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# Solar Based Electronic Voting Machine using Finger Print Sensor

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**Abstract:** The paper aims at developing an advanced Electronic Voting Machine (EVM) which helps in free and a fair way of conducting elections employing biometrics in order to avoid rigging and to enhance the accuracy and speed of the process. The design of a solar powered EVM prototype is efficient and allows the user a relief from the laborious act of vote collection and counting. Furthermore, it also removes the errors from the system, since it is a digital device. One of the biggest concerns of EVM is the security system which includes insider threats, network vulnerability and challenges to auditing. To limit these issues the prototype has been developed with a finger print sensor module so as to avoid any malpractices. As a pre-poll procedure, a database consisting of the thumb impressions of all the eligible voters in a constituency is created. During elections, the thumb impression of a voter is entered as input to the system. This is then compared with the available records in the database. If the pattern matches with anyone in the available record, access to cast a vote is granted. But in case the pattern doesn't match with the records of the database or in case of repetition, access to cast a vote is denied or the vote gets rejected. All the voting machines are connected in a network, through which data transfer takes place to the main host through Internet of Things (IOT).

**Keywords**: EVM, biometric, solar power, ARM 7 Microcontroller, IOT.

## I. INTRODUCTION

This paper aims at developing an advanced Electronic Voting Machine (EVM) which helps in free and fair way of conducting elections which are basis for democratic country like India. A biometric system is essentially a pattern recognition system that operates by acquiring biometric data from an individual, extracting a feature set from the acquired data, and comparing this feature set against the template set in the database. Depending on the application context, a biometric system may operate either in verification mode or identification mode.

The main controlling device of the whole system is a Microcontroller. Finger print module, LCD, Wi-Fi module and control buttons are interfaced to the Microcontroller. Solar panel is used to power up the microcontroller. Initially the finger prints are loaded into the finger print module through PC interface. Whenever a person places his finger on the finger print module, it gives related data to Microcontroller. The Microcontroller validates fingerprint and gives access to vote through control buttons, if fingerprint is valid. The result can be seen on LCD display. There is also an admin button, by pressing that button we can view the result. Through Wi-Fi module also we can monitor the result remotely. To perform this task, Microcontroller is loaded with an intelligent program written in embedded 'C' language.

## II. METHODOLOGY

The design of a solar powered EVM prototype is efficient and allows the user a relief from the laborious act of vote collection and counting. Furthermore, it also removes the errors from the system, since it is a digital device. One of the biggest concerns of EVM is the security system which includes insider threats, network vulnerability and challenges to auditing. To limit these issues the prototype has been developed with a finger print sensor module so as to avoid any malpractices. As a pre poll procedure, a database consisting of the thumb impressions of all the eligible voters in a constituency is created. During elections, the thumb impression of a voter is entered as input to the system. This is then compared with the available records in the database. If the pattern matches with anyone in the available record, access to cast a vote is granted. But in case the pattern doesn't match with the records of the database or in case of repetition, access to cast a vote is denied or the vote gets rejected. All the Voting machines are connected in a network, through which data transfer takes place to the main host through Internet of Things (IOT)

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## III. HARDWARE APPROACH

### 3.1 Block Diagram and Schematic diagram:

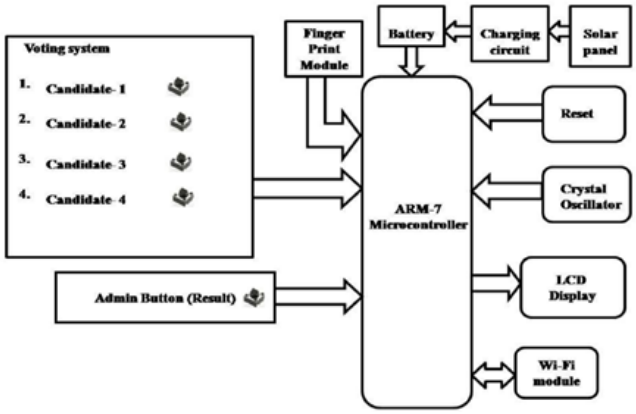


Fig: Block diagram

The control of the whole system is done by ARM 7 Microcontroller. Solar panel is used to power up the microcontroller. The energy from solar panel is stored into the battery and the battery is used to power up the controller.
The other modules of the system that is Finger print module, LCD, Wi-Fi module and control buttons are interfaced to the Microcontroller.

