, five different instructors were involved, each using Peer Instruction with his or her own style and it also started many teaching technique which are Conceptual mastery, Quantitative problem solving, Concept Test performance. They have replaced reading quizzes with, Web-based assignments designed to help students think about the reading. Peer Instruction has been successfully adopted by hundreds of instructors at other institution in over world and our communication with them indicates that one of the reasons for this widespread adoption of adapting PI to the local context.
Comparison of student perceptions of classroom instruction: Traditional, hybrid, and distance education  
Author: Mary Jo Garcia Biggs

In this report examined student psychosocial learning environment in a distance education classroom [1]. Distance Education Learning Environments Survey that was distributed as a pre-test/post-test to three sections of the same course taught in three distinct formats. Web-based tool specifically designed to assess the learning environment using a new technique and technology. These kinds of system provide excellent opportunity to improve his/her learning quality. All student utilized the Distance Education Learning Environments Survey. It is called a validated instrument for post-secondary distance education. It was the first instrument of its kind and significant for utilization on a global scale. Twenty-six students enrolled in the master of social work program at Texas State University-San Marcos were administered. It was started in January 2005. More specifically, students were enrolled in Social Work. The topics of discussion focus on interviewing, assessment, and planning skills. Those students enrolled in traditional, distance and hybrid instruction courses were included in the sample. Data was collected and analyzed on the 34 web-based statements in which students responded.

Tittle:-Use of an Audience Response System (ARS) in a Dual-Campus Classroom Environment  
Author: Patrick J. Medina, Nelson Er, Jane E. Wilson, Mark L.Britton, Melissa S. Medina, Donald S. Wanzer

In this paper introducing and discuss distance and co-located education placing a mouse on each student desk in a class-room and connecting those mice to a single computer [6]. Education is crucial factor in any discourse on economic development and consequently there is much interest in the role of ICTs in education in developing countries. In this system communicate via standared telephone network. teacher has two display field and class-room also has to display for video replace by video. Such a system should allow for backchannel for communicate to student to teacher. Med application describe that how they reflecte class-room observation. Basically goal of this system is increse student engagement. The MED application based on multimouse implementmantion, is virtual space share between teacher and student. In this system having many important feature which is Cursor and Identity: - Each paticepant represent on the virtual blackboard by unique cursor. Stu-
dent list:-teacher can see performance of student and teacher also calculate student s activity. Rising Hand:- student can ask questions during the classroom and his/her request display in the small virtual flag. Activity:- student can easaly involve in the during the lecture. MED is based around on four activity whose order and frequency 1. viewing a lecture slide, 2. multiple chose question, 3. binary question and shared keypad input. Here describing how the design support design goal. These kind of system supports indivisual student performance and teacher can able to find and see the his/her indivi-
sual activity. Multiple student are able to give answer simeltaniesly during an active class-room. Teacher also can do those who answer in an efficient manner by scanning the student list.

**Clickers in the Classroom: A Comparison of Interactive Student-Response Keypad Systems**

Author:-Roger C. Lowery

Student-response Systems (SRS)are technology designed to create an engaging student and inviting learning environment that will maximize active learning, especially in large-enrollment courses [5]. These kins of technology mostaly use in higher education. Student response system technology has been developed in to three ganration, Which are first genration came out as commercial versions there were devices work with hard wire in the class-room. In second genration of system use infrared and radio-frequency wireless. And last and third genration Web-based systems. Student-response hardware, software, and textbook bundling options are rapidly evolving. Purchasers and adopters are faced with keeping track of multiple variables. However, costs are coming down and new or improved features are constantly appearing.
Chapter 3

OUTLINE OF PROPOSED RESEARCH WORK

3.1 System Architecture

3.1.1 Server

We are using server class machine to act server, But it is also possible use any machine above panttium4 to act as server. server is connected with more then one client through internet. internet consists seven layer, but our application will run on the application layer. Application layer handle GUI suppose multi-type of devices using our system which are Smart-Phone, Tablet, PC, Ipod, Clicker. Every device having different screen size., so that at the application layer GUI provides supporting screen size for existing devices.

3.1.2 Client Clicker

All client devices contain at the physical layer at the physical layer, user have to configure his/her devices. Each devices have different type of address such as mobile user IMEI or SIM number and PC, Laptop, Blue-tooth, Tablet use with MAC address. All devices works at the physical layer, But at the other rest five layer which are presentation layer, session layer, transport layer, Network layer and data-link layer. These are works as internally which is handle by computer processor.
### 3.1.3 Scientific Virtual Keyboard

Scientific virtual keyboard is a text input method. It will support for touch-screen devices as well as non touch devices. Currently existing clicker system does not has feature for handling scientific expression. Here I would like to give some idea about scientific virtual keyboard. Basically it consists symbol which will be geometric symbol, Trigonometric symbol, logical symbol, Numerical symbol. So that existing system consists feature of adding question and generate questions. So presently that feature supports only normally keyboard. It taken text input from normal keyboard, so my aim is add and get modify in the clicker system currently adding question option has two type of text field which question pert and other is option part, so that my aim is add some feature in the existing system as a scientific virtual keyboard so that it virtual keyboard would be handle scientific symbol. It would be help instructor for make mathematical questions.
Figure 3.2: Virtual Scientific Keyboard

Figure 3.3: Virtual Scientific Keyboard
3.2 A system must meet the minimum following requirements

3.2.1 Clicker Configuration
- Clicker application.
- Server.
- Ubuntu 12.04 and latest version Operating System.
- 1GHz x86 Processor, 1 GB RAM, 10GB Disk Space.
- Wi-Fi router properly configured and Lan-Wire
- Aakash Tablets, PCs, Laptop, Ipod, Mobile-Phone, etc.

