A SURVEY: SOLAR POWERED IOT BASED SMART GARDEN/AGRICULTURE

Sangeetha Kumari M
M-Tech Student School of C & IT, Reva
University, Kattigenahalli, Yelahanka,
sangeethakumari06@gmail.com

Dr.Vishwanath Y
School of C & IT, Reva University,
Kattigenahalli, Yelahanka, Bangalore
vishwanath.y@reva.edu.in

Abstract-In current digital world, a person anticipates automation which can make the work simple and easy. In this busy world a person has the problem of remembering many trivial things one such is watering their plants in the garden regularly as per the requirement of plants for their better and healthy growth. The main idea is to adapt current technology instead of our old system so that the latest Automated system provides sufficient water for farming, home gardening, etc could be achieved. In the current scenario people expect their daily activities to be automated which make their chore convenient and efficient, IoT is one such platform that focuses on human comfort. IoT mainly targets to combine everything in our world under one system or framework. It can be used to manage things and can also keep us updated constantly with current situation. Internet of Things comprises of various devices which can connect to internet and exchange information with one another and sends that information to the user. The proposed system uses Ultra sonic sensor for examining the water level of tank and soil moisture sensor to detect the water content of soil for automated supply of water using Solar power.

Keywords-Smart Garden/Agriculture, Internet of Things, NodeMCU, ESP32, Blynk App, Ultra Sonic Sensor, Soil Wetness Sensor, Temperature and Humidity Sens or.

I. INRODUCTION

Automated Gardening/Agriculture mainly copes with the remote monitoring of gardens or agricultural fields and fulfills the current atomization requirement. Automation in Agriculture/Gardening is an activity which helps in tracking the growth of plant on everyday basis. In the current scenario people expect their daily activities to be automated which make their chore convenient and productive.

In current busy world a person has a problem on remembering many trivial one such is watering their plants regularly as per the requirement of plants for their better and healthy growth. The main idea is to adapt current technology instead of our old system so that the latest Automated System provides sufficient water for farming, home gardening, etc could be achieved[1].

As time ahead, one can focus on the intruder like birds, animals etc.. by the use of camera to record the image and send it to the user that is detected by sensor. And can make use of different sensors which can detect the fertility and also nutrients of the soil to mechanize the system for providing required fertilizers[2].

In the current scenario people expects all the day to day processes to be Automaticwhich makes the task easy, comfortable and efficient, IoT is the one such platform that primarily focuses on human comfort. Internet of things predominantly focuses to combine everything in our world under a same system, IoT can be used to manage things and also keep us timely updated with the current situation[3].Internet of Things comprises of various devices that connects to the internet and exchange necessary information with one another and

sends the results to the user. Connection of IoT with different disseminated sensors and machinery which is utilized in agriculture can widely open latest imposition for automation chore. It would be tough for farmers, to manually evaluate data associated to soil as well as crops[4]. Hence, IoT revolution can be used as a segment of agricultural circumstances in order to collect and stock the data.

In the current situation the availability of both water and power are not sufficient in order to satisfying the farmers requirements. This Solar powered smart garden automation utilizing IOT records the details and forwards the outcome to user via smart phone app[5].

The hardware part consists of Microcontroller, NodeMCU, Solar panel and also some sensors like DHT11 for Temperature, Humidity, Soil Moisture and Ultrasonic sensor. A actuator that is DCwater pump which can be usedremotely or by using a button on the device.

It mainly focuses on manufacturing an device based on IoT which can observe and provide online report to user regarding growth progress of their plants. Here the farmer can disable the automatic watering process in order to decrease wastage of water. Data that is been received from the different sensors is recorded and is analyzed via graphical representation[6].

The currently designed system reviews water level in tank and moisture level of soil for self watering[7]. In case of decrease in moisture level of soil under the fixed value, the different sensors directs indication to Microcontroller, which is powered via PV module and activate to switch ON the DC water pump and dispense water to the site. This proposed methodology can also give the status of motor, temperature and water level of the water tank through the sensors. If there is a absence of solar power due to some problems, the backup is been provided by the lead-acid battery in the system.

