Agriculture Field Motor Control Using Global System for Mobile

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ABSTRACT: Irrigation is the process of artificially supplying water to land where crops are Cultivated. Traditionally Hand pumps; canal water and rainfall were a major source of water supply for irrigation. This method has led to severe drawbacks like under irrigation, over irrigation which in turn causes leaching and loss of nutrient content of soil. Changing environmental conditions and shortage of water have led to the need for a system which efficiently manages irrigation of fields. Automated irrigation system is a machine based system, which automates the irrigation of land by combining various software and hardware approaches together for field irrigation [1-2]. The paper aims at automatic irrigation system for controlling a motor. Soil moisture sensor is used to measure the amount of moisture content present in the soil, Humidity Sensor is used to monitor whether the level of humidity in environment is high or low, Temperature Sensor is used to indicate the temperature in Celsius and the water level is continuously monitored and with respect to the sensor the motor is turned ON to pump the water. If we send a message to the system, it will send a reply with the status of all the sensors by using GSM technology. Sensor output data can be fed into the micro controller; it acts according to the control algorithm.

I. INTRODUCTION

Growing plants is both an art and a science. About 95% of plants, either food crops or cash crops are grown in open field. Since time immemorial, man has learnt how to grow plants under natural environmental conditions. Generally, a farmer uses less water with the aim of obtaining higher yield and crop quality which is attained by the better management of soil moisture during afflictive plant growth stages. The proposed methodology was implemented to monitor the soil moisture and the level of water in a field. This moisture content can be measured using soil moisture sensor and the availability of water level in a field can be measured using water level sensor. The water level present in the field is measured by water level sensor and fed to the microcontroller. If we send a message to the system, it will send a reply with the status of all the sensors by using GSM technology the controller acts according to the control algorithm. The controller controls the motor to turn ON and OFF, when the moisture content goes above or below the limit. The value of the moisture content and motor functionality status, Temperature Humidity and water level also shown in LCD display GSM module act as both transmitter and receiver. It transmits data to another GSM module in the form of coded signals using AT commands. We also see the status of all by sending a message to the system. The farm is monitored by us from anywhere, it reduces the physical presence. India is basically an agricultural country, and all its resources depend on the agricultural output. Even in the modern span of industrialization, agriculture is the key area that decides the economic growth of the country. Agriculture also accounts for 8.56% of the country's total exports. Agriculture is the most important field as compared to others in India. The underground water level is slowly falling down and as well as rainfall is also reduced due to deforestation. In order to get the maximum yield in agricultural process, it is necessary to supply the optimum quantity of water, and it should be supplied periodically. This is achieved only through a systematic irrigation system. Irrigation is the science of planning and designing an efficient, low cost, economic irrigation system designed in such a way to fit natural conditions. By the construction of proper distribution system and providing of adequate water supply will increase the yield of crops. The different methods of supplying water to the fields are 1. Surface irrigation, 2. Sub-surface irrigation and 3. Sprinkler irrigation. The stored or diverted water is passed to the agricultural lands through some suitable distribution system [3]. The aim of this project is to develop a simpler and cheaper solution that will provide remote control for motors through mobile

phones using messages. There is a tremendous rise in the mobile phone users during the past few years. Remote monitoring of processes, machines, etc., is popular due to advancement in technology. Remote monitoring through Internet based monitoring is one of the common approaches. This approach requires PCs (Client/Server) along with additional devices like buffers, modems, etc. for internet connectivity and software support for TCP/IP protocols and control system interaction. The price of such system varies greatly depending on speed and bandwidth requirements. This work provide Short Messaging Service (SMS)approach offers simple interface with only destination mobile phone address and message requirement without any protocol. So, this method is suitable for remote monitoring of systems with moderate complexity.

