ADVANCED ELECTRONIC VOTING MACHINE USING INTERNET OF THINGS (IOT)

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Abstract— Electronic Voting Machine (EVM) is a device that is used to count ballot and record votes instead of doing it manually using human resource to record and count votes.This is a long time-consuming process and prone to errors. voting is a sensitive issue, mis-management can lead to issues as large and complicated as political unrest. The debilitating effect that political unrest can eventually lead to needs no describing.this situation mis-management and the other hand, for a power-starved , the gap between demand and supply of electricity remains large. A good majority of the people are deprived of this basic facility. Over-dependency on electronic devices for sensitive purposes might not seem like a viable option either. However, renewable energy-based systems can be the solution to tackling such crisis. A solar powered EVM addresses all the above concerns. This paper discusses in detail the design of a solar powered EVM prototype which is efficient and allows the user a relief from the human resource 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.

Index Terms— Electronic Voting Machine, Renewable Energy, Solar Power, Microcontroller.
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I. INTRODUCTION

As the modern communications and Internet, today are almost accessible electronically, the computer technology users, brings the increasing need for electronic services and their security. Usages of new technology in the voting process improve the elections in natural. This new technology refers to electronic voting systems where the election data is recorded, stored and processed primarily as digital information. In the past, usually, information security was used mostly in military and government institutions. But, now need for this type of security is growing in everyday usage. In computing, e-services and information security it is necessary to ensure that data, communications or documents (electronic or physical) are enough secure and privacy enabled. Advances in cryptographic techniques allow pretty good privacy on e-voting systems.

A. Review Stage

An EVM consists of two units namely Control Unit and Balloting Unit The two units are joined by a five-meter cable. The Control Unit is with the Presiding Officer or a Polling Officer and the Ballot Unit is placed inside the voting compartment. Instead of issuing a ballot paper, the Polling Officer in-charge of the Control Unit will press the Ballot Button. This will enable the voter to cast his/her vote by pressing the blue button on the Ballot Unit against the candidate and symbol of his/her choice. The controller used in EVMs has its operating program etched permanently in silicon at the time of manufacturing by the manufacturer. No one (including the manufacturer) can change the program once the controller is manufactured. EVMs can cater to a maximum of 64 contesting candidates. There is provision for only 16 candidates in a Booth if the total number of candidates exceeds 16,then a second BU is to be linked parallel to the first Booth .Similarly, if the total number of candidates exceeds 32,then a third BU is to be connected and if the total number of candidates exceeds 48,fourth BU is to be connected to cater to a maximum of 64 candidates. As the process is faster and more reliable, the EVMs save considerable amount of time, money, paper and man power. Actual process of identifying the voter has to be done by the polling officer. For casting of votes with EVMs, the voters have to produce their Election Photo Identity Card (EPIC) issued by the Election Commission. The polling officer needs to verify the EPIC with the official list he has, then he needs to confirm whether it is an authorized card or not and he allows the voters to cast their votes. Therefore, EVMs depend upon manual verification of the EPIC. Consequently, this slows down the voting process. This limitation is overcome with the help of finger-print identification module. The second limitation is the number of contesting candidates available in the EVM. The EVMs can cater to a maximum of 64 candidates with the use of one CU and four BUs. If the number of contestant candidates exceeds 64,then the polling officer needs to carry one more set of EVM that necessitates more material and additional manpower.

B. Final Stage

The system consists of solar panel and battery as a power source, Arduino as a microcontroller, L293d motor driver IC, motor, finger print sensors 8266 IOT device and the server system. The user has to put the finger on finger print sensor, the finger print sensor reads the value and send to the web server through iot device. The Arduino will get the feedback

