iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** VI **Month of publication:** June 2017

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)

Automated Plant Irrigation System Based on Soil Moisture and Monitoring Over IOT

Dr. N. K. Choudhari[1], Mayuri Harde[2]
[1,2]Department of ECE, Priyadarshini Bhagwati College of Engineering, Nagpur, RTMN University

Abstract: ***An automated irrigation system mainly considered to optimize the usage of water on agriculture because of climatic situation which leads to lack of rains. The farmers running on the agriculture fields are needy of rain, bore wells as well as rivers. Suppose if the farm land has pumps for irrigation it also desired someone to on/off the pumps. conventional water quality measurement is through by taking samples that does not bring the real time data. In this gateway sensor is used to handle sensor information and helps to broadcast data to web application using internet of thing. Wireless and soil moisture sensor is programmed with microcontroller based gateway which is used to manage and maintain the flow and quality of water. By using automated system water is saved of up to 92% and manufacture a good yield compared with older irrigation systems. The system has a spread wireless set of connections of soil-moisture along with temperature sensors positioned in the root region of the plants. In this we also use rainfall sensor ,flow sensor and level sensor. In addition, a gateway unit handles sensor information and transmits data to a web application. In this paper, automatic irrigation system based on ARM LPC 2148 and GPRS module. All the system will be group using ARM and GPRS module using IoT (Internet of things). The ESP8266 is a little unit allows microcontrollers to tie with a Wi-Fi network and build easy TCP/IP connections by means of Hayes-style instructions.***
The plan of our embedded scheme is to supervise position of the sensor which can be monitored on web page throughout microcontroller. The web-server is coupled to internet. This page contains all the information regarding the status of the sensor purpose of this scheme is use to examine and control dissimilar parameters in agriculture and engineering field and also harmful area such as chemical or nuclear place.
Keywords: Irrigation System, ARM7 LPC2148, IoT, Sensors, GPRS Module

I. INTRODUCTION

Agriculture essentially depends on fresh water and there is increased utilization of water due to over population and demand for food materials. So, agriculture is in necessitate of a most excellent policy based on irrigation for optimum use of fresh water, jointly with quality improvements. With the different landforms, different atmospheric situation and unexpected use of water natural resources which causes the lack of water forces us to think in different way. Best solution to this trouble is irrigation system and sprinkler irrigation [1]. Irrigation can be defined as the knowledge of artificial purpose of water to the land or soil that means depending on the soil category, plant are to be provided among water. For continuously growing requirement of food necessities, it is essential to quick enhancement in making of food technology. The software as well as hardware come together offer a extremely advanced control more than the currently implemented manual scheme. The implementation involves utilize of internet for remote monitoring as well as have power over of automated Irrigation system. This structure uses sensors like humidity, soil moisture, temperature, rainfall, water flow sensor. These sensors send signal means information to microcontroller. Microcontroller sends signal to IoT then send to PC by means of serial communication. According to real point sensors values continuous graph is put on view on PC and android based mobile using Internet along with android application. The system has a distributed wireless set of connections of soil humidity and temperature sensors positioned in the root zone of the plants and water level sensor is to be found in tank for inspection the water level in tank. In adding together, a gateway unit handles all sensor information and sends data to a web application. Irrigation management is a composite choice manufacture process to decide when and how much water to be appropriate for a increasing crop to assemble specific management objectives. By means of various sensor the controller and IoT plays an very important role in irrigation and GPRS module is providing the wifi to IoT for showing the waveforms on webpage. In today's world, people is ever-increasing day by day. India is one of the most populated countries.

Farming plays the main role in the economy and development, like India. Keeping this in brain, we are designing an advance irrigation system which will increase the yield by analyzing the current full of atmosphere conditions and feeding the crops with the correct quantity of water. This paper offers a cheaper along with simpler effect to this problem by developing automated irrigation controllers by way of wireless ability assisted with little cost wireless sensor nodes. Similar to temperature sensor, humidity sensor

Volume 5 Issue VI, June 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

which senses the intensity of moisture in the soil. So, efficient water managing play a vital role in the irrigated agriculture cropping system. The main goal of farmer is to manufacture “more crop per drop”, therefore there is need to find the irrigation technique.

II. LITERATURE REVIEW

A. *A NOVEL APPROACH FOR AUTOMATIC IRRIGATION AND FERTIGATION USING EMBEDDED SYSTEM [2]*

Many irrigation systems are used to apply capable irrigation scheme for the field having different crops. The system can be further better by using fuzzy logic controller. The fuzzy logic scheme is used to increase the accuracy of measured value and assists in decision making. In this also used wireless network. Fuzzy logic is very hard to understand.

