

DESIGN OPTIMISATION AND COMPARISON OF FRACTIONAL SLOT OVERLAP AND NON OVERLAP WINDING DIRECT-DRIVE PM WIND GENERATORS USING IOT

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ABSTRACT

Renewable energy sources have long been established as viable alternatives to fossil-fuel-based resource use. Wind energy is a device that converts mechanical energy into electrical energy. Furthermore, of all renewable energy sources, large-scale wind turbines power generation. IoT data is transformed into useful information in order to enhance wind turbine performance, lowering wind energy costs and lowering risk. However, because the wind turbine system and component levels require real-time control, IoT deployment is a difficult challenge. In this method using IoT to assess wind resources and estimate the lifetime of wind power modules. A model with sub-models of an aerodynamic rotor connected directly to a multi-pole variable speed Permanent Magnet Synchronous Generator (PMSG) with variable speed control, pitch angle control, and full-scale converter connected to the grid is created to highlight this issue. Quality of the force determines the strength of the electrical capacity of the method. The Voltage repetition and stage synchronization allow the electrical system to work in its proposed conduct without execution or extensive loss of life using neural network calculations. Axial Flux Permanent Magnet Synchronous Generation (AFMSG) is allowed to turn the turbine with variable speed, indicating that the force and repetition of the generator shift are constant. The calculation of the neural network algorithm along these lines should be a clear working point and a plan of the generator for full functional reach is controlled by wind speed propagation. It has been tracked that the non-cover winding hinge magnet has generally a good performance for the wind energy system associated with the simultaneous generator.

Keywords: Wind, Axial Flux Permanent Magnet Synchronous Generation, Neural Network Algorithm, Overlap and Non-Overlap, IOT (Internet of Thing).

I. Introduction.

As communication technique based in Photovoltaic (PV), when the presented limits of power plants are contradictory, and the proximity force matrix limits are equally significant, the influence of the mesh should not be ignored. The structure associated with the force will advance the issues of the current electric force era, the progress of the mesh and financial and so many more issues. So, it is necessary to strip these issues and make clear adjustments [1]. The introduction of the solar-based energy radiant Photovoltaic (PV) age will play a significant role in shaping the future energy radiance

everywhere in the world. The inverter is a significant office fee for the PV system. Guaranteeing its safety and quality is an important link in promoting this innovation. The status and prospects of the PV power era are particularly well recognized and confirmed [2]. Investigating power quality issues in the PV structure has got associated with the mesh. Photovoltaic (PV) energy is generally of interest today because it is complete and infinite without contamination. The system would need an inverter to convert instantaneous current into current exchange [3]. Power transformations using conditional conversion have become exceptionally well known in recent years. They enjoy the benefits of value power yield, high voltage uniformity and low electromagnetic similarity. The construction of these stuck inverters allows them to reach high voltages with the depreciation of a fixed consonant without using some other symphony reduction strategies such as synchronized exchange gadgets associated with transformers Rise [4]. The effect quality of the consonant distortion on the force, which is brought by the sun-based inverter, is strongly influenced by the terrible feature of the network impedance rather than the regular coupling which can be represented as network impedance, the same impedance of the lattice structure and the same connection of a sunlight based inverter system. In particular, the same tester examined the effect of quantities of the same inverter, sunlight-based energy radiation on subsequent phantom matrix impedance, and other sustainable energy. PV Age innovation is increasingly considered [5].

The matrix associated inverter is the canter of the power system associated with the mesh. When the inverter connected to the network operating in the system, the current control mode is the output of the voltage source information and the current source of the inverter. So far, a ton of work has been completed on the channel determination at home and abroad and the control mechanism associated with the network and parts of the regulatory scheme are expected to improve the forced nature of the current associated with the mesh [6].