II. LITERATURE SURVEY

01.Norakmar binti Arbain Sulaiman & Muhamad Dan Darrawi bin Sadli, "AN IOT-BASED SMART GARDEN WITH WEATHER STATION SYSTEM"
This specific paper contains Smart Garden technique which is based on IoT along Metrological system, that is been utilized to observe the plants growth on daily basis and forecast the possibility of rain. Many people always face a problem on remembering watering their plants which effects the growth of plants. An automatic system which is based on IoT can keep track on and provide online observation to user on the progress of plants growth. It comprises of different types of sensors like barometric pressure, temperature, light, and soil moisturizer sensor. Additional to above specified devices it also comprise of water pump for balancing the wetness in soil, fans for reducing temperature and Light Emitting Diode(LED) for managing the photosynthesis process in the night-time. It has two unique mainly process units in this structure, among one is Arduino and NodeMcu. The Arduino is been used as controller of this system, another is NodeMcu which will act as the controller for phone ,so that it would be able to manage different devices from a long-way by the use of Wi-Fi.

02.Kshirod Kumar Rout, Samuchita Mallick & Sivkumar Miishra, "SOLAR POWERED SMART IRRIGATION SYSTEM USING IoT"
In this paper an IOT based solar powered smart irrigation system have been designed and developed for monitoring the water requirement. The availability of water and power is not sufficient for the farmers requirements. This system is implemented to overcome water and power crisis. The hardware part consists of the following specification ESP8266 and its main controller, DC water pump, DHT11 for temperature and humidity sensors for recording and managing irrigation process where it been is planted in soil.

2nd International Conference on
Advances in Computing & Information Technology (IACIT-2020)
Date: 29-30 April 2020
Organized by School of Computing and Information Technology
Reva University, Bengaluru, India

184

03. Rashmi R. Agale & D. P. Gaikwad , "AUTOMATED IRRIGATION AND CROP SECURITY SYSTEM IN AGRICULTURE USING INTERNET OF THINGS"

Management and control of automated agricultural process is necessary for better and healthy growth of plants. Agricultural production is rapidly decreasing due to intruders like birds, different animals etc… The damage of crops can be controlled by installing camera in the farmland to take picture and send it to user, buzzers and scarecrow that rotates automatically.

The currently designed system can gather, observe and analyze real live data like humidity, temperature, moisture of soil, Passive infrared sensor(PIR)etc.. with the aid of IoT in every 10 seconds from environment and soil. PIR sensors installed in farmland for signaling movement of birds and animals..

04. Vaishali S, Suraj S, Vignesh G, Dhivya S and UdhayaKumar S, "MOBILE INTEGRATED SMART IRRIGATION MANAGEMENT AND MONITORING SYSTEM USING IOT"

The proposed system is implemented to meet the demand for water that is been rapidly increasing due to increasing population. Traditional Methods of irrigation like overhead sprinkler and flood type have resulted in excess wastage of water and also have caused disease like fungus formation because availability of more moisture in soil. The major purpose of the proposed system is to control supplying of water and can monitor the plants across Smart phone application.

The designed automated irrigation and controlling system comprises of Raspberry pi, water pump, moisture, temperature and humidity sensor. In the above developed system smart phone module is used as a communication device. At the different stages of growth, plants or crops are irrigated with respect to their water necessity. Farmers and gardeners are the one who are mostly benefited from the proposed system.

05. R. Nageswara Rao & B.Sridhar , "IOT BASED SMART CROP-FIELD MONITORING AND AUTOMATION IRRIGATION SYSTEM"

The recommended system primarily focuses at creating smart agriculture using automation and technologies of IoT. Most of the time is wasted by farmers in a process to make the availability of water to plants at required time. To reduce the circuit complexity an efficient system for management of water is implemented. The requirement specification is as following, humidity and temperature of the soil are obtained at base station by using two sensors namely humidity and temperature sensor. Based on the values obtained the proposed system calculates the water required for irrigation. To increase the efficiency different hardware resources are integrated into a resource pool by the use of different technique like vitalization, acquiring dynamic distribution of resource and balancing of load.

