# SOLAR POWERED SMART IRRIGATION SYSTEM USING IOT

[1]Ms.P.Kalaivani, [2]Sushma N, [3]Ragavi S

[1]Assistant Professor, [2,3]UG Student
Department of Electronics and Communication Engineering,
SNS College of Engineering, Coimbatore, Tamil Nadu – 641107.

*Abstract:* **The sun powered PV modules are commonly utilize in dusty conditions which is the situation in tropical nations like India. The residue gets amassed on the front surface of the module and hinders the episode light from the sun. It decreases the force age limit of the module. The force yield diminishes as much as by half if the module isn't cleaned for a month. So as to consistently clean the residue, a sun following cum-cleaning framework has been structured, which tracks the sun as well as cleans the modules naturally. This mechanized framework is executed utilizing microcontroller which controls the stepper engine coupled sunlight based board. This system doesn't require any sensor or synchronization for following the sun. Right now, sun based boards make a pivot of 360o in a day, which brings about sliding of cleaning brushes twice over the PV modules. This framework is likewise evolved by utilizing Internet of Things Technology to move the figures to the cloud**

**Keywords: IOT, Arduino, Thing Speak, solar panel, sensor**

## I. INTRODUCTION

Electricity is additionally added to the most essential needs throughout everybody's life. The chart of vitality utilization is getting expanded step by step whereas the vitality assets are decreasing equal. So as to adjust the shortage for power, different sources are utilized to produce power. For the age of power, there are two different ways: one is by traditional strategy and other one is nonconventional technique. A portion of the vitality transporters like non-renewable energy sources and atomic powers are additionally utilized, however they are not inexhaustible assets (i.e., they are not 'topped off' naturally) and it is said to be non-ordinary. In its broadest sense, economical force 538 source can be accomplished by utilizing the sunlight based force as source. Sunlight based vitality has the wide accessibility all through the world. Indeed, even the sun has delivered vitality for billions of years. The sun's beams may feline as a significant hotspot for the age of power by changing over it into an electric force. Such application is called as sun oriented warm vitality, which is traditional. Despite the fact that different manageable sources are accessible, for example, wind, downpour, tides and geothermal, characteristic based bio fills and ordinary biomass, sunlight based force have enormous advantages. These days in India, visit power cut is extremely normal. For that it is essential to utilize the sustainable power source and checking it optionally. The fast development in sustainable power source applications have been engaged by a basic drop in cost the previous decades and specific change in their efficiency, relentless quality and lifetime. Also, by methods for observing the vitality anticipating, family units and networks, the profitability gets expanded. If there should be an occurrence of India's improvement and monetary development, power assumes a crucial job. In vitality utilization, India is the fourth greatest nation after China, USA and Russia. India has an introduced limit of 278.7GW with a for every capita all out power utilization of 1,010 kWh in 2014–15.Despite a development of 5.54% more than 2013–14 and furthermore having less expensive power levies, the per capita utilization is low when contrasted with numerous different nations. The nation represents around 21% of the total populace with no entrance to power. The general jolt rate in India is 64.5%, while 35.5% of the populace despite everything lives without access to power. Web of things implies just the system of Physical articles. This gives the association of every single article on the planet by methods for remote sensor organize. A portion of the gadgets, structures, vehicles and different articles inserted with programming, sensors, hardware and system availability can empowers these items to gather and trade information. This IoT (Internet of Things) is accomplished by remote sensor systems, sensor systems, 2G/3G/4G, GSM, GPRS, RFID, WI-FI, GPS, microcontroller, microchip, and so forth. Engaging headways for the Internet of Things are thought of and assembled into 3 characterizations. They are advance that enable "things" to acknowledge logical data. that enable "things" to process the important information, Advancement to improve security and assurance. Tolerating the data and preparing the important information can give an understanding which is expected to fabricate the "insight" into "things". This is the featured component that separates IoT from standard web. The requirement for utilizing IoT idea right now framework is to beaten the significant detriments of power age from the sunlight based vitality. The scope of sun's radiation that arrives at the ground surface isn't in a fixed worth. Since the range A Study of IoT based Solar Panel Tracking System 539 may changes as per area, time and climatic conditions. For that the sun based board can be totally presented to the sun's radiation consistently. Also, subsequently the sun powered board can be observed by utilizing Internet of Things. There are a few Techniques which have been read for the sunlight based board following framework by utilizing IoT. Furthermore, the examinations around scarcely any strategies are conveyed as follows. This paper reveals two additional portions. Section II gives the itemized clarification about the different related works right now. Fragment III uncovers the end lastly, references used as a piece of this zone.