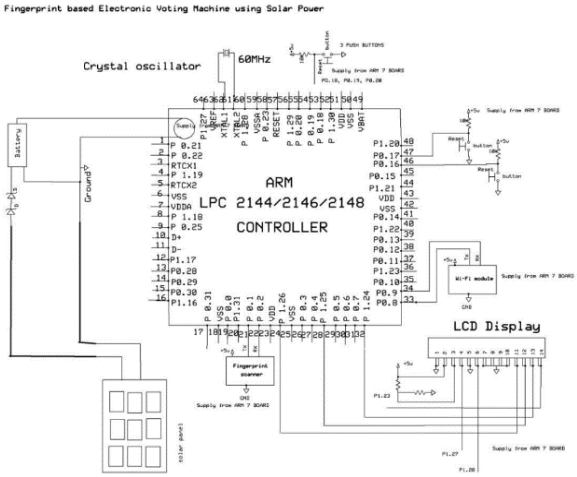


Fig: Schematic diagram

#### *3.1.1*: *solar panel*


An array of solar panels converts solar energy into a usable amount of direct current (DC) electricity. This energy is stored in battery so that it can be used in the absence of sunlight. As per the application the solar panel is chosen such that it can produce DC sufficient enough to power up the ARM 7 Microcontroller. The solar panel used is 12x10 inches, producing 12V and 5Watts of power.

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### *3.1.2*: *Finger Print Module*

The fingerprint identification process will change slightly between products and systems. Standard systems are comprised of a sensor for scanning a fingerprint and a processor which stores the fingerprint database and software which compares and matches the fingerprint to the predefined database. Within the database, a fingerprint is usually matched to a reference number, or PIN number which is then matched to a person's name or account.

A fingerprint consists of ridges and valleys. They together provide friction for the skin. The main identification of the skin is based upon the finer points, which actually is the location and direction of the ridge endings and splits along a ridge path.

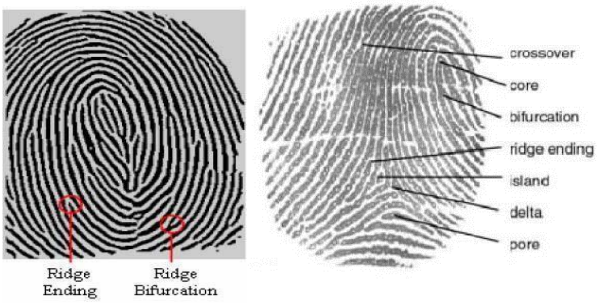


FIG: Finger print verification

The image shows all the other characteristics of a fingerprint. These characteristics may also be helpful during the process of finer points extraction. The unique information used for the identification includes the flow of the friction ridges, the sequence and also the presence/absence of the individual friction ridge path features.

### *3.1.3*: *LCD Display*

One of the most common devices attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

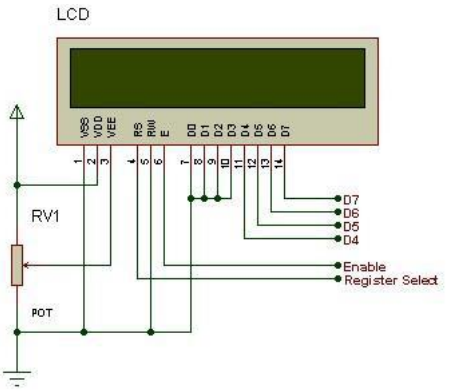


Fig: LCD Pin diagram

The LCD requires 3 control lines as well as either 4 or 8 I/O lines for the data bus. The user may select whether the LCD is to operate with a 4-bit data bus or an 8-bit data bus. If a 4-bit data bus is used the LCD will require a total of 7 data lines (3 control lines plus the 4 lines for the data bus). If an 8-bit data bus is used the LCD will require a total of 11 data lines (3 control lines plus the 8 lines for the data bus).

The three control lines are referred to as EN, RS, and RW.

The EN line is called "Enable." This control line is used to tell the LCD that we are sending it data. To send data to the LCD, our program should make sure this line is low (0) and then set the other two control lines and/or put data on the data bus. When the other lines are completely ready, bring EN high (1) and wait for the minimum amount of time required by the LCD datasheet (this varies from LCD to LCD), and end by bringing it low (0) again.