III.   COMPARISION TABLE

SRN	Title of paper	Authors	Year	Problem identified	Solution to problem
01	AN IOT-BASED SMART GARDEN WITH WEATHER STATION SYSTEM	Norakmar binti Arabian Sulaiman & Muhamad Dan Darrawai bin Sadli	2019	Many people always have problem on remembering watering their plants which intern effects the growth.	An automatic Internet of Things(IoT) based system which can record and provide online feedback to the user regarding the growing process of their plants.
02	SMART GARDENING	Prof. Mitul Sheth & Prof.	2019	In today's fast life it is not possible to keep	The main purpose here is to promote the existing

2ⁿᵈ International Conference on
Advances in Computing & Information Technology (IACIT-2020)
Date: 29-30 April 2020
Organized by School of Computing and Information Technology
Reva University, Bengaluru, India

185

	AUTOMATION USING IOT WITH BLYNK APP	Pinal Pupani		under surveillance on plants or field whole day.	technique of watering to fully automatic approach.
03	SOLAR POWERED SMART IRRIGATION SYSTEM USING INTERNET OF THINGS	Kshirod Kumar Rout, Samuchita-Mallick & Sivkumar Miishra	2018	The availability of water and power is not sufficient for the farmers requirements.	An automatic solar powered smart irrigation system is been implemented in order to solve water and power crisis.
04	SMART HOME GARDEN IRRIGATION SYSTEM USING RASPBERRY PI	S.N. Ishak, N.N.N. Abd Malik, N.M. Abdul Lattif, N.Effiyana Ghazal & M.A. Baharudin	2017	The current retail price of the drip irrigation technique for undersized area is expensive.	A design is been proposed for smart irrigation that implements energy efficient and cost effective system.
05	IOT BASED LOW COST SMART IRRIGATION SYSTEM	Kiranmai Pernapati	2018	The rapidly increasing population has an great effect on scarcity of water and the old irrigation system demands a large amount of water.	Smart techniques are been implemented in order to reduce the percentage of wasting availability of water for irrigation purpose.
06	MOBILE INTEGRATED SMART IRRIGATION MANAGEMENT AND MONITORING SYSTEM USING IOT	Vaishali S, Suraj S, Vignesh G, Dhivya S and Udhayakumar S	2017	Traditional Methods of irrigation like overhead sprinkler and flood type results in large amount of wastage of water and develops disease like growth of fungus due to extreme moistness in soil.	The major purpose of the proposed system is to limit the water flow and observe the plants across a Smartphone application.
07	IOT BASED SMART CROP-FIELD MONITORING AND AUTOMATION IRRIGATION SYSTEM	R. Nageswara Rao & B.Sridhar	2018	Focusing on availability of water to plants at the position of demand, almost all farmers waste lot of time in field.	A well organized and labor-saving management should be developed for watering plants and to reduce the complexity of circuit.
08	DYNAMIC MODEL OF SOIL MOISTURE FOR SMART IRRIGATION SYSTEM	Luisella Balbis & Ali Jassim	2018	Wastage of water due to inefficient irrigation system.	Gives optimal solution for irrigation scheduling with a considerable reduction in consumption of water
09	AUTOMATED IRRIGATION AND	Rashmi R Agale & D.P Gaikwad	2017	Agricultural production is	It can be supervised by securing the agricultural

2nd International Conference on
Advances in Computing & Information Technology (IACIT-2020)
Date: 29-30 April 2020
Organized by School of Computing and Information Technology
Reva University, Bengaluru, India