II. Previous Research Work.

Photovoltaic (PV) system associated with grids with power electronic interfaces is becoming popular because they do not increase ecological contamination. As it turns out, one of the issues with the network taking care of the inverter is the need for a high DC-connect voltage. To tackle this, single-stage sunlight-based inverters using regular inverters may not be suitable, as they require more than the peak of input DC voltage line-line voltage [7]. In a worldwide development on clean energy renewal, dynamic exploration with these types of fuel sources needs to be completed to expand the next energy waste utility structure with cleaner and solid infrastructure. Natural pollutions such as global warming, and greenhouse gas emissions, which are alleged to be caused by regular water bodies such as coal, atoms, and giant hydroelectricity which are being developed worldwide by truly mechanical exercises [8] Single-stage inverter geography for PV system associated with the network.

Excellent AC is to be taken care of in the system. The limiting voltage produced by sunlight-based modules towards voltage generation is successfully used in fair direct sprinkled inverters. The control plot is carried out simultaneously in a pivoting reference

outline for non-control charge control of the dynamic and responsive force [9]. The utility is expanding significantly. Expanding the continuous use of energy will further burden the dispersal structure like force entrances, adversely affecting force accessibility, safety and quality. One of the answers to winning this is the use of sustainable energy resources. The PV (photovoltaic) age is exceptionally inconsistent concerning nonstop vacations in the solar-based radiation force [10]. Wind energy is probably the most accessible and useful type of sustainable power. Among the most environment-friendly energy sources, wind energy has emerged as the most imaginative well-being of electrical energy and is economically more powerful than common sources [11]. Beyond that point, extensive efforts have been made to use wind-power generators in limited networks with small assets such as water power or coal power and places that may not be mostly associated with public inventory organizations [12]. Another objective of building wind power plants is to increase interest in electrical energy and rapidly expanding interest in petroleum products, especially coal and oil, whose stores are restricted [13]. In the early years of the twentieth century, wind energy development for the era of electric power improved when aeronautics brought tolerance to improve the powers at the cutting edge of air travel by gear. This improved a few sharp-edged turbines [14]. Integrating wind energy into existing force structures presents practical difficulties and requires a sign of voltage stability, guidance, and power quality issues [15].

Permanent Magnet (PM) machines with a presentation have been used for various applications over the last couple of years [16]. The ability to create the power of a surface coordinated is contrasted with Alternating Current (AC) machines and it regularly excels with an "ideal" machine. Simultaneous machines are the grandest contenders for direct drive applications, as demonstrated [18]. Instant Drive PM Coordinated Machine Geography which is commonly used in wind turbines, electrical vehicles and boat promotion systems [17].

Research with Permanent Magnet Synchronous Generator (PMSG) fragmentary opening cover and non-cover windings are carried out for a limited scope direct current (DC) system or direct-drive wind energy system associated with the battery [18]. The point of this exam is to show significant reflection and tariffs in the industry by looking at the use of overlap winding (O-PMSG) and non-overlap winding (NO-PMSG) geographies. NO-PMSGs are mains in the industry and are often referred to as partial space-cantered winding PMSGs [19].

Featured with tremendous transmission capacity at clear repetition, Symphony is perfect for separating sounds from feeder current to improve accuracy for detection. To share the DC circuit with a unique voltage restorer, the kinetic force channel and the kinetic voltage restorer should be in constant connection for lopsided, and Symphony pays for the transport of the clear structure [20].

III. Factors and Defects of Fractional Slot Overlap and Non Overlap Winding.

A Dynamic Voltage Restorer (DVR) and working Active Power Filter (APF) have been introduced. A repetitive moving method based on systematic change is used to bring the sounds of positive and negative succession into a coherent current regulator.

