Remotely controlled microcontroller based Automatic Irrigation System

Manju Kaushik
Ph. D Scholar
MVN University, Haryana,India

Anita Devi
Electronics and communication engineering Department,
MVN University, Palwal, Haryana

Dr. Rajeev Ratan
HOD (ECE)
MVN University, Haryana,India

Dr. S. K. Luthra
Vice Chancellor
MVN University, Haryana,India

Abstract - This paper proposed a soil moisture sensor for sensing the soil moisture and according to the moisture remain in soil LCD gives the display . In this paper we are using four conductive soil moisture sensors for four different crop and these sensors are connected to the base station unit that is home by zig-bee module. This project also senses the moisture level of the field and whenever the moisture level is too low then the system immediately generates a visual and sound alarm and then it automatically switches ON the motor. When the moisture level reaches maximum of the soil then the motor is switched OFF. The Communication signals from irrigation control and the sensor network to the base station interfaced using X bee-PRO communication and this technology is a low-cost, low-power wireless sensor network. The modules operate within the 2.4 GHz frequency band and outdoor RF line-of-sight range up to 4000 ft. (1200 m) and RF Data Rate 250,000 bps

KEYWORDS:-AVR microcontroller-bee module, soil moisture sensors,

I. LITRATURE REVIEW

www.irrigation.com[1] gives an idea that what are the recent trends in irrigation system to supply water to plants. This website gives an idea about the various procedure to irrigate the land, plants.These all procedures are really good that they supply water to plant maximum in root zone by this we can save water and energy.

S. Thenmozhi, M. M. Divya, R. Sudershan, K. Nilmalakumari[2] proposed a system Green House Managment using Embedded system and zig bee technology. In this paper they discussed about the system that is when any of input module or sensors does not work properly and the required work is not get performed. At that time zig bee wireless sensors networks based controlling process is used to communicate between control room to green house system.

Rashid Hussain, JL Sahgal, Anshulgangwar, Md.Riyaz [3] proposed a system control of irrigation Automatically by using Wireless sensor network. In this paper they are discuss about Fertility meter and ph meter to measuring the fertility of soil and after that a drip irrigation through wireless is done .Both will help to judge moisture content and fertility of soil and hence prevent the rapid growth of weeds and excessive water usage.

Venkata Naga Rohit Gunturi[4]proposed microcontroller based automatic plant irrigation system. In this irrigation starts only when humidity of soil goes below the reference. This can be done with the controlling of system with microcontroller and soil moisture sensor, humidity sensors. This system have several benefits as operate with less man power and supply water to root zone. Also controls the weeds and fungal diseases occur due to excess irrigation.

Uday Waykole,Prop. DhirajG. Agarwal[5] proposed green house automation system by combination of zig-bee, microcontroller and sensors. In this they uses wireless sensors which overcome the exccessive wiring and easy to install. This system automatically controls all factors like humidity, temperature etc which effect plant growth.
H.T.Ingale,N.N.Kasat[6] gives an automated irrigation system. This system shows the combination of microcontroller and sensors which gives water only when humidity of soil goes below reference and due to direct supply/transfer water to the roots help to maintain moisture in soil. The system is compatible with changing environment, improves the growth of plants and save water.
Sushama ArjunKolhe,S.A.Annadate[7] proposed implementation of green house automation using ARM7controller .In this paper, They +proposed a system that is connected to microcontroller ARM7 receive data on green house environment condition accordingly microcontroller controls devices heater, fan ,bulb etc. The ARM7 is a microcontroller which gives high performance with low power consumption. It is cost effective also.
B.Vidyasagar[8] proposes green house monitoring and automation using GSM. It proposed a set of sensors connected to control unit for controlling the sensors according to the environment condition and soil condition. The controlling of irrigation and other parameters like moisture and humidity is fully automated using GSM and PIC microcontroller.
Anzzouz Benzekri,Kamal Magriche,Larbi Refoufi [9] proposed PC based automation of multimode control for an irrigation. In their paper is used to instruct and controlling of microcontroller and then sensors for irrigation managment. This presents a design and implementation of an automated PC- based multimode control for an irrigation system, which uses Delphi- based software to access and supervise the microprocessor based data acquisition system via serial port.
Sumit A. Khandelwal[10] gives an automated green house managment using GSM modem.It proposed a system in which GSM mobile is used to instruct microcontroller. This paper not only provides automatic control over devices like pump, light ,shade but also tackles with the critical conditions like rain fire etc.Also provide remote access control to farmers.
V. Ramya, B.Palaniappam,, and Boby Goerge [11]gives an embedded system for automatic irrigation of cardamom field using x-bee pro technology. In this they control the irrigation of cardamom field by using PIC microcontroller and humidity sensor/moisture sensors. The proposed system have some conditions to start proper irrigation such as current temperature should lie in between maximum and minimum values of set points, as high temperature is not good for irrigation to cardamom. so, it saves water, energy, money and extra manpower.
Zain Aldeen, S. A. Rehman, Raury S. Ali, Basil.H.J.[12] proposed wirelessly controlled irrigation system in this they explain how the wireless sensors are connected to X-bee pro module to control the irrigation. The system has two modes one is smart mode and other is manual. The range or set points must be changed manually according to the season to satisfy given conditions for proper irrigation.