II. HARDWARE DEVELOPMENT

It explains regarding the Hardware Implementation of the project. It tells about the design and working of the design with the help of circuit diagram and explanation of circuit diagram in detail. It explains the features, programming and serial communication of 8051 microcontroller. It also explains the different modules used in this project.
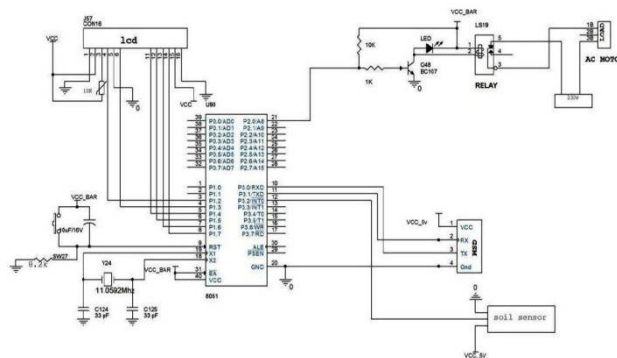

Fig 2.1 Circuit Diagram
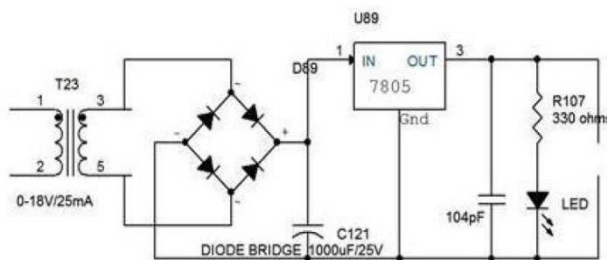
2.1 Power Supply:

Fig 2.2 Power Supply Block Diagram

Power supply is the circuit from which we get a desired dc voltage to run the other circuits. From fig. 2.2 shows the voltage we get from the main line is 230V AC but the other components of our circuit require 5V DC. Hence a step-down transformer is used to get 12V AC which is later converted to 12V DC using a rectifier. The output of rectifier still contains some ripples even though it is a DC signal due to which it is called as Pulsating DC. To remove the ripples and obtain smoothed DC power filter circuits are used. Here a capacitor is used. The 12V DC is rated down to 5V using a positive voltage regulator chip 7805. Thus a fixed DC voltage of 5V is obtained.

2.2 Microcontroller:

The 8051 Microcontroller is one of the basic type of microcontroller, designed by Intel in 1980's. This microcontroller was based on Harvard Architecture and developed primarily for use in embedded systems technology. Normally, this microcontroller was developed using NMOS technology, which requires more power to operate. Therefore, Intel redesigned Microcontroller 8051 using CMOS technology and their updated versions came with a letter C in their name, for instance an 80C51 it is an 8 bit microcontroller. These latest Microcontrollers require less power to operate as compared to their previous versions. The 8051 Microcontroller has two buses and two memory spaces of 64K X 8 size for program and data units. It has an 8 bit processing unit and 8 bit accumulator units.

2.3 Liquid Cristal Display:

A liquid crystal display or LCD draws its definition from its name itself. It is combination of two states of matter, the solid and the liquid. LCD uses a liquid crystal to produce a visible image. Liquid crystal displays are super-thin technology display screen that are generally used in laptop computer screen, TVs, cell phones and portable video games. LCD's technologies allow displays to be much thinner when compared to cathode ray tube (CRT) technology.

Liquid crystal display is composed of several layers which include two polarized panel filters and electrodes. LCD technology is used for displaying the image in notebook or some other electronic devices like mini computers. Light is projected from a lens on a layer of liquid crystal. This combination of colored light with the grayscale image of the crystal (formed as electric current flows through the crystal) forms the colored image. This image is then displayed on the screen.

The display used is 16x2 LCD (Liquid Crystal Display); which means 16 characters per line by 2 lines. The standard is referred as HD44780U, which refers to the controller chip which receives data from an external source (Here Atmega16) and communicates directly with the LCD. Here 8bit mode of LCD is used, i.e., using 8-bit data bus. The three control lines are EN, RS, and RW. The EN line is called "Enable." This control line is used for telling the LCD that we are sending data. For sending data to the LCD, the program should make sure that the line is low and then set the other two control lines or put data on the data bus. When the other lines are ready completely, bring EN high (1) and should wait for the minimum time required by the LCD datasheet and end by bringing it low (0) again. The RS line is "Register Select" line. When RS is low (0), the data is treated as a command or special instruction (such as clear screen, position cursor, etc.). When the RS is high, the data sent is text data which is displayed on the screen. For example, to display the letter "B" on the screen you would set RS high. The RW line is "Read/Write" control line. When RW is low (0), the information on the data bus is written to the LCD. When RW is high (1), the program is effectively questioning (or reading) the LCD. Only one instruction ("Get LCD status") is read command. All the others are write commands so RW will always be low.