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The RS line is the "Register Select" line. When RS is low (0), the data is to be treated as a command or special instruction (such as clear screen, position cursor, etc.). When RS is high (1), the data being sent is text data which should be displayed on the screen. For example, to display the letter "T" on the screen we would set RS high. The RW line is the "Read/Write" control line. When RW is low (0), the information on the data bus is being written to the LCD. When RW is high (1), the program is effectively querying (or reading) the LCD. Only one instruction ("Get LCD status") is a read command. All others are write commands--so RW will almost always be low. Finally, the data bus consists of 4 or 8 lines (depending on the mode of operation selected by the user). In the case of an 8-bit data bus, the lines are referred to as DB0, DB1, DB2, DB3, DB4, DB5, DB6, and DB7.

### *3.1.4*: *WI-FI Module (ESP8266)*

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much Wi-Fi-ability as a Wi-Fi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

There is an almost limitless fountain of information available for the ESP8266, all of which has been provided by amazing community support. In the Documents section below you will find many resources to aid you in using the ESP8266, even instructions on how to transforming this module into an IoT (Internet of Things) solution!

The ESP8266 Module is not capable of 5-3V logic shifting and will require an external Logic Level Converter. Please do not power it directly from your 5V device board.

This new version of the ESP8266 Wi-Fi Module has increased the flash disk size from 512k to 1MB.

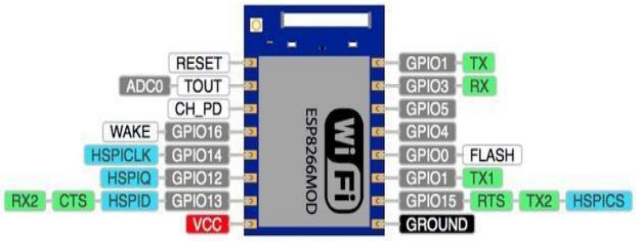


FIG: WiFi module pin diagram

***Electrical Characteristics:***
Working Voltage: 3.3V
Maximum IO Driving Power IMAX: 12 mA
Maximum IO Voltage Level VMAX: 3.6V
Current Consumption: 100mAmp

### *3.1.5*: *Push button/ Control switch:*

A push-button (also spelled pushbutton) (press-button in the UK) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, though even many un-biased buttons (due to their physical nature) require a spring to return to their un-pushed state. Different people use different terms for the "pushing" of the button, such as press, depress, mash, and punch.

Most load control switches consist of a communication module and the relay switch and can be used as part of a demand response energy efficiency system such as a smart grid. Such a switch operates similarly to a pager, receiving signals from the Power Company or electrical frequency shift to turn off or reduce power to the appliance during times of peak electrical demand. Usually, the device has a timer that will automatically reset the switch back on after a pre-set time. Some operation intolerant appliances, such as dryers, use switches that can reduce or shut off power to their heating coils yet still tumble until signalled to resume full power.

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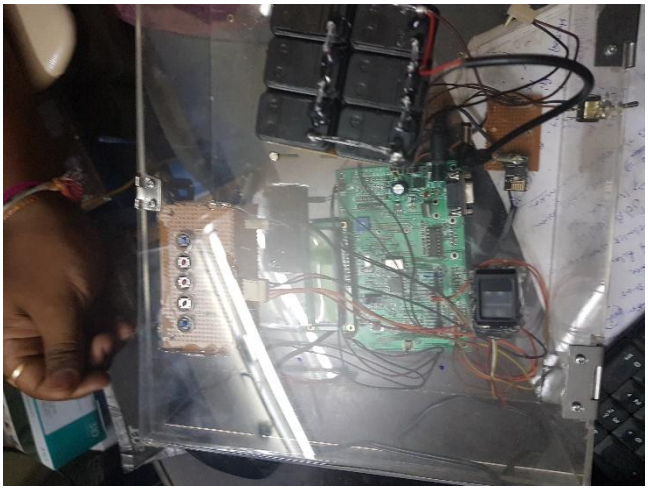
### *3.1.6*: *Microcontroller ARM7TDMI-S(ARM LPC2148)*

The ASK 32-bit ARM7TDMI-S microcontroller Training board is specifically designed to help students to master the required skills in the area of embedded systems. The kit is designed in such way that all the possible features of the microcontroller will be easily used by the students. The kit supports in system programming (ISP) which is done through serial port. ASK Board has new and advance options which will give user the liberty of implementing complex logic used in the design of Embedded System.

### *3.1.7*: *Hardware Assembled*

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## IV. SOFTWARE APPROACH

### *4.1 Express PCB*

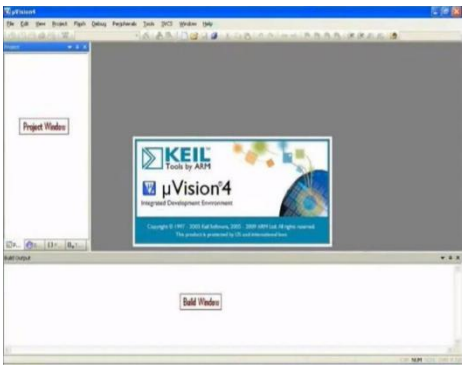
Breadboards are great for prototyping equipment as it allows great flexibility to modify a design when needed; however the final product of a project, ideally should have a neat PCB, few cables, and survive a shake test. Not only is a proper PCB neater but it is also more durable as there are no cables which can yank loose. Express PCB is a software tool to design PCBs specifically for manufacture by the company Express PCB (no other PCB maker accepts Express PCB files). It is very easy to use, but it does have several limitations.

It can be likened to more of a toy then a professional CAD program.
It has a poor part library (which we can work around)
It cannot import or export files in different formats
It cannot be used to make prepare boards for DIY production

Express PCB has been used to design many PCBs (some layered and with surfacemount parts). Print out PCB patterns and use the toner transfer method with an Etch Resistant Pen to make boards. However, Express PCB does not have a nice print layout. Here is the procedure to design in Express PCB and clean up the patterns so they print nicely.

### *4.2: Keil u Vision4 software*

The µVision IDE from Keil combines project management, make facilities, source code editing, program debugging, and complete simulation in one powerful environment. The µVision development platform is easy-to-use and helping you quickly create embedded programs that work. The µVision editor and debugger are integrated in a single application that provides a seamless embedded project development environment




#### 4.2.1: *Creating HEX for the Part*

1. Click on Target 1 in Tree menu
2. Click on Project Menu and select Options for Target 1
3. Select Target Tab
4. Change Xtal (MHz) from 50.0 to 11.0592
5. Select Output Tab
6. Click on Create Hex File check box 7. Click OK Button 8. Click on Project Menu and select Rebuild all Target Files
9. In the Build Window it should report '0 Errors (s), 0 Warnings'
10. You are now ready to Program your Part

#### *4.2.2: Testing Program in Debugger*

1. Comment out line ACALL DELAY by placing a Semicolon at the beginning. This will allow you to see the port change immediately.
2. Click on the File Menu and select Save
3. Click on Project Menu and select rebuild all Target Files 4. In the Build Window it should report '0 Errors (s), 0 Warnings'

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5. Click on Debug Menu and Select Start/Stop Debug Session

### *4.2.3: Running the Keil Debugger*

1. The Keil Debugger should be now be Running.
2. Click on Peripherals. Select I/O Ports, Select Port 1
3. A new window should port will pop up. This represent the Port and Pins
4. Step through the code by pressing F11 on the Keyboard. The Parallel Port 1 Box should change as you completely step through the code.
5. To exit out, Click on Debug Menu and Select Start/Stop Debug Session.

## V. CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Secondly, using highly advanced IC's with the help of growing technology, the paper has been successfully designed, tested and implemented in hardware.
Whenever a person places his finger on the finger print module, it gives related data to Microcontroller. The Microcontroller validates it and gives access to vote through control buttons, if fingerprint is valid. The result can be seen on LCD display. There is also an admit button, by pressing that button we can view the result. Through Wi-Fi module also we can monitor the result remotely. To perform this task, Microcontroller is loaded with an intelligent program written in embedded 'C' language.

The future scope of this paper is

- It can be extended by using finger vein module which can make a difference between a finger which is dead and the finger that is alive.
- We can also link aadhar card for voting purpose.
- We can also place USB camera to capture the image of the unauthorized person and email the photo to the higher authorities.
- We can also store the image and other details about the voter in the database of the PC.
- We can display the voter details when he casts the vote**.**

## REFERENCES

[1]Raj Kamal –Microcontrollers Architecture, Programming, Interfacing and System Design.
[2] Mazidi and Mazidi –Embedded Systems
[3] PCB Design Tutorial –David.L.Jones.
[4] PIC Microcontroller Manual – Microchip
[5 Embedded C –Michael.J.Pont.
[6] R. Jameel, S.U. Hani, T. Aziz, "Impact Study of Integrating Solar Plant in an 11 kV Urban Distribution System", IEEE Power & Energy Society General Meeting, 2014.
[7]F. Khatun, "Economic Implications of Political Instability", [online] Available: http://www.thedailystar.net/economic-implications-of-political-instability-7499.
[8] Kimball, J.W., Krein, P.T., 2008. Discrete-time ripple correlation control for maximum power point tracking. IEEE Trans. Power Electron. 23, 2353–2362.