



## WIND VENTILATOR THROUGH ELECTRICITY GENERATED SYSTEM

***Prof. Sanvatsarkar Kamini. P<sup>1</sup>, Ms. Shinde Shital D<sup>2</sup>, Ms. Gunjal Rituja Y<sup>3</sup>, Ms. Jadhav Radheshwari D<sup>4</sup>, Mr. Dukale Tushar A<sup>5</sup>***

<sup>1</sup>Lecturer, Department of Electrical Engineering, Santosh N Darade Polytechnic, Yeola, Maharashtra, India.

<sup>2,3,4,5</sup> Students, Department of Electrical Engineering, Santosh N Darade Polytechnic, Yeola, Maharashtra, India.

### ABSTRACT :

Wind energy is one of the most important renewable sources of energy available in nature. It is obtained from the movement of air caused mainly by differences in atmospheric pressure and temperature. Unlike conventional energy sources such as coal, petrol, and natural gas, wind energy does not require fuel during operation and produces very low direct emissions. Because of these advantages, researchers and engineers have developed different systems for using wind energy for electricity generation, ventilation, and other applications.

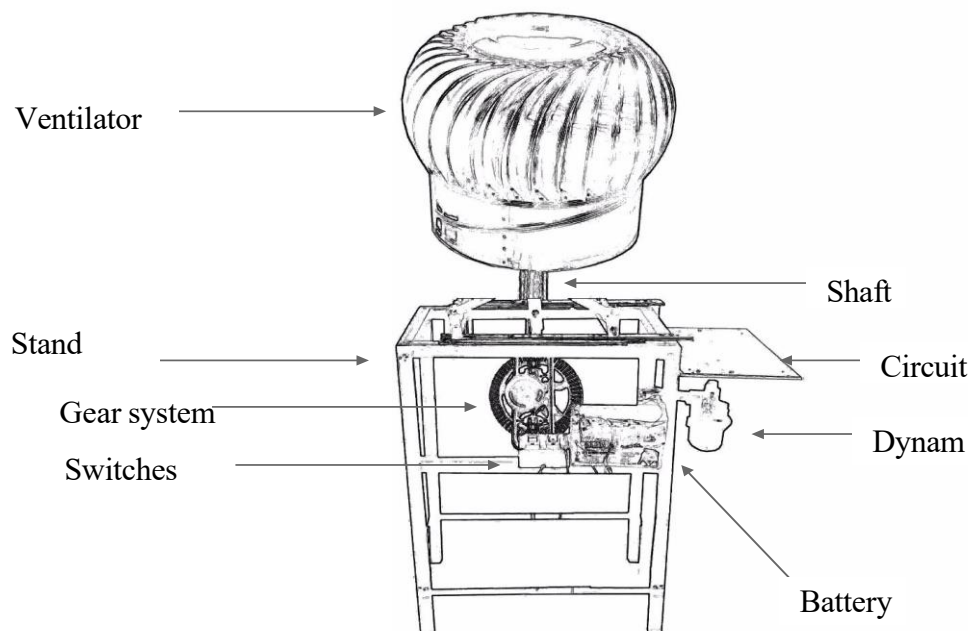
The wind turbines advanced technology to improve performance and durability. Some of the features and technology present in these products make them ideal for backup power generation. These products are designed and tested to be reliable in our region, to power remote facilities. Ideal for places like Palawan and Samil Island, customer feedback ensures they are ideal for the current market. Places like Jensen and Digs require a product of superior quality that has a long lifespan, to charge batteries for brown-outs. These generators are quiet, and are designed to be pleasing to your ears and to not cause vibration in the supporting pole. Making unwanted noise pollution. They are also very efficient at low wind speeds. The following technologies are included in each wind generator

