



GSM BASED AUTOMATIC IRRIGATION CONTROL SYSTEM FOR EFFICIENT USE OF RESOURCES AND CROP PLANNING USING MOBILE

Ms B.ANITHA, Assistant professor

anithajune2@gmail.com

Department of Electronics and Communication Engineering

Bharathiyar Institute Of Engineering For Women, Deviyakurichi.

A.SANDHIYA (sandygreen183@gmail.com)

P.VIDHYA (vidhyaece13@gmail.com)

V.VANAJA (vpvanaja30@gmail.com)

K.VINODHINI (kjvinodhiniece@gmail.com)

ABSTRACT: In famous world, wireless technology should be used by 85% people. Nowadays, agriculture has not well in growth; many people are not properly protecting the agronomy. Because they have to spend more time to visit and maintain the growth of crops. For this purpose they are using vehicles to visit the farm house. It is the main reason for the climate changing and environment pollution. Due to climate change, there is no proper raining in the growing period. In this paper GSM-SMS based on wireless technology is used to detect soil temperature, moisture and water level indication. From this technology they provide water supply depending upon the growth of crop and mainly developed the wireless technology in agriculture.

Keywords—GSM module, automatic irrigation, soil moisture sensor;

The agriculture field presents problem in different parts of area may have different evaporation rate due to presence of rocks at different height underground part of field in close measurements. Moisture measurement at a location in the field does not make much sense. It required distributed number sense node scattered pump water to specific location covered by sensor unit multiple sensor need for an in expensive moisture sensor. It create a lot of problems to ploughing, Harvesting etc.. Automated irrigation is low cost moisture sensor is proposed in the paper. A system provided the hardware and software design.

I. INTRODUCTION

In past few years rapid growth in micro irrigation. The user communicate through SMS. The unit communicates with the system through GSM with the help of SIM card. GSM sends through continuously receives some node to another node. The climate changes and need of precision agriculture have resulted in poor yield as compared to population growth. Irrigation is mostly done using tube systems in which water is pumped into fields after regular interval of time without any feedback of water level in field. When the motor is monitoring soil moisture and water level. The soil moisture reached to sufficient level in the motor automatically turned on and off message to subscriber .the water level indicates three levels low, medium, high and also empty the tank.

At introduced GSM SMS remote measurements and control green house data based system with base station. Base station is developed by microcontroller, GSM module, sensor and actuator. Mainly focuses on field of remote monitoring on control potential advantages. This paper proposed on innovative GSM Bluetooth based on embedded system for irrigation. Irrigation depending on temperature humidity reading from sensor and type crop and automatically irrigated the field the information exchange between designing system via SMS on GSM network. The Bluetooth interface with microcontroller .a traditional irrigation method regulates supplied water according to needs of the field and crops. The capacity sensor has costland need to calibrate varying temperature and soil type. Due to the an alternative low cost sensor must be produced use of smart irrigation system in third world countries.

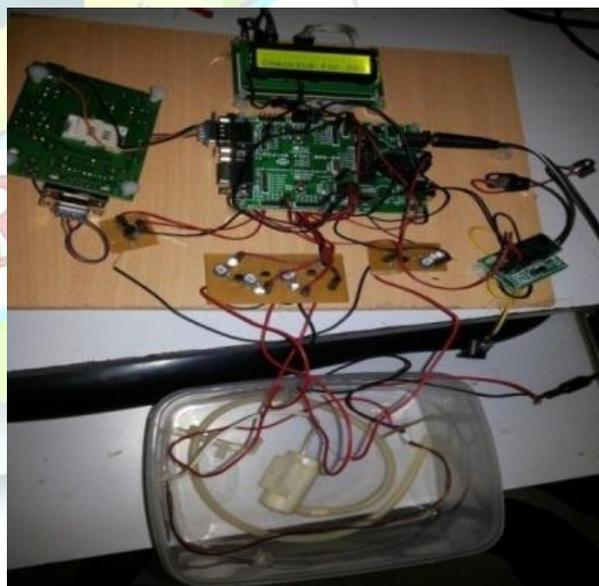


Fig.1: GSM based automatic irrigation control system by using a mobile.

It will be possible for user to use way of SMS to monitor. The conditions of their farmland and schedule the water needs of crops. It automatically control watering and set control operational condition. This will help minimize overwatering and crop production cost.