186

				decreasing because of intruders like as birds, some animals, etc… on farming land.	fields with equipments such as kind of sensors, buzzers and automatic scarecrow.
	CROP SECURITY SYSTEM IN AGRICULTURE USING INTERNET OF THINGS				
10	IOT BASED SMART SOIL MONITORING SYSTEM FOR AGRICULTURAL PRODUCTION	Dr. Nananthi.M.E ,Ph.D Divya J, Divya M & Janani V	2017	Lower rate in the agricultural production.	Embedded technique for monitoring soil and fully automated process of irrigation to minimize manual examining of agricultural fields.
11	AUTOMATED IRRIGATION AND WATER LEVEL MANAGEMENT SYSTEM USING RASPBERRY PI	Sfiso H Nkosi & S.P Daniel Chowdhury	2018	Scarcity of water due to very less rain fall.	Minimizing both the Intervention of human and usage of water during the process of irrigation. To stop drying out and over spilling of water in storage area.
12	IOT BASED SMART IRRIGATION SYSTEM AND NUTRIENT DETECTION WITH DISEASE ANALYSIS	AmoghJayaraj Rau, Jairam Sankar, Ashok R Mohan , Deepti Das Krishna and Jimson Mathew	2017	The main problem is under or over watering to plants and necessity of continuous manual irrigation process.	To identify the deficiency of nutrients and disease in rice crop, a fully automated irrigation and fustigation with image processing is developed.
13	SMART WATER DRIPPING SYSTEM FOR AGRICULTURE/ FARMING	D. Sowmya , R.Praveen Sam & K.Govardhan Reddy	2019	The scarcity of Water is a tremendous difficulty facing by farmers for agriculture.	An electronic gadget for irrigation is developed which is completely based on pH, temperature and moisture of soil.
14	AUTOMATIC PLANT MONITORING AND CONTROLLING SYSTEM OVER GSM USING SENSORS	C. Gajapriya, M.Abhishek pandu & B.Chandra	2017	Problem to secure agricultural fields from continuously changing factors of environment which can affect plants growth.	The different factors of environment like temperature, soil moisture and humidity were made obtainable to plants for desired amount as they needed at right time.
15	AN INTERNET OF THINGS(IOT) ARCHITECTURE FOR SMART AGRICULTURE	Saurav Verma, Rahul Gala, S.Madhavan, SanchitBurkule, Swapnil Chauhan & Dr. Chetana Prakash	2018	The currently used techniques were not effective as they Required huge amount of human manpower and time for irrigation and to spread fertilizers for yield.	The advantage of currently designed architecture lead to the extension of agriculture production economically and exponentially.

I. CONCLUSION

This paper introduces an IoT based Automated Garden/Agriculture using Solar energy. The

2ⁿᵈ International Conference on
Advances in Computing & Information Technology (IACIT-2020)
Date: 29-30 April 2020
Organized by School of Computing and Information Technology
Reva University, Bengaluru, India

187

major objective of this proposed system is to establish an Internet of things based system that is capable of recording the data and send result to the user across smart phone application. A currently designed system is beneficial and is easily manageable by all the users such as farmers, gardeners and researchers. It includes different types of sensors namely humidity, temperature, soil moisture and ultrasonic sensor. Other than these it also has a water pump to manage the soil moisture and the source of energy is through solar power. When the moisture is beneath the threshold, the moisture level sensor directs the sign to microcontroller their by triggering the DC water pump to supply water to the land. This system can also give the condition of motor and temperature to the user across mobile. It mainly helps in maintaining pH level of soil and can prevent drought like situations.

REFERENCES

[1] Norakmar binti Arbain Sulaiman, Muhamad Dan Darrawi bin Sadli. "An IoT-based Smart Garden with Weather Station System", 2019 IEEE 9th Symposium on Computer Applications &

Industrial Electronics (ISCAIE), 2019

[2] Rashmi R. Agale& D. P. Gaikwad, "Automated irrigation and crop security system in Agriculture using Internet of things", in Third International Conference on Computing, Communication, Control And Automation, 2017.

[3] Mitul Sheth, Pinal Rupani. "Smart Gardening Automation using IoT With BLYNK App", 2019 3rd International Conference on Trends in Electronics and Informatics (ICOEI), 2019

[4] S. Vaishali, S. Suraj, G. Vignesh, S. Dhivya, S. Udhayakumar. "Mobile integrated smart irrigation management and monitoring system using IOT", 2017 International Conference on Communication and Signal Processing (ICCSP), 2017

[5] Amogh Jayaraj Rau, Jairam Sankar, Ashok R Mohan, Deepti Das Krishna, Jimson Mathew. "IoT based smart irrigation system and nutrient detection with disease analysis", 2017 IEEE Region 10 Symposium (TENSYMP), 2017

[6] "Smart Water Dripping System for Agriculture/Farming", International Journal of Recent Technology and Engineering, 2019

[7] Saurav Verma, Rahul Gala, S. Madhavan, Sanchit Burkule, Swapnil Chauhan, Chetana Prakash. "An Internet of Things (IoT) Architecture for Smart Agriculture", 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), 2018

[8] S.N. Ishak, N.N.N.Abd Malik, N.M. Abdul Latiff, N. Effiyana Ghazali, M. A. Baharudin, "Smart Home Garden Irrigation System Using Raspberry Pi", in IEEE 13th Malaysia International Conference on Communications (MICC), 28-30 Nov. 2017

2nd International Conference on
Advances in Computing & Information Technology (IACIT-2020)
Date: 29-30 April 2020
Organized by School of Computing and Information Technology
Reva University, Bengaluru, India

188