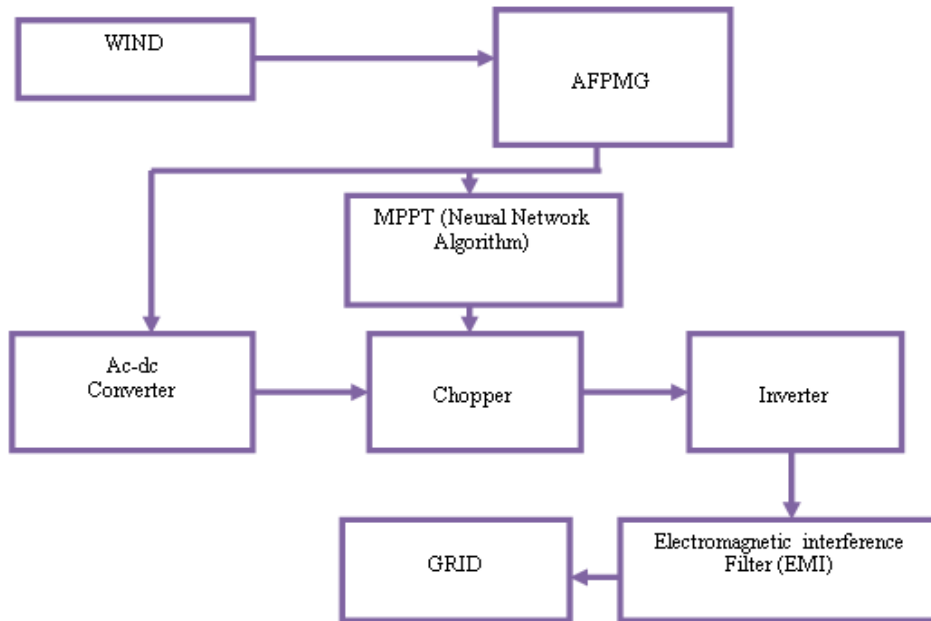


Figure 1: Block Diagram of Proposed System

This technique involves testing PM communicated generators for partial space overlap and non-overlap windings for limited space DC lattice or direct-drive wind energy systems. The point of this examination is to demonstrate significant reflection and trade facilitation in the industry by looking at the use of overlap winding (O-PMSG) and non-overlap winding (NO-PMSG) geographies.

NO-PMSGs are exceptionally mainstream in the industry and are regularly referred to as fragmented space compressed winding PMSGs. Basic opening twisting PMSG generally has a overall higher coagulating force. The cogging force is particularly fragile to accumulate bugs, making the important winding of PMSG unsatisfactory for wind turbines. The correlation application of this system is clear, and consequently, only the spiral motion considers the partial spatial curvature of the surface-mounted PMSG.

Direct drive wind energy system without materials is an attractive suggestion for wind energy release structures. The Axial Flux Permanent Magnet Generator (AFPSG) is an attractive alternative to the spiral motion machine in wind turbine applications. The main speed type machine is suitable for low speed and the high-power activity of instant drive wind energy system. This strategy uses a Maximum Power Point Tracking (MPPT) based neural network algorithm calculation control approach to obtain the most extreme force from the variable wind speed. To achieve high efficiency in wind power conversion structures, the factor motion activity system considers a ton as the largest force point following MPPT, the main motion permanent magnet generator and the static magnet integration generator system.

A. AFPMSG

Electric power stability has been a key issue, necessitating the use of renewable energy sources such as wind. Wind energy is abundant and inexpensive, making it simple to harness using a wind turbine. The principle of electromagnetic induction is used to generate electricity. The magnetic field flux is created using permanent magnets. The permanent magnets were mounted on a steel plate and utilized as the rotor, concentrating on one side of the plate to prevent flux leakage. The wind turbine electric generator relies on the flow of electrons flowing through electric coils, or the other way around, where wire coils (stator).

One mechanical pattern in the wind energy transformation system directly defines variable speed turbines. Hub transition permanent magnet synchronous generators allow the use of high post numbers that support the gearless system. The basic advantages are material prices, oil spills, gear care, and the expectation of misfortune; by staying away from this transmission element which can essentially reduce the seasons. Axial motion machines are considered for greater force thicknesses than their counterparts due to their spiral motion.