An automated irrigation unit in conjunction with a low-cost, the moisture sensor is proposed in this paper. A system level description is provided and detailing the hardware and software design. The subsequent section introduces the GSM technology. The two sections are provided detailing hardware and software used by some description of the experimentation.

II. MOISTURE SENSORS

The sensor responds to changes in applied to the moisture, when being dried and when called into action, if there is moisture into a process. These are the types of sensors mainly used for

- Interfacing with Microcontroller to detect the liquid levels.
- Moisture detection for automatic watering of plants.
- Liquid level detected by putting multiple probes at each liquid level.



Fig.2: Moisture Sensor

Moisture sensor is a device. That is measures to the relative moisture of any environment.

III. GSM based irrigation control system

The connections between the two mobiles are done by using GSM. The GSM module and microcontroller are connected using UART. When the moisture sensor senses the low moisture content of the soil automatically gives a signal to the microcontroller. The microcontroller then gives a signal to the mobile. It is called a mobile activates the buzzer. when calling a mobile calls, that buzzer is heard representing the valve desires to be open by vital the button in the called function. The signal is given reverse to the microcontroller. The microcontroller gives signal to the valves which causes it to catch open. The water is given to the root of the plant drop by drop. when the moisture content becomes abundance. The sensor senses this and gives backside the signal to the microcontroller and the buzzer becomes off. Then by vital the button in the calling function again the valve is made off. The power supply

needed by the controlling system is +5V. An UART is answerable for performing the main task in serial communications with computers. The tool changes incoming equivalent in sequence to serialized data. which can be sent on a communication line. A second UART can be used to get the information. The UART performs all the tasks, timing and parity checking needed for the communication. The only extra devices attached are line driver chips proficient of transforming the TTL level signals to line voltages and vice versa. The Microcontroller ARM7 formation is a general purpose 32-bit microprocessor, which offers high presentation and very low power burning up. The ARM architecture is based on compressed Instruction Set of Computer (RISC) principles, and the instruction set and interrelated decode method are much simpler than those of micro programmed intricate Instruction Set Computers. It Can be used to manage water flow.

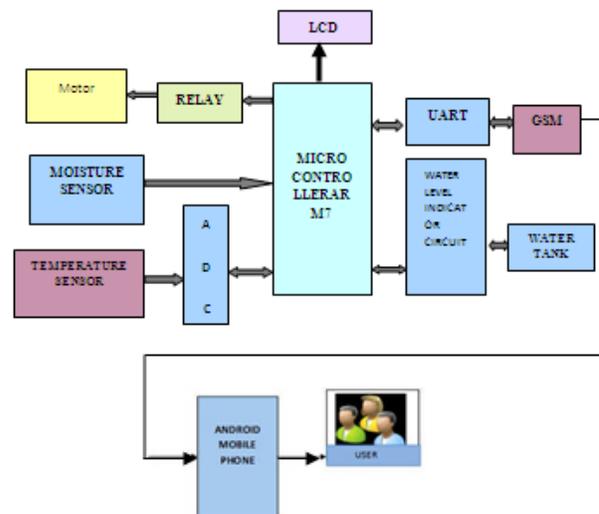


Fig.3: Block Diagram of the Irrigation Control System

IV. Structure Of GSM Module

At present the GSM module is used for Remote Control performance such as Gate Control and Temperature Control. GSM/GPRS component consists of a GSM/GPRS modem assembled equally with power supply circuit and communication interfaces for computer. The MODEM is the spirit of such modules. They generate, transmit or decode data from a cellular network, for establishing e-mail linking the cellular network and the computer. These are pretend for specific cellular network (GSM/UMTS/CDMA) or specific cellular data standard technology (GPS/SIM). They use serial e-mail to interface with the user and need Hayes well-suited AT

commands for e-mail with the computer (any microprocessor or microcontroller system).

An RS-232 port was once a standard mark of a personal computer for associates to modems, printers, mice, data storage, un-interruptible power supplies and other marginal devices. The limited transmission speed, relatively large voltage swing, and large standard connectors goaded increase of the universal serial bus which has displaced RS-232 from most of its marginal boundary roles.

Many modern personal computers have no RS-232 ports and must use an external converter to connect to older peripherals. Some RS-232 devices are still found especially in industrial machines or scientific instrument.