II. EXISTING SYSTEM

In existing system,there is a problem of ON/OFF the motor pump manually and for this farmer have to travel from their home to farm house/field and also from field to home at odd hours for ON/OFF the motor pump. Existing aids are incapable of communicating the operating system of motor situated at fields. There are many times when motor pump left running for longer time due to power cut. this leads to wastage of energy, money, electricity, etc.

III. PROPOSED SYSTEM

To overcome the difficulty of existing system like wastage of money, energy, water we want to introduce a system which will have microcontroller, wireless connection between home(receiver unit) and field (transmitter unit).in the proposed system the irrigation starts only when sensors senses the need of irrigation and moisture level is gone beyond the set value it also apply the required amount of water at right time.

IV. SYSTEM ARCHITECTURE

Both the transmitter and receiver circuit are 12V powered which is converted +5V by 7805. This unit supply power to all the components where ever needed.
The four soil moisture sensor continuously monitors the soil moisture content and gives analog variation of voltage which is converted to digital using LM324 OPAMP IC in comparator mode. The digital data is fed to controller. The transmitter controller sends different acknowledgement to receiver on various moisture levels via the x bee module. The receiver x bee receives the data and give to controller. The controller checks the data and display the moisture level on 16x2 LCD. If the moisture is less an alarm is activated on receiver end. The user can then turn on the tullu motor in the filed by the remote button and when proper moisture level is reached turn it off.

