

An Approach to Student-Teacher Interaction System

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Abstract— In education, tutorial is essential part of student’s learning experience. Traditionally these have been hand written into notebook and that will be checked & marked by teachers manually, which is very time consuming. This paper presents an electronic workbook [E-Workbook] system, which is a question-answer workbook in traditional paper format to practicing concept of mathematical functions. Teachers will use his/her personal computer (PC) for send tutorial questions to every students on their login ID & students send answers of attempt questions back to teacher PC from their PC, this two way transmission will be achieve with the help of wireless sensor network i.e. zigbee technology. At the end, the result will automatically collate on teacher’s PC and instantly provide the results for the individual student and the class as a whole with the help of software application running in PC. At the time of data transmission/reception, if both PC is turn off then data will temporary saved in SD card which attached to ARM7 [LPC2148] microcontroller. The ARM7 microcontroller will use to maintained & control over the system function. The proposed E-workbook system will introduced computer assisted electronic workbooks could result in higher achievement on the students’ part and we are trying to make it easier than ever for teachers & students by scrapping unnecessary paperwork and traditional procedure.

Key words: Electronic Workbook, Wireless Sensor Network Module: Zigbee, Microcontroller, SD Card, Teacher-Student Interaction System, Intelligent Tutors

I. INTRODUCTION

The use of technology in the classroom has rapidly expanded over the last few years and now education technologies, both wired and wireless, exist to aid the student and teacher. Today, a range of technologies exist to support teaching and learning. [1, 2]

Teaching school pre-calculus has traditionally been carried forth using methodology such as teaching large sections, usually complemented with separate and smaller tutoring sections, using printed materials with exercises to be studied on the student’s time, solving problems either in tutoring labs or in working groups. This type of methodology involves the student in learning only to the extent that they have to “pay attention” and “listen” to the material presented in class. The student does not take an active part in the learning process. The introduction of electronic workbooks, intelligent tutors, and computer assisted instruction into these traditional settings could result in higher involvement on the student’s part, and hopefully higher achievement. [10]

Clearly superior teaching is depends on good preparation & teach detail concept of any topic. But the most of the teachers working hour is spent in giving tutorial/tutorial, checking, marking, attendance and other school duties. Many teachers are sent emails after midnight

because there was no other time to do this and also teachers don’t have time to look after their own children. [3, 4]

In education, tutorial is essential part of student’s learning experience. Traditionally these have been hand written into notebook & that will be checked by teachers manually. In recent year, electronic based technology has superseded much of the hand-written work with word processed tutorials and reports becoming standard practice. Traditional methods of giving tutorial, checking, marking, attendance is very time consuming, so by scrapping unnecessary paperwork and traditional procedure, we are making it easier than ever for teachers to focus on teaching and learning and getting the very best for their pupils.

We can propose this E-workbook system which is save teacher’s time by automatic checking of tutorials, also useful for dumb student which are doesn’t direct interaction with teachers as well as higher achievement on student part. This application can be achieved by using zigbee wireless sensor network.

Wireless sensor network is an integrated intelligent information system that assembles information acquisition, information transmission, information processing, it has the characteristics of low cost, energy consumption, low data rate, self-organizing networks. The ZigBee technology is the standard wireless network protocol stack for low-rate sensor and control network design, is the suitable standard for wireless sensor network. ZigBee wireless sensor network is based on the ZigBee technology. It has great application potential. [5] Zigbee modules have the ability to transmit Digital, PWM, Analog or Serial RS232 signals wirelessly.

In this proposed system, such technologies will considered and a student workbook (question-written answer notebook in paper format) used for automatic assessment of class tutorials. Electronic student workbook (E-Workbook) can be basically having three easy steps which is illustrating from the below figure

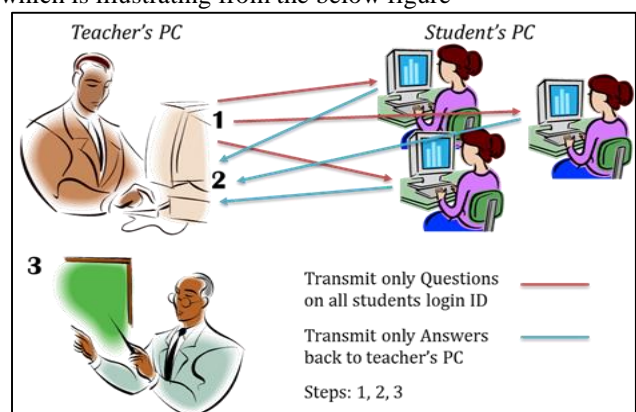


Fig. 1: E-Workbook Process

Essentially, a login ID is for a student identification & authentication. If teacher wish to gives a tutorial to student, for that they have to write the questions on their PC. Then they will be distributed only the tutorial questions from his/her PC to all students on their login ID through

