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ARDUINO AND PHP BASED ELECTRONIC VOTING SYSTEM DESIGN AND IMPLEMENTATION

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Abstract
With the development of information technologies, the electronic voting system which began to be used in many areas and it also affected the field of education and it has been used in many countries in the learning process.

In this study, a voting material that can be used in lectures has been developed in order to determine the level of knowledge and opinions of the students. The voting unit to be developed is sensitive to hand pressure, and Arduino Mega is used as an electronic card. In addition, a PHP based software system is developed to collect and use data generated from voting material so that results can be evaluated in a computer environment. The system enables the user to interactively determine the students' feelings and thoughts and helps the lecturers to edit the course content, material.

Keywords: electronic voting, arduino, interactive training, teaching material, classroom voting.

INTRODUCTION

Given the convenience that technology brings to human life, the electronic voting system is inevitable. Electronic voting (E-voting) system is a wireless technology that enables information gathering and analysis phases to be conducted instantly from a single point. People can do their tasks much more quickly, easily, cheaply and interactively through this technology. E-voting can be used in many domains such as in competitions, election votes, ratings, market research.

The developed system aims to make teaching more efficient if used as a source to assist the existing courses and examination system. When the literature is reviewed, it could be seen that electronic voting system is used in lessons, in designing different forms and in determining the effect of system on the students (Akkuş et al., 2012; Barber & Njus, 2007; Cubric & Jefferies, 2015; d'Inverno et al., 2003; Draper et al., 2002; Draper & Brown, 2002; Halloran, 1994; Jackson & Trees, 2003; Lang & Kostrab, 2015; Roschelle et al., 2004; Simpson & Oliver, 2006; Simpson & Oliver, 2007; Weldemariam & Villafiorita, 2010). Response system technology has been used in previous studies and subjects such as nursing, engineering, computer science, mathematics, chemistry, philosophy, biology, physics, medicine, veterinary and dental education, economics, psychology (Akkuş et al., 2012).

In this study, the teacher reflects the questions prepared before the lesson on the board with the help of projection. The students answer these questions using the controls. Responses from the control are transferred to the server computer via the lecturer's mobile phone or tablet (receiver unit) using Bluetooth communication technology. The answers can be stored on the server database and

displayed on the web when statistical reports on the device (person), class, university and time are requested. The system provides further useful advantages:

- It supports active participation and interaction of students during the learning process.
- Students' rate of not responding to questions is reduced because they feel reserved and shy
- It increases student motivation if used appropriately.
- It increases diversity and participation in classes.
- It provides quick feedback
- It enhances learning
- It allows the instructor to edit the course content, material and speed of expression.
- It avoids unnecessary paper costs and waste of time if used as an electronic exam

They system also have some drawbacks:

- A training is needed for installation and use of the system.
- The phone to be used by the instructor must be open to Bluetooth and internet access.
- When used extensively during instruction, the information given by the students may be random and wrong information may be delivered.

MATERIALS AND METHODS

In this study, apart from the control hardware and software required for electronic voting, a special PHP-based computer interface software was developed for the receiver unit android software and reporting stage. The operating logic of the system can be summarized as follows:
Firstly, it is checked whether data transmission from the commander is carried out or not. The control of this process is coded as 0 or 1 on the backplane. If the student has pressed the command, that is, if there is data, it is coded as 1 and if no data is coming from the command then it will be 0. If there is no data transmission from the controller, the system will be paused and we will go back to check whether the data transmission has been done. If the incoming data is 1, then it is better to proceed to the next stage to read the data. Since the hand pressure sensitive sensor is used on the control, the student will perform his / her scoring with the help of hand pressure. The pressure data arriving at the stage of reading the data passes through certain processes and determines the voting result of student proportionally with the pressure. LEDs on the control are illuminated according to the relevant results. The data received by the microcontroller in the controller is held to be sent to the receiver unit via Bluetooth. Before data transmission starts, it is checked whether there is a Bluetooth connection between the controller and the receiving unit. If there is a connection, the related data is sent to the receiving unit via Bluetooth communication. If there is no connection between the control unit and receiver unit, it will return to the first stage. Since the data coming from the mobile device will be transmitted over the internet, the device should have an internet connection (Wi-Fi or mobile data). If the mobile device does not have an internet connection, it goes back to the first step. If an Internet connection is established, the data coming from the web service software is processed according to the database. It is checked if the data has connection to the database via PHP software. If control approval is obtained, the data is processed and added to the data database at this stage. Reports can be viewed on the web at any time. Report output can be obtained through the system. The flow diagram of the system is shown in figure 1.