B. AC-DC CONVERTER

A hybrid technique is used to calculate the performance of a coreless stator axial flux permanent magnet generator, which combines finite element analysis (FEA) with theoretical analysis. The converter moves an exchange currently, as its voltage additionally substitutes the receptive impedance components, such as Inductors (L) and Capacitors (C), where it is placed away and coordinated. The approach is then used to improve the design of a big power coreless stator AFPM generator using a multidimensional optimization procedure. For small-scale wind power applications, a stable energy supply necessitates a cost-effective and mechanically simple generator. AC power sent over high distances to significant distances and then switched from low to low voltage is the more efficient and more secure skill of force in homes. The use of direct-drive generators rather than geared machines decreases the number of drive components, allowing for cost savings while also improving system reliability and efficiency.

C. CHOPPER

A chopper is a static gadget used to obtain a variable DC voltage from a constant DC voltage source. A helicopter is otherwise called a DC-to-DC converter. The converter offers more significant effectiveness, faster response, lower care, more modest size and easier control. Choppers are commonly used in streetcars, battery work vehicles, foot engine control, and control of a large number of DC engines and are therefore used to regenerate DC engines to slow down regeneration in addition to DC voltage controllers.

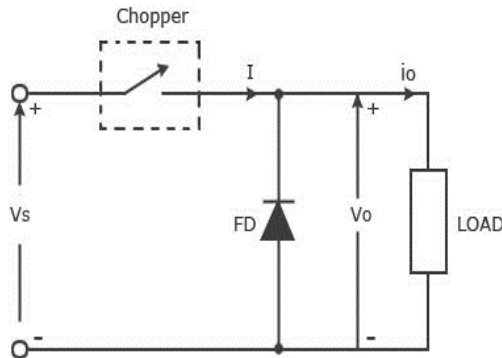


Figure 2 Choppers

D. INVERTER

An inverter is classified as an electrical gadget that converts an alternating current source at a direct flow source. The primary source of electrical power is the battery which is the DC source. The DC output of the battery needs to be kicked or supported and then converted to AC using a DC-AC inverter. The inverter can convert the DC input voltage to the desired magnitude and the symmetrical AC output voltage of the repeater. The output voltage waveforms of the ideal inverter should be sinusoidal. However, the waveform of a practical inverter is non-sinusoidal and contains certain music. The contribution of the inverter is a fixed DC voltage obtained from the battery, and the yield of the inverter is by and large a specific variable repeating alternating voltage and AC voltage greatness is the same factor.

E. ELECTRO MAGNETIC INTERFERENCE FILTER (EMI)

An EMI channel, or electromagnetic impedance channel, is an aloof electronic gadget used to lighten a directed barrier available on a sign or electrical cable. The system can use EMI channels to alleviate an obstacle created by a gadget or other hardware, altogether making the gadget more secure for electromagnetic barrier signals present in the climate.

