

Design and Implementation of Automated irrigation system using ZIGBEE and GSM

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Abstract—The objective of this paper is to represent the Automated irrigation system using ZIGBEE and GSM for agricultural crop. In these system use the Wireless Technology. The system has represented the wireless sensor network of soil-moisture, temperature and humidity sensor and water level sensor placed into root zone of the plant. In traditional approach to measure these factors in an agricultural environment meant individuals manually taking measurements and checking them at various times. This paper includes the monitoring of the system using zigbee and gsm.

Key words— Automated irrigation system , zigbee , gsm ,soil-moisture sensor, Humidity sensor, water level indicator, ARM 7.

INTRODUCTION

In india is rural nation. and its gross assist depend on the Agriculture output. In agriculture use of water resources is so high. And resources of water is less so Increase the population increase the food demand. So for that urgent need to design a Automated system and to use technology for sustainable use of water.

Irrigation is the artificial application of water to the land or soil. It is used to assist in the growing of agricultural crops, maintenance of landscapes, and during periods of inadequate rainfall. In a country like India, where the economy is mainly based on agriculture and the climatic conditions are isotropic, still we are not able to make full use of agricultural resources. The main reason is the lack of rains and scarcity of land reservoir water. Another very important reason of this is due to unplanned use of water due to which a significant amount of water goes waste. At the present era, the farmers have been using irrigation technique in India through the manual control in which the farmers irrigate the land at the regular intervals. This process sometimes consumes more water or sometimes the water reaches late due to which the crops get dried. So for that use so many methods of irrigation so that crop get proper water. In irrigation system using sensor and microcontroller exclusive instrument that can automatically feed water to plant according to their need without farmer's interference. so intelligence irrigation system will manage flow of water into the field uniformly in desired ratio deserved by the plant automatically.

Wireless technology using various sensors for precision agriculture has become a popular research with the greenhouse

effect . now a days use embedded system into monitoring and controlling system for agriculture parameter.

Monitoring of temperature and humidity is important for obtaining high quality environment. Remote monitoring is efficient method in order to avoid the interference of environment. Today's use Ethernet network, RF module and zigbee wireless network used to transmit data in remote monitoring system these paper gives GSM-ZIGBEE based remote control and monitoring system with automated irrigation system is proposed. The design represented has advantage of zigbee and gsm technology.

BLOCK DAIGRAM AND COMPONENT DISCRPTION

LPC2138microcotroller

Microcontroller is a heart of system. in my project I used LPC2138 microcontroller. The LPC2138 microcontroller both 16/32bits. It has 64 pins. it is provide real-time emulation and embedded support. so that combine microcontroller and embedded gives high speed flash memory of 512kb. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate.

Lcd display

Lcd display is use for display image and text which we get from sensors or other component.in my project I want to display the parameter which comes from different sensors.



Lcd display

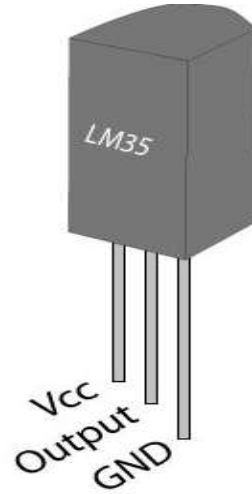
Soil-moisture sensor

Soil moisture sensors measure the water content in soil. Most of soil moisture sensor are proposed to measure soil volumetric water content base on the dielectric constant of soil. through the electric constant can find the transmit electricity. electricity constant depend on the water content of soil so if dielectric constant increases as water content of the soil increases. Thus, measurement of the dielectric constant gives a predictable estimation of water content. Soil moisture sensors measure the water content in soil. A soil moisture probe is made up of multiple soil moisture sensors.



Soil-Moisture sensor

Temperature sensor is used to measure the temperature in any field. most commonly used temperature sensor is LM35. In my project I have to use temperature sensor to measure the temperature of agriculture field. LM35 is series precision integrated-circuit temperature sensor with an output voltage linearly proportional to the centigrade temperature. this operate an 4to30V.



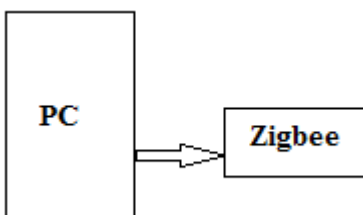
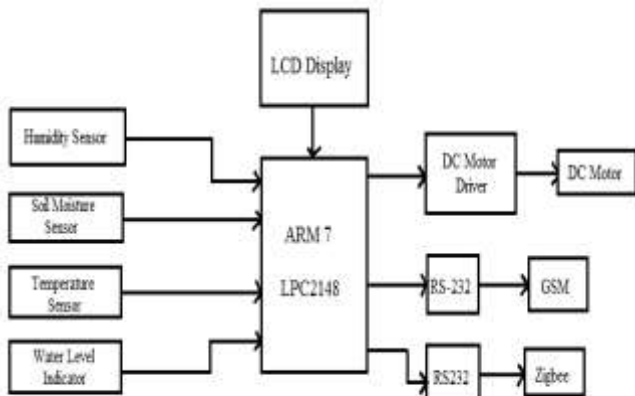
Temperature sensor

Humidity sensor

Humidity is amount of vapor in air. higher humidity reduce the effectiveness of sweating in cooling the body by reducing the rate of evaporation of moisture from skin. one humidity sensor HS1101LF



Humidity Sensor



Block diagram of automatic irrigation system

DC motor and L293D

DC motor is used to exchange electrical energy into mechanical energy. L293D is a driver used to drive the motor. DC motor has some specifications like operating voltage 12V DC, current rating 500mA-1A, speed 100/200/300/1000rpm. L293D operates on 5-12V and its rating current is 600mA.