B. *Review For ARM Based Agriculture Field Monitoring System [3]*

The automatic irrigation system based on microcontroller and for communication GSM technology was used. Soil moisture sensor positioned in core zone in paddy ground and sense water level. The system was set up using ARM7TDMI core and GSM. GSM is an important part of this system. GSM service is send SMS to our and is a connection under the ARM processor and centralized unit. This information send to user in the form of SMS and GSM modem controlled with the help of standard set of AT(Attention) commands. These commands are used to control majority of the functions of GSM mode.

C. *Microcontroller based Automatic Water level Control System [4]*

Zigbee is also have disadvantages i.e. low transmission rate. It is only use for smaller distance. Maximum papers have problem in networking and also some security issues. Therefore we used another technique for irrigation which is very beneficial.

D. *Efficient Registration Of Optical And IR Images For Automatic Plant Water Stress Assessment [5]*

Automatic listing of optical and IR images is a crucial step towards constructing an automated irrigation organize system where plant water information is sensed using thermal processing. A computationally efficient algorithm is designed and packaged as asoftware application. This work provides an interference free process for extracting plant water stress information which can be fed into an automated irrigation development program.

E. *An Acoustic Method For Soil Moisture Measurement [7]*

In this paper, soil moisture content has be detected using acoustic based technique was developed. The main propose of this technique is development for measure soil moisture in real time method. The technique based on two quantities i.e. speed of sound and the degree of saturation with water in soils. This testing found that the rate of sound decreases with the moisture content depending on the kind of soil.

III. BLOCK DIAGRAM

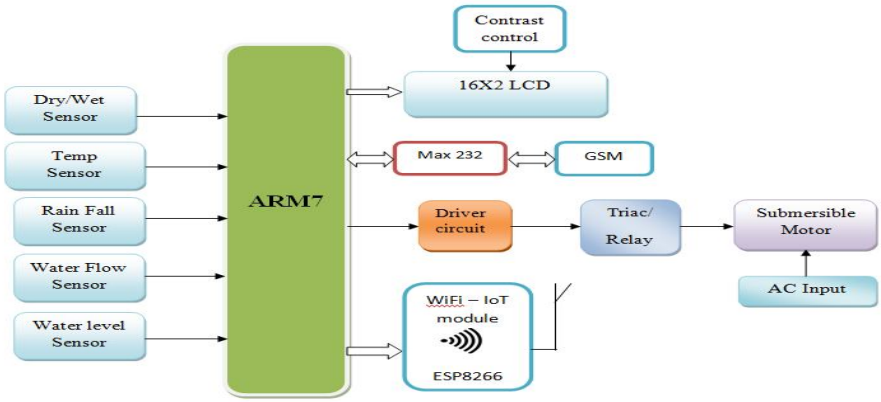


Fig: Block diagram of automated plant irrigation system based on soil moisture and monitoring over IoT

In our paper there are five types of sensors are used, They are dry/wet sensor, rainfall sensor, temperature sensor, flow sensor and water level sensor. All sensors are connected to LPC2148 i.e ARM 7 microcontroller. In our paper we irrigate the land or not are controlled by microcontroller and all database are stored in IoT and shows on webpage. The output are shown on LCD and IoT Webpage.

Volume 5 Issue VI, June 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

If dry/wet sensor are inserted in soil, means two condition occur either soil dry soil or wet soil. Depend on that condition submersible motor is on/ off by using application. The information of sensor are communicated with microcontroller and also send to IoT and IoT module is interfaced to the controller to update the information in the web server about the condition of the field. The IoT is ESP8266 offers a whole and self controlled wifi networking result it allowing for host the function or to delegate all the information from use processor. The computer is used to maintain proof of all information starting from present field condition. With the help of IoT we can monitored and controlled the irrigation in our farm.

A. Dry/Wet sensor

The soil moisture helps to determine the requirement of water to the plant .The content also determines the right amount of water required by the plant. This help to minimize the wastage of water and also prevent water logging of the field due to excess water. Soil Moisture Sensor is a easy break for measuring the wetness in soil and related materials .The two large exposed pads function as probes used for the sensor, mutually acting as a variable resistor. The extra water that is in the soil means the improved the conductivity among the pads will be and will answer in a minor resistance, and a higher SIG out.

