

SOLAR SMART FLOWER BASED POWER GENERATION & UTILIZATION IN IRRIGATION SYSTEM USING IOT

A. S. Utane¹, Mrunali Kherde², Deepa Sawai³, Pallavi Rokade⁴, Dhnashree Jamnikar⁵

¹Assistant Professor, Dept. of EXTC, PRMIT & R Badnera

Dept. of EXTC, PRMIT & R Badnera. Dept. of EXTC, PRMIT & R Badnera.

Dept. of EXTC, PRMIT & R Badnera. Dept. of EXTC, PRMIT & R Badnera.

Abstract - An A new technologies has been introduced and utilized in modern world, there is a need to bring advancement in the field of agriculture, Various types of Researched have been undergone to do this and some are also have been widely used. This proposed system is one of them. In order to improve the crop productivity efficiently with new technologies, it is necessary to monitor the environmental conditions in and around the field. The parameter that have to be properly monitored to enhance the yield is moisture. Moisture sensors will monitor and collect information about the field moisture. So according to the need pump can be start to water the field. This can be done from anywhere with the help of IOT. Internet of Things (IoT) is being used in several real time applications. The introduction of IoT along with the sensor network in agriculture refurbishes the traditional way of farming. Online moisture monitoring using IoT helps the farmers to stay connected to his field from anywhere and anytime. To make this system more farmer friendly an idea of using more and more renewable energy is utilized. This plug-and-play renewable energy alternative is equipped with 6 solar panel petals that follow the daily trajectory of the sun. It unfolds itself sensing the sun light and refolds in the evening. Sensors in the system allow it to protect itself from rain and high wind by unfolding itself after sensing.

Key Words: soil moisture sensor, smart flower, irrigation system ,IOT, cloud networking

1. INTRODUCTION

The smart flower is an all-in-one ground mounted solar system with a tracker that follows the sun. It name comes from its design – the solar cells are arranged on individual “petals” that open at the beginning of each day. After the sun goes down, the smart flower petals fold up and a self-cleaning process kicks in. In addition to solar cells, the smart flower system contains a dual-axis tracker that makes it possible for its “petals” to follow the sun across the sky throughout the day. The smart flower-plus offers energy storage capabilities via an integrated battery in addition to the standard solar electricity generation that the smart flower offers. The main objective of this paper is to improve and stabilize the crop yields of smallholder olive farmers through the implementation of sustainable irrigation systems. To promote water management practices that optimizes the volume and timing of water distribution. To generate positive economic consequences for farmers and their families. Minimize year to year yield fluctuations, leading to higher and more stable farm income.[6][10] In this paper To make irrigation system more farmer friendly an idea of using more and more renewable energy is utilized. It

became possible by using a SMART FLOWER which produces 40% more energy than a traditional photovoltaic panel. This plug-and-play renewable energy alternative is equipped with 6 solar panel petals that follow the daily trajectory of the sun[3][4]. The concept in future can be enhanced by integrating GSM technology, such that whenever the water pump switches ON/OFF, an SMS is delivered to the concerned person regarding the status of the pump. We can also controlled the pump through SMS. The smart flower is an all-in-one ground mounted solar system with a tracker that follows the sun. It name comes from its design – the solar cells are arranged on individual “petals” that open at the beginning of each day[7][9]. After the sun goes down, the smart flower petals fold up and a self-cleaning process kicks in. In addition to solar cells, the smart flower system contains a dual-axis tracker that makes it possible for its “petals” to follow the sun across the sky throughout the day. The smart flower-plus offers energy storage capabilities via an integrated battery in addition to the standard solar electricity generation that the smart flower offers.

2. LITURATURE SURVEY

There are various Solar Powered Irrigation System implemented by various researchers. In one of the research Archana and Priya.et.al considered the humidity and soil moisture sensors which are placed in the root zone of the plant. Based on the sensed values the microcontroller is used to control the supply of water to the field. This system doesn't intimate the farmer about the field status. In another work Sonali D.Gainwar et al. which uses soil parameters such as pH, humidity, moisture and temperature are measured for getting high yield from soil. This system is fully automated which turns the motor pump ON/OFF as per the level of moisture in the soil. The current field status is not intimated to the farmer[2]. Some another researchers Karan kansara and S.Reshma and B.A.Sarath et.al shows an an automated irrigation system where the humidity and temperature sensors are used to sense the soil conditions and based on the microcontroller will control the water flow. Farmer will be intimated through GSM. This system doesn't monitor the nutrient content in the soil [3] also an IOT based automatic irrigation system using wireless sensor networks in which various sensors are used to measure the soil parameters. This system provides a web interface to the user to monitor and control the system remotely. Weather monitoring is not done in this system [4]. In current research the researchers found that The new scenario of decreasing water , drying up of rivers and tanks, unpredictable environment, present an urgent need of proper utilization of water. To cope up with this use of temperature and moisture, sensors are placed at suitable locations for monitoring the crops.[3][8][9] After research in the agricultural field, researchers found that the

