IoT Technology for Remote Controlled Watering System

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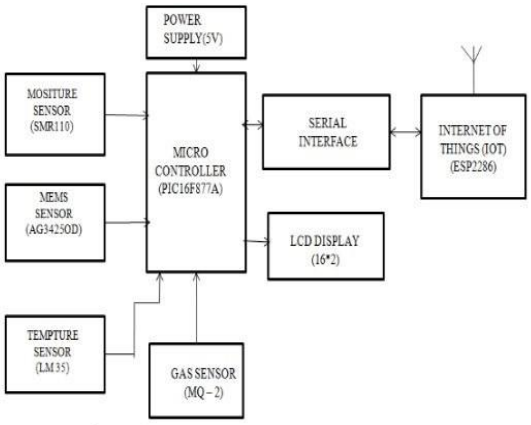
***Abstract*— In this paper both monitoring and control process of water is possible. This experiment is a particular case that could determine the soil moisture, plant growth and amount of co2 present around the plant and allowing the studies of the best controller algorithm to save water. The water consumption log can be monitor in real life and served to any user as a distributed remote laboratory with a support of LAN connection adaptive algorithm.**

Keywords—Microcontroller,LCDdisplay,Android wireless LAN, tranceivers,TCP client.

1. INTRODUCTION

An embedded system is a special purpose computer system built in to an environment connected to systems through sensors, and other interfaces. Embedded system must meet timing and other constraints imposed on it by environment. Embedded systems control many devices in common use today. In recent years, as the size and cost of mobile robots have decreased significantly, they are finding increasing uses in home environments. Various home robots have been proposed to do housework such as cooking, cleaning, house plant watering, pet feeding and taking care of children. Although most of the current home security systems can work normally, it is inconvenient to deploy and maintain a lot of sensors and accessories everywhere in the rooms with the rapid development of microelectronics and wireless communication technologies, mobile robots, are being widely used in industrial automation, home automation, hospitals, entertainment, exploration, military, etc. In this project, a lot of water is saved from being wasted. The system proposes remote monitoring and control system based on GSM. GSM network is a medium for transmitting the remote signals and communication takes place between monitoring centre and remote monitoring station. The sensor nodes uses radio signal for communication and they are self organized after deployed a base station acts like an interface between users and the network. Due to over population many water related problems like water pollution, wastage of water, water scarcity etc is arising day by day. Monitoring and controlling water level in the reservoir is an important task in homes and offices in order to reduce wastage of water. To avoid one such problem of reducing water level and saving the plant we have developed an IoT technology for remote controlled watering system. The information about the plant's moisture, growth condition, co2 level is transferred to the mobile through wireless technology. The command from the receiver is resend to the sender side.

2. BLOCK DIAGRAM AND DESCRIPTION



In this section, we have discussed the design of our proposal "IoT Technology For Remote Controlled Watering System". It consist of the major units; Sensor, microcontroller, display unit, IoT module. Microcontroller is the heart of any circuit design. Here we have used PIC16F877 microcontroller or simply PIC which is a member of atmga family and an advanced version of at89c52. It has a set of serial transmission and receiver pins, I/O ports and timers, which are the basic requirements system proposed . It also has inbuilt analog to digital converters and requires easier programming than other microcontrollers. Depending upon the water level in the soil the sensor sense a signal to the microcontroller which produces an encoding signal to be sent over GSM transceiver serially. At the receivers end the microcontroller receives a signal from the GSM transceiver module and depending upon the signal received it decides whether to turn motor OFF or ON depending upon the level of water in the soil. Micro electro mechanical systems are miniature devices comprising of integrated mechanical and electrical component design to work in concert to sense and report on the physical properties of their immediate or local environment, or , when signal to do so, to perform some kind of control physical interaction or actuation with their immediate local environment some well-known examples of

EMS- enabled functionality in everyday life are airbag deployment in automobiles; motion and orientation deduction in smart phones; and blood pressure measurement in catheters. MEMS sensor monitors the plant in X, Y, Z axis and also determines the growth of the plant in order to detect the plants dislocation, defects that occurred in plant due to disasters.

The Grove sensor module is useful for gas leakage deduction and it is suitable for deducting H2, LPG, CH4, CO, ALCOHOL, and SMOKE. Due to its high sensitivity and fast response time, and measurements can be taken as soon as possible. The sensitivity of the sensor can be adjusted by using potentiometer.

Temperature sensor measures the hotness or coolness of an object. The temperature rises whenever the voltage increases .The sensor records any voltage drop between the transistor base and emitter.

The internet of things (IoT) is the network of everyday objects – physical things embedded with electronics , software , sensors, and connectivity enabling data exchange. Basically a little networked computer is attached to a thing, allowing information exchange to and from that thing. Be it light bulbs, toasters, refrigerators, flower pots, watches, fans, planes, trains, automobiles, or anything else around you, a little networked computer can be combined with it to accept input or to gather and generate informational output. This means computer will be terminating everything around us- ubiquitous embedded computing devices, uniquely identifiable, interconnected across the internet. Because of low- cost, networkable microcontroller modules, the internet of things is really starting to take off.

