

# Efficient Wind Energy Generation and Energy Storage for SMS Based E-Voting System

Prof. Jitendra M. Bakliwal<sup>1</sup>, Harshal M. Pawar<sup>2</sup>, Mahesh S. Khatavkar<sup>3</sup>, Sopnil U. Shinde<sup>4</sup>

<sup>1,2,3,4</sup>Department of Electronics and Telecommunication, Marathwada Mitra Mandal's Institute of Technology, Pune, India

**Abstract:** Wind energy is the most widely used and low cost energy source amongst all renewable sources. Wind energy is the form of solar energy formed due to uneven distribution of the heat by the Sun in the atmosphere. Due to different air temperatures at different places, wind airflows are created. Wind power can successfully reduce carbon emissions because we are not using coal, nuclear plants and natural gases. The purpose of this work is to reduce the power deficit, turning to the renewable power sources as a primary source and conventional electricity as a secondary source. As well as using this supply, application of mobile EVM (Electronic Voting Machine) will be executed. We are introducing mobile EVM. Voting will be done via Mobile. One has to send UID (Unique Identification Number) and password which is assigned to each individual by election commission. This system is tampered proof. This work ensures belief in democracy and also helps to balance ecosystem.

**Keywords:** accelerometer sensor, SMS based e-voting system, switching circuit, windmill model

## 1. Introduction

The conventional energy is facing power deficit problems causing load-shedding. Electrical energy generation using non-renewable resources is costlier than using renewable resources. Presently wind energy is the most widely used natural resource. Wind turbine works in harsh and unattended environment hence to increase the efficiency and tracking of windmill, accelerometer sensor can be used. The purpose of our work is to reduce the power deficit, turning to the renewable power sources as primary source and conventional energy as a secondary source. As well as using this supply, application of mobile EVM will be executed. Direction of the accelerometer sensor will be sensed according to which there will be angular displacement of the windmill [1] and ultimately maximum energy will be generated. Now the energy generated will be stored in the storage device and then this energy can be used for voting machine. If the energy from the windmill is not sufficient, then the supply from the conventional energy will be switched.

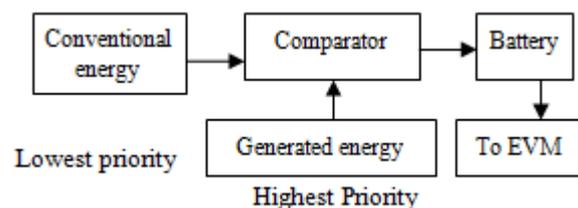
Switching circuit will provide supply to EVM via battery. It will be place before battery and will act as switch between conventional energy and wind energy. [2]

This work aims to develop SMS based password protected voting machine. For voting, voters have to send their UID, password as well as party name by SMS to the number declared by Election Commission. The format is <UID>SPACE<PASSWORD>SPACE<PARTY NAME>. If registered voter mistypes digit/digits of UID and password, or party name is not valid, voting will be unsuccessful and acknowledgement SMS as such will be sent to respective voter by EVM. If he types all digits correct then voting will be successful. Repeated vote will get decline i.e. one voter can vote only once.

## 2. Methodology

This is a very good project for institutions and election assemblies. The latest technology uses GSM module which is

used to communicate between a mobile and embedded device. When the voter wants to cast his vote; he has to send the message defining the UID, password and party name. SMS will be sent to the number of the subscriber identity module (SIM) which is inserted in the GSM module. Then, SMS will be received by GSM which is connected to the LCD screen via microcontroller. The microcontroller will read the message and verify for the password and UID, if both are correct then it will start performing desire task. Party name is different for different parties. Party name will not be verified like UID and password but it should be valid. Example, if party name is ABC and voter type ABD which is not a valid party, voting will be unsuccessful. [3]



**Figure 1:** Block Diagram of Switching System

The idea is to implement a system which can be use anywhere. Example, in the institute, without use of fossil fuels for generator, we can use the system in which the highest priority is given to the energy generated by windmill. If in case, windmill fails or does not give sufficient amount of energy to charge the battery, second priority is given to conventional energy as shown in Fig. 1.

If we supply the energy from windmill and conventional energy source directly then due to loading problem, fast switching will take place and because of this, there is an extreme possibility that device may get damage. So, before application circuitry i.e. EVM, we are providing rechargeable battery so that there is no interruption in power supply and our device won't get affected and loading problem will get solved.

### 3. System Architecture

As shown in Fig. 2, accelerometer sensor output is given to the microcontroller ATmega16. According to the sensor output servomotor will define the direction. Windmill will generate power by using DC motor.