yield of agriculture is decreasing day by day. However, use of technology in the field of agriculture plays an important role in increasing the production as well as in reducing the man power. Some of the research attempts are done for betterment of farmers that provide systems which use technologies helpful for increasing the agricultural yield. The cloud computing devices create a whole computing system from sensors to tools that observe data from agriculture field and accurately feed the data into the repositories. This idea proposes a novel methodology for smart farming by linking a smart sensing system and smart irrigation system through wireless communication technology. It proposes a low cost and efficient wireless sensor network technique to acquire the soil moisture, Humidity, temperature from various locations of field and as per the need of crop water motor is enabled. It proposes an idea about how automated irrigation system was developed to optimize water use for agricultural purposes. In another research G.Parameswaran et.al Proposes smart drip irrigation system using IOT in which humidity, temperature and pH sensors are used. Irrigation status is updated to the server or local host using personal computer. The farmer can't access about the field condition without internet [5].

3. PROPOSED SYSTEM

It consist transmitter and receiver module. The sensors that are present in the circuit will sense the value which is then transferred to the Wi-Fi module and then send to the cloud (ubidots). Then the android app will receive the data from the cloud and vice versa.

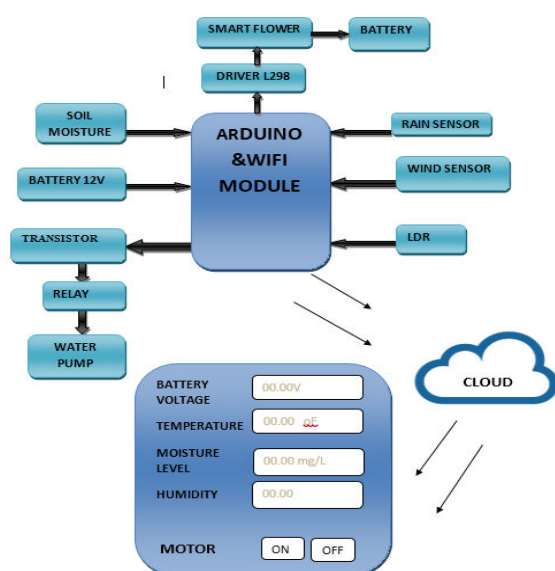


Fig 1. Block Diagram of Solar Smart Flower Based Power Generation & Utilization in Irrigation System Using IoT.

The proposed system is divided into three Sub parts consist

1. Solar Smart Flower based power generation
2. Irrigation system using Solar Power

3. Mobile application to Monitor and controlling of smart irrigation system

In this system we used the smart flower design of Solar panel, solar energy absorbed by the SMART FLOWER will be stored in batteries. The entire electricity requirement for the Irrigation system inside the farm will be fulfilled by this renewable energy stored using solar smart flower as this flower is able to produce more energy than our regular solar panel.[2][5][7] As the sun rises in the morning, smartflower POP unfolds itself completely automatically. It directs its solar modular fan (with a surface area of 18 m²) towards the sun and begins producing electricity for the system – from the hot showers from sun, this can utilized for your coffee Makers, radio application etc. In the proposed system soil moisture, Humidity, temperature, which are used to collect moisture level, temperature range in the agricultural field. The information collected by the sensors is sent to the Arduino for further Processing and then displayed on Mobile application. An Android Application used to receive and display information such as voltage, Motor ON/OFF, Humidity and temperature this information is collected by the sensor is updated periodically through Wi-Fi. The collected information is visible to farmer anytime using Mobile Application. The sensor in this system which continuously monitored the environmental conditions and accordingly the input will provide to control of irrigation process. This process can initiated by farmer from anywhere with the help of accessing android application based on IOT

4. IMPLEMENTATION

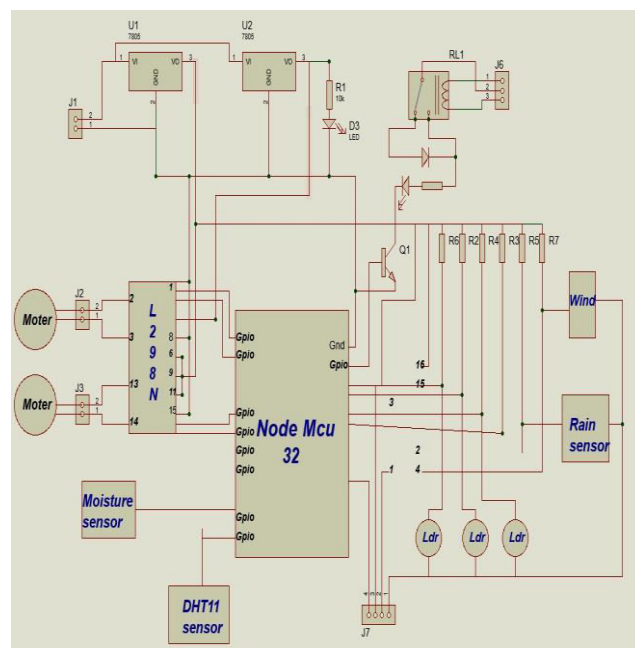


Chart -1: Circuit diagram of Solar Smart Flower Based Power Generation & Utilization in Irrigation System Using IoT

In this circuit the Node MCU 32S it provides controlling signal which has an inbuilt Wi-Fi module. The input supply is 230V, 50Hz which that given to center tap transformer (step down) which provide an output of 12V. But to provide pure dc supply it is given to the full wave rectifier and then to capacitor which provide the output of 12V DC. Then further the output is given to the IC7812 and IC7805. IC7812 which

provide actual 12V that is used to drive the motors. Motor 1 is used to open the smart solar flower, motor 2 is used for rotation (sun tracking). IC7805 which provide 5V is given to the moisture sensor, DHT11, rain sensor and wind sensor. Three LDR is required that is connected to the motor. LDR1, LDR2 for tracking the sunlight (rotating left and right), LDR3 for day and night. L298 is motor driver IC which will boost the current and drive the motor through relay. Relay is then connected to the freewheeling diode which helps to prevent from back EMF provided by motor. As the whole model works on DC but the motor works on AC supply so transistor is used as an amplifier which provides heavy current.

5. EXPERIMENTAL RESULTS



Fig -1 image of opening and closing of solar smart flower system on the basis of solar tracking.

The irrigation system is proposed by sensing the soil condition as wet or dry, Humidity, temperature. It produces an efficient use of water in irrigation system. In this paper we had developed an android Application to control the Pump and monitor parameters like Humidity, Temperature Etc.

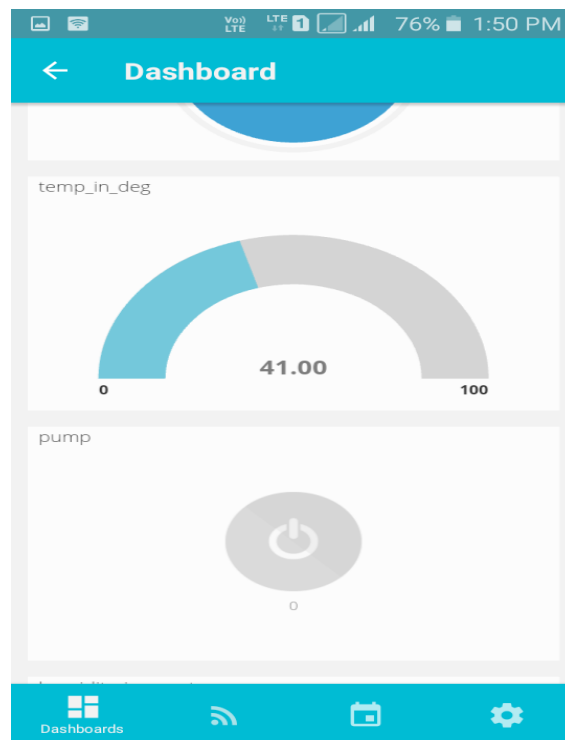


Fig -1 Mobile Application based on IoT showing Pump turning ON and OFF through Mobile phone

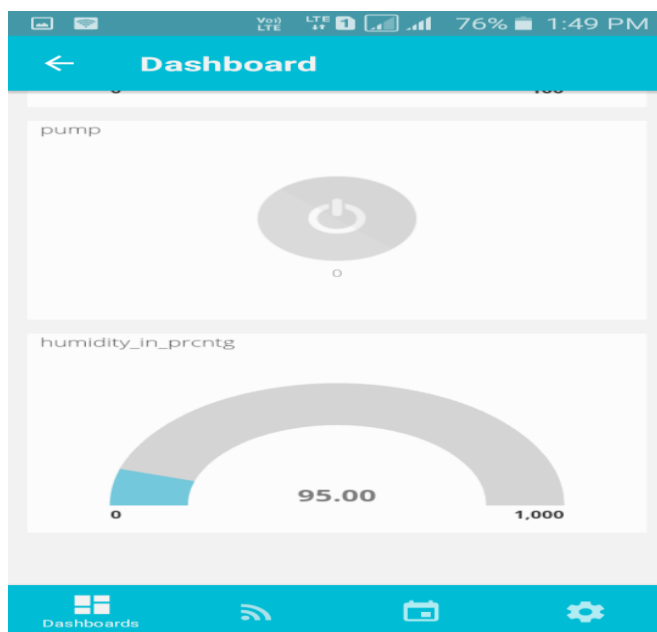


Fig. Mobile Application based on IoT showing Humidity levels

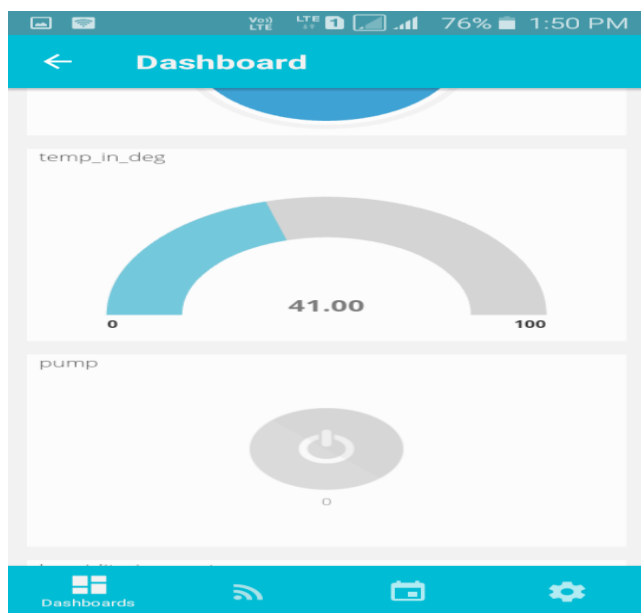


Fig. Mobile Application based on IoT showing Temperature Levels

6. CONCLUSIONS

The main objective of this irrigation system is to make it more innovative, user Friendly, time saving and more efficient than the existing system. Measuring parameters such as soil moisture, temperature and humidity. Due to sever updates farmer can know about crop field nature at anytime, anywhere. Internet of Things has enable the agriculture crop monitoring easy and efficient to enhance the productivity of crop and hence profit for the farmer. Smart flower with a smaller footprint manages this is an attractive and elegant way and due to the design future benefits are realized. Solar smart flower consume the less space and it is more useful at anywhere. In that we also controlling the soil moisture level, temperature & humidity by using the android application through IOT. The irrigation is proposed by sensing the soil condition as wet or dry. It produces an efficient use of water in irrigation system. This is more effective for the farmers.

REFERENCES

- [1] Archana and Priya, "Design and Implementation of Automatic Plant Watering System", *International Journal of Advanced Engineering and Global technology* vol-04, Issue-01, Jan-2016.
- [2].Sonali.D.Gainwar and Dinesh.V.Rojatkar, "Soil Parameters Monitoring with Automatic Irrigation System", *International Journal of Science, Engineering and Technology Research (IJSETR)*, vol-04, Issue 11, Nov 2015.
- [3]C.H.Chavan and V.Karnade, "Wireless Monitoring of Soil moisture, Temperature and Humidity using Zigbee in Agriculture" *International Journal of Engineering Trends and Technology (IJETT)*, vol-11, May-2014.
- [4] G.Parameswaran and K.Sivaprasath, "Arduino Based Smart Drip Irrigation System Using IOT", *International Journal of Engineering Science and Computing (IJESC)*, May- 2016.
- [5] S.Reshma and B.A.SarathManoharBabu, "Internet of things Based Automatic Irrigation System using Wireless Sensor Networks", *International Journal of Engineering, Technology, Management and Research*, vol-03 Issue 09, Sep-2016.
- [6] Joaquin Gutierrez and Juan Francisco, "Automated Irrigation Network and GPR Module", *IEEE Transactions on Instrumentation and Measurement*, 2013.
- [7] Haris R and Tatang M 2015 Website Design of EMS-SCADA for AC Usage on a Building (Proceedings of the 3rd International Conference on Information and Communication Technology 2015 (ICoICT 2015)) p 17-22
- [8] Joaquin Gutierrez and Juan Francisco, "Automated Irrigation Network and GPRS Module", *IEEE Transactions on Instrumentation and Measurement*, 2013.
- [9].Yunseop Kim and Robert G.Evans, "Remote Sensing and Control of Irrigation System using a Distributed Wireless Sensor Network", *IEEE Transactions on Instrumentation and Measurement*, Vol- 1-57, July-2008.
- [10]. Karan Kansara and Vishal Zaweri, "Sensor Based Automated Irrigation System with IOT" *International Journal of Computer Science and Information Technologies*, vol-06, 2015.