**Keywords:** Wind energy, Ventilator, Electricity Generation.

### INTRODUCTION

The wind turbines advanced technology to improve performance and durability. Some of the features and technology present in these products make them ideal for backup power generation. These products are designed and tested to be reliable in our region, to power remote facilities. Ideal for places like Palawan and Samil Island, customer feedback ensures they are ideal for the current market. Places like Jensen and Digs require a product of superior quality that has a long lifespan, to charge batteries for brown-outs. These generators are quiet, and are designed to be pleasing to your ears and to not cause vibration in the supporting pole. Making unwanted noise pollution. They are also very efficient at low wind speeds. The following technologies are included in each wind generator

**Diagram of Wind ventilator through electricity generated system**



## LITERATURE SURVEY

Wind energy is one of the most important renewable sources of energy available in nature. It is obtained from the movement of air caused mainly by differences in atmospheric pressure and temperature. Unlike conventional energy sources such as coal, petrol, and natural gas, wind energy does not require fuel during operation and produces very low direct emissions. Because of these advantages, researchers and engineers have developed different systems for using wind energy for electricity generation, ventilation, and other applications.

A wind ventilator is a mechanical device generally installed on the roof of a building to remove hot, humid, and stale air from the indoor environment. Conventional roof ventilators rotate when wind passes over their blades. The rotation creates a pressure difference that helps draw warm air from inside the building and release it outside. Such ventilators are commonly used in factories, warehouses, workshops, agricultural buildings, and other structures where proper air circulation is required. The major advantage of a wind ventilator is that it can provide ventilation without continuously consuming electricity.

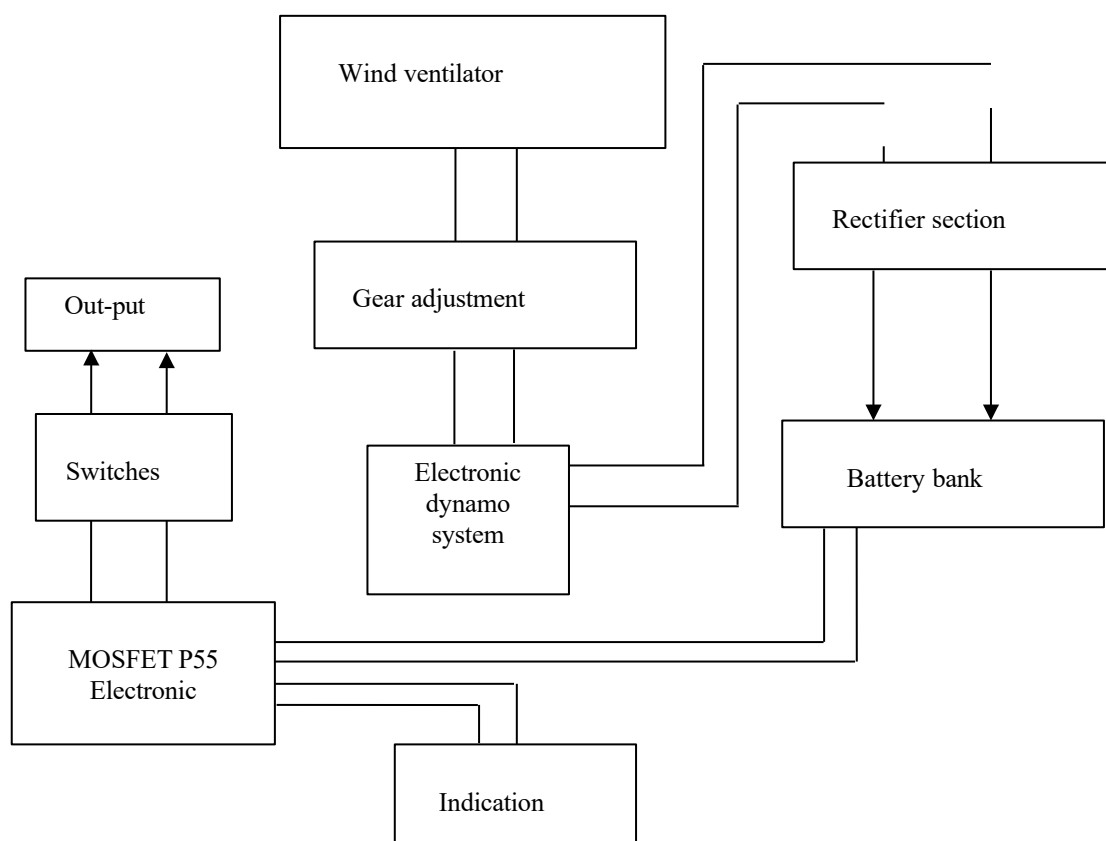
Several studies have investigated the performance of small wind turbines and wind-driven ventilation systems. These studies show that the amount of energy available from wind depends strongly on wind velocity. Wind power increases significantly as wind speed increases. Therefore, the design of the blades, rotor diameter, shaft arrangement, bearing system, and installation location plays an important role in the performance of a wind-based system. Proper positioning of the ventilator can improve its exposure to available wind and increase rotational speed.