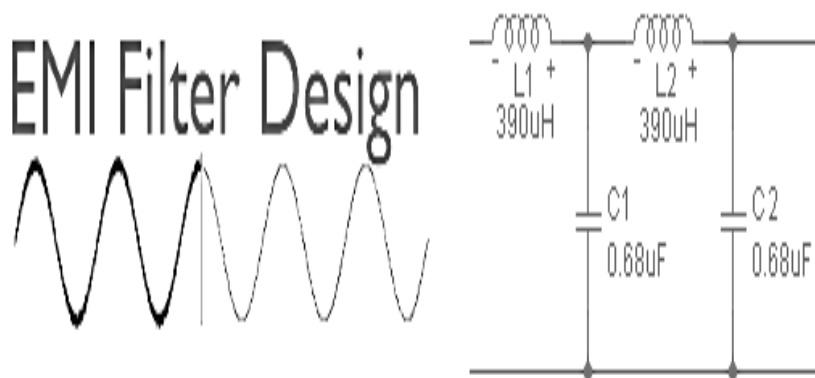


Figure 3 EMI Filter Design

Most EMI channels consist of segments that suffer from differential and regular position barriers. Electromagnetic barrier, also known as Radio Frequency Interference (RFI), is the excitation generated by an external source when the radio is in the repetitive series that affects the electrical circuit by electromagnetic registration, electrostatic coupling or conduction. The unsettling effect may contaminate the presentation of the circuit or prevent it from working. Due to an information pathway, these effects can lead to a complete loss of information by expanding the error rate.

F. IOT(Internet of Thing)

An IOT (Internet of Thing) based AC to DC converter that improves the match between a sunlight-based displays (PV board) and a battery bank or utility system. See our MPPT charge regulators. A charge regulator is a voltage or current regulator used to prevent batteries from cheating; it maintains the speed of voltage and current coming into the battery from the solar-powered board. MPPT sunlight-based charge regulator is required to maximize the maximum force from any PV module to any solar-oriented force structure; It gives the IOT(Internet of Thing) module the power to work at a voltage closer to the most extreme force highlight Draw the most accessible force. The Sun-operated charge regulator reduces the system's complexity while the yield of the system is high efficiency.

IV. Results and discussion

The investigation is carried out in Mat lab / Simulink, where wind-wave generator power systems operate the force structure model. The over-lap and non-overlap models presented in the section are remembered as cumulative wind power for the force system neural organization. The direct model enhances the evaluation of the little sign shelter. The initialization directly on the power system model using the Simulink control plan tool station. The rotor rate of the generator between field modes is very clear because the generators swing against each other. Reactions of over-lap and non-overlap models are only allowing linearization.

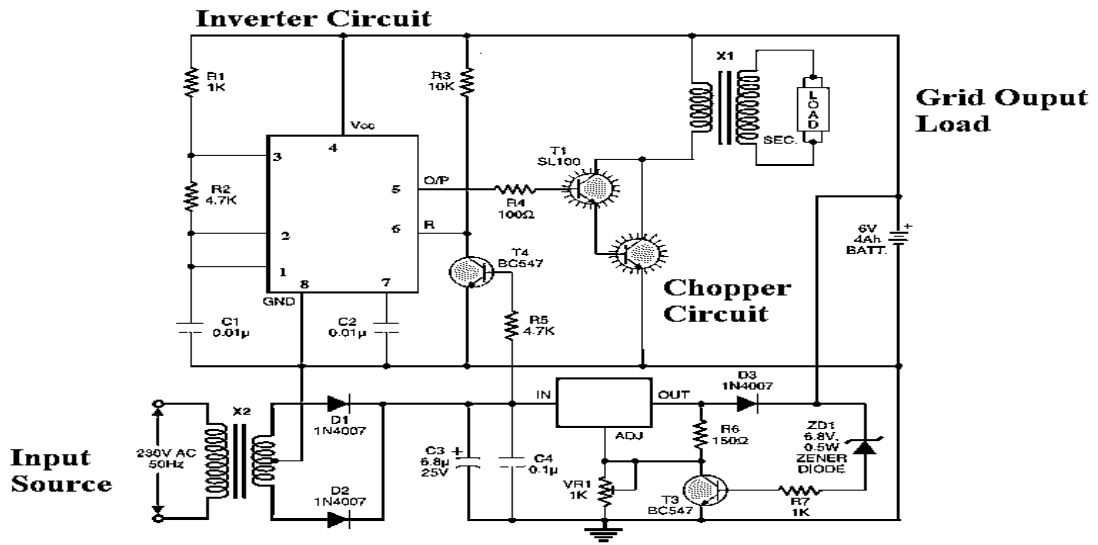


Figure 4: Circuit Diagram

The control plan tool uses a fixed linearization for each capability of the kit model with a logical first subset. It is used for math compression components, such as tables in appearance, which the system cannot scientifically modify.