B. Temperature sensor

Measurement and control of temperature and relative humidity finds applications in several areas. These time devices are accessible which have mutually temperature and humidity sensors with signal conditioning, ADC, calibration and communication interface all build surrounded by them. The DHT11 sensor uses a proprietary 1-wire protocol which we will be exploring now and implementing by way of the LPC2148 i.e. ARM7 microcontroller that will collect the temperature and humidity values from the sensor and show them on a 16×2 character LCD.

C. Water Flow sensor

Water flow sensor consists of a plastic valve body, a water rotor, and a hall-effect sensor. When water flows during the rotor, that time rotor rolls. Its rate changes among different velocity of flow. The hall-effect sensor outputs the equivalent pulse signal. This one is appropriate to sense flow in water dispenser .

Rain sensors for irrigation systems are available in both wireless and hard-wired versions. If rain falls on this sensor the controller will controlled the motor.

D. Water level sensor

The system continuously monitors the water level in the tank and provide accurate amount of water required to the plant or tree (crop). The substance that measured can be inside a container or can be in its natural form (e.g. a river or a lake). The level measurement that can be either continuous or point values.

IV. EXPERIMENTAL RESULTS

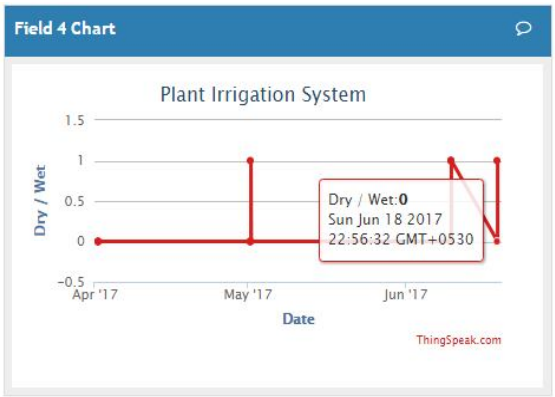


Figure 1

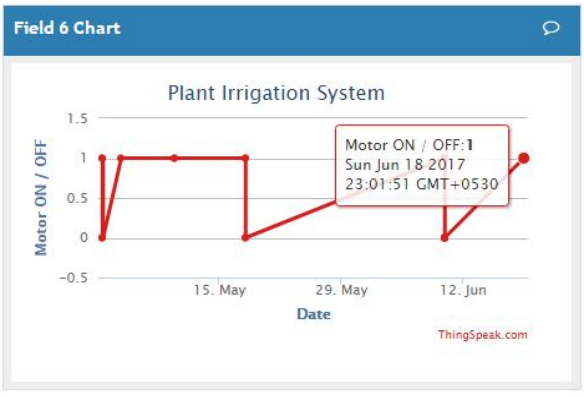


Figure 2

the figure 1shows the output sensed by sensor as a dry soil detected and output wavefom on iot webpage.

The figure 2 shows the If dry soil detected by dry/wet sensor then the requirement of turn ON the motor and it shows on IoT.

