

# INTALLIGENT CONTROLLER FOR GEN SET (MAINS) DG SET AND SOLAR PV CONNECTED HYBRID POWER SYSTEM

SHUBHAM KAKDE<sup>1</sup>, ANSHUL DEOTALE<sup>2</sup>, DEVENDRA TAJNE<sup>3</sup>, KANCHAN DANDGE<sup>4</sup>, RAJNANDINI PISE<sup>5</sup>, PROF. PRATIK GHUTKE<sup>6</sup>

<sup>123456</sup> Department Electrical Engineering, Abha Gaikwad-Patil College of Engineering and Technology, Nagpur.

**Abstract :** *In this paper , focuses on the smart conversion between energy sources, namely solar generators and diesel generators (DG). An inverter is required to convert the direct current (DC) output of the solar panel into alternating current (AC). Here, an inverter coupled to the synchronous output grid (GTI) is used. The Automatic Grid Fault Controller (AMF) is used to automatically start the DG and synchronize the DG at the same time. The luxury of this project is the ability to use two electric energy sources (solar grid or solar diesel) together to meet the needs of major energy consumers. This reduces the need for grid electricity and improves the use of energy from solar energy sources.*

**Keywords—** *Image capturing and Notification , Safety and Security , Smart Door System.*

## I. INTRODUCTION

A control panel is a cabinet containing electrical components for controlling equipment and motors. Smart consoles perform the same tasks as traditional consoles, except for advanced techniques such as programming via a microcontroller to perform control tasks. The world, especially developing countries like India, is facing an “energy crisis”. There is a significant gap between power supply and demand. This gap is widening as countries move towards development. Faced with this situation, it is very important to continue the country's upward path. To find a It means "liquid crystal display". LCD screen is a flat panel technology used in televisions and computer monitors. It is used in on the screens of mobile devices such as laptops, tablets and smartphones. LCD screens are not only different in appearance from bulky CRT monitors, but they also work very differently. Backlit LCD screens provide light for individual pixels arranged in a rectangular grid rather than emitting electrons onto a glass screen. Each pixel has red, green, and blue RGB subpixels that can turned on or off. When all subpixels of a pixel are freed, they are displayed in black. If all subpixels are set to 100%, they will be white. You can combine millions of colors by individually adjusting the light levels of red, green, and blue. It provides a uniform light source behind the backlight display of liquid crystal displays.

This light is polarized, and the light incident on the liquid crystal layer is half. Liquid crystals are made up of some solids and some liquids, and can be "distorted" by applying an electrical potential. solution, many options are being considered with a focus on research and development of renewable energy. Class systems can be distinguished as

## II.SOME COMMONLY USED COMPONENTS

### Liquid Crystal Display

It means "liquid crystal display". LCD screen is a flat panel technology used in televisions and computer monitors. It is used in on the screens of mobile devices such as laptops, tablets and smartphones. LCD screens anot only different in appearance from bulky CRT monitors, but they also work very differently. Backlit LCD screens provide light for individual pixels arranged in a rectangular grid rather than emitting electrons onto a glass screen. Each pixel has red, green, and blue RGB subpixels that can turned on or off. When all subpixels of a pixel are freed, they are displayed in black.



Fig. liquid crystal Display

If all subpixels are set to 100%, they will be white. You can combine millions of colors by individually adjusting the light levels of red, green, and blue. It provides a uniform light source behind the backlight display of liquid crystal displays. This light is polarized, and the light incident on the liquid crystal layer is half. Liquid crystals are made up of some solids and some liquids, and can be "distorted" by applying an electrical potential.

## B. Relay Module

A relay module is an electrical switch that can turn circuits on and off using much higher voltage and / or current than the microcontroller can handle. There is no connection between the low voltage and high power circuits operated by the microcontroller. The relays protect each circuit from each other. Each channel of the module has three connections: NC, COM, NO. Depending on how the input signal is triggered, the jumper cap can be set to the same low-level activated mode as the low-level efficiency mode, but "close" the normally open (NO) switch at the same time. The high input works at the low level input. I go. specifying

## C. ARDUINO NANO

The Arduino Nano is a small, complete and user-friendly board based on the ATmega328 (Arduino Nano 3.x). It has the same functionality as the Arduino Demilune, but with a different package. It does not have a DC power outlet and works with a USB Mini-B cable instead of the standard cable.