Researchers have also explored the possibility of combining the mechanical rotation of wind ventilators with electrical generators. In this approach, the rotating shaft of the ventilator is mechanically connected to a small generator. When wind rotates the ventilator blades, the shaft rotates the generator. The generator converts the mechanical energy into electrical energy. Depending on the type of generator, the electrical output may be AC or DC. A rectifier can be used when AC output needs to be converted into DC.

The generated electrical energy can be regulated using a charge controller and stored in a rechargeable battery. The stored energy can then be used for small electrical loads. Examples include LED lights, sensors, monitoring devices, small electronic circuits, and other low-power applications. This approach can make use of energy that would otherwise only be used for ventilation.

Previous research on small-scale wind energy systems also identifies several factors affecting electrical output. These include wind speed, generator rating, rotor size, blade shape, shaft speed, friction, mechanical losses, electrical losses, and generator efficiency. If wind speed is low, the ventilator may rotate slowly and the electrical output may be insufficient. Therefore, the system should be designed according to the wind conditions of the installation location.

## Block Diagram



## Working Principle

- **Wind Ventilator**

A wind ventilator is a mechanical device used to provide natural ventilation in buildings. It is usually installed on the roof of factories, warehouses, workshops, farms, and other buildings.

- **Gear**

A gear is a mechanical component with teeth that transfers rotational motion and power from one shaft to another.

- **Electronic Dynamo System**

An electronic dynamo system is a system that converts mechanical rotation into electrical energy. In the proposed wind ventilator project, the dynamo is connected to the rotating shaft of the ventilator.

- **Rectifier Section**

A rectifier is an electronic circuit that converts AC (Alternating Current) into DC (Direct Current). In the proposed Wind Ventilator Through Electricity Generated System, the rectifier is connected between the dynamo/generator and the battery or charge controller.

- **Battery Bank**

A battery bank is a group of one or more batteries connected together to store electrical energy. In the proposed Wind Ventilator Through Electricity Generated System, the battery bank stores the electricity generated by the dynamo.

- **Indication Section**

The indication section is used to show the operating status of the Wind Ventilator Through Electricity Generated System. It helps the user easily know whether electricity is being generated, the battery is charging, or the output is being supplied to the load.

- **MOSFET P55 Electronic Circuit**

If you mean a P55/P55NF06-type power MOSFET, it can be used as an electronic switching device in your wind-ventilator electricity-generation system.

### Role of MOSFET

A MOSFET (Metal Oxide Semiconductor Field Effect Transistor) is used to control the flow of electrical current. It can work as a fast electronic switch and can help control the DC power produced by the generator.

- **Switches**

A switch is an electrical component used to turn a circuit ON or OFF. In the Wind Ventilator Through Electricity Generated System, switches are used to control the flow of electricity between different sections of the system.

- **Output Section**

The output section is the final part of the Wind Ventilator Through Electricity Generated System. It provides the electrical energy generated by the system to a useful load.

The Wind Ventilator Through Electricity Generated System works on the principle of converting wind energy into mechanical energy and then into electrical energy.