Volume 5 Issue VI, June 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

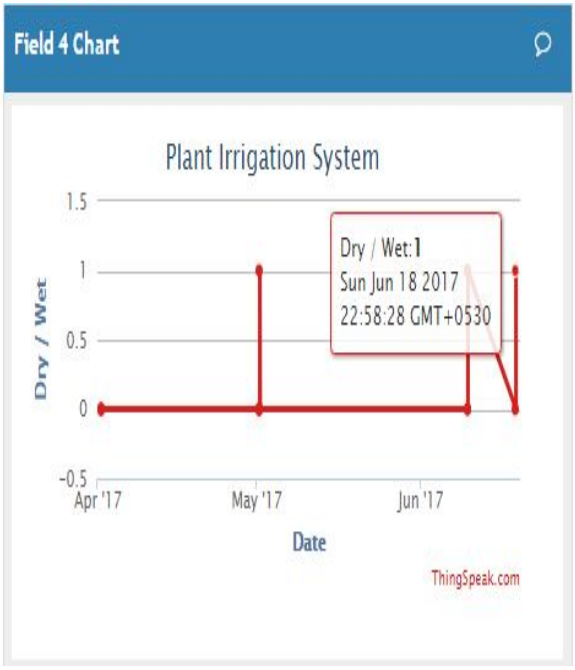


Figure 3

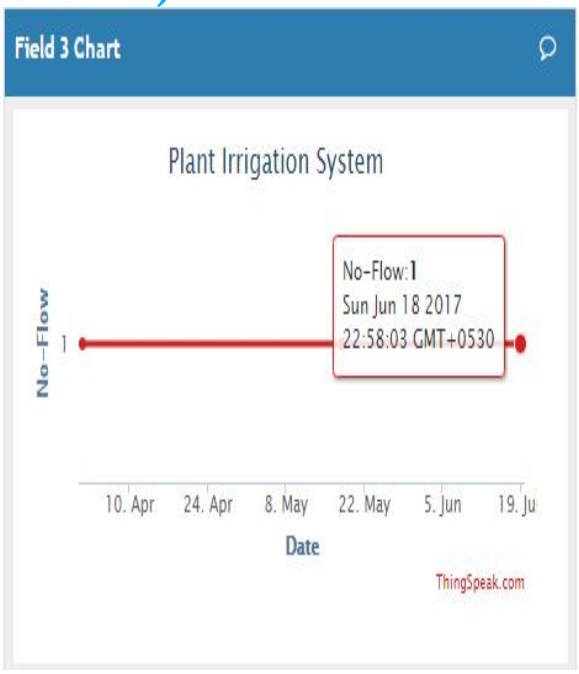


Figure 4

The above figure 3 shows an output of wet soil detected by sensor and figure 4 is shows that the there is wet soil so no require water flow and waveform shown.

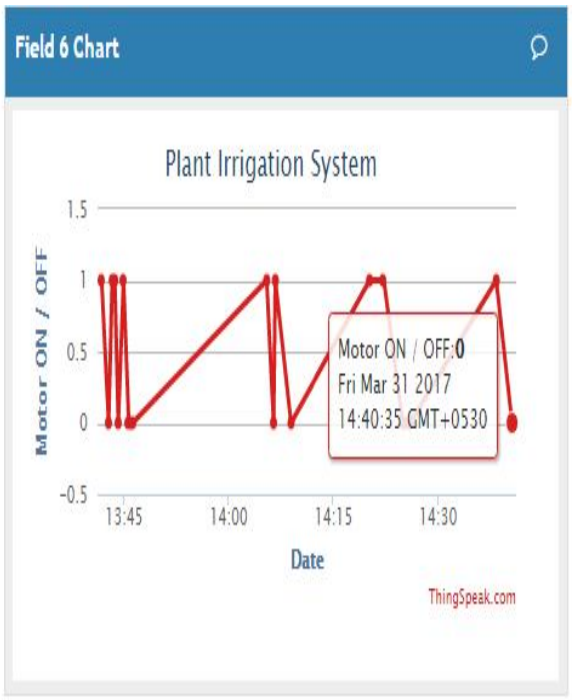


Figure 5

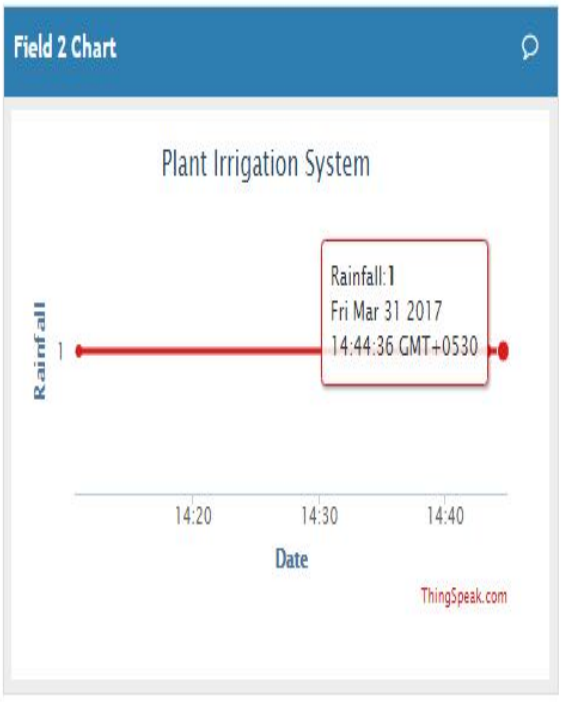


Figure 6

The above figure 5 shows that the wet soil is present so motor is OFF and the figure 6 shows if rainfall is present at that time rainfall detected by sensor.