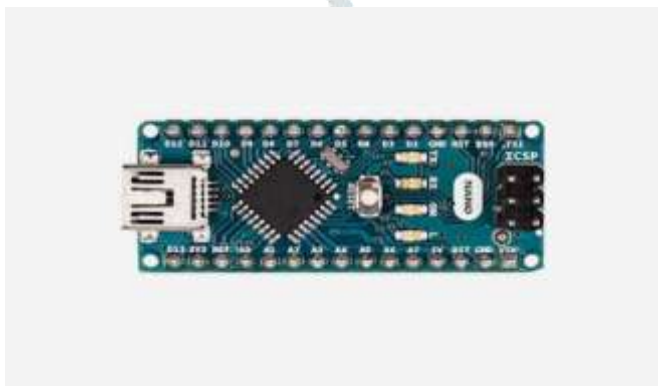


Fig. Arduino Nano

## D. SMPS

The SMPS OR switching power supply is an electronic power supply that incorporates a switching regulator to effectively switch the power supply. Like other power supplies, SMPS converts voltage and current characteristics by transferring power from a DC or AC source to a DC load such as a PC. Switching regulators are used as an alternative to linear regulators when high performance, miniaturization or light weight is required.

Due to their performance, switching power supplies efficiently and effectively power most types of electronic systems used in all but the most demanding applications.



**Fig. SMPS**

### **E. Battery**

The lead-acid battery was the first rechargeable battery invented in 1859 by the French physicist Gaston Planté. Power-to-weight ratio Relatively high power/weight. These features, combined with their low cost, make them attractive for use in cars that provide the high current needed for starter.



**Fig. Battery**

### **III. LITERATURE REVIEW:**

“[1] J. Godson et al. (2013) Energy produced from renewable energy sources, namely solar, wind, biomass, hydroelectric, geothermal and marine resources, is considered as a technical alternative to the production of energy in quantity clean.

However, although energy production from solar and wind power is much lower than that from fossil fuels, the amount of electricity generated by photovoltaic batteries and wind turbines has increased sharply in recent years. This treaty proposes a hybrid solar and wind power system that uses renewable energy from the sun and wind to generate electricity. The control of the system is mainly based on the microcontroller. It ensures optimal use of resources and is more efficient than individual creative modes. It also improves reliability and reduces the need for a single source. This hybrid PV system is suitable for industrial and domestic use.

[2] Ali Diabat (2014) Of the many problems facing the world today, there is a global consensus that greenhouse gas (GHG) emissions have the greatest negative impact on the environment. GHGs contain carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrogen fluorocarbon and perfluorocarbon. These gases help keep the Earth's temperature at a comfortable level for living things, and when those levels drop, the temperature may be too low for us to survive. However, GHGs allow the sun to enter the atmosphere, but because it traps heat radiating from the surface, this increase in emissions leads to an increase in Earth or global temperatures. cause death. Many scientists believe that an increase in natural disasters, which change patterns in the atmosphere and oceans as Earth's temperature rises, is due to climate change.

[3] Karim Moussa et al. (2014) Solar and wind power are two of the most viable renewable energy sources, but little research has been done on harnessing them in parallel to take advantage of their additional properties. .. In this article, we use optimized parameters such as the number of solar cell modules, the height of the wind turbines, the number of wind turbines and the diameter of the turbine rotor to optimize the design of a mixed PV plant. The aim is to develop and minimize costs. Sensitivity analyzes and simulation studies show that hybrids can take advantage of the complementary properties of the two energy sources to ensure energy delivery throughout the year.

#### IV.EXISTING SYSTEM

Solar energy free but system not work in clouded day Electricity supply cut on maintenance and grid fail Diesel generator user for emergency condition time only it is not permanent solution. Solar energy is environmentally friendly, renewable and can be used as a sustainable energy source. So, with the depletion of fossil fuels on Earth, it will certainly become an important part of the future energy structure. However, the degradation of energy density and geographically dependent seasonal behavior is a major challenge in identifying suitable applications for the use of solar energy as a heat source. Therefore, it is necessary and practical to study the technology of high efficiency solar concentrators. Solar energy is recognized as one of the most promising renewable energy alternatives because it is free and environmentally friendly. In the near future, we can expect the large-scale introduction of solar energy systems that directly convert solar radiation into Heat.



Fig. Solar Energy



Fig. Existing system

## V.METHODOLOGY

*Methodology Design control systems for hybrid electric systems. Prototype based on lack of electricity. These systems can be divided into three types of electrical systems: It is a system that can supply stable power 24 hours a day, 365 days a year. first Electricity is a form of synthetic electricity produced by hybrid or wind power plants, or nuclear power plants. The second part is solar energy, which is collected and used by the solar cells in the battery. third power diesel generator.*

