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PV PANEL POSITION CONTROL THROUGH GSM

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Abstract — Alternatives to the usage of non-renewable and polluting fossil fuels need to be researched in the current environment of increased energy needs and growing environmental concern. The sun's energy is one such alternative. Photovoltaic cells, which are used in solar panels, turn solar energy into electrical energy, which is then storedin batteries. The suggested project work uses GSM technology to send an SMS that may be used to position the solar panel towards the direction of the sun and monitor the panel voltage. rotates the panel to best utilize solar power in accordance with the SMS message supplied from the mobile device. The solar panel is moved into three places with the use of a single DC motor and the voltage of the panel is monitored at every point of the panel to determine the position of the sun. The output of the solar panel voltage sensing circuit is given to the micro-controller chip via the ADC. The user can adjust the position of the panel to the desired direction by answering to a message in the mobile device by checking the panel voltage. the SMS format. The controller controls the DC motor to move the solar panel to the desired position by receiving the message.
Keywords GSM,HOME AUTOMATION, PHOTOVOLYIC,SENSORS, REMOTE CONTROL, BATTERIES.

I.INTRODUCTION

prevent system failure due to misalignment or other problems. This is particularly relevant in regions where solar energy is the main source of electricity since a dependable and effective system is essential for supplying the necessary energy. Cost-effective energy use is the third goal of GSM-based solar panel position control. [7] Solar power is a renewable and sustainable energy source, and by making the solar panels more efficient, the system can lower consumers' energy expenses. This could increase the number of individuals who have access to solar energy, particularly in developing nations where energy costs can be expensive.

The reduction of carbon emissions is a further goal of GSM-based solar panel position management. Utilizing solar energy systems can lower carbon emissions and help to lessen the negative effects of climate change. Solar energy is a clean and renewable source of energy. For the long-term viability of our world and welfare, this is crucial. The position of PV panels using GSM technology. These actions will enable the system to the design and construction of the system, creation of the control algorithm, integration of the GSM modem and microcontroller unit, testing and calibration, deployment, and operation make up the methodology for controlling efficiently harvest solar energy for the production of clean, renewable energy.

II.LITERATURE SURVEY

Paper 1: solar tracking system using a GSM-basedcontrol mechanism.

The project work that is being presented sounds intriguing and creative. [1] The quantity of energy produced can be increased by using GSM technology to align the solar panel with the sun and increase its efficiency. The user can direct the solar panel to face the sun by sending a command signal using a wireless communication system built with a GSM modem.[2] The

One study by Patel et al. (2018) developed a solar tracking system using a GSM-based control mechanism. The system used a microcontroller to receive control signals through a GSM modem and adjust the position of the PV panel accordingly. The study found that the system was effective in increasing the efficiency of solar energy capture and reducing energy loss.

received signal is next demodulated using a GSM module, afterwhich the microcontroller unit processes it and uses an H-bridge to operate the motor. The 'H' Bridge package, GSM modem, ADC, and other devices are interfaced with this single chip because it has four ports. This control circuit's goal is to move the panel using a DC motor in response to instruction signals from a mobile device.The purpose of GSM-based solar panel position controlis to boost the effectiveness of solar panels. [6] The technology can maximize the energy produced and hence improve the efficiency of the solar panel by orienting it towards the sun. The positioning of solar panels using GSM technology is precise and exact, guaranteeing that the solar panel is always facing the sun for maximum energy generation.Another goal of GSM-based solar panelposition management is to increase the dependability of solar energy systems. Solar energy systems can be made more effective and efficient by using GSM technology to manage the position of the solar panels. This can help to maximize solar energy capture.

Paper 2: GSM-based solar tracking system used in microcontroller.

Another study by Sharma et al. (2017) developed a GSM-based solar tracking system that used a microcontroller and H-bridge to control the position of the PV panel. The study found that the system was able to accurately track the position of the sun and improve solar energy capture, even under cloudy

Paper 3: GSM technology for PV panel position control.

A study by Ramanujan and Srinivasan (2016) also investigated the use of GSM technology for PV panel position control. The system used a microcontroller and GSM modem to adjust the position of the PV panel, based on inputs from a light sensor. The study found that the system was able to effectively track the position of the sun and maximize solar energy capture**.**

Overall, these studies suggest that the use of GSM technology for PV panel position control can provide an effective means of optimizing

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III.EXISTING SYSTEM

for the system's successful operation. The hardware development stepis critical since it entails developing and building a control unit with all necessary components such as an Arduino, motor, sensors, and a GSM module. In addition, circuitry for power supply, signal conditioning, and communication must be added. The software development process can begin after the hardware is in place. The primary focus of the software development phase is programming the Arduino to process control signals received from the GSM module and modify the position of the PV panel accordingly. It is critical to optimize solar energy capture and battery charging by incorporating In the software, relevant algorithms are used. determining the peak power demand as well as the total power consumption of all the devices and appliances that must be powered. Sizing the solar array: After the necessary power has been determined, the solar array needs to be sized. This entails figuring out how many and what size solar panels are necessary to provide the necessary amount of energy. This stage will take into account elements including the building's location, the roof's angle and orientation, and the amount of sunlight that is accessible. Component selection: After determining the size of the solar array, the next stage is to choose the inverter, battery, charge controller, and wiring for the solar power system. The components will be selected based on the solar panel specifications and the required amount of power.