Volume 5 Issue VI, June 2017
ISSN: 2321-9653
International Journal for Research in Applied Science & Engineering Technology (IJRASET)

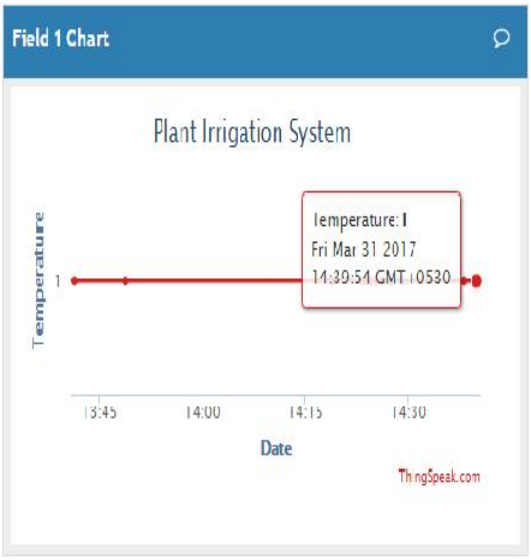


Figure 7

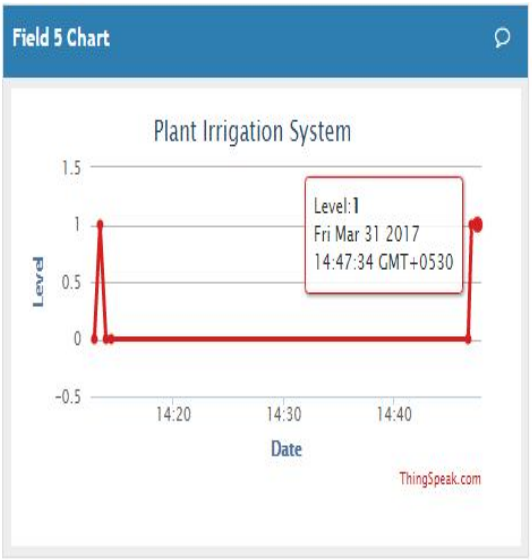


Figure 8

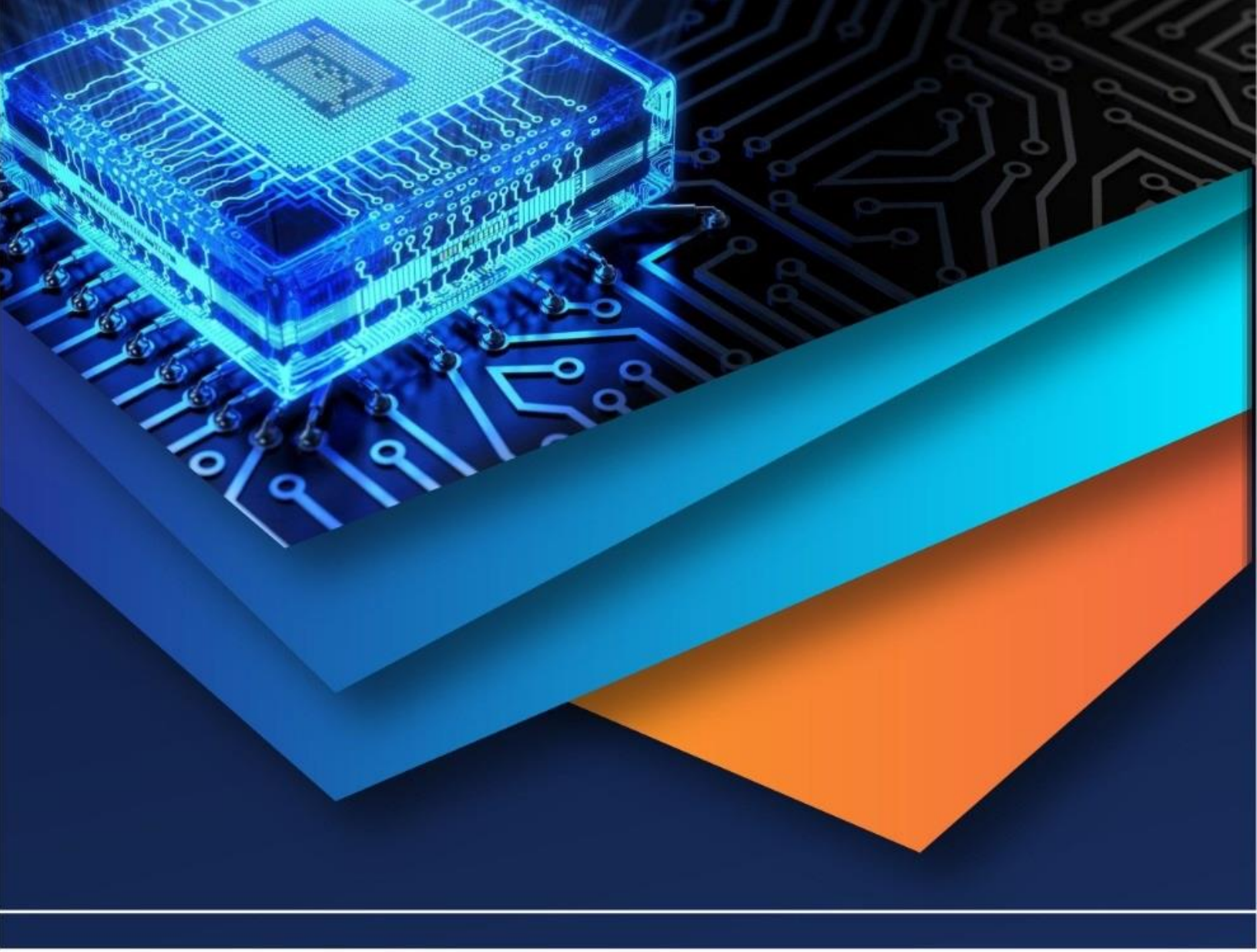
The figure 7 is the high temperature detected by sensor and level of tank sense by level sensor shown in figure 8.