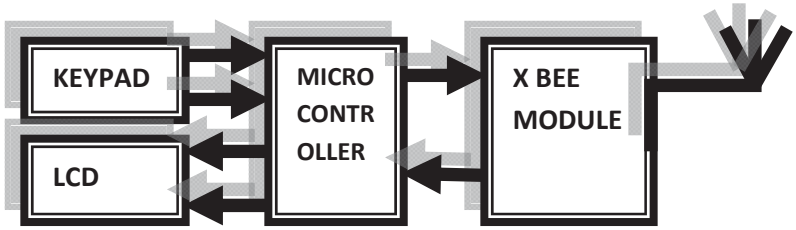


fig-1(a) TRANSMITTER UNIT

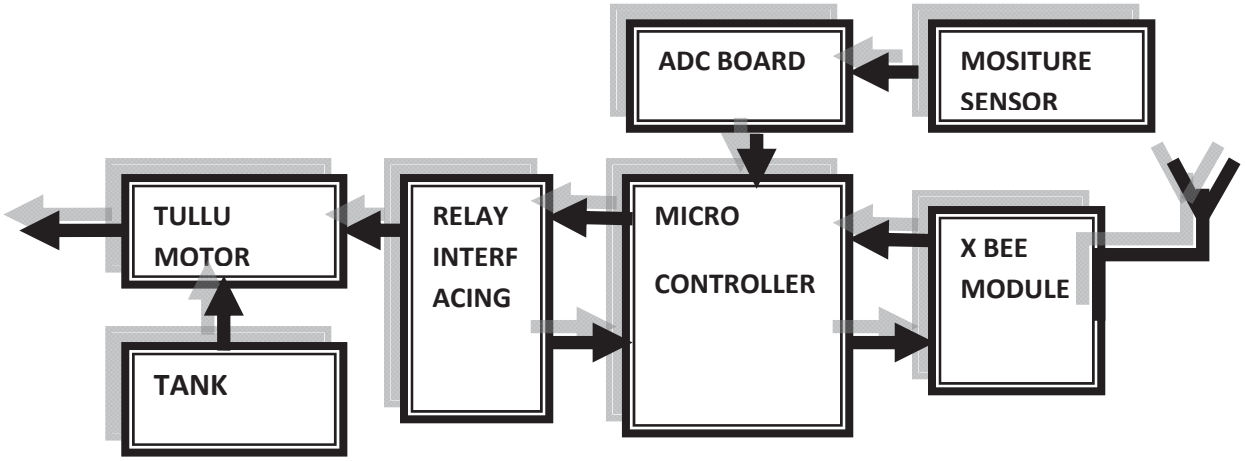


fig-1(b) RECIEVER UNIT

V. CIRCUIT DIAGRAM

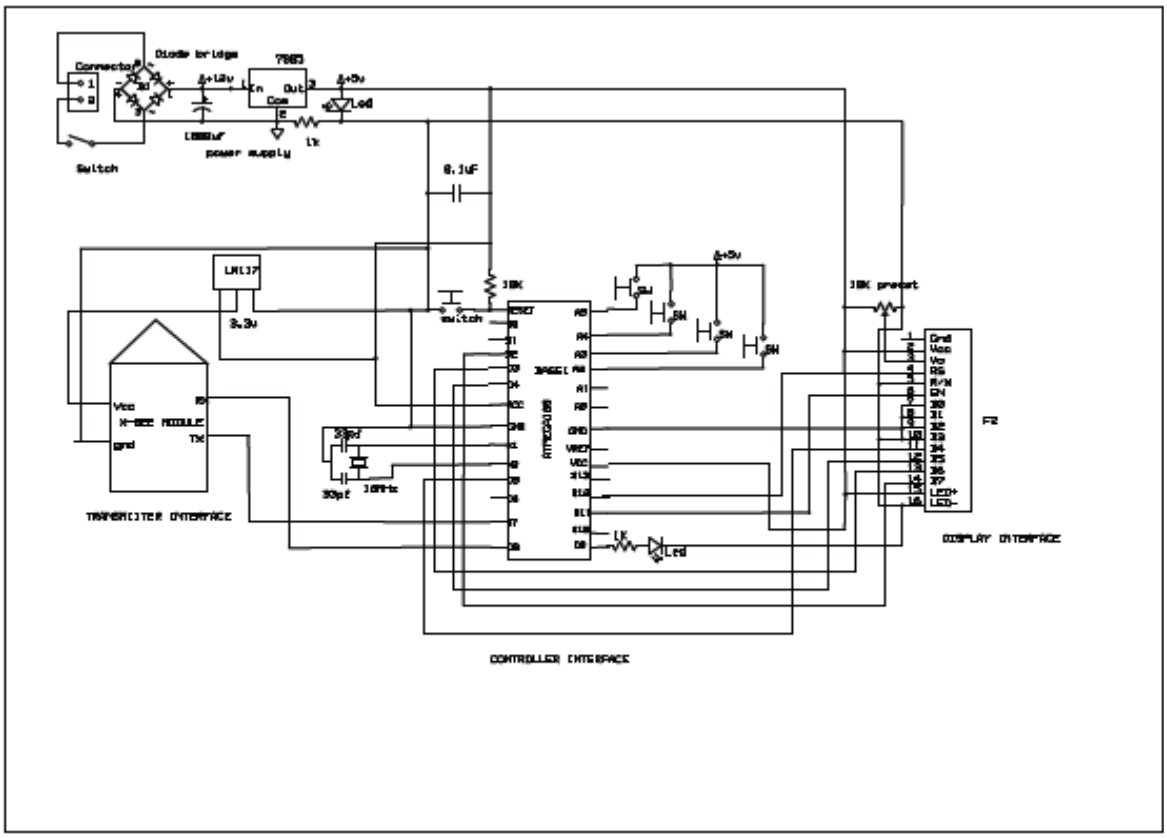


Fig2(a) showing TRANSMISSION UNIT

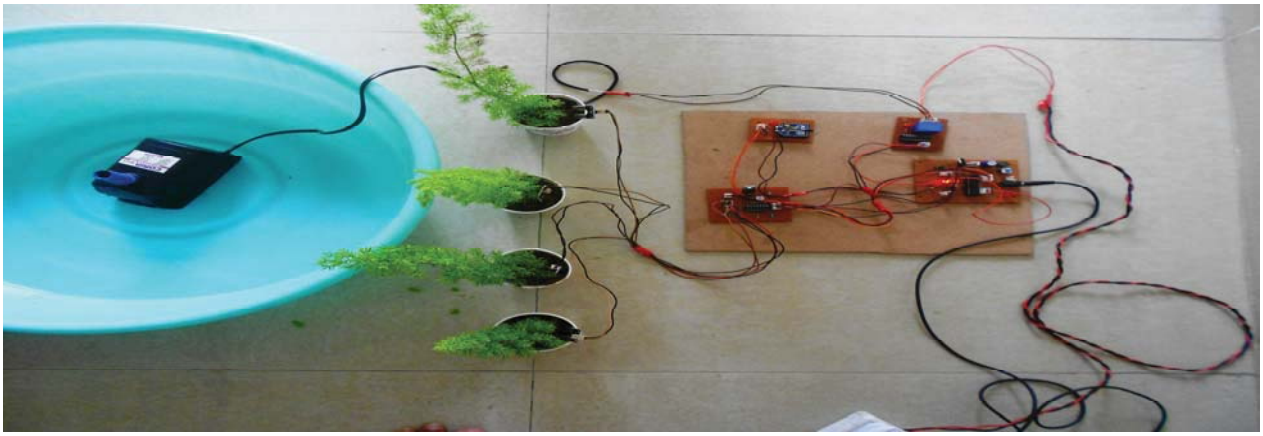


fig :2(b) Schematic Diagram of the Proposed System Transmitter side

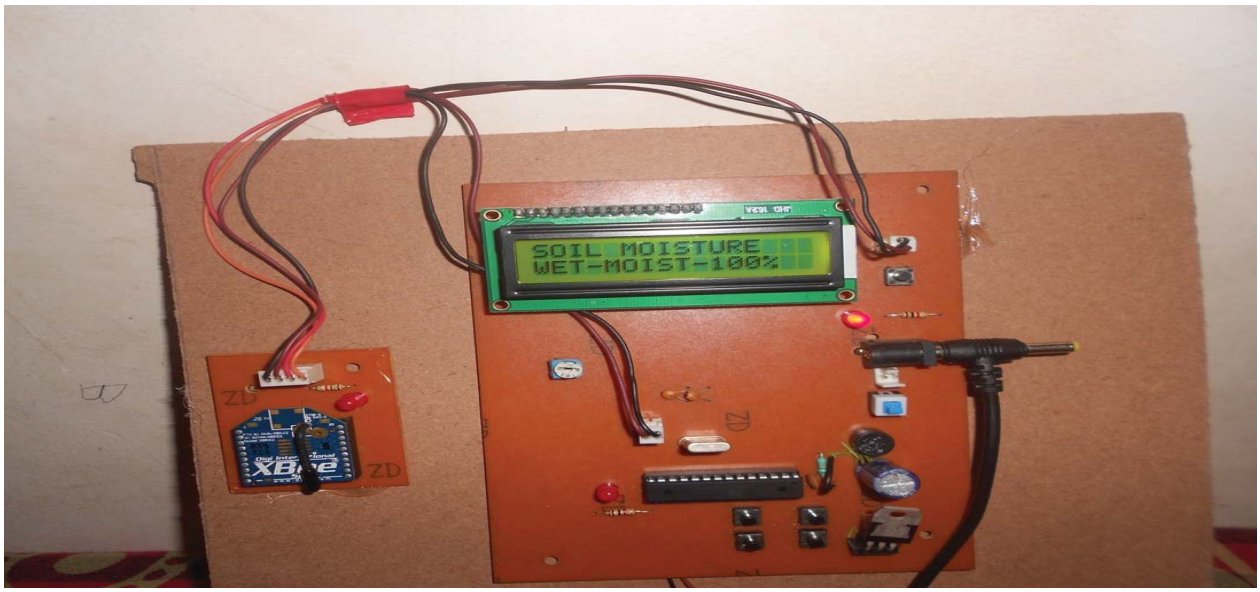


fig:3(a) Schematic Diagram of the Proposed System Receiver side

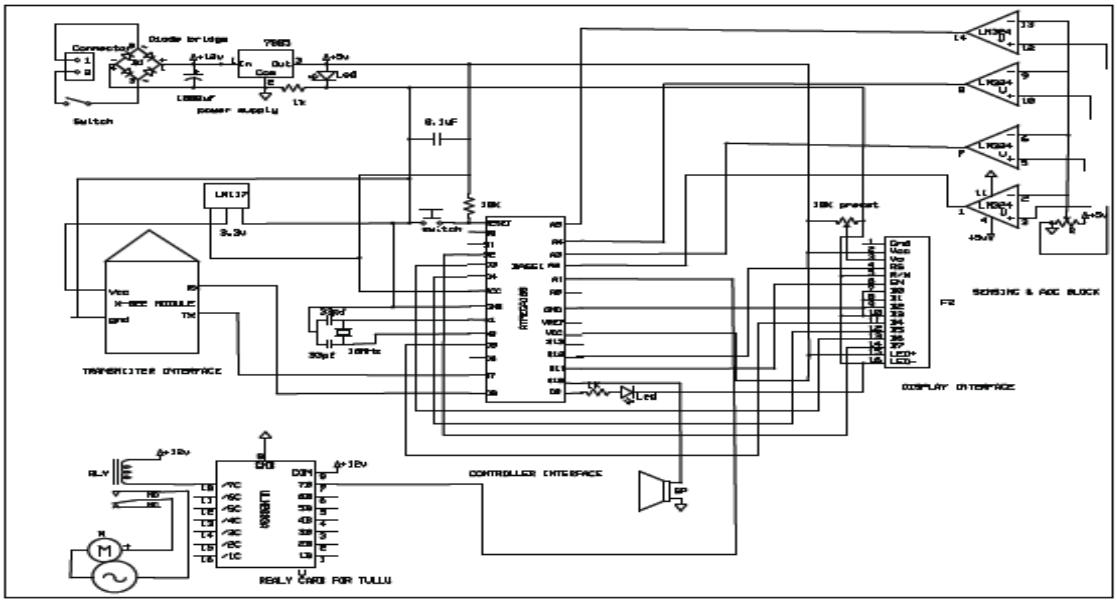


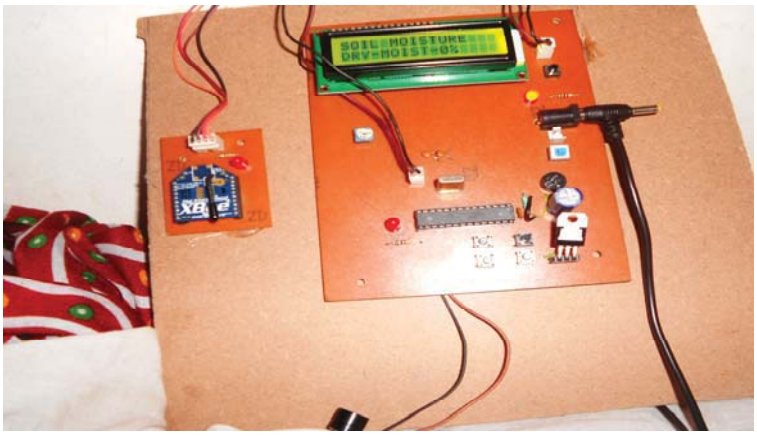
fig :3(b) Circuit diagram of Receiver side

VI. RESULT AND CONCLUSION

If the moisture is sensed by sensors below the set value then an alarm is start on receiver unit for starting an irrigation and when moisture is sensed above the set value then also alarm is start for stop the irrigation to turn off the motor. According to the neccessity of irrigation LCD display the moisture percentage that how much moisture is remained in soil as shown in fig

