# FUTURISTIC ELECTORAL SYSTEM USING PALM VEIN TECHNOLOGY

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## ABSTRACT

India is the largest democratic country in the world. The people choose their political leaders and government representatives. The primary objective of voting is to allow voters to exercise their right to express their choices with respect to citizen initiatives, political and other government representatives. The voting is a very huge and tedious task for highly populated countries like India. In the recent years, rigging and other malpractices are being carried out during elections which may lead to contrary results. To avoid problems mentioned above, this paper brings out the idea of Biometric voting system that uses Palm vein recognition system thereby avoiding fake and repeated voting by an individual. Palm vein technologies are leading technologies in the field of biometrics which are highly secure due to complex veins patterns and accurate. Also the vein pattern is unique to each individual and impersonation is extremely difficult thereby it enables an extremely high level of security. Typically palm vein recognition system consists of a small palm vein scanner which is interfaced with a control unit that will automatically release an empty vote to the balloting unit when the voter is legitimate. Thus the proposed system will be portable, easily adaptable with minimum power consumption and minimizes the time taken to identify legitimate voter.

**Index Terms:** Palm vein scanner, Biometric voting system, Palm vein recognition system.

## I. INTRODUCTION

The process of executing the power of citizens to elect their representatives without any discrimination is called voting. India as a democratic nation has given its citizens the right to vote during elections which are conducted by the election commission of India and this process will decide the fate of different political parties. In the early independence stages, ballot papers were used in which the citizens choose and impress the party name they were willing to vote. This process was not secure, time consuming, could be tampered easily and there may be many errors while counting of votes due to all these reasons Electronic Voting Machines were introduced which eliminated many drawbacks of paper ballot system. These EVM's provided fast and reliable systems which are easy to handle. It requires less power to operate and so these systems are used all over the country. In spite of all these advantages of EVM's, there are some issues with these systems like security tampering, repeated voting, rigging of votes etc. These malpractices cannot be identified easily so their rectification is a very tedious job. All these factors led to the invention of our idea intrinsic biometric voting system where the palm vein recognition system will be used. In this method, user's palm vein pattern is captured which is of near-infrared range. The vein pattern so captured then gets converted to a unique biometric template which will be matched against pre-registered users' Palm vein patterns. The palm vein pattern of each person is unique even among the twins and constant throughout the lifetime of an individual. This feature of human body can be used to avoid many drawbacks of EVM.

## II. PRESENT METHOD

The people will select MLA's and MP's and other candidates of different parties who make development to the nation or to their respective constituencies. In the recent years voting system in India has become technically advanced when compared to the previous methods where ballot paper was used and it was a tedious task to count the number of votes that a candidate has got. In the recent years EVM's have replaced these ballot papers which consist of balloting unit and the control unit. Control unit system will be under the

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control of election officer .When the database  registered in the list matches with the voter id details of legitimate voter then the presiding officer  presses the control machine which releases an empty vote in which the candidate has to cast  his vote. Ballot unit is the system in which the candidate claims his vote. When the control unit releases an empty vote the person presses the blue button in the balloting unit against the candidate or symbol which he likes. Later the officer marks left hand forefinger of the voter with indelible ink which shows that he cannot claim another vote in that election. The Electronic Voting Machines can record up to 3840 votes. A single balloting unit can hold up to 16 candidates and maximum of 4 such balloting units can be connected in parallel. The aim of the EVM is "ONE PERSON, ONE VOTE". [4] discussed about an eye blinking sensor. Nowadays heart attack patients are increasing day by day."Though it is tough to save the heart attack patients, we can increase the statistics of saving the life of patients & the life of others whom they are responsible for. The main design of this project is to track the heart attack of patients who are suffering from any attacks during driving and send them a medical need & thereby to stop the vehicle to ensure that the persons along them are safe from accident. Here, an eye blinking sensor is used to sense the blinking of the eye. spO2 sensor checks the pulse rate of the patient. Both are connected to micro controller.If eye blinking gets stopped then the signal is sent to the controller to make an alarm through the buffer. If spO2 sensor senses a variation in pulse or low oxygen content in blood, it may results in heart failure and therefore the controller stops the motor of the vehicle. Then Tarang F4 transmitter is used to send the vehicle number & the mobile number of the patient to a nearest medical station within 25 km for medical aid. The pulse rate monitored via LCD .The Tarang F4 receiver receives the signal and passes through controller and the number gets displayed in the LCD screen and an alarm is produced through a buzzer as soon the signal is received.
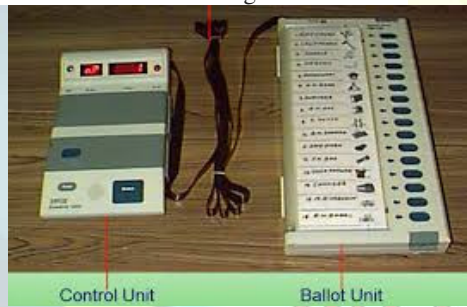