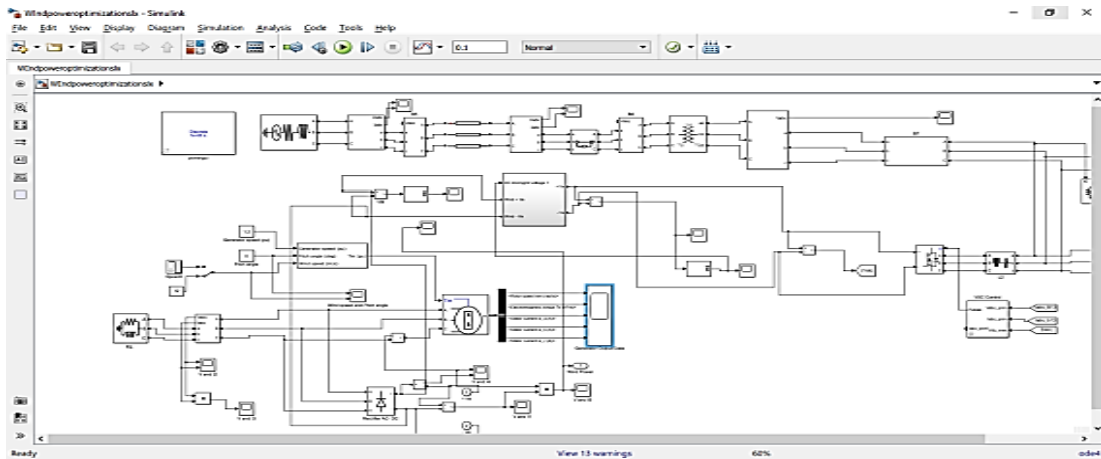


Figure 5: MATLAB Simulation Output

Restoration of partial opening cover winding; Two stars are not provided with the same voltage shape. Current waves appear in the current relative to the main star. This means that the stars did not originate gracefully. Thus, with this last reproduction, the induction shared between the two phases is less.

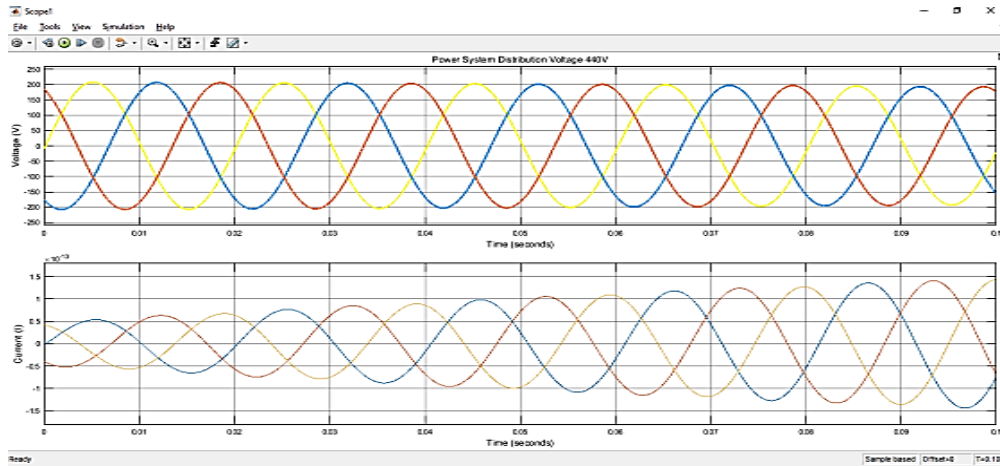


Figure 6: Output Waveform

In some cases, the amplification of the repetitive repetition in the inverter can remove the current wave. However, the system will not increase such moderation of normal induction (here, 30% -35% is separated by five before the general criterion).