Zigbee

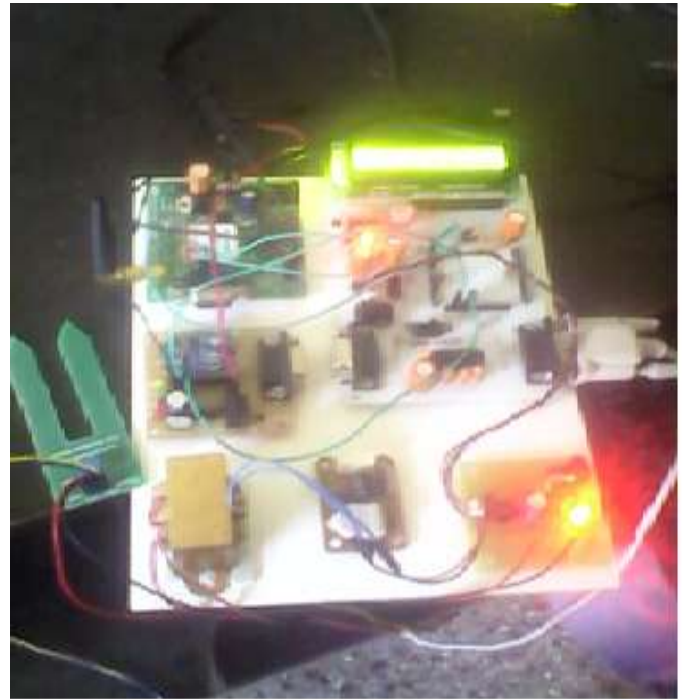
Zigbee standard is IEEE 802.15.4. This standard provides both physical and medium access control layers for a low-rate wireless sensor network. The physical layer has three frequency bands with different data rates: 2,450MHz, 915MHz, and 868MHz. Zigbee supports both physical and application layers. Zigbee is used in low data rate applications that require high battery power and a secure system. Zigbee's range is up to 300 meters, and its data transmission and reception rate is around 225 kbps. Applications of Zigbee include wireless light switches, traffic management systems, and other applications in agriculture and food demand.

Temperature sensor



Zigbee series 2

Gsm(global system for mobile communication)
 Gsm is a transmission media which is used to transmit data control station to server.GSM provide some basic services like Voice services, data services, short message services. it is provide some additional services like emergency number, electronic mail .



The system is low cost & low power consuming so that anybody can afford it. The data monitored is collected at the server. It can be used in precision farming. so easily irrigate the farm without need of farmer monitoring. The system is represented the different sensor which measure the humidity temperature and soil moisture level and this data give to the microcontroller which control such all parameter which is display on the LCD so according to the parameter variation motor will be on and off. In these system use zigbee and gsm for sending data to control station or pc. so this system is very efficient if we want to irrigate large area.



GSM module

SYSTEM DESIGN AND IMPLEMENTATION

irrigation system includes LPC2148 microcontroller, Temperature, humidity and soil moisture sensors, LCD, Zigbee, GSM. Irrigation system is used wireless sensor network. A WSN is a system which consist of radio frequency (RF) transceivers, sensors, microcontrollers and power sources. Recently use the wireless sensor network technology which is low cost, low power and multifunctional sensor nodes. Sensor nodes is sense the environment together with data processing. In WSN use a variety of sensors, such as temperature, humidity, allow monitoring of different environment. They are capable to network with another sensor network and exchange data with external users. Currently two there standard technologies are available for WSN: ZigBee and Bluetooth. Both operate in 2.4GHZ Band.

RESULT



moisture Display on LCD



Humidity percentage Display on Lcd



Water level percentage Display on Lcd

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ADVANTAGES

Automatic irrigation provide effectiveness because according to requirement of water easily supply the water. all plants get sufficient water and fertilizer also can use with water. reduce labour cost .system can be operate in night so the evaporation is thus minimised. irrigation process start and stop when exactly require so thus optimize the energy requirement.

CONCLUSION

These system was found to be feasible and cost effective for optimizing water resource for agriculture production. These system can adjusted to variety of crop and improve the maintenance .this system is feasible for all type of crop. we can used these system for large scale up green house and open field.

FUTURE ENHANCEMENT

Automated irrigation system control through the internet. so the internet link allow supervision through the mobile communication like smart phone. And we can use video capturing with ARM controller by using MMS facility about the crop position and the same time sending video to the farmer.

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