## II. LITERATURE SURVEY

In paper [1],a novel technique for smart agriculture was proposed
by developing a smart sensing framework and irrigator equipment using wireless sensor technology. This approach focuses on checking of external parameters like soil moisture, pH of soil and nutrient level and based on the measured parameters the essential amount of water supplied for the crops via irrigator system which is placed on crane system. In paper[2],Mobile integrated smart automated irrigation scheme which includes soil and temperatue sensors. The principle objective of this framework is to manage the water and take care of the plants over cell phone which empowers the farmers to water the plants without human nearness and get the state of motor and the temperature status on mobile. In paper[3],proposed an automated smart irrigation system using Arduino and Raspberry pi where the user inputs are refined on Raspberri pi and on or off message are received by the Arduino microcontrollers from raspberrypi with zigbee technology. Aim of this system is to water the plant by sending an mail without the need of human presence to monitor watering .In paper[4],Irrigation regulation with system security was proposed where the main objective of this system maintain the necessary amount of water in field and throw up the excess water by using two pumps and wireless messaging is used to provide the information about the land. The system consists of water sensor which is cost effective and helpful to find the water content in the field. In order to provide the security for the pumps and other equipments password lock system has been used .In paper[5],Arduino based irrigation system with wifi technology was proposed and the system consists of soil moisture ,pH, temperature sensor where it senses the values from the soil and according to that the water is supplied. Arduino obtain the data from sensors and update with the cloud. In paper[6],Irrigation system using soil moisture sensor,air humidity sensor and air temperature sensor was proposed for vegetable crop The main goal of this project is to overcome the drawbacks faced in traditional approach. This system provides 96% accuracy in command control.By referring all the papers no system provides the integration of automated irrigation as well as seed sowing in a single system and we achieved this in our proposed system.

## III. EXISTING SYSTEM

Presently days the sunlight based board is broadly utilized yet we can't get the full vitality from sun because of stable situation of panel. Sun following sun powered board is used.It was actualized by utilizing different other algorithms. Agriculture is the wellspring of living of lion's share Indians and it additionally impacts economy of the nation. The goal of our undertaking is to diminish this manual association by the rancher by utilizing a computerized water system framework which object is to improve water use for agrarian yields. The motivation for this venture originated from the nations where economy depends on farming and the climatic conditions prime to deficiency of downpours and shortage of water. The ranchers working in the homestead lands are just subject to the downpours and bore wells for water system of the land. Regardless of whether the homestead land has a water-siphon, manual association by ranchers is required to turn the siphon on/off when required. The venture is proposed to develop a programmed water system framework which controls the siphon engine ON/OFF on detecting the dampness substance of the dirt. In the field of agribusiness, utilization of fitting system of water system is fundamental. The upside of utilizing this method is to lessen human intercession and still affirm appropriate water system. A product application was created by foreordaining the edge estimations of soil dampness, temperature and water level that was modified into an arm controller. This paper presents the controlling and checking the degree of water and recognizing the dirt dampness content.As we realize that Indian economy is one of the biggest creating economies of the world. The rural area has its biggest commitment in the Indian economy. To accomplish most extreme usage of labor and to get greatest benefit in a given stipulated there is a need in the upgradation of different building strategies that are being utilized today. Consequently keeping up legitimate measure of water level in the dirt is one of the fundamental prerequisites to gather a decent harvest that can be a wellspring of different sorts of supplements whether small scale or full scale for their appropriate development.