**Figure 1: Sub-units of EVM.**

### III.     PALM VEIN RECOGNITION SYSTEM

Biometric authentication techniques are the growing fields of electronics used for human identification and authentication based on the physical characteristics. The palm vein recognition system belongs to class of intrinsic biometric system. The intrinsic biometrics provide greater degree of security and accuracy over external biometrics as it is internal to body, not visible to human eye and so its forgery is extremely difficult. The palm vein authentication uses vascular patterns of palm as personal identification data. The palm of individual is held above the device scanner which flashes infrared ray on the palm which cannot be seen by human eye. The deoxygenated haemoglobin in the palm veins absorb wavelength of 760nm which appears as a black pattern. The vein pattern is then extracted by image processing and digitized template can be stored in the data base. The vein pattern of the person can be verified against the pre-registered pattern. The palm vein recognition system has very less false rejection rate and a false acceptance rate. It is found that the vein patterns of an individual's two hands differ. No two people in the world can possess same palm vein pattern - even those of identical twins differ.
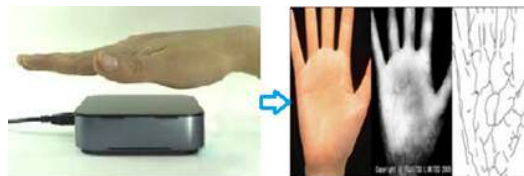


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**Figure 2: Palm vein scanner.**

## IV. PROPOSED IDEA

As mentioned earlier, the cons of EVM led to invent of our idea of introducing a biometric scanning system in the elections that can avoid malpractices. Palm vein authentication uses an infrared sensor to capture the user's vein pattern which will be unique to every individual's palm. The electronic voting machine has a control unit and a balloting unit. This arrangement is connected to the controller with external memory and palm vein scanner unit. When the person enters the booth to cast his vote, his details are checked manually by preceding officers. The next step is that he has to rest his wrist on the sensors support such that the palm is held some centimetres distance above the device's scanner. The device emits a near-infrared ray on the palm. Skin passes the near-infrared light through it making the deoxygenated hemoglobin in the blood flowing through the veins absorbs the ray, this illuminates the hemoglobin, making it visible to the scanner. The blood carried by arteries and capillaries are oxygenated hemoglobin which are not capable of absorbing the near-infrared light and so they are invisible to the sensor. The scanner makes use of a special feature of the deoxygenated hemoglobin flowing through the palm Veins which absorbs near-infrared light. This makes it possible to take an image of what's beneath the skin, which is something very hard to steal or copy. The image captured by the camera is of near-infrared range which will be a black network like structure, reflecting the palm's vein pattern against the lighter background. An individual's palm vein pattern is converted by algorithms into specific data points, which is then encrypted and gets converted into binary format that gets attached to the records along with the other details in an individual's profile as a reference for future comparison. Each time when a person wants to vote the newly captured image is likewise processed and compared to the registered details in the database, all in a period of seconds. Binary number and their crossing points are all compared and based on the results, the person is either granted or denied access to vote. So when the person gives his palm vein pattern, it gets verified through its database which will be already present in the servers. This step is used to identify the legitimate voter. The same pattern gets stored in the temporary external memory interfaced with the scanner. Now the pattern gets compared with the already present pattern since it matches, an empty vote is released into the balloting unit with an alarm sound which indicates the person that he can vote. Now the person choses his candidate hence empty vote is occupied by the respective values. The counter present in the EVM is incremented which indicates that the vote has been accepted successfully. When a person tries to vote for the second time he has to again give his palm vein impression this gets cross checked with the data present in the external memory, as he will be attempting to vote for the second time his entry would be found in the external memory stating that he is not eligible to vote or he has already casted his vote. Since a binary format is stored with the palm scanner and not the image, there is no chance an identity could be stolen and illegally reproduced. The palm vein scanner has no harmful effect on the body. Unlike the current fingerprint scanners, this device doesn't need be touched. Also, this recognition system is not affected by aging. Neither the cuts, scars, tattoo nor the skin colour affects the scan's outcome and since that the veins are internal, they can hardly be tampered.