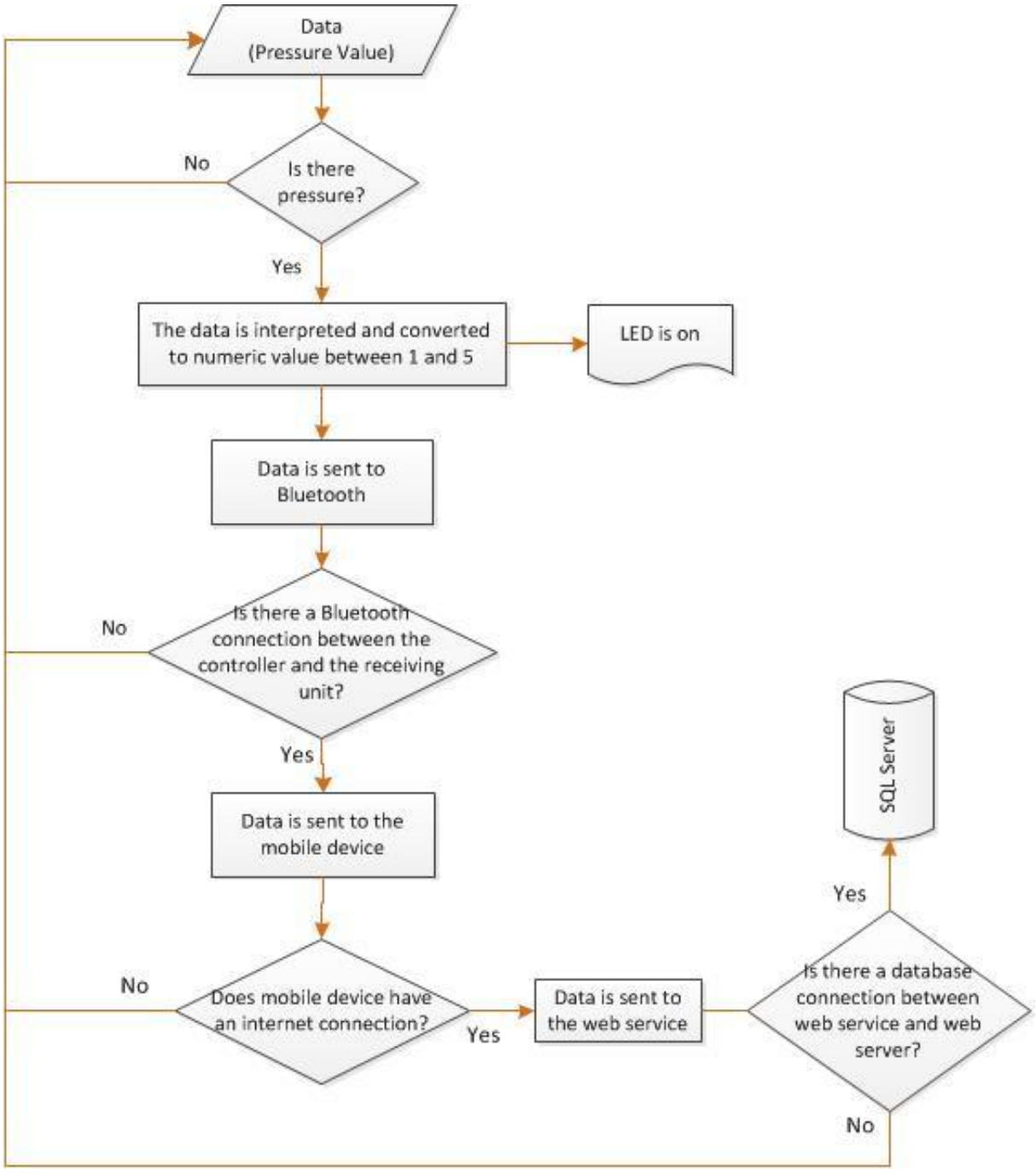


Figure 1: The flow diagram of the system

Hardware Structure and Development Process of System

The hardware components of the system can be grouped under 3 main headings. As shown in Figure 2, these are the control module which the students use for voting, the instructor's tablet computer (receiver unit) and web server units which includes database.