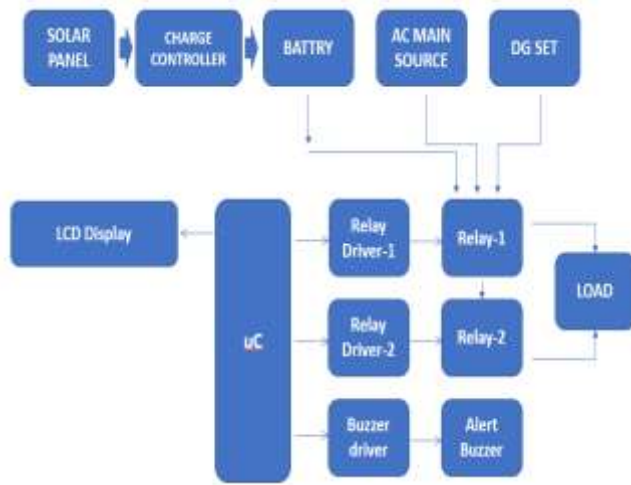


Fig. Block diagram

### Classification of Hybrid Power System

On the basis of power system hybrid power system is divided into three parts

- 1) Electric Power
- 2) Solar System
- 3) Diesel Generator

#### 1) Electric Power

Electric power is the rate, per unit time, at which electrical energy is transferred by an electric circuit. The SI unit of power is the watt, one joule per second. Electric power is usually produced by electric generators, but can also be supplied by sources such as electric batteries.

#### 2) Solar System

Solar power is the conversion of energy from sunlight into electricity, either directly using photovoltaics, indirectly using concentrated solar power, or a combination. Concentrated solar power systems use lenses or mirrors and solar tracking systems to focus a large area of sunlight into a small beam.

#### 3) Diesel Generator

A diesel generator (DG) (also known as diesel genset) is the combination of a diesel engine with an electric generator (often an alternator) to generate electrical energy. This is a specific case of engine-generator. A diesel compression-ignition engine is usually designed to run on diesel fuel, but some types are adapted for other liquid fuels or natural gas.

## . VI. Conclusion

Although all kinds of system's initial investment is almost same, The entire cost of Integrated system within its lifespan depends on Battery Change Cost and Maintenance Cost. Meanwhile, Battery change/Maintenance Cost depends on system reliability, system reliability depends on controller system. Thus, better controller decides better system and better returns on investment. So, choosing better controller is the key decision for decision-makers.

## VII. Result

It focuses on the smart conversion between energy sources, namely solar generators and diesel generators (DG). An inverter is required to convert the direct current (DC) output of the solar panel into alternating current (AC). Here, an inverter coupled to the synchronous output grid (GTI) is used. The Automatic Grid Fault Controller (AMF) is used to automatically start the DG and synchronize the DG at the same time. The luxury of this project is the ability to use two electric energy sources (solar grid or solar diesel) together to meet the needs of major energy consumers. This reduces the need for grid electricity and improves the use of energy from solar energy sources.



.fig. working of system.

### VIII. Future Scope:

*This system can be considered for a sustainable hybrid energy system, designed on two modes. One is standalone and other is grid-assisted mode. In stand-alone mode, it draws power from the wind–solar hybrid energy system. In the grid-assisted mode, when the hybrid system is unable to feed the power, it automatically takes the grid power. If the site-specific data is not available, one may use nearest meteorological station data in designing the system. The system voltage variation, the frequency, waveform and power factor at the time of grid connection, must be maintained within the limits. One can improve the power quality depending upon the local conditions. Hybrid energy flow is controlled using power electronic converters. This energy would be useful in many applications such as ship power systems, electric hybrid vehicles, telecommunication industries, rural electrification*

### IX. REFERENCES

- 1) IRENA, “Off-Grid Renewable Energy Systems: Status and Methodological Issues About IRENA,” 2015.
- 2) C. V Nayar, “High Renewable Energy Penetration Diesel Generator Systems,” Paths to Sustain. Energy, InTech, pp. 1–27, 2010.
- 3) K. Sopian and M. Y. Othman, “Performance of a Photovoltaic Diesel Hybrid System In Malaysia,” ISESCO Sci. Technol. Vis., vol. 1, pp. 37–39, 2005.
- 4) B. Ali, K. Sopian, M. A. Rahman, Y. M. Othman, A. Zaharim, and A. M. Razali, “Performance of a Hybrid Photovoltaic Diesel System in a Cable Car Resort Facility,” in 4th IASME/WSEAS International Conference on ENERGY, ENVIRONMENT, ECOSYSTEMS and SUSTAINABLE DEVELOPMENT (EEESD’08), 2008, pp. 183–187.
- 5) CLUB-ER, “Rural Electrification with PV Hybrid Systems,” 2013.
- 6) S. Yilmaz, H. R. Ozcalik, M. Aksu, and C. Karapinar, “ScienceDirect Dynamic Simulation of a PV-Diesel-Battery Hybrid Plant for Off Grid Electricity Supply,” Energy Procedia, vol. 75, pp. 381–387, 2015.
- 7) Merai G. & Magnor D. & Leuthold M. & Sauer D.U. (2014). Optimization of an Off-grid Hybrid Power Supply System Based on Battery Aging Models for Different Battery Technologies. Research Consortium at RWTH Aachen University: Institute for Power Electronics and Electrical Drives, Juelich Aachen Research Alliance JARA-Energy and Institute for Power Generation and Storage Systems (PGS) E.ON ERC
- 8) Meteoset (2015). Meteonorm. Solar Irradiation Database. Online. Accessed Decemb