RFID BASED DATA ACQUISITION VOTING SYSTEM TO AVOID VOTE DUPLICATION

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Abstract

This paper proposes a method for the ARDUINO-based secure data collection voting system to avoid repeated voting in elections. This paper discusses the innovative voting methods associated with RFID tags. When the voter scans this card, the ID will be checked and if it matches the program in Arduino, the PLX-DAQ is used for storing details and has the ability to store infinite personal details on the computer. After that, Serial Port data is imported and imported into Microsoft Excel for computer calculation. In this system, a voter can poll the vote easily. The voter used four pushbuttons for four different candidates. When a voter presses one of four buttons, the value of the vote increases one by one. Then click on the Results button to see the results. When clicking the "Results" button, Arduino calculates the total votes of each candidate and displays it on the LCD. This paper proposed a cost-effective and reduce the staff of voting center.

Keyword: Arduino Uno, RFID tag, PLX-DAQ, LCD

1. INTRODUCTION

A democratic government means the rules of the people will be from the people and intend for the people. To ensure that this policy makes by the people; so, elections are a vital role in choosing the competent representative to create an impressive impact of Nation. Election Commission conducts a fair and correct election process. Previous some past few decades' elections were held by ballot paper which was very risky. This system change ballot paper but in this voting system whenever a person goes to the polling booth to poll vote the voters have to show a voter ID card [2]. This process is a time-consuming process. Thus to avoid this kind of problem has designed RFID based voting machine.

2. SYSTEM REQUIREMENTS

The module included in the proposed system list is the Arduino Uno board, RFID (MFRC 522), Button, Buzzer, LCD, and PLX-DAQ Software.

- Arduino Uno board

Arduino is an electronics-based open-source and easy-to-use as hardware and software. In Arduino software, using Arduino IDE, programs are generated on a computer. The code can be written and edited by IDE and it converts this code into a form of instructions so that it is understood by Arduino hardware. This process of transferring instructions is called uploading. Arduino Uno is a microcontroller board based on ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs) [5]. There are 6 analog inputs. There is a 16 MHz crystal oscillator and also a USB connection. There is a power jack. There are an ICSP header and a reset button. It has everything needed to support the microcontroller; easily connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery. Arduino C is a programming language derived from C / C ++ and is included in a built hardware-based library. The following in table 1 description is Technical Specification in Arduino Uno [1].

Microcontrôleur	Atmega 328
Opérationnel Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital Input/ Output Pin	14 (of which 6 provide PWM output)
Analog Input pin	6
DC current per Input/ Output Pin	40mA
CD current for 3.3V pin	50mA
Flash Memory	32KB of which 0.5KB used by boot loader
SRAM	2KB
EEPROM	1KB
Clock Speed	16 MHz

Table 1. Technical Specification in Arduino Uno

- RFID (MFRC 522)

The RFID Reader is also known as the Proximity Coupling Device (PCD), which reads data through a single frequency antenna. In the case of the passive tag, the reader generates a radio signal. Only then can the passive tag transmit signals that the reader can read with energy. The reader interprets the received information and transfers it to a wireless or wireless transmitter. The same Reader can read data from frequency-based tags. The following in table 2 description is Compare Active RFID and Passive RFID [6].

Description	Active RFID	Passive RFID
Power	Have own power source	No internal power source
Required Signal Strength	Low	High
Communication Range	Long range (100m+)	Short range (3m)
Range Data Storage	Large read/write data(128kb)	Small read/write data (128kb)
Cost Applications	Expensive Auto Manufacturing, asset tracking	Inexpensive Electronic tolls, item Level tracking

Table 2. Compare Active RFID and Passive RFID

- Button

In this paper, buttons are used to cast vote by voters. Here five buttons have been implemented named SW1, SW2, SW3, SW4 and result button. These buttons are connected with LCD and used to input for the microcontroller. Each and every button belongs to the different political parties except the result button. If the person is already enrolled one, then the only voters can cast the vote. When voters press a button named SW1, SW2, SW3 and SW4 vote are polled for respective political candidates. Then click on the Results button to see the results.

- Buzzer

When the RFID reader scans the tag, checks the ID. If the person has voted previously or invalid tag, buzzer rings, and voting cannot be continued anymore.

- LCD

Figure 9 shows an LED backlight and two rows of up to 16 characters in each row can be displayed. The rectangles represent the pixels that characterize the display and the characters that each character plays. The screen is white and is intended to display text. LCD screen functions as an interface between the user and Arduino, which displays messages that feature the user to know when to register and to vote and also whether their vote is valid or not [4].

LCD	Display Arduino Board
VSS pin	GND pin
VDD pin	5v pin
VO pin	10k potentiometer out pin
RS pin	Digital pin 7
RW pin	GND pin
Enable pin	Digital pin 6
D4 pin	Digital pin 5
D5 pin	Digital pin 4
D6 pin	Digital pin 3
D7 pin	Digital pin 2
Anode pin	5v pin with 10k resistor
Cathode pin	GND pin

Table 3. LCD Display to Arduino Connection

- PLX-DAQ Software

In the proposed system, the Parallax Data Acquisition tool (PLX-DAQ), which connects Arduino with Excel, is easily implemented. Once the Arduino code is uploaded into the Arduino, click on the PLX-DAQ spreadsheet icon. Choose the port the Arduino is connected to and then click Connect [3].