Designing the circuit: After choosing the components, the circuit must be created. In order to accomplish this, the charge controller, battery, and inverter must all be connected to the solar panels. At this point, the circuit will also incorporate theArduino board and the Blynk app.

Building and testing the system: Following the design of the circuit, the system needs to be built and tested. rooftop solar panels, wiring the parts in accordance with the design, and testing the system to make sure it is working properly.Integrating the IoT components is the last phase, and it entails setting up the Arduino board to receive data from the sensors and deliver instructions to the relay module.

DC energy is produced by a solar power system and converted by an inverter to power home appliances. A battery for energy storage and a relay module connected to an Arduino board are also included in the system. If the load demand is too great or there is not enough solar energy being produced, the relay module may switch between the solar energy and AC mains electricity.

Identifying the power needs: The first stage in constructing a solar rooftop power generation system is figuring out what kind of power the home or building will need. This entails determining the peak power demand as well as the total power .

The final step in installing the PV panel position control system with GSM technology is deployment. It is critical to install the control unit and PV panel in an appropriate place, such as on a rooftop or in a field, and to configure the system to communicate with mobile devices over the GSM network. It controls the solar and lunar positions via messages Finally, constant monitoring and maintenance are required for the system to perform properly.

Regularly monitoring the PV panel position control system ensures that it is operating properly and optimizing solar energy capture. Regular maintenance, such as cleaning the PV panel and replacing worn-out components, is also essential for ensuring long-term performance and reliability.

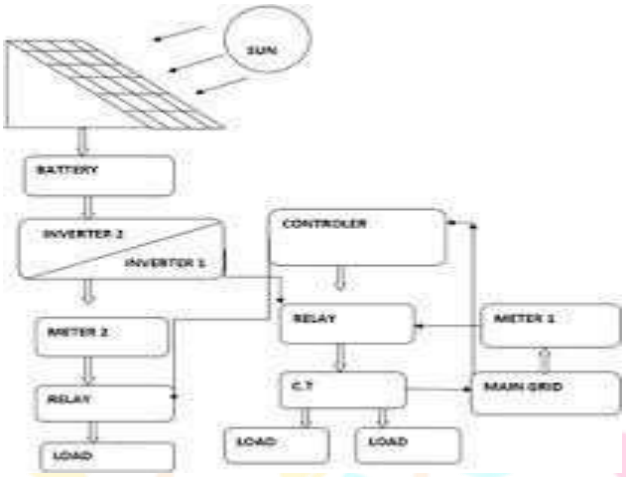
To summaries, building a PV panel position control system using GSM technology necessitates thorough planning, design, and testing to achieve optimal field performance. Data gathering and pre-processing are critical elements in the creation of a GSM-based PV panel position control system. The obtained data is utilized to inform the control algorithm and find the best location for the PV panel. The initial stage in data collecting is to measure the solar intensity at the installation site of the PV panel. Solar intensity can be detected with a sensor such as a photodiode or pyranometer, which outputs a voltage proportional to the solar intensity. An Analog-to-Digital Converter (ADC) is then used to transform the voltage output to a digital signal.

Following that, data on meteorological conditions such as temperature, Additionally,

the Blynk app will be set up to provide real-time statistics and give users remote access to the system.

humidity, and wind speed should be obtained. This information can be received from the local weather service. his information can be gathered by installing sensors at the PV panel. control algorithm, the data obtained sensors is pre-processed. Pre-components.

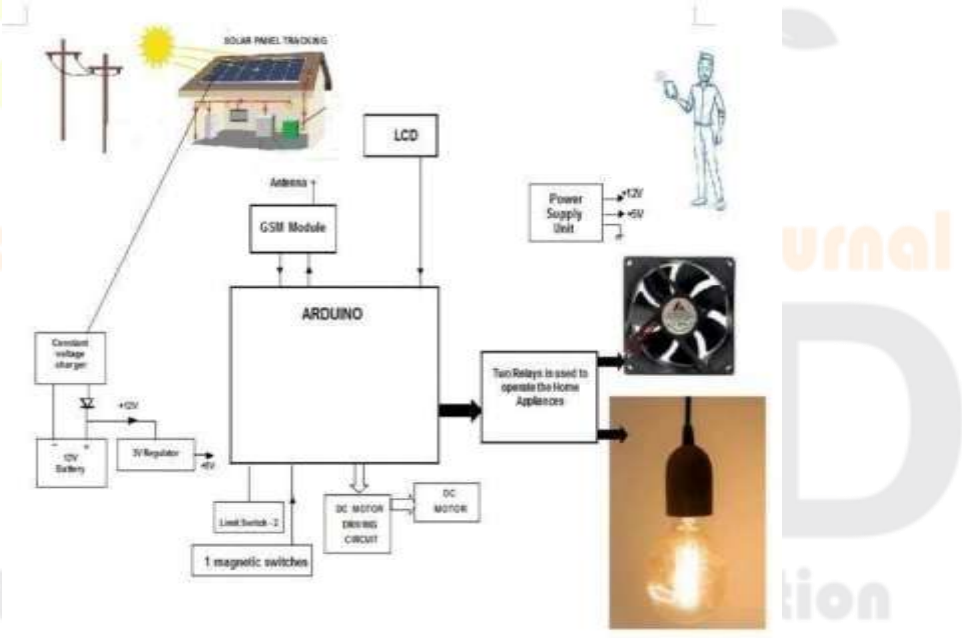
IoT-based solar rooftop power generation system design often entails meticulous planning, component selection, circuit design, extensive testing, and integration of the IoT Before being used to guide the from the sun intensity and weather