On the off chance that we talk about Indian ranchers they are most exceedingly terrible hit by the starvations that happens because of disappointment of harvests relying on different dry season factors. Downpour assumes the key job in choosing the fate of these yields just as the ranchers consistently. The over use of ground water has radically decreased the ground water level in the last 15 years. So it is the need of hour to use every single drop of water shrewdly with the goal that it can likewise be utilized by our coming ages moreover. Additionally we ought to build up some new techniques that utilization the inexhaustible wellsprings of vitality. The advancement of these new procedures are going to arrive at our objective of manageable improvement just as to remove the outflow of ozone harming substances to a base level.As the name of our task that is smart system with the assistance of the Solar force is a stage to use some new building strategies. This strategy will be a generally excellent choice for the little and medium ranchers who endure each year due to disappointment of harvests that occurred each year. The execution of this innovation has a wide degree in the close by future.
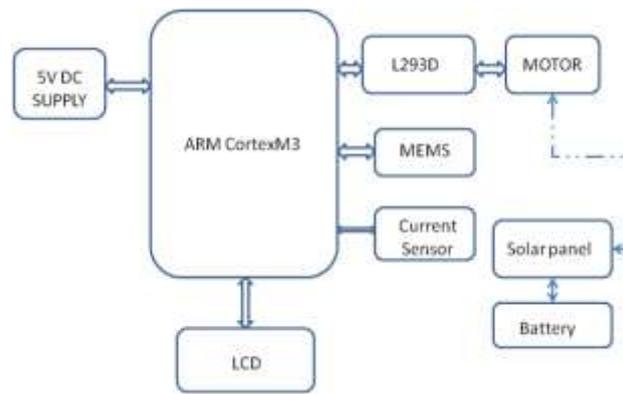
**Figure 3.1 Block Diagram of existing system**

## IV. PROPOSED SYSTEM

This paper has proposed a programmed daylight altering framework utilizing sun oriented force for the sun powered board control.After getting the position, the board will follow the daylight to get most extreme force by exchanging over to the following quadrant. When the sun sets down the sun oriented board will go to the reset position. When the sun based force is lacking to help the framework, the framework force can be changed to DC source promptly utilizing the DPDT exchanging framework. Programmed cleaning process is empowered. The voltage esteems are additionally shown utilizing LCD and furthermore these figures are transferred to the cloud utilizing Internet of Things Solar following instruments improve the vitality increase of sunlight based force plants. Programmed sun based following framework is commonly the one that arrives at the most elevated vitality gain in each district. It is in this way the most adaptable framework, since it very well may be introduced anyplace, ensuring a high vitality gain. Sun based trackers are prescribed wherever from an enthusiastic perspective, since they generally increment the measure of gathered energy. It is additionally proficiently used to control the water system framework for horticulture.