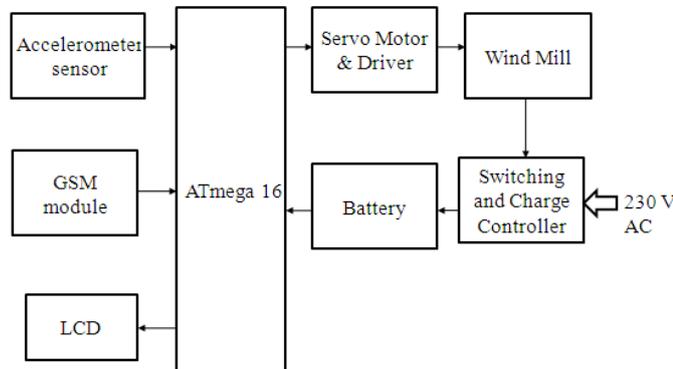


Figure 2: Block Diagram of project

Switching circuit and charge controller are used to switch between conventional energy supply and windmill generated supply through which battery will get charged. Here we are using GSM module for SMS based e-voting system i.e. EVM. The final result will be displayed on the LCD screen.

### 4. Working

Accelerometer is a sensor with 3-axis namely X, Y & Z. The sensor output is given to controller input. Controller output will drive the servo driver and motor.

The supply to an application circuitry will be provided by battery. Before battery, switching will take place between the windmill supply and conventional energy supply. The primary preference is given to the windmill. In case, if windmill fails, circuitry will switch to conventional energy supply until windmill regain its power. If both supplies fail, battery is still there to run the application

The application circuitry is the SMS based e-voting system. UID and password will be provided to each individual so that one voter can vote once. If either UID or password is invalid or voting is already being done by voter, the vote will not be count. Also, if party name is invalid, vote will not be count. The final result will be displayed on LCD display.

### 5. Security Argument

We begin with a model of the adversary in terms of goals, capabilities, limitations, and information available for attack. Our model focuses on attacks against only integrity and privacy of the data storage and transmission mechanisms. [4]

The main GSM system will be kept under election commission and high security will be provided for its protection. The location of the system will be known to legalised person only. Using GSM we can cover a large geographic area. The advantage of messaging system is that there is no crosstalk of a signal. The messaging system works

on an electromagnetic signal which is send by the base station to the mobile station. UID and password will be issued by authority to each citizen eligible for voting. The voter has to take care that his UID and password be secret.

### 6. Advantages And Disadvantages

- 1) If both wind and mains supply system fail still EVM will work on battery so that no interruption in power supply..
- 2) Load on conventional energy gets reduce and hence an electricity bill.
- 3) Tampered proof and easy to use mobile voting.
- 4) Labor cost is reduced and provision of mobile voting, so no needs to go to polling booth.
- 5) Maintenance required is least.
- 6) Supervision is not required continuously.
- 7) We require experts for programming.
- 8) The GSM module should have sufficient range to send and deliver the message which contains the information.

### 7. Future Scope

We can use magnetometer sensor, gyro sensor to track so that we can use renewable resources in an efficient way. Even we can use hybrid renewable resources to maximize the efficiency as shown in Fig. 3. We can use solar energy, hydroelectric energy etc.

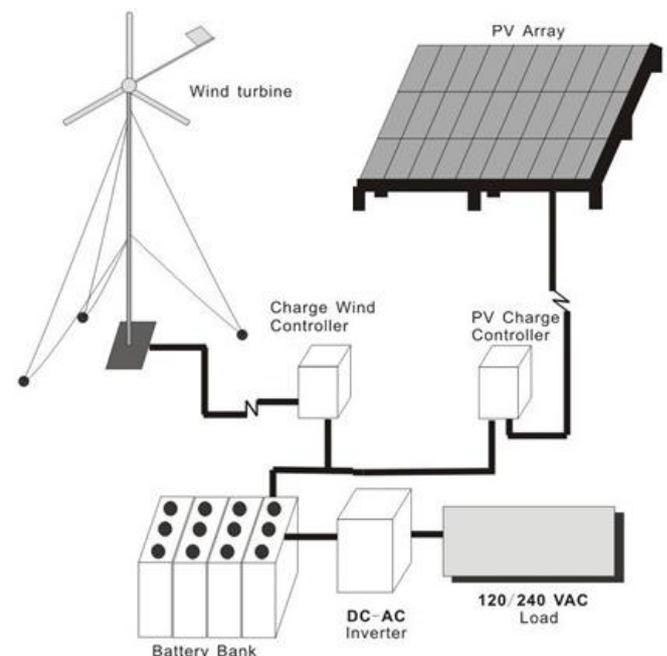


Figure 3: Hybrid Model

For EVM section, in voters mobile, we can use biometric sensors like fingerprint scanner, eye scanner etc. for security purpose. Instead of mobile voting, voting via internet can also be done but security parameters must be strong enough to tackle phishing and viruses.