from the web server through the iot device the information of that person, if the person information is present in the web server and he or she is trying to access the system first time than the microcontroller gives the command to the motor and allow the user to access. if the person is not valid and he or she already given the vote than the motor will remain in idle condition. If the person allow to access the person needs to write desire candidate name further he/she will put paper inside the voting machine box.
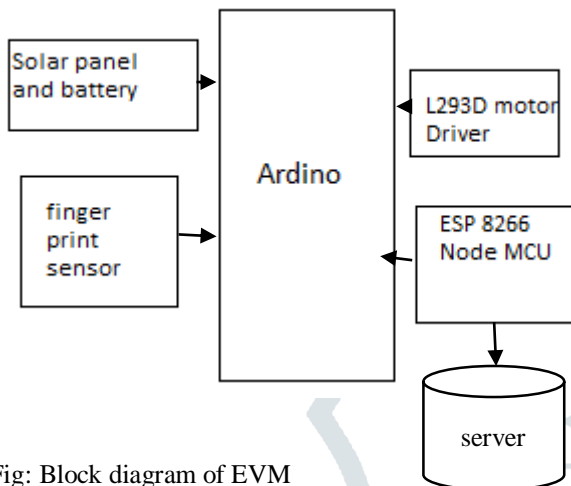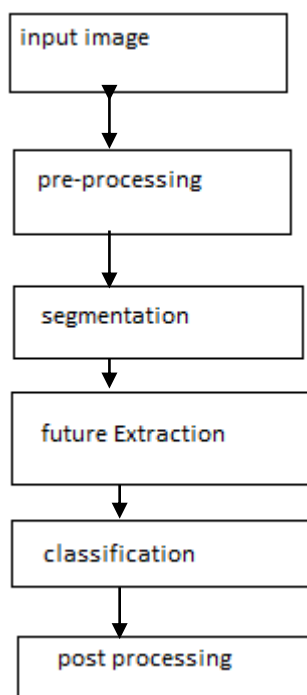
C. Figures

Fig: Block diagram of EVM

Flowchart

Ardino

The Arduino Uno is a microcontroller board based on the ATmega328

(datasheet). It has 14 digitalinput/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHzceramicresonator, aUSB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or powerit with an AC-to-DC adapter or battery to get started. The Uno differs from all receding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2up to version R2) programmed as a USB-to-serial converter.

Solar panels

Solar panels are those devices which are used to absorb the sun's rays and convert them into electricity or heat.A solar panel is a collection of solar (or photovoltaic) cells, which can be used to generate electricity through photovoltaic effect. These cells are arranged in a grid-like pattern on the surface of solar panels.

Thus, it may also be described as a set of photovoltaic modules, mounted on a structure supporting it. A photovoltaic (PV) module is a packaged and connected assembly of 6×10 solarcells. When it comes to wear-and-tear, these panels are very hardy. Solar panels wear out extremely slow. In a year, their effectiveness decreases only about one to two per cent (at times,even).

Most solar panels are made up using crystalline silicon solar cells.

Installation of solar panels in homes helps in combating the harmful emissions of greenhouse gases and thus helps reduce global warming. Solar panels do not lead to any form of pollution and are clean. They also decrease our reliance on fossil fuels (which are limited) and traditionalpowersources. These days, solar panels are used in wide-ranging electronic equipment's like calculators, which work as long as sunlight is available. However, the only major drawback of solar panels is that they are quite costly. Also, solar panels are installed outdoors as they need sunlight to get charged.

NodeMCU 8266

NodeMCU is an open source Lua based firmware for the eSP8266 WiFi SOC from Espressif and uses an on-module flash-based SPIFFS file system. NodeMCU is implemented in C and is layered on the Espressif NON-OS SDK.

NodeMCU is an open source IoT platform. Which includes firmware which runs on the ESP8266 Wi-Fi Module from Espressif Systems,and hardware which is based on the ESP-12 module. The term "NodeMCU" by default refers to the firmware rather than the dev kits. NodeMCU firmware was developed so that AT commands can be replaced with Lua

scripting making the life of developers easier. So, it would be redundant to use AT commands again in NodeMCU.

L293D Motor Driver

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors. Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance stateL293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

DC-motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current flow in part of the motor.DC motors were the first type widely used, since they could be powered from existing direct-current lighting power distribution systems. A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field windings. Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight brushed motor used for portable power tools and appliances. Larger DC motors are used in propulsion of electric vehicles, elevator and hoists, or in drives for steel rolling mills

Fingerprint sensor

A fingerprint in its narrow sense is an impression left by the friction ridges of a human finger. The recovery of fingerprints from a crime scene is an important method of forensic science. Fingerprints are easily deposited on suitable surfaces (such as glass or metal or polished stone) by the natural secretions of sweat from the eccrineglands that are present in epidermal ridges. These are sometimes referred to as "Chanced Impressions". In a wider use of the term, fingerprints are the traces of an impression from the friction ridges of any part of a human or other primatehand. A print from the sole of the foot can also leave an impression of friction ridges.

Programming

The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno from the Tools > Boardmenu (according to the microcontroller on your board). For details, see the Referenceand tutorials. The ATmega328on the Arduino Uno comes preburned with a bootloaderthat allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500protocol (reference, C header files). You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions

for details. The ATmega16U2(or 8U2 in the rev1 and rev2 boards) firmware source code is available . The ATmega16U2/8U2 is loaded with a DFU bootloader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.
- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

You can then use Atmel's FLIP software(Windows) orthe DFU programmer(Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU bootloader).

Automatic (Software) Reset

Rather than requiring a physical press of the reset button before an upload, the Arduino Uno is designed in a way that allows it to be resetby software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328

via a 100 nano-farad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip.

The Arduino software uses this capability to allow you to upload code by simply pressing the upload button in the Arduino environment. This means that the bootloader can have a shorter timeout, as the lowering of DTR can be well-coordinated with the start of the upload. This setup has other implications. When the Uno is connected to either a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened. If a sketch running on the board receives one-time configuration or other data when it first starts, make sure that the software with which it communicates waits a second after opening the connection and before sending this data. The Uno contains a trace that can be cut to disable the auto-reset. The pads on either side of the trace can be soldered together to re-enable it. It's labeled "RESET-EN". You may also be able to disable the auto-reset by connecting a 110-ohm resistor from 5V to the reset line; see this forum threadfor details.

USB Overcurrent Protection

The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.

Physical Characteristics

The maximum length and width of the Uno PCB are 2.7 and 2.1 inches respectively, with the USBconnector and power jack extending beyond the former dimension. Four screw holes allow the board to be attached to a surface or case. Note that the distance between digitalpins 7 and 8 is 160 mil (0.16"), not an even multiple of the 100 mil spacing of the other pins.

Text Extraction process

The aim of Optical Character Recognition (OCR) is to classify optical patterns (often contained in a digital image) corresponding to alphanumeric or other characters.

The process of OCR involves several steps including segmentation, feature extraction, and classification. In principle, any standard OCR software can now be used to recognize the text in the segmented frames. However, a hard look at the properties of the candidate character regions in the segmented frames or image reveals that most OCR software packages will have significant difficulty to recognize the text. Document images are different from natural images because they contain mainly text with a few graphics and images. Due to the very low-resolution of images of those captured using handheld devices, it is hard to extract the complete layout structure (logical or physical) of the documents and even worse to apply standard OCR systems. For this reason, a shallow representation of the low-resolution captured document images is proposed. In case of original electronic documents in the repository, the extraction of the same signature is straightforward; the PDF or PowerPoint form of the original electronic documents is converted into a relatively high-resolution image (TIFF, JPEG, etc.) on which the signature is computed. Finally, the captured document's signature is compared to with all the original electronic documents' signatures in order to find a match.

Architecture of Text Extraction Process

Text extraction and recognition process comprises of five steps namely text detection, text localization, text tracking, segmentation or binarization, and character recognition. Architecture of text extraction process can be visualized in

Text Detection: This phase takes image or video frame as input and decides it contains text or not. It also identifies the text regions in image.

Text Localization: Text localization merges the text regions to formulate the text objects and define the tight bounds around the text objects.

Text Tracking: This phase is applied to video data only. For the readability purpose, text embedded in the video appears in more than thirty consecutive frames. Text tracking phase exploits this temporal occurrence of the same text object in multiple consecutive frames. It can be used to rectify the results of text detection and localization stage. It is also used to speed up the text extraction process by not applying the binarization and recognition step to every detected object.

Text Binarization: This step is used to segment the text object from the background in the bounded text objects. the output of text binarization is the binary image, where text pixels and background pixels appear in two different binary levels.

Character Recognition: The last module of text extraction process is the character recognition. This module converts the binary text object into the ASCII text. Text detection, localization and tracking modules are closely related to each other and constitute the most challenging and difficult part of extraction process. Text extraction from images has ample of applications. With the rapid increase of multimedia data, need of understanding its content is also amplifying.

Image processing

The Image Processing Toolbox is a collection of functions that extend the capabilities of the MATLAB's numeric

computing environment. The toolbox supports a wide range of image processing operations, including:

– Geometric operations

– Neighbourhood and block operations

– Linear filtering and filter design

– Transforms

– Image analysis and enhancement

– Binary image operations

– Region of interest operations

CONCLUSION

This review discussed introduction about EVM and its variation, Issues of EVM, Taxonomy, and Biometric based EVM. Our efforts to understand electronic voting systems leave us optimistic, but concerned. This paper suggest that the EVM system has to be further studied and innovated to reach all level of community, so that the voter confidence will increase and election officials will make more involvement in purchasing the innovated EVM's for conduct smooth, secure, tamper- resistant Elections

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