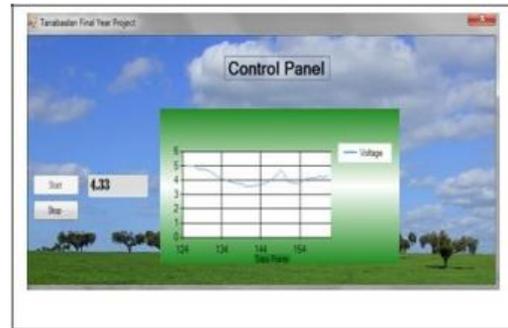


Fig 5: software implement

V. HARDWARE

Figure 1 shows a schematic of experimental setup containing hardware as well as software module. In this

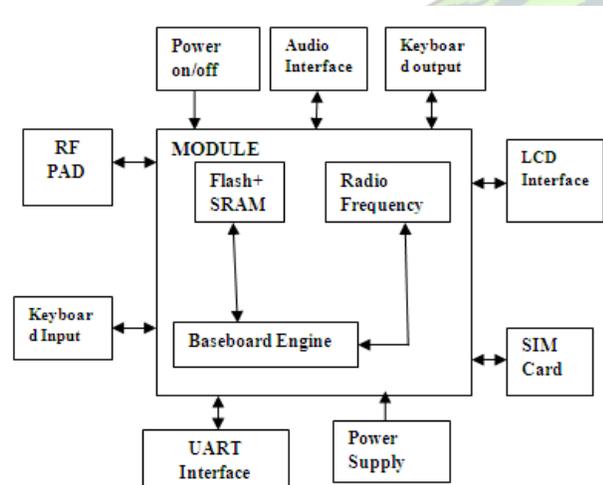


Fig.4: GSM module structure

Android Software development kit:

The growth is the process by new applications are created for the Android operating system. Applications are usually industrialized in the Java programming language using the Android Software Expansion Kit. The Android software growth kit (SDK) includes a complete set of development tools. These include a debugger, libraries, a handset emulator based on QEMU, documentation, sample code, and tutorials. The SDK also supports older versions of the Android platform in case designers wish to target their applications at older devices. Expansion tools are downloadable mechanisms, so after one has downloaded the latest version and platform, older platforms and tools can also be downloaded for compatibility testing. Android requests are packaged in.apk format and stored under /data/app folder on the Android OS (the folder is nearby only to the root user for safety reasons). APK package contains.dex files (compiled byte code files called Dalvik executable

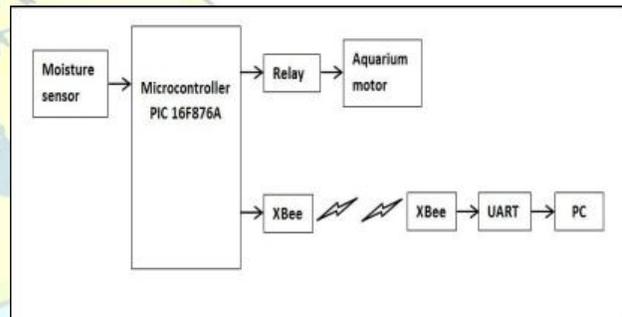


Fig 6: Hardware configuration

moisture sensor, microcontroller (PIC 16F876A) and the GSM module are connected to form a sensory node. This node then sends data to the hub that is connected to the PC in order to deposit data into a database.

The basic source is to amount the potential difference between the two galvanized metallic electrodes of the impedance sensor. These electrodes are located at a distance of 30 mm from each other. Together electrodes are placed on an acrylic sheet for on condition that motorized constancy and maintaining constant distance between them. Almost equal resistance to that of soil is to be located for voltage screen, which will be determined using a sensitive voltmeter or by test and mistake. This resistance is very important because it controls the compaction of sensors. If the resistance is too large, sensor can become too searching to trivial changes in moisture and if it's too small, the sensor will not be subtle enough as per our needs. Therefore we have applied both methods to control its value and the value of the resistance most suitable is found to be 10 kK.