1. Wind enters the ventilator: Natural wind flows over the blades of the wind ventilator.
2. Blades rotate: The force of wind causes the ventilator blades to rotate continuously.
3. Shaft rotation: The rotating blades are connected to a shaft, so the shaft also rotates.
4. Generator operation: The rotating shaft is connected to a small generator. The generator converts the mechanical rotation into electrical energy.
5. Rectification: If the generator produces AC output, a rectifier converts it into DC power.
6. Battery charging: The DC power is supplied through a charge controller to charge a rechargeable battery.
7. Power supply: The stored electrical energy can be used for small loads such as LED lights, sensors, or monitoring devices.
8. Ventilation: At the same time, the rotating ventilator removes hot and stale air from the building, providing natural ventilation.

- **Energy Conversion**

Wind Energy → Rotational Mechanical Energy → Electrical Energy → Battery Storage → Electrical Load

This system therefore uses the same wind-driven rotation for both ventilation and small-scale electricity generation.

## Advantages

1. **Renewable energy source** – It uses naturally available wind energy.
2. **Eco-friendly** – It does not produce pollution during operation.
3. **Natural ventilation** – It removes hot and stale air from the building.
4. **Electricity generation** – The rotating ventilator can generate small amounts of electrical power.
5. **Low operating cost** – No fuel is required for operation.
6. **Energy saving** – It can reduce the use of conventional electricity for small loads.
7. **Low maintenance** – The system has a relatively simple mechanical structure.

8. **Battery storage** – Generated electricity can be stored for later use.
9. **Dual-purpose system** – It provides ventilation and electricity generation together.
10. **Useful for remote areas** – It can support small electrical loads where grid power is limited.

---

### Disadvantages

1. **Depends on wind speed** – Electricity generation decreases when wind speed is low.
2. **Low power output** – A small ventilator generally produces limited electrical power.
3. **Initial cost** – Generator, battery, and electrical components require initial investment.
4. **Location dependent** – The system needs a suitable location with sufficient wind.
5. **Battery maintenance** – Batteries may require periodic maintenance or replacement.
6. **Mechanical losses** – Friction and other losses reduce the useful output.
7. **Variable output** – Generated voltage and power can change with wind conditions.
8. **Limited applications** – It is mainly suitable for small electrical loads.

---

### Applications

1. **Factories and industries** – For ventilation and small electrical loads.
2. **Workshops** – To remove hot air and provide power for small devices.
3. **Warehouses** – For natural ventilation.
4. **Agricultural buildings** – To improve air circulation.
5. **Poultry farms** – To remove hot and stale air.
6. **Garages** – For ventilation and low-power lighting.
7. **Storage rooms** – To reduce heat accumulation.
8. **Greenhouses** – For air circulation and sensor operation.
9. **Rural areas** – For small renewable-energy applications.
10. **Educational projects** – To demonstrate wind-energy conversion.

---

### Conclusion

The **Wind Ventilator Through Electricity Generated System** is a simple and useful renewable-energy system. It uses natural wind to rotate a ventilator, which provides ventilation while its rotational motion is used to drive a small generator. The generator converts mechanical energy into electrical energy.

The generated electricity can be rectified, regulated, and stored in a battery. This stored energy can be used for small electrical loads such as LED lights, sensors, and monitoring devices. The system reduces dependence on conventional electricity and makes effective use of naturally available wind energy.

Although the power output depends on wind speed and is relatively small, the system demonstrates an effective combination of **natural ventilation and electricity generation**. It can be useful in factories, workshops, warehouses, farms, and other suitable locations.

---

### REFERENCES

1. G. D. Rai, **Non-Conventional Energy Sources**, Khanna Publishers.
2. C. S. Solanki, **Renewable Energy Technologies**, PHI Learning.
3. J. A. Duffie and W. A. Beckman, **Solar Engineering of Thermal Processes**, Wiley.
4. **International Energy Agency (IEA)** – Renewable Energy and Wind Energy resources.
5. **International Renewable Energy Agency (IRENA)** – Wind Energy and Renewable Energy reports.