The stars are not provided with the same voltage shape. No current wave appears in the current of the primary star. This means that the stars are strikingly obscure. At present, it is less than 1%. The all-out attractive motion in one tooth is 1.5 when its curls are controlled, and not all the attractive transitions in one side tooth are equal - 1.5. It is not possible to set the speed of teeth in each one to 0. This indicates that the cover winding will never be equal to 0. Truth is told, machines with cover equivalents turn out to be significantly more than 30%.

They should be planned with caution and entertainment to assess the effect of current waves on the machine's behaviour. As a result, reproduction is ended using the mat's laboratory openings. Engine is taken as the underlying model. This new design has been introduced to spread the related momentum. It can be very well assumed that in the drive using a wind generator structure, without semi-shut or shut openings, a less general inductance effect is observed. In addition, if the attractive transition in the primary tooth is decreasing as 0.49 MW in the main case and 0.25 MW in the latter case, the system should note that the full speed goes to the rotor and does not pass anywhere else.

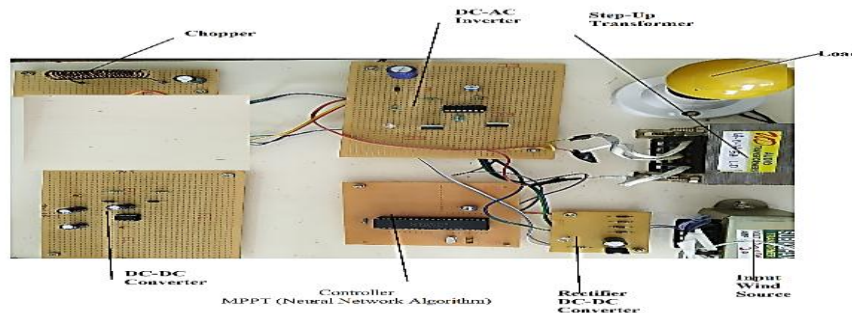


Figure 7: Hardware Experimental Kit

The main case is transition expansion dynamics which does not create force. One of the principal goals of these machines is effectiveness. General skills of 93% -94% or more are common. The system can monitor the increase in electric force by increasing the number of stars. Star windings with a 30 ° electrical split between stars are the remarkable geographies that can provide low force waves and high efficiency. Scattered windings cannot accept this geography closed opportunity that they are connected, as the current can show some waves and can be destructive to the converter.

Table 1: Hardware Specification.

Hardware	Specification	Input Ranges	Output Ranges
Microcontroller	PIC (16f877a)	5V DC	5V DC
Rectifier	Input power	12V AC	12V DC
Inverter	Output power	12V DC	12V AC
Boost converter	Regulating power	12V	0-50v
Transformer	step-up	24VAC	230VAC
Load	Load	230V	3A

The time area of both the over-lap and non-overlap generator system is supplemented with reproduction to allow linearization of the modular probe model. The motions are stimulated by a staged increase of 1% in terms of the excitation voltage of the generator.

A. ADVANTAGES

- Improves accuracy for consonant location.
- Feed Feeder is able to separate sounds from the current.
- Harmonic current and uneven voltage will be able to reduce remuneration later.

B. APPLICATIONS

- Industrial applications, for example, Electric vehicles.
- UPS.
- Renewable energy change.

V. Conclusion

The power network in the AFPMSG structure has been tapped, and it experiences the adverse effects of the force pulse, which damages the rotor course and summarizes the hardness of the IOT (Internet of Thing). The difficulty in adapting to the force quality issue is distinguishing the part from the computed voltage or current mark. The system can distinguish the required curve into two categories which are voltage imbalance and current Symphony. Since voltage imbalance means free for symphony bending, the main segment should be settled based on the calculation of the neural organization and the first voltage signal with the primary goal. The key is with the matrix voltage stage for an analogy with the force mesh for positive adjustment voltage.

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