3. PROCEDURE

The sensors are used to sense the moisture, temperature(fig 2), plant's position and the carbon level of the plant around the soil. The moisture sensor is dipped in the soil ,the resistance of the sensor will change as per the moisture. When the soil is dry the information is send to the receiver through GSM to the TCP client. The mems sensor used to determine the plant's position in x-axis up to 360 degree(fig. 3). The temperature sensor is used to determine the temperature of the environment. The gas sensor is used to determine whether the carbon level around the plant is normal or abnormal(fig 1). When the moisture sensor senses the soil, the information is send to the microcontroller(fig 4). And then it is passed to the receiver through internet of things. IoT is the collection of physical devices or vehicles through network. IoT consist of LAN, public internet. when the message is received to the TCP client of receiver, he can ON or OFF the motor by sending the command. The gas sensor senses the gas around the plant and it will send the information only when the carbon level is abnormal. The gas sensor works based on the scientific technology. The air sucker is used to suck the air in the water around the plant in order to separate the carbon from the water. Microcontroller is programmed by using proteus software. LCD display is used to show the information of the field. The TCP client application has installed in the user mobile for the purpose of shown the details to the receiver and user can send the commands.

4. RESULT

In this implemented system, monitoring and control of the water level in the soil is possible, switch on the motor when the soil is dry and switch off the same motor when the soil is wet without any need for human intervention. Because of the incidence water wastage is eliminated and cut-off of water supply is equally also eliminated. The microcontroller has passed various tests with various components being interfaced to it. As described in the previous sections of the paper the controller is the heart of this project work as all the control signals are passed and processed by the microcontroller. The LCD is interfaced to the microcontroller in order to display the status of the system as it operates. The LCD data port is connected to the I/O port of the microcontroller and through this port the microcontroller is able to send information or instruction codes to the LCD. The microcontroller processes the data received and used it to control the motor based on the written flow or control algorithm stored in its ROM. The TCP client application is installed in android mobiles. Information is received from the field through internet of things . As per the instruction received from the field the user send the command to the microcontroller .As per the command received the water pumped to the field to switched ON or OFF.

5. CONCLUTION

In this paper we have explained the design and implementation of a simple, reliable and cost effective automatic water level control circuit. This circuit can be mainly implemented in offices and buildings and can cover an area of 50-100m. For covering larger distances LAN based water level controller can be used but it can be expansive. RF based water level controllers are present in the market which cannot send serial data and are used for short distance purposes. It is observed that the offices and households are the main areas of water wastage. So, constant monitoring and control of water level in the overhead tank is required. It has no problem of wire breakage after the installation is complete. It can also be employed for water leakage,detection is find using the water level.

Fig 1GAS sensor output

Fig 2 Temperature sensor output

Fig 3 Moisture sensor output

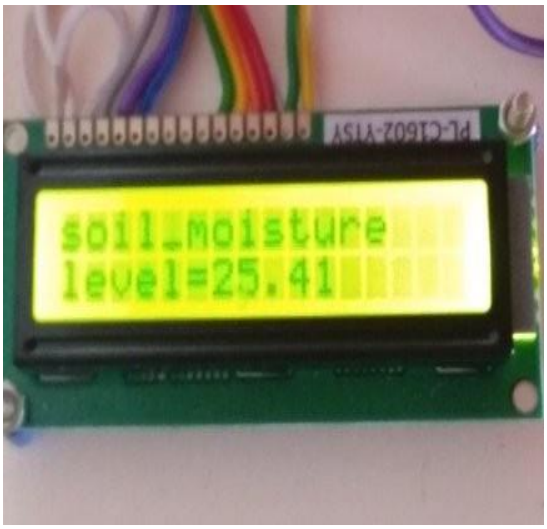


Fig 4 MEMS sensor output

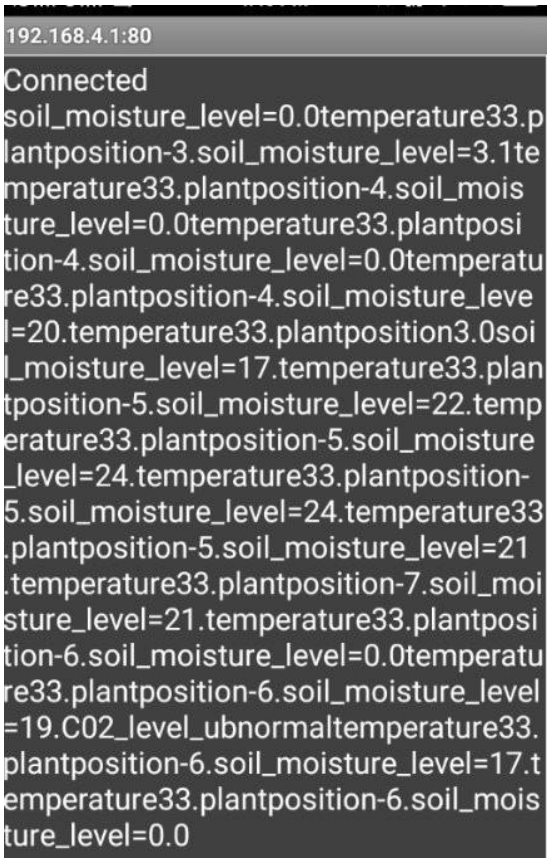


Fig 5 Tcp client output

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