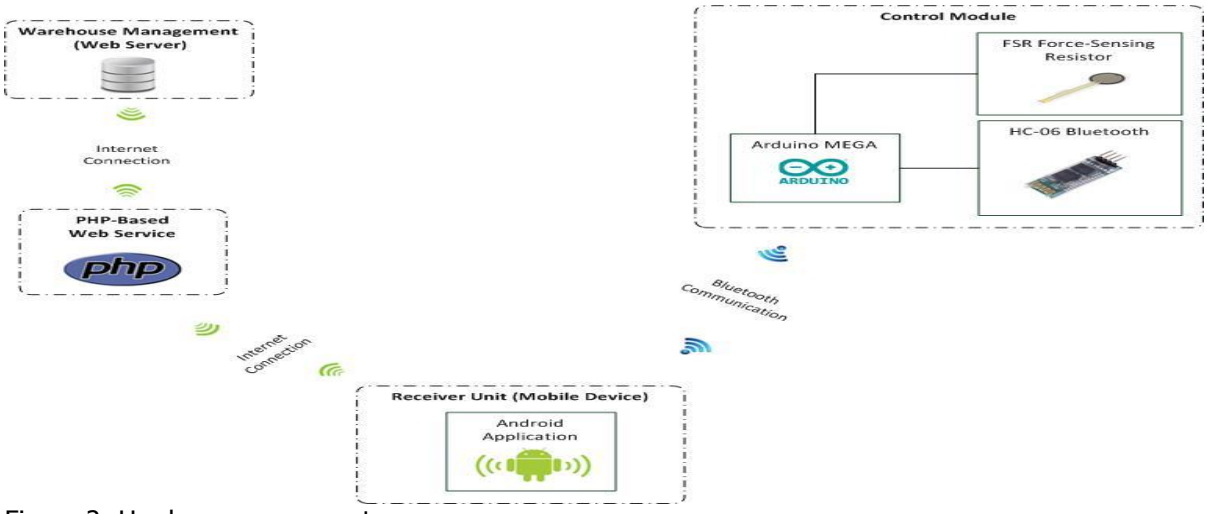


Figure 2: Hardware components

In the control module, a microcontroller (Arduino Mega) is used in the control box to send and receive the vote (data) to be used. Bluetooth sensor needed to send data to microcontroller and pressure sensor to be used during voting are connected to microcontroller. The connection diagram of the control module is shown in Figure 3 and the external image in Figure 4.

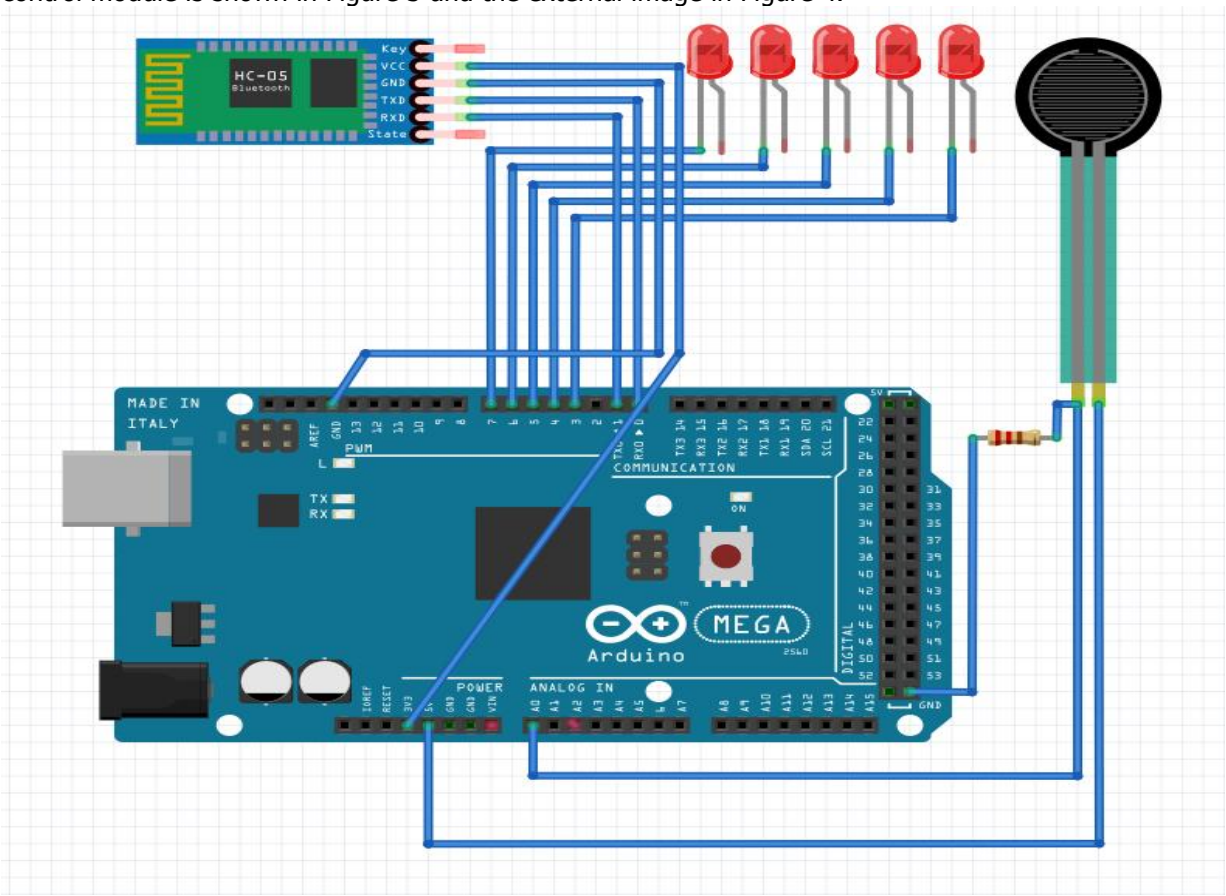


Figure 3: Connection diagram of the control module

Figure 4: Control Module

Each control communicates the responses of students to the receiving unit (android device) using Bluetooth communication technology. The receiving unit is the instructor's android (phone or tablet) device. The Android device has to be connected to the internet via Wi-Fi or mobile data in order to communicate with the service. The server database is communicated via the web service by the android software developed for the receiving unit, and the votes of students are saved in database. The developed PHP software help data to be displayed on the web graphically according to person, class, universities and time. In Figure 5 you can see the scores given by the student number 2 at A university. In Figure 6 you can see several example reports.