## V. BLOCK DIAGRAM
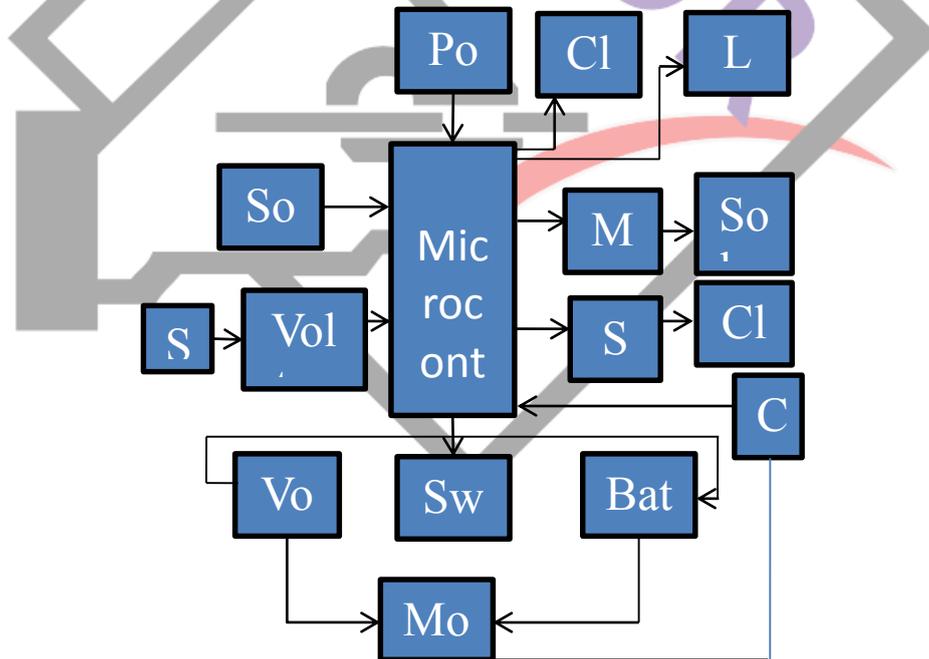


**Figure 4.1 Block diagram of proposed system**

## VI. FLOW CHART
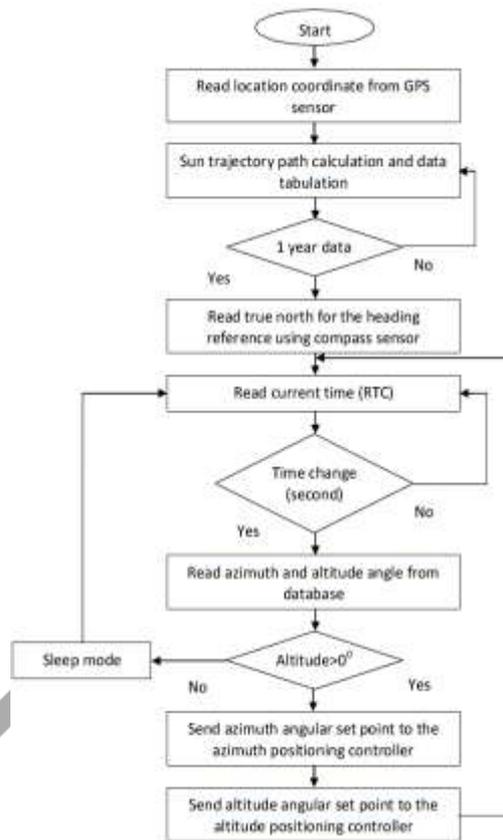


**Figure 6.1 Flow chart of solar tracking system**

## VII. HARDWARE REQUIREMENT

**Liquid Crystal Display**

LCD is a level board show innovation normally utilized in TVs and PC screens. It is additionally utilized in screens for cell phones, for example, workstations, tablets, and smartphones.LCD shows don't simply appear to be unique than massive CRT screens, the manner in which they work is altogether extraordinary also. Rather than terminating electrons at a glass screen, a LCD has backdrop illumination that gives light to singular pixels masterminded in a rectangular matrix. Every pixel has a red, green, and blue RGB sub-pixel that can be turned on or off. At the point when the entirety of a pixel's sub-pixels are killed, it seems dark. At the point when all the sub-pixels are turned on 100%, it seems white. By changing the individual degrees of red, green, and blue light, a huge number of shading blends are conceivable.

