

## Solar Power Remote Monitoring Using IoT

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**Abstract-** The Internet of Things is commonly used to improve efficiency when measuring solar energy. It's also used to keep the plant alive and well. The cost of renewable energy equipment is falling around the world, which stimulates large-scale solar plant installations. Since the bulk of the field units are located in isolated, distant areas and hence are not supervised from a central office, automation of plant observation on such a wide scale of preparation deployments necessitates complex systems dependent on Internet interfaces. Is discovered The project is predicated on the use of the most up-to-date cost-effective technique sponsored by IoT to remotely monitor a star plant for performance. examination It can help with plant preventative management, fault diagnosis, and real-time observation.

**Keywords:** AT mega 328, Power Measurement, Wireless Transmission, Internet of Things, Thing speak.

### I. INTRODUCTION

For optimal power production, solar power plants must be supervised. Although faulty star panels, searching for contacts, and alternating those problems with sludge collected on output reducing panels and shaking wiring, this helps to recover economic power generation from power plants. But we're going to suggest a machine-controlled IoT, which is essentially an alternative Energy viewing device that allows for automatic alternative energy consumption from anywhere on the internet. To obey solar battery specifications, we prefer to use AT super controllers focused primarily on mega controllers. Our system constantly tracks the solar battery and sends the IOT system's capacity performance over the internet. We have a habit of using IOT Thing Speak to send alternate energy parameters to the IOT Thing Speak server's net. It currently shows these parameters in a user-friendly graphical user interface and notifies the user when the performance cap is exceeded. This makes remote viewing of star plants much easier and provides the optimum power generation.

## II. LITERATURE SURVEY

[1]Aayushi Nitin Ingole, (2014) (ICSTSD) International Conference on Science and Technology for Sustainable Development presented "Arduino dependent solar monitoring device." If the testing finds a flaw in the panels, it displays the best performance from the panels to the customer. You will have to rely on your IoT sensors or other devices if they develop errors that you do not have an unbiased means of checking.

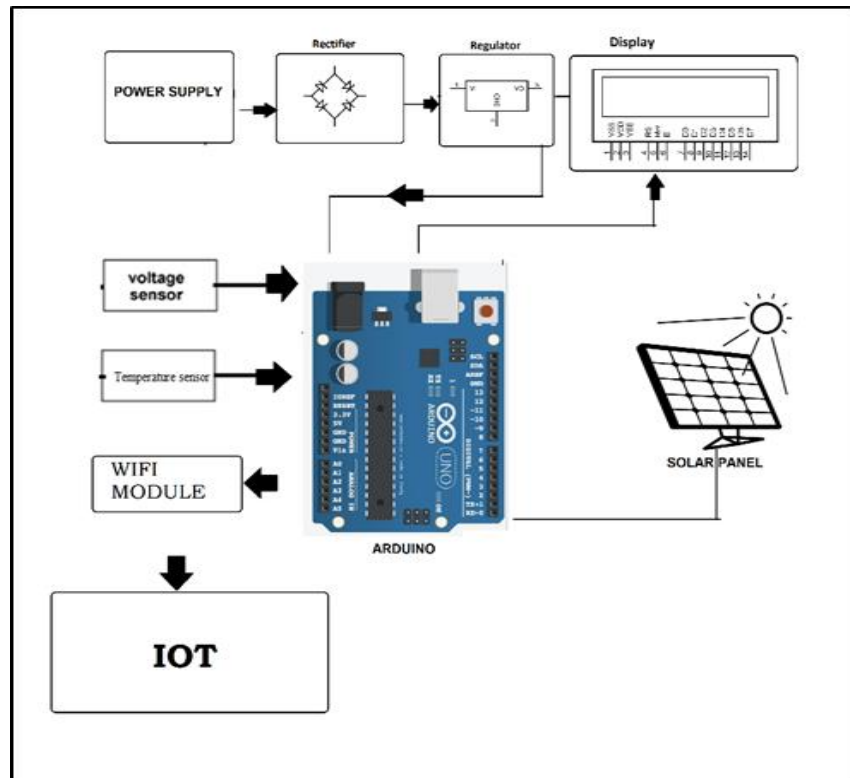
[2]Kabalcı This paper proposes a fast control infrastructure for a sustainable energy generation system made up of wind turbines and solar panel arrays. The DC turbine is converted to the wind turbine's AC output voltage by an unregulated six-pulse rectifier. The hybrid system of renewable energy sources (RES) supplied the charge voltage to the battery bank by generating voltages from wind turbines and solar panels on the DC-bus. The tracking platform is focused on each renewable source's current and voltage measurements. The established sensing circuit's corresponding values are calculated and interpreted by the microchip's 18F4450 microcontroller. The conditions that are being used The processed data is then sent via USB to a personal computer (PC), where it is placed in a database and the device is automatically tracked. Microsoft Visual Studio-coded applications that can be viewed. The net platform helps the system administrator to see at a glance the amount of electricity produced and the current status of each renewable energy supply. The tracking software's coded graphic interface will handle the saved data and evaluate the constant, weekly, and monthly values of each measurement separately.

[3]Jiju K proposed the development of online renewable energy tracking and control systems based on Android. The Bluetooth interface of an Android tablet or phone is used as a data communication link with the digital hardware of the power conditioning device in this process. Slower data rates, poor data protection, and a shorter battery life are all drawbacks of Bluetooth as a technology. Bluetooth's data transfer speed is limited by its low-power architecture.

[4]H OhnishiAs The telecom industry's position in society is becoming increasingly significant, as evidenced by the exponential growth of e-business and "dot-com" businesses. Power-supply infrastructure used to deliver utilities in this period must be extremely stable as well as adaptable to satisfy economic demands. In this respect, one of the modern networks' distinguishing features is that existing telecommunications systems generate more heat than networking systems. As a consequence, even though the power supply to telecommunications equipment is reasonably stable, it is possible that a device will malfunction due to heat-related conditions. As a result, the power supply used by air conditioning systems, like that used by telecommunications equipment, must have high quality characteristics. The aim of this paper is to provide a method for designing a high-generation density data centre for telecommunications networks in order to achieve a high-reliability power supply in air conditioning systems.

[5] Alexander Suzdalenko This paper identifies the issue of load disagreement in various devices using a non-intrusive load monitoring system where certain local generators based on renewable energy sources are connected to the same grid, as they might be mismatched with the load variable in time. Three approaches to electrical energy consumption from locally based renewable energy sources are listed.

### III. SOLAR POWER MONITORING SYSTEM BLOCK DIAGRAM

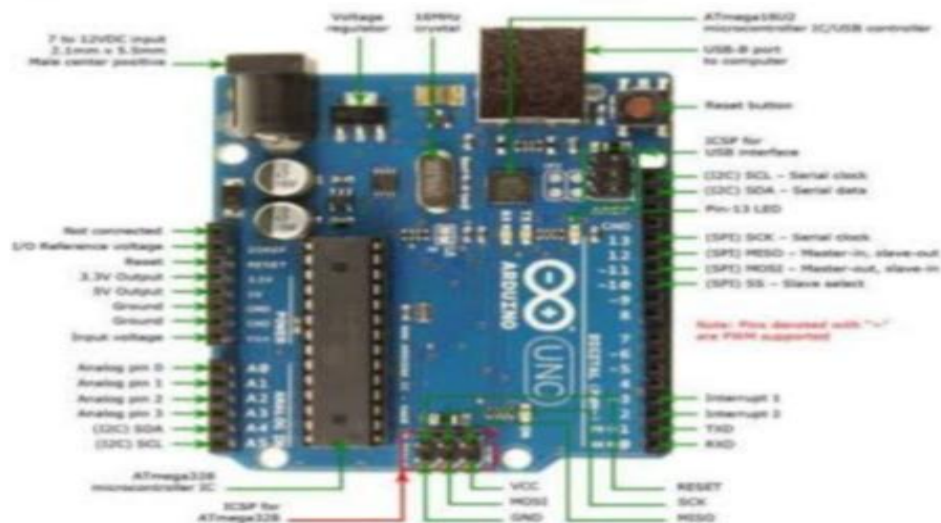


**Fig. 1. BLOCK DIAGRAM**

## IV. MODULE DESCRIPTION

### A. ARDUINO :

The AT Mega 328 is mostly used for its high versatility along with its ease of use and familiarity. The AT Mega 328 connects solar panels and the Internet of Things (Internet of Things). For running, the AT Mega 328 needs a 5 volt DC supply.



**Fig. 2. ARDUINO**

### B. SOLAR PANEL :

Photovoltaic (PV) modules are often referred to as solar panels. The PV module is an installation-ready assembly of photovoltaic cells assembled in a chassis. Photovoltaic cells produce direct electricity by using sunlight as a source of energy.



**Fig. 3. SOLAR PANEL**

### C. VOLTAGE SENSOR :

A voltage sensor is a device that measures and calculates the sum of voltage in an entity. Voltage sensors can detect AC or DC voltage levels, with voltage as the input and switches, analogue voltage signal, current signal, or audio signal as the output.



**Fig. 4. VOLTAGE SENSOR**

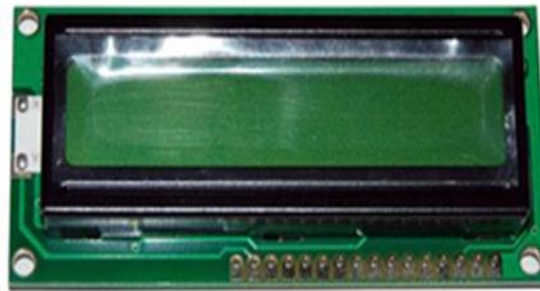
### D. CURRENT SENSOR :

As a current and power monitor, it measures the overall power used by the shunt load and sends the data to the AT super 328 in digital form. The latest reading of the shunt load is computed by the AT super 328 with the programmer loaded in it.

### E. LIQUID CRYSTAL DISPLAY (LCD) :

In matrix and segmental displays, liquid cell displays (LCDs) are used to represent numeric and alphanumeric characters. They can be used in notebook computers, digital clocks and watches, microwaves, CD players, and a variety of other mobile gadgets all over the United States. LCDs are popular because they offer a number of advantages over alternative display technologies. LCDs use a lot less power than junction rectifiers and gas-fired displays because

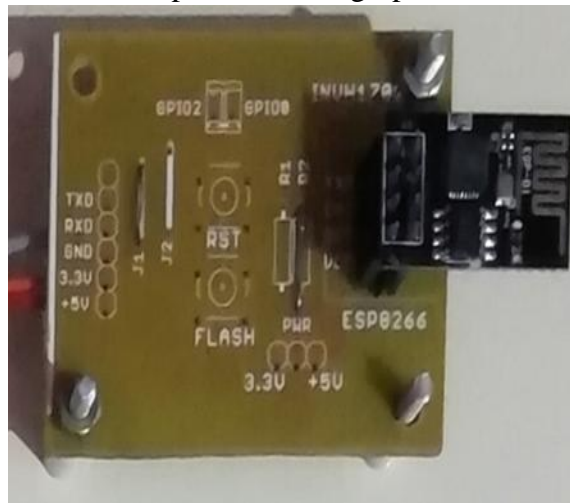
they use interference light instead of transmitting it. A lcd | Liquid crystal show | Lcd | Digital display | Alphanumeric display can be made as a passive or energetic matrix display grid. An energetic matrix has a semiconductor unit at each picture element intersection, which means that managing the luminosity of a picture element requires less current. As a result, in an enthusiastic matrix display, the current can be turned on while the refresh time on the screen is turned off. The passive matrix LCD has twin scanning, which means it scans the grid twice as fast as the current.



**Fig. 5. LCD**

#### F. Wi-Fi MODULE :

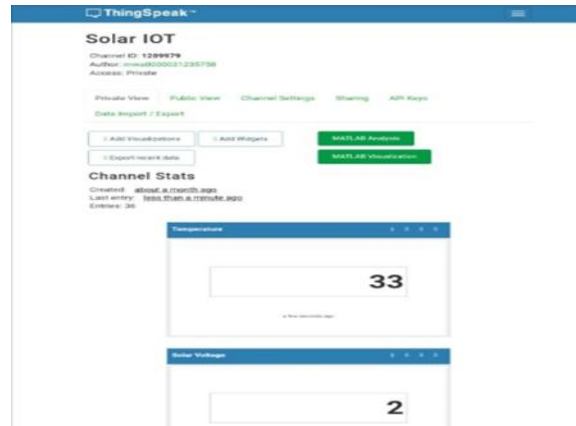
(ESP8266) The AT Mega 328 uses a Wi-Fi module to process all computed data before storing it on an IoT (Internet of Things) server or cloud. On a regular, weekly, and monthly basis, we analyse this data using the famous IoT platform Thing Speak.



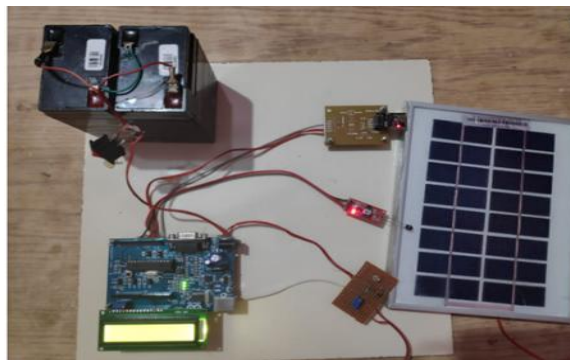
**Fig. 6. Wi-Fi MODULE**

### V. RESULT

Because this method keeps track of solar energy plants, daily, weekly, and monthly analysis becomes simple and cost-effective. Additionally, with the help of this analysis, any fault that occurs inside the powerhouse can be discovered, as the generated power may show some inconsistency in solar energy plant knowledge.



**Fig. 7. RESULT**



**Fig. 8. HARDWARE RESULT**

## VI. FUTURE SCOPE

Since the device requires an additional power supply of five volts and three.three volts for service, this can be avoided by exclusively relying on the energy produced by the solar array. Furthermore, with the aid of an engine and a primary, it is possible to track the sun for higher power generation. Excluding that, by combining a variety of Machine Learning algorithms and models, it is possible to create a system intelligent enough to make decisions about information and results.

## VII. CONCLUSION

1. With the aid of this research, regular, weekly, and monthly analysis becomes simple and reliable as the machine continues to monitor solar power plants.
2. Any flaw happening inside the power plant may be detected and the produced power can indicate any variance in data from solar power plants.

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