3.2.2 Clicker software is to be configured at different levels
- Server
- Wi-Fi router and configure IP-addresses
- Aakash Tablets, PCs, Laptop, Ipod, Mobile-Phone, etc.

3.3 Proposed Algorithm
- Remote client tries to established a connection with main server by sending SYN. And server replies with SYN-ACK.
- Client send to request for established connect return and server accept, return connection is established.
- Client request to write data and server read return. It is happen both side server also send request to write data, then client return ACK.
- FIN WAIT-1 state is waiting for the peer to ACK Server send FIN, That outgoing FIN is subject to all the normally TCP return and time out processing. So client become completely disappeared and never responds TCP, Time out the connection.
Figure 3.4: Proposed Algorithm
3.3.1 Hardware Student Response System

The hardware consists of a number of inexpensive keypads which function as Heterogeneous devices, Which is Laptop, Teblat, Smart-Phone and PCs and one or more receivers connected to a computer placed within a classroom. Typically, each student has access to a his/her device. Clicker application depend on the type of Heterogeneous devices and the size of the classroom. Heterogeneous devices communicate using infra-red or radio frequencies based wireless technologies as well as Lan-Wire.

3.3.2 Software Student Response System

The purpose clicker application allows the instructor to conduct quiz, and collect and store the student response data in a database. after that by the instructor represent the information in various ways such as graphs, charts, and generate reports.

3.3.3 Proposed System Architecture

Clicker application act all special task and related information in system which works in any devices for any environment. This kind of system will reduced of learning cost and also student will have not faced device constant because system supports any kind of devices such as smart phone, pcs, laptop, ipod, clicker. Web based systems do not require a classroom projector and screen questions and/or images can be transmitted directly to each students cell phone, PDA, or pocket/notebook/laptop PC. In the existing system has not feature of write long equation and scientific equation so that, Now here some modification has been done in the existing system. So that now instructor are able to make and set questions of higher scientific mathematical questions. It system will be flexible like if student want to connect to the system with android devices, then that time android function will be call and if student want to connect to the system with window phone, Then that time window function will be call and so on. In web based multi-environment system runs on TCP or UDP or OSI model. It consists seven layer, but our application will run on the application layer. It will be communicate with other physical layer which are contain all client devices at the physical layer configure devices by the user. Both are communicate in HTML and XML format, because HTML helps for the display browser and XML use for send quiz file ate the server side. In purpose system, if user request through using unique URL, then our system automatically understand that which type of devices requesting for quiz, then our application provides supporting
3.4 Project Planning

Our problem statement is, Extented the existing system in to modern clicker application for conducting on-line quizzez to work semlessly with multiple devices which are Laptop, Tablet, PCs, Ipod, Clicker etc. started our project from end of june. Initially I read around 40 reasearch paper. Then after that selected most related to my MTP topic, In august choose around 10 paper, I read them in depally. Then in september finally I got one paper tittle is Clicking away the distance from Education A Synchronous, Distributed approach for use of Student Response Systems, Authore is Divya Tiwari, Richa Sehgal, Jayant Bansal and Sahana Murthy. It is written by indian institute of technology Bombay. I gone throught all paper which is referred by author Divya Tiwari, Richa Sehgal, Jayant Bansal and Sahana Murthy. End of september written literature servay and also analysis existing system.
First week of October propose my extended system which provides more feature like described the design and architecture of proposed system. Such a system can enable the use of a student response system in a multiple remote classroom as effectively as in a conventional classroom with various kinds of devices acting as clients e.g. phone, laptop, pc, pager, tablet, etc. Providing additional functionalities like virtual keyboard for mathematical expressions.

### 3.4.1 Project Chart

<table>
<thead>
<tr>
<th>Months and Weeks Tasks</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IDENTIFY NEED OF THE PROJECT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. RESEARCH A. EXISTING RESEARCH PAPER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. REQUIREMENT ANALYSIS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. DESIGNING DEVELOP ALGORITHMS OF DIFFERENT MODULES</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.6: Project Planning
Chapter 4

CONCLUSION

In this report, we described the design and architecture of proposed system. Such a system can enable to emulate the use of a student response system in a multiple remote classroom as effectively as in a conventional classroom with various kind of devices acting as client e.g phone, laptop, pc, pager, tablet, etc. The system enables the instructor to collect data from a very large pool of students and can be extended to comprehend the needs of the participants on various classifications such as demographics, back ground etc. Also, providing additional functionalities like virtual keyboard for mathematical expressions, etc with the proposed system.
References


[4] http://webclicker.org/home/contact/. A free web clicker system that can flip your classroom and have students voting in less than one minute at zero cost, June 2014.