zigbee in first step. In the second step; the questions will be displayed on student's PC after they authenticate by login ID. After solving all questions, they sending a summary of the answers from his/her PC to teacher's PC through zigbee. The tutorial answers are automatically collating the result on teacher's PC and available for the class teacher. Teacher will instantly provide these results for the individual student and the class as a whole. If particular students have problem at answering the tutorial questions, then the teacher will immediately knows from their PC. These students are immediately and automatically made aware at the time of teacher give an answer of highlighted problems at the start of the class in third step. The student therefore retains his/her copy of the fully-worked solutions for reference and the teacher has the results available without an explicit need to personally checking the tutorials and manually collates the results. [1]

II. OVERALL DESIGN

The proposed system is to develop an electronic student workbook, which exists to aid the student and teacher to support teaching and learning. This system will be developed, by creating electronic student workbook using GUI on teacher's PC & student's PC for distribution of tutorial questions from teachers unit to student unit & getting feedback (i.e. summary of answers) from students unit back to teacher unit using zigbee. And also the system will be automatically collate the result and instantly provide the results for the individual student and the class as a whole. (i.e. automatic assessment of tutorial).

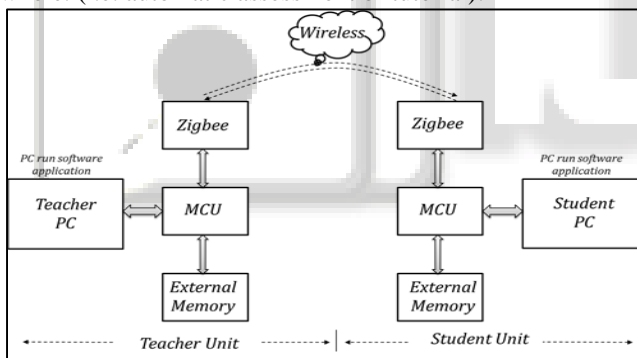


Fig. 2: Block diagram of E-Workbook system.

The proposed E-Workbook system is basically having two units one is teacher unit & another one is student unit. Block diagram of E-Workbook system is as shown in below fig.(2). Teacher wish to give a tutorial question to students, they first write into their PC along with summary of answers and send only tutorial questions to all students on their unique ID though zigbee. The question are store into SD card at student unit at the time of student PC is turn OFF. Before sending the answers of tutorial question back to teacher unit the student have to login into their PC (student PC) with the help of login ID & password. Each and every student has their unique login ID & password. The answers of tutorial question which is sending by every students that will store along with their unique ID in SD card at teacher unit at the time of teacher's PC is turn OFF. After teacher turning ON their PC the result will automatically collated with the help of software running in teacher's PC. For the teacher, there are the benefits that the student progress in tutorials can be obtained and instantly

analysed by the workbook without the need to read all notebook (suitable for large classes) and also problems can be flagged and dealt with on an individual student basis.

III. HARDWARE SYSTEM DESIGN

The teacher-student interaction system i.e. E-Workbook system consist of personal computer (PC). The pc used for development of two software applications for the student and teacher for performing the basic functionality. The suitable programming will be used for the interface design as it provides for a powerful graphical user interface (GUI) design capability and links to the USB (Com) port for data I/O and for database access. The tutorial question & answers send from teacher PC to student PC and vice versa. Wireless sensor network will be used for this type of two way wireless transmission i.e. zigbee technology. The zigbee modules work at the 2.4 GHz frequency which means smaller board and antenna size. Zigbee modules have the ability to transmit Digital, PWM, Analog or Serial RS232 signals wirelessly. In zigbee technology data is transmitting serially, so the system will used SD card which have ability to accept incoming serial data and then logs data to text files. Zigbee module communicated over UART or USART, we just need three basic signals which are namely, RXD (receive), TXD (transmit), GND (common ground). So, to interface UART with LPC2148 microcontroller, we just need the above basic signals. The serial data from the zigbee receiver is taken by using the Serial Interrupt of the controller. +5V and ground is connected to provide power to the module. While TX and RX pin is connected for communication. Here we can see port0 is used for transmission & reception. And before the signals coming from ARM controller it goes through MAX232 IC which is serial level conversion module. The MAX232 is an IC that converts signals from a TIA-232 (RS-232) serial port to signals suitable for use in TTL compatible digital logic circuits or to standard five volt TTL levels in order to achieve the communication between ARM7 & UART port. The circuit diagram of system is as shown in fig.3 ARM7 can provide two UART port which name as UART0 & UART1. UART0 will use for zigbee and UART1 will use for SD card. This can be illustrating from the below table.