### 8. Result

By using accelerometer efficiency can increase by 10%. We reduced 80% of load on conventional energy supply and

reduced the cost as well. The result about angular rotation of windmill in degrees is shown in Table I.

**Table 1**

Sr. No.	Delay in ms	Angular rotation of windmill in degrees
1	500	180
2	700	160
3	900	145
4	1000	135
5	1500	90

Tampered proof GSM based SMS voting system successfully implemented. The result about EVM is shown in Table II. UID and password will have to provide by Election Commission to each individual eligible for voting. EVM will check whether UID and password are correct or not as well as party name must be valid. Example- Sr.No.1, 2, 3 and 4 are registered voters. Sr. No.1 has not provided UID and password correctly so his voting is unsuccessful. Sr. No. 2 provides UID and password correctly but his party name is not valid, his voting is unsuccessful. Sr. No.3 provides UID, password and party name correctly, he has not voted before, his voting is successful and his vote will get count. Sr. No.4 provides everything correctly but he has already voted, his voting is unsuccessful.

**Table 2**

Sr. No.	UID	Is UID and Password match?	Party name valid?	Is already voted?	Successful
1	1234 5679 1234	No	Yes	No	No
2	5555 5050 1212	Yes	No	No	No
3	5555 5050 1212	Yes	Yes	No	Yes
4	5555 5050 1212	Yes	Yes	Yes	No

## 9. Conclusion

Power generated from the windmill can be used for further utilization. We can reduce load on conventional energy by use of renewable energy. A mobile EVM application is an ambitious project. The model in which each individual expert write his code will make it unreliable and our belief on democracy may shatter. We, the citizens have sovereign right to vote and make sure our vote goes to only those to whom we voted. It is our duty to design tampered proof EVM and friendly atmosphere during election period to preserve democracy.

## 10. Acknowledgement

We are thankful to Marathwada Mitra Mandal's Institute of Technology, Lohgaon, Pune for moral and financial support.

## References

- [1] Arenas, L. Victoria, F. J. Abell'an, and J. A. Ib'a'nez," *Angular Velocity Control for a Windmill Radiometer*", IEEE TRANSACTIONS ON EDUCATION, VOL. 42, NO. 2, MAY 1999
- [2] V. Akhmatov, H. Khudsen, and A. H. Nielsen, "Advanced simulation of windmill in the electric power

supply," *Int. J. Elect. Power & Energy Syst.*, vol. 22, no. 6, pp. 421-434, Aug. 2000.

- [3] T. Kohno, A. Stubblefield, A. D. Rubin, and D. S. Wallach, "Analysis of an electronic voting system," in *IEEE Symp. Security and Privacy*, 2004, p. 27
- [4] W. A. Arbaugh, "The real risk of digital voting?," *Computer*, vol. 37, no. 12, pp. 124-125, 2004..

## Author Profile



**Prof. Jitendra Bakliwal** (Guide) was born in Maharashtra, India in 1972. He received BE & ME degree in electronics engineering from Jawaharlal Nehru College of Engineering, Dr. Babasaheb Ambedkar Marathwada University in 1995 & 2007 respectively. He has industrial experience of 2 years, polytechnic teaching of 11.5 years, degree engineering teaching of 6 years, now working with Marathwada Mitramandal's Institute of Technology, Pune under Savitribai Phule Pune University. His research interests include power electronics control applications, renewable energy sources & audio, video engineering.



**Harshal M. Pawar** (UG Student) was born in Maharashtra, India on August 15, 1993. He has done Higher Secondary Certification from Nasik Board under University of Pune, Maharashtra in 2009-10. Currently he is pursuing Bachelor of Engineering in Electronics and Telecommunication from Marathwada Mitra Mandal's Institute Of Technology, Pune under Savitribai Phule pune University. His research interests include renewable energy sources, automated electronics and digital image processing.



**Mahesh S. Khatavkar** (UG Student) was born in Maharashtra, India on January 1, 1994. He has done Diploma in Electronics and Telecommunication Engineering from AISSMS Polytechnic, Pune under MSBTE, Maharashtra in 2012. Currently he is pursuing Bachelor of Engineering in Electronics and Telecommunication from Marathwada Mitra Mandal's Institute Of Technology, Pune under Savitribai Phule pune University. His research interests include PLC, power electronics control applications, renewable energy sources and embedded technology.



**Sopnil U. Shinde** (UG Student) was born in Maharashtra, India on August 25, 1994. He has done Higher Secondary Certification from Pune Board under Maharashtra State board of Secondary and higher Secondary Education in 2010-11. Currently he is pursuing Bachelor of Engineering in Electronics and Telecommunication from Marathwada Mitra Mandal's Institute Of Technology, Pune under Savitribai Phule Pune University. His research interests include power electronics control applications, automated electronics, renewable energy sources and embedded technology