Case 1: IRRIGATION ON

When land is totally dry and crop need irrigation then an alarm is generated on receiver side and motor pump is ON



Case 2:IRRIGATION OFF :When requirement of water is fulfilled and moisture of soil is 100% then an alarm is generated at receiver side and motor pump is OFF.

REFERENCES

[1] www.irrigation.org
[2] S. Thenmozhi, MM divya, R Sudarshan, K Nirmala Kumari "Green house management using embedded system and X bee technology" Vol.III Issue II IJAREEIE 2014.
[3] Rasid Hussain, JL Sehgal, Anshul Gangwarr, Mohd. Riyaj " Control of irrigation automatically by using wireless sensor network" AJSCE Vol. III Issue I 2013.
[4] Venkata Naga Rohit Gunturi " Micro controller based automatic plant irrigation system" IJART Vol. II Issue IV 2013.
[5] Uday A Waykole, Prof. Dheeraj G Agarwal " Green House automation System" IJECSCSE First international conference on recent trends in engineering and technology 2012.
[6] H T Ingale, N N Kasat " Automated Irrigation System" IJERD Vol. IV Issue XI Nov 2012.
[7] Sushma Arjun Kolhe, S A Annadate " Implementation of green house automation using ARM 7 controller" IJCA Vol. 47- no 20 June 2012.
[8] B. Vidyasagar " Green house Monitoring and Automation using GSM" IJSRP Vol.2 Issue 5, May 2012.
[9] Azzouz Benzekri, Kamal Meghriche, Larbi Refoufi " PC-Based automation of a multimode control for an irrigation system" IEEE 2007.
[10] Sumit A Khandelwal " Automated green house management using GSM modem" IJCSIT Vol. III (1) 2012.
[11] V Ramya, B Palaniappam, Boby George " Embedded system for automatic irrigation of cardamom field using Zigbee pro technology"
[12] Zain Aldeen, S A Rahaman, Raury S.Ali, Basil H *Jasim Wirelessly controlled irrigation system* Iraq J. Electrical and Electronic Engineering Vol.10 No.2 , 2014