V. CONCLUSION

The automated irrigation structure implemented was set up to be feasible and cost efficient for optimizing water resources designed for farming production. A entirely automated irrigation system which is controlled as well as supervise by means of using IoT. The Internet controlled duplex communication scheme provides a powerful decision making tool idea for adaptation to numerous crop growing scenario. The wished-for model LPC 2148 which is totally based on GPRS component and IoT. This structure is minimizes the water utilize since it provide irrigation as per the requirement of the crop. This system is automated irrigation system so it minimizes the human being resources. via this system we can check the status of all the sensors (Soil-moisture, Temperature, Water level, rainfall) and also the ON/OFF status of the motor. Thus the system monitor, control and communicate. The system provides a actual point feedback control system. The system valves are turn ON or OFF without human intervention depending upon moisture content. Using this system, can save manpower, water to improve creation and eventually increase profit.

REFERENCES

[1] Mayuri R. Harde, Dr. N. K. Choudhari "A Review Paper On Wireless Sensor Network And Gprs Module For Automated Irrigation", International Research Journal of Engineering and Technology (IRJET), Volume: 04 Issue: 01 Jan -2017
[2] Vimal. P, Priyanka. V, Rajyasree.M, SanthiyaDevi.P.T, Jagadeeshraja.M, SuthanthiraVanitha.N, "A Novel Approach For Automatic Irrigation And Fertigation Using Embedded System," International Journal Of Vlsi And Embedded Systems-IjvesVol 05, Article 03257; March 2014
[3] Ms. Sweta S. Patil, Prof. Mrs. A.V. Malvijay, "Review for ARM based agriculture field monitoring system",International Journal of Scientific and Research Publications, Volume 4, Issue 2, February 2014
[4] Ejiofor Virginia Ebere (PhD)1, Oladipo Onaolapo Francisca (PhD)2, "Microcontroller based Automatic Water level Control System", International Journal of Innovative Research in Computer and Communication Engineering Vol. 1, Issue 6, August 2013
[5] X. Wang, W. Yang, A. Wheaton, N. Cooley, and B. Moran, "Efficient registration of optical and IR images for automatic plant water stress assessment," Comput. Electron. Agricult., vol. 74, no. 2, pp. 230–237, Nov. 2010.
[6] Jia Uddin, S.M. Taslim Reza, Qader Newaz, Jamal Uddin, Touhidul Islam, and Jong-Myon Kim,"Automated Irrigation System Using Solar Power" ©2012 IEEE
[7] Samy Sadeky, Ayoub Al-Hamadiy, Bernd Michaelisy, Usama Sayedz," An Acoustic Method for Soil Moisture Measurement ", IEEE 2004
[8] G. Yuan, Y. Luo, X. Sun, and D. Tang, "Evaluation of a crop water stress index for detecting water stress in winter wheat in the North China Plain," Agricult. Water Manag., vol. 64, no. 1, pp. 29–40, Jan. 2004.
[9] S. B. Idso, R. D. Jackson, P. J. Pinter, Jr., R. J. Reginato, and L. Hatfield, "Normalizing the stress-degree-day parameter for environ-mental variability," Agricult. Meteorol., vol. 24, pp. 45–55, Jan. 1981



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY