ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

*(An ISO 3297: 2007 Certified Organization)*

**Vol. 3, Issue 12, December 2014**

# Automated Irrigation System In Agriculture Using Wireless Sensor Technology

Karthikeswari M[1], Mithradevi P[2]

PG Student [CS], Dept. of ECE, Muthayammal Engineering College, Namakkal,Tamilnadu, India [2]

Assistant Professor, Dept. of ECE, Muthayammal Engineering College, Namakkal,Tamilnadu, India [1]

**ABSTRACT** - Agriculture plays the major role in economics and survival of people in India. Nowadays Indian agriculture faces a two major problem. They are as follows we know government has promoted a free supply of electricity for farmers to run their motors and pumps for irrigation purpose. But it is found that the farmers misusing the electricity to run their home appliances such as radio, TV, fans, etc. This misuse of electricity has brought a considerable problem for government to supply free electricity. The main aim of this project is to design low cost Automated Irrigation System using a Wireless Sensor Network and GPRS Module. The Purpose of this project is to provide embedded based system for irrigation to reduce the manual monitoring of the field and get the information in the form of GPRS. This proposed system recognizes whether the free electricity has been used other than electric motors for pumping water and if so electricity is being misused, it shuts the total supply for the farmers through a tripping circuit. By using wireless networks we can intimate the electricity board about these mal practices. The development of this project at experimental scale within rural areas is presented and the implementation was to demonstrate that the automatic irrigation can be used to reduce water use.

**KEYWORDS**–*PH,*HUMUNITY Sensor, Embedded Architecture.

## I. INTRODUCTION

Agriculture plays the major role in economics and survival of people in India. Nowadays Indian agriculture faces a two major problem. They are as follows; know government has promoted a free supply of electricity for farmers to run their motors and pumps for irrigation purpose. But it is found that the farmers misusing the electricity to run their home appliances such as radio, TV, fans, etc. This misuse of electricity has brought a considerable problem for government to supply free electricity. Since most of the farmers have less knowledge about the nature of their soil and its fertility, they cannot find the right seeds for their fields to be sowed.

To avoid these problems a microcontroller based embedded system has been proposed in this project. This proposed system recognizes whether the free electricity has been used other than electric motors for pumping water and if so electricity is being misused, it shuts the total supply for the farmers through a tripping circuit. By using wireless networks can intimate the electricity board about these mal practices. This system also helps the farmers to find their soil fertility. In this paper also use humidity sensor to identify humidity of the soil where as this senses automatically water will pumped to certain field.

The system has a distributed wireless network of soil-moisture and temperature sensors placed in the root zone of the plants. In addition, a gateway unit handles sensor information, triggers actuators, and transmits data to a web application. An algorithm was developed with threshold values of temperature and soil moisture that was programmed into a microcontroller-based gateway to control water quantity.

The development of the automated irrigation system based on microcontrollers and wireless communication at experimental scale within rural areas is presented. The aim of the implementation was to demonstrate that the automatic irrigation can be used to reduce water use.This gateway permits the automated activation of irrigation when the threshold values of soil moisture and temperature is reached. Communication between the sensor nodes and the data receiver is via the zigbee.

The internet connection allows the data inspection in real time on a website, where the soil-moisture and temperature

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

*(An ISO 3297: 2007 Certified Organization)*

**Vol. 3, Issue 12, December 2014**

levels are graphically displayed through an application interface and stored in a database server. Because of its energy autonomy and low cost, the system has potential use for organic crops, which are mainly located in geographically isolated areas. The already existing system uses simple water pumps to supply water to the crops as and when required by manual control.

Another disadvantageous method is the discontinuous monitoring of the water level by using GSM technology. But, the proposed system uses automatic control by using continuous monitoring by GRPS The use of binding coils for communication purpose is practically impossible. This is because when long distances are involved, it leads to damage of the coils and also disruption in communicating information between the field and the centre and the use of coils for communication purpose is economically not possible.

The development of the automated irrigation system based on microcontrollers and wireless communication at experimental scale within rural areas is presented. The aim of the implementation was to demonstrate that the automatic irrigation can be used to reduce water use.A microcontroller for data acquisition, and transceiver; the sensor measurements are transmitted to a microcontroller based receiver.

Zigbee and GPRS wireless system on the agricultural land by regulating with the use of micro-controller. The benefits of wireless communication extend beyond simply not using wires. Wireless technology has had an overall positive impact on the costs and efficiency of anything from home Internet installations to the operations of large corporations worldwide. Thereby the use of wireless communication for the monitoring and controlling on the agricultural land is highly essential
This gateway permits the automated activation of irrigation when the threshold values of soil moisture and temperature is reached. Communication between the sensor nodes and the data receiver is via the Zigbee. This receiver unit also has a duplex communication link based on a cellular Internet interface, using General Packet Radio Service (GPRS) protocol, which is a packet oriented mobile data service cellular global system for mobile communications (GSM).

The Internet connection allows the data inspection in real time on a website, where the soil-moisture and temperature levels are graphically displayed through an application interface and stored in a database server. This access also enables direct programming of scheduled irrigation schemes and trigger values in the receiver according the crop growth and season management. Because of its energy autonomy and low cost, the system has potential use for organic crops, which are mainly located in geographically isolated areas where the energy grid is far away.

The potential and current transformers are used for avoiding the misuse of electricity. Both the transformers are allows particular current for agriculture applications. If it is used for other applications beyond agriculture the information is intimated to the Electric Boards.

## II. SYSTEM ARCHITECTURE

A.BLOCK DIAGRAM
Figure 1: shows the block diagram for automated irrigation system.
The features of the proposed system are,

- Intelligent monitoring of electricity misuse
- Controls the malpractice
- Misuse can be intimated to EB.
- Soil type recognition.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

*(An ISO 3297: 2007 Certified Organization)*

**Vol. 3, Issue 12, December 2014**

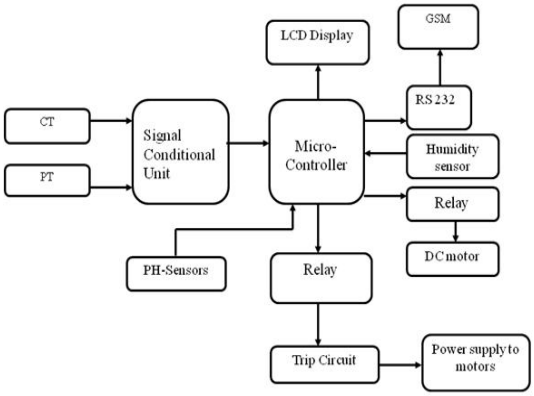


Fig.1 Block diagram of automated irrigation system

B. SENSORS

Figure 2: The temperature sensor used to measure the temperature at the field is LM 35.The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade).The LM35 does not require any external calibration or trimming to provide typical accuracies of degree C at room temperature and degree C over a full -55 to +150øC temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

Figure 2: Temperature Sensor

Figure 3: A humidity sensor also called a hygrometer, measures and regularly reports the relative humidity in the air. A humidity sensor senses relative humidity. This means that it measures both air temperature and moisture. Relative humidity,expressed as a percent, is the ratio of actual moisture in the air to the highest amount of moisture air at that temperature can hold. The warmer the air is, the more moisture it can hold, so relative humidity changes with fluctuations intemperature. The most common type of humidity sensor uses what is called "capacitive measurement." This system relies on electrical capacitance, or the ability of two nearby electrical conductors to create an electrical field between them.

The sensor itself is composed of two metal plates with a non-conductive polymer film between them. The film collects moisture from the air, and the moisture causes minute changes in the voltage between the two plates. The changes in voltage are converted into digital readings showing the amount of moisture in the air.

Figure 3: Humidity Sensor

10.15662/ijareeie.2014.0312017

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

*(An ISO 3297: 2007 Certified Organization)*

**Vol. 3, Issue 12, December 2014**

C. PIC MICRO CONTROLLER

PIC is a family of modified Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller" Peripheral interface controller is the most powerful microcontroller which is a 40pin device which is used as RISC architecture. One advantage of reduced instruction set computers is that they can execute their instructions very fast because the instructions are so simple. Another, perhaps more important advantage, is that RISC chips require fewer transistors, which makes them cheaper to design and produce.

LCD Display

The LCD Display is used to provide the user with the digital values converted by the PIC microcontroller. LCD driver is a link between the microcontroller and LCD. It is necessary to interface the LCD according to the driver specification. To understand the algorithm of LCD interfacing user must have datasheet of both LCD and LCD driver. In LCD initialization you have to send command bytes to LCD.

RS 232

The RS 232 cable is used for the purpose of serial communication. The output signal of PIC16F877A is in TTL level from 0V to +5V. But for COM port on PC, it needs both positive and negative voltage levels. Therefore, a RS 232 Level Converter is necessary to perform +15V and -15V.

D. ZIGBEE MODULE

Zigbee technology is the standard of choice among other wireless technologies due to its efficient low- power connectivity and ability to connect a large number of devices into a single network. Zigbee technology uses the globally available, license-free2.4GHz frequency band.

It enables wireless applications using a standardized set of high level communication protocols sitting atop cost-effective, low-power digital radios based on the IEEE 802.15.4standard for wireless personal area networks. The low cost allows the technology to be widely deployed in wireless control and monitoring applications, the low power-usage allows longer life with smaller batteries, and the mesh networking provides high reliability and larger range.

E. GPRS

GPRS stands for General Packet Radio Service. GPRS is one of the technologies to improve 2G phones to enable them for transferring data at higher speed. GPRS allows mobile phones to remain-- connected to network and transfer requested or sent data instantly, e.g. if you receive MMS from other mobile phone, you do not need to press a button to check if you have any new MMS. GPRS technology can provide you up to 32 kbps to 48 kbps. One of the features of GPRS technology which makes it even more useful and practical is that data can transfer during the call and there is no requirement of disconnecting call to receiving incoming or outgoing data.

F. RELAY

A relay is an electrically operated switch. The relay is used here to switch the motor to ON /OFF position according to the water requirements. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw switches.

Figure 4: Relay

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

*(An ISO 3297: 2007 Certified Organization)*

**Vol. 3, Issue 12, December 2014**

G. DC MOTOR

A DC motor is a mechanically commutated electric motor powered from direct current (DC). The stator is stationary in space by definition and therefore its current. The current in the rotor is switched by the commutator to also be stationary in space. DC motors have a rotating armature winding but non -rotating armature magnetic field and a static field winding or permanent magnet. Different connections of the field and armature winding provide different inherent speed/torque regulation characteristics. The speed of a DC motor can be controlled by changing the voltage applied to the armature or by changing the field current. Modern DC motors are often controlled by power electronics systems called DC drives.

## III. RESULT AND DISCUSSION

The automated irrigation system is designed and simulated in PATIENT Simulation software.
Figure 5 shows that overall design of automated irrigation system in patient software.

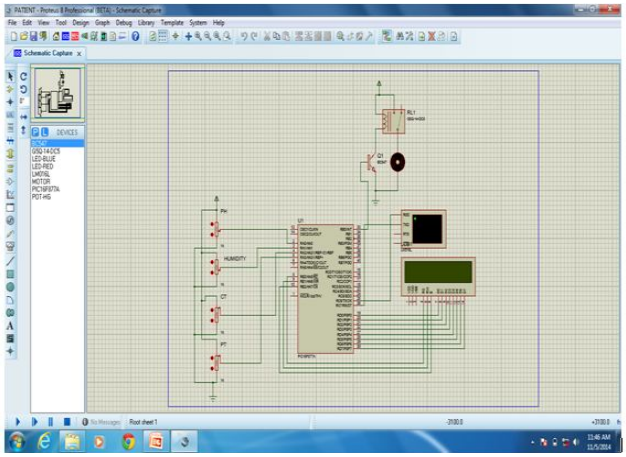

Figure 5: Overall design of automated irrigation system

Figure 6 shows when the pH value get increased then the motor automatically go into ON state.

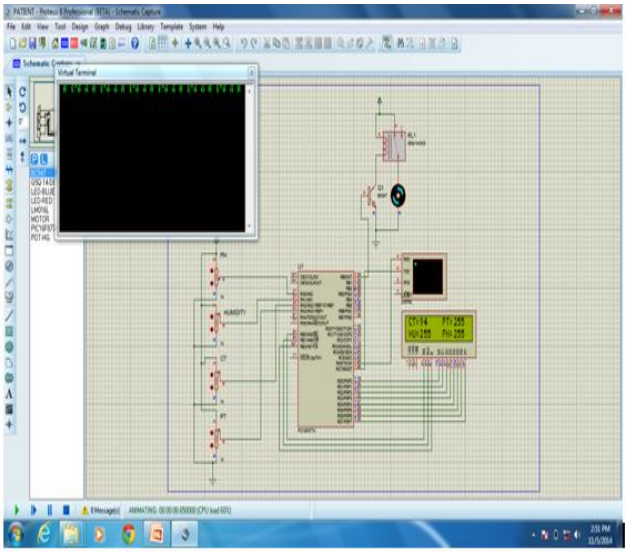

Figure 6: Motor in ON state.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

*(An ISO 3297: 2007 Certified Organization)*

**Vol. 3, Issue 12, December 2014**

Figure 7 shows when the pH value get reduced then the motor automatically go into OFF state.

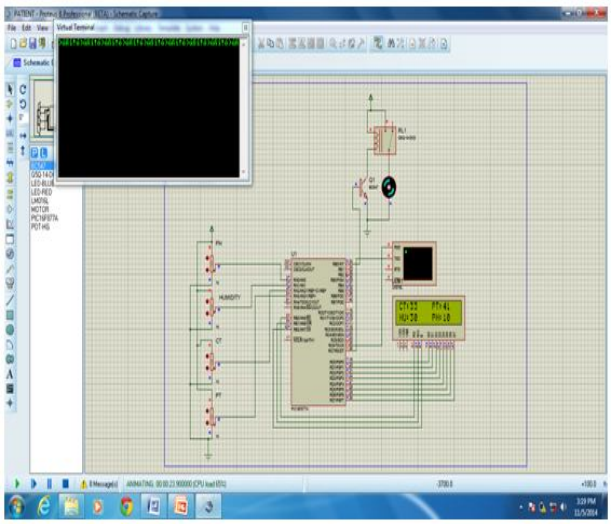

Figure 7: Motor in OFF state.

## IV CONCLUSION

The automated control is implemented here to avoid damage of crops due to surplus or deficit usage of water. The already existing system uses simple water pumps to supply water to the crops as and when required by manual control. Another disadvantageous method is the discontinuous monitoring of the water level by using GSM (global system for mobile communications) technology. But, the proposed system uses automatic control by using continuous monitoring.

Thus the continuous monitoring of the agriculture was designed and developed using various microcontrollers by using GPRS. In existing method, only discontinuous was obtained by the use of GSM which led to inefficient use of water and electricity. Hence by incorporating this method, the water and electricity was used efficiently. Compared with the existing method it gives better performance. So we can avoid these problem in a very efficient and innovative manner with the help of micro controller (arm 7), with the help of wireless technology of zigbee protocol through very sensitive sensors.

## REFERENCES

[1]. K.S.S. Prasad, Nitesh Kumar, Nitish Kumar Sinha and Palash Kumar Saha"Water-Saving Irrigation System Based onAutomatic Control by Using GSM Technology" Middle-East Journal of Scientific Research 12 (12): 1824-1827, 2012.
[2] Rashid Hussain, JL Sahgal, Anshulgangwar, Md.RiyajInternational "Control of Irrigation Automatically By Using Wireless Sensor Network".
[3] Godfrey a. mills, Stephen k. Armoo, Aagyeman k. Rockson "GSM Based Irrigation Controland Monitoring System".
[4]Yunseop (James) Kim, Member, IEEE, Robert G. Evans, and William M. Iversen "Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network" VOL. 57, NO. 7, JULY 2008 1379.
[5] Pranita A. Bhosale, Prof. V. V. Dixit " Water Saving-Irrigation Automatic Agricultural Controller" volume 1, issue 11, december 2012
[6] Sanjukumar, R.V.Krishnaiah" Advance Technique for Soil Moisture Content Based Automatic Motor Pumping for Agriculture Land Purpose" Volume 04, Article 09149; September 2013.