3. SYSTEM DESIGN AND IMPLEMENTATION

When the user enters the polling-booth, the RFID reader scans the tag and then the controller gets the tag number. And then the controller checks a valid tag or not. And also the controller checks the user has previously voted or not. Then the device is connected to a computer with PLX-DAQ software installed. A voter list will be created on a computer in Excel format. This record contains voter Name, NRC no, Date, Time. If this user is a voter, the noise level will be alarmed.

Now the user can select the candidate's options (BJP/INC/AAP/OTH) from the four buttons keypad. Once the user has pressed at a time and the voting result will be displayed on LCD. Repeat the above steps to see the results for each candidate and the candidate with the most votes. Then press the results button to see the winners of this election.

An RFID (MFRC522) reader was used to read RFID tags without any contact between the reader & the Tag. The system uses 125 kHz RFID reader & tags which have a range of 5-8 cm. The output of the RFID reader is serial hence it is given to the RX pin of the controller i.e. Digital pin10. The communication baud rate is 9600.

An LCD (16x2 Alphanumeric) is used to display information. The LCD's pins, D4 to D7 are connected to Arduino digital pin numbers 2, 3, 4, 5, 6, and 7. The Two pins (RS & Enable) are used to display on LCD. These two pins are connected to D7 and D6 of the controller. The RW pin is directly connected to the ground for only writing purposes of the LCD (Liquid Crystal Display) not reading from it. The button "selection" is used to select voting options for the user. The complete circuit diagram is shown in Figure 1(a) and Figure 1(b).

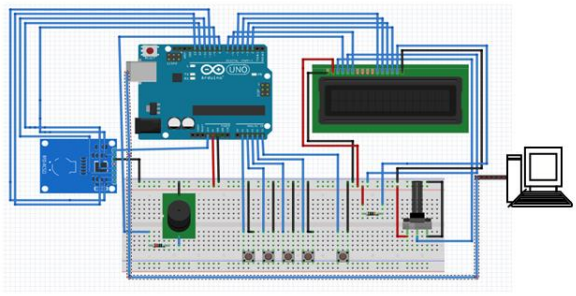

Figure1 (a) Circuit connection diagram of the system

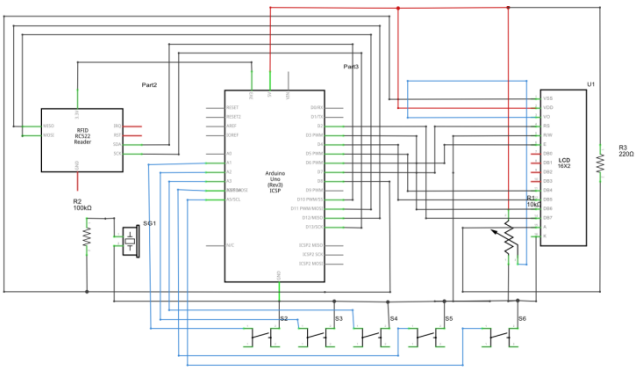

Figure1 (b) Schematic diagram of the system

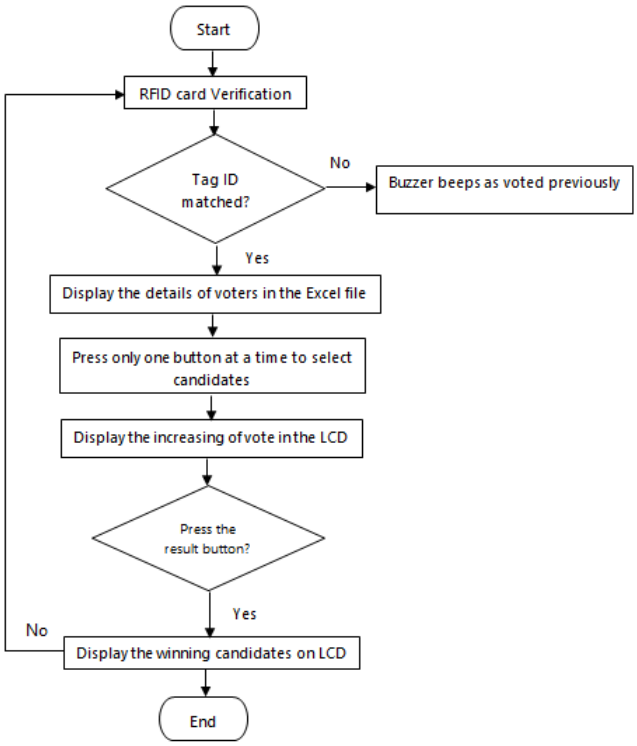

Figure 2 System Flow

4.EXPERIMENTAL RESULTS

The experimental results of the proposed system are discussed in this section. Test results are bifurcated in two separate phases. One is the verification phase and another one is the voting process phase.

- Test Results of Verification phase

Test Results of the Verification Phase are described in Figure 3 to Figure 4. RFID module found successfully result in Figure 3 which shows accurate details of date and time continuously Figure 4, Voter list recorded successfully along with registered ID no. and Logfile of voter list sheet which is generated by PLX-DAQ software.

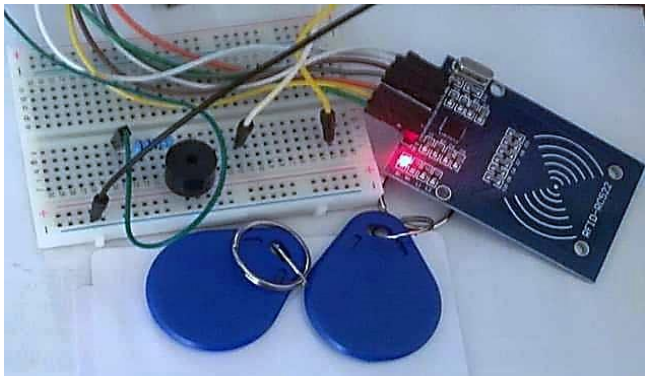

Figure 3 Scan for RFID card

ID	Date	Name	Number	Card ID	1st Time IN	2nd Time IN
1	10/29/2019	Daw Su	228474	16610074239	11:17:03 AM	
2	10/29/2019	U kyaw	221407	1122188843	11:17:19 AM	
3	10/29/2019	U Mg	422222	20219199115	11:17:24 AM	
4	10/29/2019	U kyaw	221407	1122188843		11:17:28 AM
5	10/29/2019	Daw Aye	359347	8517870131	11:17:32 AM	
6	10/29/2019	Daw Su	228474	16610074239		11:17:40 AM
7	10/29/2019	U Mg	422222	20219199115		11:17:43 AM
8	10/29/2019	Daw Aye	359347	8517870131		11:17:47 AM

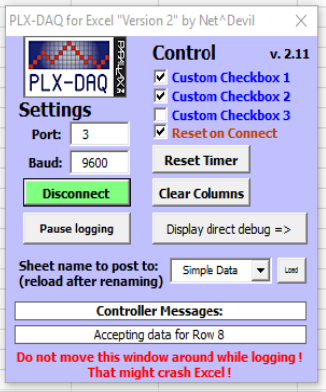

Figure 4 Display voting Data Log File recorded in Excel Sheet

- Test Results of Voting Process Phase

Test Results of Voting Process Phase is described in Figure 5 to Figure 11.

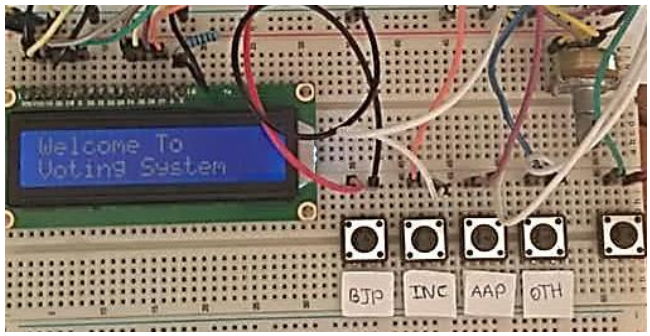

Figure 5 System Validation Message

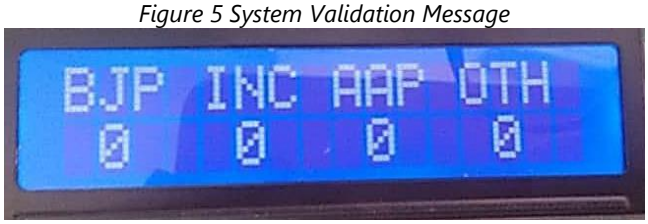

Figure 6 Select favourite candidate

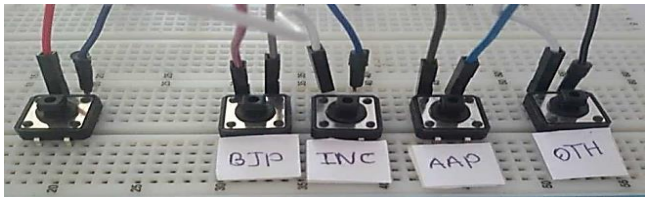

Figure 7 Press buttons to select candidate

Figure 8 Display voting result on LCD

Figure 9 Show the winning candidate on LCD

Figure 10 Display message in no voting condition

Figure 11 Display voting result in tie up condition

5. CONCLUSIONS

This system provides security during the voting process. This system perfectly provides for the voter. This system is linked to PLX-DAQ software to generate the log file voter sheet to avoid vote duplication. The RFID based voting system is security can be very useful for implementing the real-time application for recording the voter list and tracking system as well as providing the security benefits. This system is more secure, fast responded, and cost-effective. The suggested system is better than other traditional systems as it is designed on a low power platform.

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