Palm vein sensor named Palm secure with the following specifications can be used with an Operating Voltage of 4.4V~5.4V. The operating Current is less than 500mA with a search time of less than 0.15seconds



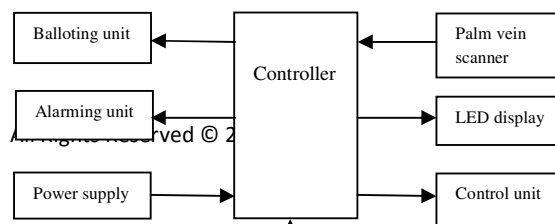**Figure 3: Palm vein scanning process.**

**Figure 4: Block diagram.**

and capturing distance of 40-60mm. The power consumption is up to 2.5W. This sensor is interfaced with controller named ATMEGA16 which is an 8bit controller where AT stands for Atmel and MEGA refers to balanced output and inputs and 16 stands for 16KB on chip flash memory which has the following specifications. It is a 40 pin DIP package and there are 32 programmable input/output Pins with the operating voltage of 4.5V~5.5V and it has an 8 channel 10 bit ADC. It has two 8 bit timers and one 16 bit timer and it also has four PWM channels. In our idea of obtaining the palm vein pattern from the voter, the palm vein scanner is interfaced with the controller (ATMEGA16).This scanner comes with four output pins which are TXD, RXD, VCC, GND. where a 5v constant dc voltage is supplied to the VCC pin, while GND pin connected to ground and the TXD pin of scanner is connected to PD0 (RXD) and RXD pin of scanner is connected to the TXD pin of the controller that is PD1.The next step is to receive the binary pattern of the voters palm vein, this binary pattern is formed by an image processing technique where the voter's palm is scanned and the received print is imposed on a grid like structure. The binary pattern is formed based on the intersections of the valley between the corresponding lines of palm vein pattern which are crossing lines of the grid (4*4 or 5*5). In order to receive the message from the sensor the baud rate is set and since there is requirement of external memory in order to store the palm vein pattern of such a large amount of palm veins obtained from the voter's, We interface an external memory with PORT A of the controller and the controller is coded in such a way that the received binary pattern if not found on the memory then it is stored on the external memory. In case a match of the binary pattern is found then the voter is not allowed to vote and will be considered guilty for multiple voting's.
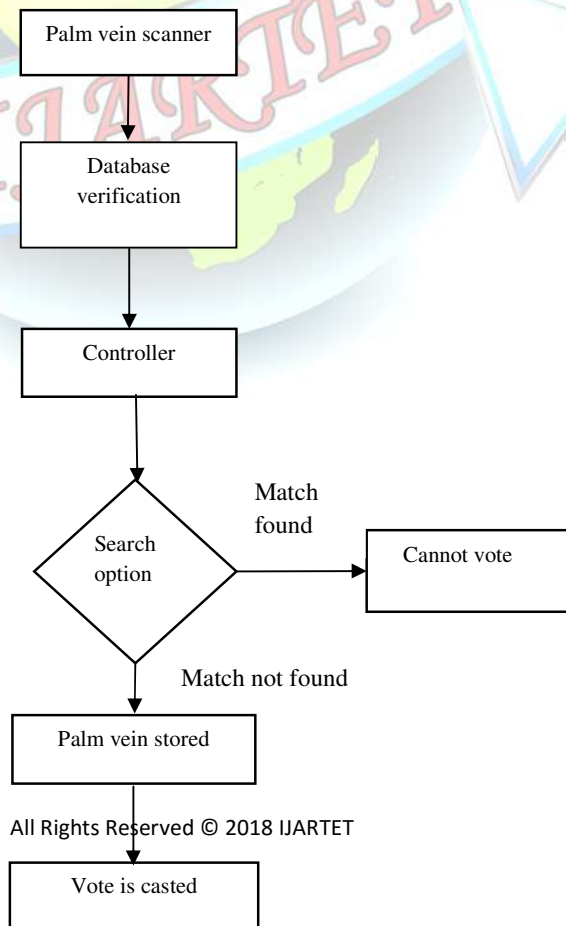
**Figure 5: Flowchart.**