**Soil Moisture Sensor**

Soil wet sensor comprise of two directing plates which work as a test and going about as a variable resistor together.When the sensor is embedded into the water, the opposition will diminish and improve conductivity between plates. Soil dampness sensors measure the volumetric water content in soil. Since the direct gravimetric estimation of free soil wet requires expelling, drying, and weighing of an example, soil dampness sensors measure the volumetric water content in a roundabout way by utilizing some other property of the dirt, for example, electrical opposition, dielectric steady, or association with neutrons, as an intermediary for the wet content.
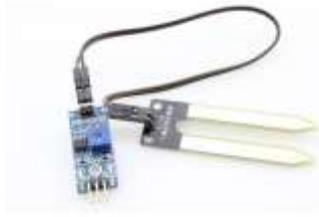
**Figure 7.1 Soil Moisture Sensor**

**Voltage Sensor**

This sensor is utilized to screen, compute and decide the voltage supply. This sensor can decide the AC or DC voltage level. The contribution of this sensor can be the voltage while the yield is the switches, simple voltage signal, a present sign, a perceptible sign, and so forth. A few sensors give sine waveforms or heartbeat waveforms like yield and others can produce yields like AM (Amplitude Modulation), PWM (Pulse Width Modulation) or FM (Frequency Modulation). The estimation of these sensors can realy upon the voltage divider.



**Figure 7.2 Voltage Sensor**

**Node MCU**

NodeMCU is an open-source firmware and improvement pack that encourages you to model or construct IoT items. It incorporates firmware that sudden spikes in demand for the ESP8266 Wi-Fi SoC from Espressif Systems, and equipment which depends on the ESP-12 module. The firmware utilizes the Lua scripting language. It depends on the eLua venture and based on the Espressif Non-OS SDK for ESP8266.



**Figure 7.3 Node MCU**

**VIII SOFTWARE REQUIREMENTS**

**Arduino IDE**

Arduino sheets can understand simple or computerized input signals from various sensors and transform it into a yield, for example, initiating an engine, turning LED on/off, associate with the cloud and numerous other actions.You can control your board capacities by sending a lot of guidelines to the microcontroller on the board through Arduino IDE (alluded to as transferring software)like most past programmable circuit sheets, Arduino needn't bother with an additional bit of equipment (called a developer) so as to stack another code onto the board. You can basically utilize a USB link.

**Proteus 8**

It is a product suite containing schematic, recreation just as PCB designing.ISIS is the product used to draw schematics and mimic the circuits in genuine time.The reproduction permits human access during run time,thus giving ongoing simulation. ARES is utilized for PCB designing. It has the element of review yield in 3D perspective on the planned PCB alongside components. The fashioner can likewise create 2D drawings for the item.

**Design of Embedded system**

Programmable and figuring electronic gadget intended to perform explicit assignments dependent on a fixed time span. An installed framework is a blend of equipment and programming, maybe with some mechanical and different parts intended to play out a particular task. Electronics for the most part utilizes either a chip or a microcontroller. Some enormous or old frameworks utilize broadly useful centralized servers PCs or minicomputers. It is exceptionally responsive and continuous constrained. Increasingly high performance. Application explicit processor configuration can be noteworthy part of inserted system. It goes about as a solitary capacity not utilized as universally useful.

## IX. RESULT



**Figure 9.1 Result**

## X CONCLUSION AND FUTURE WORK

Sunlight based following components improve the vitality addition of sun powered force plants. Programmed sun oriented following framework is commonly the one that arrives at the most noteworthy vitality gain in each area. It is consequently the most flexible framework, since it very well may be introduced anyplace, ensuring a high vitality gain. Sun oriented trackers are suggested wherever from a lively perspective, since they generally increment the measure of gathered energy. It is additionally productively used to control the water system framework for horticulture.

As a result of the utilization of IOT right now, there is an enormous extension for future work can include present day gadgets and sensors without the dread of similarity. Adaptability of this framework is its uniqueness. Adding more sensors, it can gauge AC voltage and flow yield, power utilization of burden, sun based irradiance and comparing yield of the observing and control to improve conventional solar based electrical vehicle framework for converter plan and the reception of reasonable Maximum Power Point Tracking (MPPT) strategies.

## XI ACKNOWLEDGMENT

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