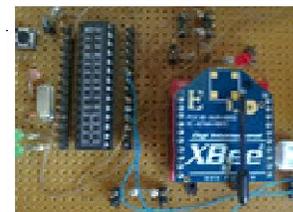


Fig 7: The GSM with the microcontroller

The power across rods is then fed into the ADC of the microcontroller for further dispensation. A switching device, in form of a transmit, panels the actuator, which in turn controls water flow in the field in response to the data received from the GSM node. The hub GSM is placed in the secondary board as shown in Figure 2. It receives data from the GSM in the main board and send data to the PC using successive communications. Christo Ananth et al. [6] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry. It is an interfacing of the advanced technologies like Embedded Systems and the Automobile world. This “Intelligent Sensor Network for Vehicle Maintenance System” is best suitable for vehicle security as well as for vehicle’s maintenance. Further it also supports advanced feature of GSM module interfacing. Through this concept in case of any emergency or accident the system will automatically sense and records the different parameters like LPG gas level, Engine Temperature, present speed and etc. so that at the time of investigation this parameters may play important role to find out the possible reasons of the accident. Further, in case of accident & in case of stealing of vehicle GSM module will send SMS to the Police, insurance company as well as to the family members. In the prototype, an aquarium pump is to supply water to the soil. The aquarium pump’s motor is controlled via a relay on

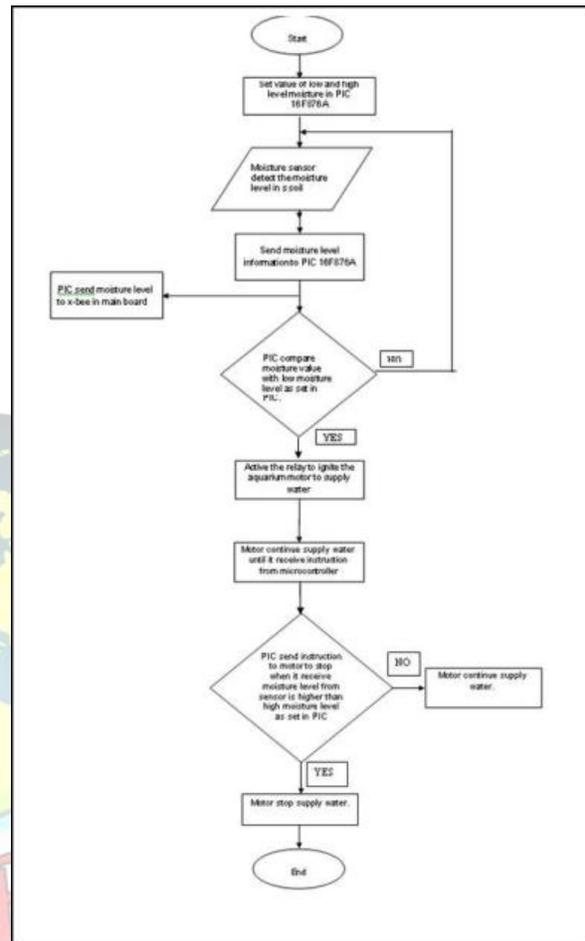


Fig 8: The flowchart of the embedded software of the microcontroller

conditions explained in the algorithm in Figure 3. The relay is

$$Y = P_1 * x^4 + P_2 * x^3 + P_3 * x^2 + P_4 * x + P_5 \quad (2)$$

Where $P_1 = 4.1 * e^{-8}$
 $P_2 = -6.01 * e^5$
 $P_3 = 0.0268$
 $P_4 = -1.7$
 $P_5 = 30.6$

Y=volts in terms of ADC values (electrode depth of 50 mm)
 x= water level in ml

Figure 7 Experimental measurements and a cubic fit to water level (ml) verses moisture (ADC output) with electrode depth of 25 mm

$$Y = P_1 * x^3 + P_2 * x^2 + P_3 * x + P_4 \quad (3)$$

Where $P_1 = 5.8 * e^{-6}$
 $P_2 = -0.0085$
 $P_3 = 4.62$



$$P_4=18.3$$

Y=volts in terms of ADC bit values (electrode depth of 25 mm)

x= water level in ml

VI. CONCLUSION

The system has an incorporated Bluetooth for remote monitoring which reduces the problem of range with GSM network and saves SMS cost for the farmer. The smoke sensors used to send emergency information to user incase of fire in field or burning of motor. The design is low power, low cost, small size, robust and highly versatile. Thus, this system avoids over irrigation, under irrigation, top soil erosion and reduce the wastage of water.

VII. FUTURE WORK

Many features can further be added to this system which includes web-based communication, mobile alerts and weather adaptive systems. This type of system is a good solution for condition monitoring of agricultural setups as it is low in cost. This idea should be implemented to large scale farms in the form of sensor grids in which each sensor will be treated as a GSM . Each node is then connected to GSM master receiver, which then feeds data into hub for further processing. They provide water supply to specific part of the farm house using GSM through sms.

Fig 9:Proposed schematic of moisture sensor network

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