**Figure 6: Palm vein Scanner**

## V. ADVANTAGES

- The manual operation of control unit can be eliminated. Illegal practices like rigging, fake and repeated voting can be eliminated.
- The system is highly reliable, more convenient method with low maintenance cost, tamper-proof and relatively more secure compared to other methods as it is difficult to duplicate vein pattern lying underneath the skin and is unique for every individual. Thus it is practically non-intrusive.
- The dryness or roughness of skin or physical injury on the surface of hand will not cause any affect to cast a vote during the time of elections.
- The palm vein of an individual is rich and complex. It will be accurate even in cold environments and will not change over time.
- Also it is possible to get instantaneous results with high authentication accuracy with a very less false acceptance and false rejection rate.

## VI. FUTURE SCOPE

The palm vein scanner is expensive and is not manufactured at bulk yet. In future, using a less expensive infrared camera can overcome the price issue. The multimodal biometric system can be employed by combining different biometric systems such as palm vein with fingerprint geometry thereby reducing the risk of system attacks. But surely the palm vein technology will bring a revolution in the field of voting system in the near future. Further the database can be linked with the aadhar card or any other documents.

## VII. CONCLUSIONS

The elections in India would no longer be tedious job. This paper provides an overview of biometric voting system using palm vein authentication technology which enhances the security by eliminating bogus voting, fake and repetitive voting. The palm-vein based authentication system utilized here is the latest intrinsic Biometric technology which is highly secure as the information is contained within the body and is also highly accurate. This can bring revolutionary change in electoral procedure by hosting fair elections in India and will preclude illegal practices like rigging so that the citizens can choose their leaders and government parties by exercising their right in democracy. The same method can be implemented in other countries. Thus the electoral procedure can be changed drastically using this technology.

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# REFERENCES

[1] A.Mallikarjuna, S.Madhuri, "Palm Vein Technology Security", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 7, July 2013.

[2] K. R. Deepti, Dr. R. V. Krishnaiah, "PALM VEIN TECHNOLOGY", International Journal of Computer Engineering & Applications, Vol. II, Issue I/III

[3] Kenneth Wong,Thomson Lai, Bosco Lee,Frankie Shum, "ANALYSIS OF PALM VEIN BIOMETRIC SYSTEM".

[4] Christo Ananth, S.Shafiqa Shalaysha, M.Vaishnavi, J.Sasi Rabiyathul Sabena, A.P.L.Sangeetha, M.Santhi, "Realtime Monitoring Of Cardiac Patients At Distance Using Tarang Communication", International Journal of Innovative Research in Engineering & Science (IJIRES), Volume 9, Issue 3,September 2014,pp-15-20

[5] Swapnali N. Dere, Dr. A. A. Gurjar, "Human Identification Using Palm –Vein Images: A New Trend in Biometrics", International Journal of Engineering Science and computing, Vol. 6, Issue III, March 2016.

[6] Alima Begum S, josthana lily joy D,"PALM VEIN TECHNOLOGY".

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