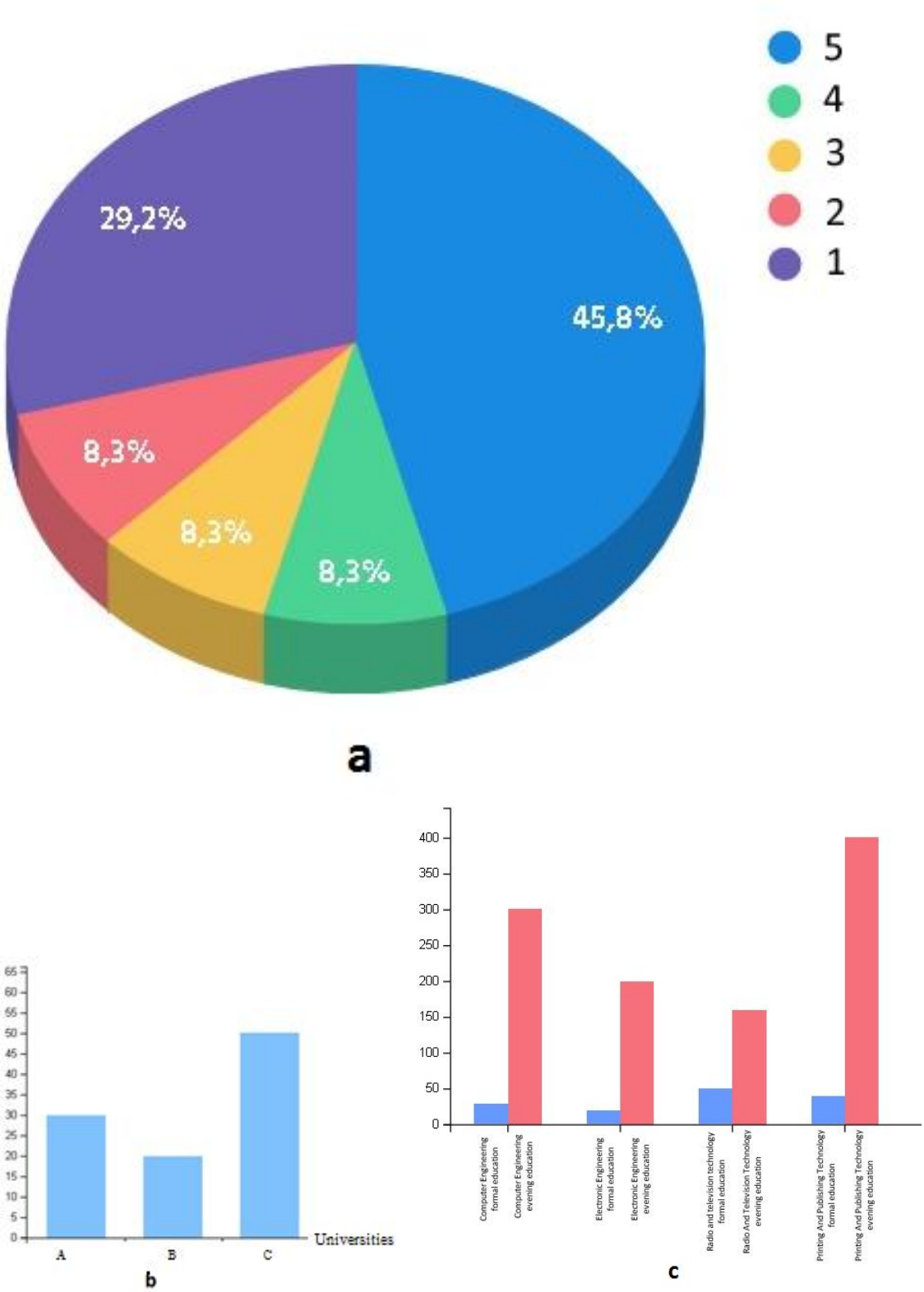
School Reports

Show 10 entries Search:

Class Name	ClientID	Date	Point
A	2	25-05-2017 23:15:42	3
A	2	25-05-2017 23:15:42	3
A	2	25-05-2017 23:15:42	2
A	2	25-05-2017 23:15:42	4
A	2	25-05-2017 23:15:42	1
A	2	25-05-2017 23:15:42	4
A	2	25-05-2017 23:15:42	2
A	2	25-05-2017 23:15:42	4
A	2	25-05-2017 23:15:42	1
A	2	25-05-2017 23:15:42	4

Showing 1 to 10 of 37 entries Previous 1 2 3 4 Next

Figure 5: Scores given by the student number 2 at A university



a: Percentage of votes in a class
b: Graphical view according to universities
c: Comparison of the score of formal education and evening education
Figure 6: Reports

In the developed system, applications were made with one control as a prototype, the flexibility of the system allows more controls to be added to the system.

CONCLUSION AND SUGGESTIONS

It can be seen that voting systems have the potential to increase learning. Voting systems are not a teaching approach, but a tool. These systems can be used for lectures, confidence evaluation, objective tests and electronic exam applications. The developed system not only motivates the student, but also has the ability to increase diversity and participation in the classes. It increases the participation of each student by getting quick feedback. The multiple evaluation of each student reduces the load of the instructor and helps arranging the speed of lecturing. When used as an electronic test application, this system avoids unnecessary paper waste and waste of time. In the developed system, Bluetooth wireless communication is used. Instead of Bluetooth, data can be transferred in different sizes with a large number of people using XBee or RF wireless communication systems. More functions and keypads can be added to increase the use of the controllers.

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