IV.PROPOSED SYSTEM

The deployment of a PV panel position control system usingGSM technology entails numerous procedures that are critical processing is the process of filtering and scaling data to remove noise and outliers and normalize the values to a standard range.

To reduce noise or interference from the data, filtering techniques such as median or low-pass filters can be applied. Scaling data entails converting measured values to a standard range for easier comparison and analysis.



V.RESULTS

A PV (photovoltaic) panel's location can be managed using GSM (Global System for Mobile Communications) technology.This can be accomplished by integrating a motor driver circuit, a GSM module, and a microcontroller into the PV panel system.The microcontroller can be configured to accept SMS (Short Message Service) orders from a smartphone and use the motor driver circuit to move the PV panel into the desired position. The panel's exposure to sunlight may be improved as a result, potentially increasing its capacity to produce electricity.

However, a number of variables, including the positioningsystem's precision, the control system's responsiveness, and thesurrounding environment, will affect how effective this controlsystem is the place of installation. Additionally, there might besome restrictions on the use of GSM technology in someinaccessible or rural locations with scant or nonexistent cellular coverage.

Overall, the use of GSM technology for controlling the positionof PV panels can be a helpful solution in some circumstances, but it is crucial to carefully assess its viability and efficiency foreach individual application.

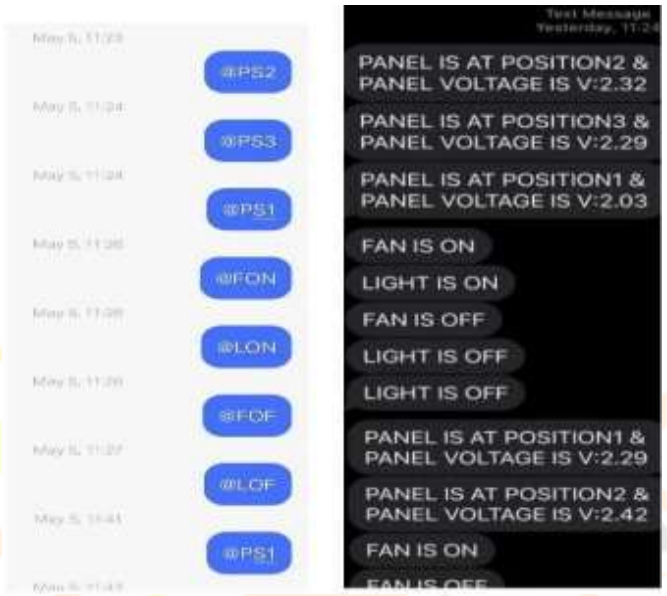


FIGURE : 5.1 INPUT AND OUTPUT

VI.CONCLUSION

An outstanding accomplishment is the successful design, testing, and production of a PV panel position control module employing GSM technology. Although it is noteworthy that the module was built with components that were readily available locally, it is crucial to remember that adjustments might be required to make the module perform best in a real-world system. In order to increase the length of the screw rod with suitable support and bearings and drive big loads, a higher-ratedmotor can be used. Both feasible improvements can boost the system's performance. It may also be a good update to include three motors for 3-dimensional rotation. Overall, the work on this project is a remarkable illustration of the potential of renewable energy technology and the application of cutting- edge communication technologies for control and optimization. It is It's admirable that professionals from many organizations were consulted during the design and development process, as this is likely what led to the prototype module's successfuldisplay.

VII.FEATURE SCOPE

Real-time monitoring: The system is capable of displaying the orientation, location, and operation of the PV panel in real-time. This can involve variables including temperature, voltage, current, and the quantity of solar irradiation.

Remote control: The system can be managed from a distance using SMS, web-based tools, or other channels of communication. Users may then be able to move the panel into a different location, follow itsprogress, and get notifications and alarms**.**

Automated tracking: The device can monitor the sun's motion and alter the location of the panel as necessary. The panel's exposure to sunlight may be improved as a result, potentially increasing its capacity to produce electricity.

Data logging: The system has the ability to record and store information about the operation and surroundings of the PV panels. This can include information about the panel's effectiveness, upkeep requirements, and potential issues**.**

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