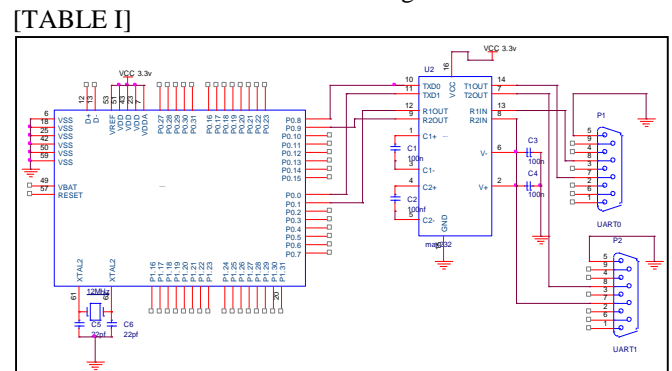


Fig. 3: Circuit Diagram

UART Connector	LPC2148 processor lines	Serial port Selection
UART0 (Zigbee)	TXD-0	P0.0
	RXD-0	P0.1
UART1 (SD Card)	TXD-1	P0.8
	RXD-1	P0.9

Table 1: Zigbee and UART1

IV. SOFTWARE SYSTEM DESIGN

In order to access the E-Workbook system there is some software design is required. For the data transmission between wireless communication modules i.e. zigbee or temporary storage date i.e.SD card and PC is via ARM7. In ARM7, controller framework can perform with the help of Keil software. In Windows, send and receive serial data mostly by MSComm control which is provided by Microsoft, or Serial communications API functions under Windows. The software is used to design graphical user interface (GUI) to perform teacher & student basic task. The two software applications were required to have the following basic functionality. Visual Basic 2010 as part of the Visual Studio programming suite from Microsoft was used for the interface design as it provides for a powerful graphical user interface design capability and links to the USB (Com) port for data I/O and for database access.

The example of GUI display on teacher PC is as shown in figure (4) & the example of GUI display on student PC is as shown in figure (5).

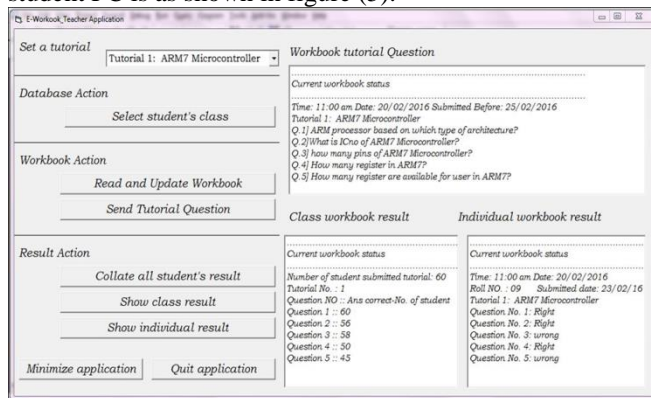


Fig. 4: GUI on Teacher PC

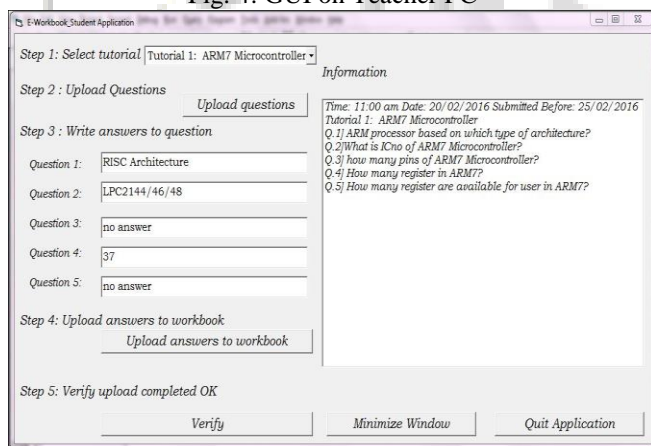


Fig. 5: GUI on Student PC

V. CONCLUSION

This paper conveys the concept of electronic student workbook which exists to aid the student and teacher to support teaching and learning with the help of suitable software application running in PC. The system will introduce computer assisted electronic workbooks & intelligent tutors could result in higher achievement on the students' part as well as result will automatically collate and instantly provide the results for the individual student and the class as a whole on teachers' part. The system will provide login ID to student for authentication, zigbee for

duplex data transmission & store temporary data in controller with external memory. The system use for saving teacher's time by automatic assessment of the tutorials and higher involvement in learning process with this system on student part who does not take active part in traditional learning process.

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