2.4 Global System for Mobile:

The idea of GSM was developed at Bell Laboratories in 1970. It is widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. AGSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates[4-6]. There are various cell sizes in a GSM system such as macro, micro, pico and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, pico and umbrella cells. The coverage area of each cell varies according to the implementation environment.

A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem is like a dial-up modem. The basic difference between them is the dial-up modem sends and receives data through a fixed telephone line while the wireless modem sends and receives data through waves. Like a GSM mobile phone, a GSM modem also requires a SIM card from a wireless carrier to operate. SIM 300 is a Fixed Cellular Terminal (FCT) used for data applications. It is a compact and portable terminal which satisfy various data communication over GSM. It also can be connected to a computer with a standard RS232C serial port. SIM 300 offers features like Short Message Services (SMS), Data Services (sending and receiving data files), Fax Services and data file connectivity through wire

is not available or not possible. The SIM 300 is very easy to set up. It also finds its applications in IT companies, Banks, Financial Institutions, Service Providers, Far away Project Sites, and other business establishments.

2.5 Soil Sensor:

Soil moisture sensors measure the volumetric water content in soil. Since the direct gravimetric measurement of free soil moisture requires removing, drying, and weighting of a sample, soil moisture sensors measure the volumetric water content indirectly by using some other property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as a proxy for the moisture content.
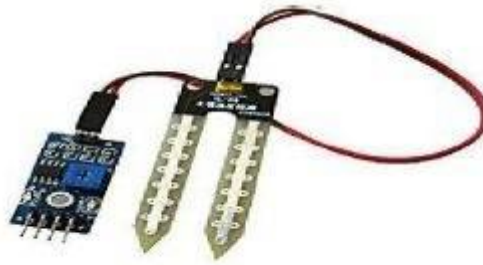

Fig 2.3 Soil Moisture Sensor

The relation between the measured property and soil moisture must be calibrated and may vary depending on environmental factors such as soil type, temperature, or electric conductivity[7,9]. Reflected microwave radiation is affected by the soil moisture and is used for remote sensing in hydrology and agriculture. Portable probe instruments can be used by farmers or gardeners. Soil moisture sensors typically refer to sensors that estimate volumetric water content. Another class of sensors measure another property of moisture in soils called water potential; these sensors are usually referred to as soil water potential sensors and include tension meters and gypsum blocks.

III.SOFTWARE IMPLEMENTATION

This chapter describes about the software implementation of the project. This discuss about the programming and the software tools used and how output is obtained by programming.

3.1 Software Tools

AVR Studio and Pro Load are two software's used to program microcontroller.

3.2 Programming Micro Controller

The compiler for high level language helps to reduce production time. For programming ATmega16L AVR Studio is used .The programming is done in embedded C language. The compilation of the C program converts it into machine language file (.hex). This is the only language the microcontroller will understand, because it has the original program code converted into a hexadecimal forma .During this process some errors and warnings occurs. If there are no errors and warnings then run the program, the system performs all the given tasks and behaves as expected the software developed. If not the whole procedure is repeated again.

3.3 AVR Studio

AVR studio is software used where machine language code is written and compiled. After compilation machine source code is converted to hex code to be burnt into the microcontroller. The program is written in C language code.

3.4 Proload

Proload is software that accepts only hex files. After the machine code is converted into hex code, that hex code has to be burnt into the microcontroller which done by the Proload. Proload is a programmer which contains a microcontroller in it other than the one which is to be programmed. The program is written in the Proload microcontroller in such a way that it accepts the hex file from the AVR Studio and burns this hex file into the microcontroller which is to be programmed. The Proload programmer kit requires power supply to operate, this power supply is given by the power supply circuit. It is noted that this programmer kit contains a power supply section in the board but in order to switch on the power supply, a source is required. This is accomplished from the power supply board with an output of 12 V.

- Microcontroller Software Compiler generates a Hex file.
- Hex file accepted and sent to MCU program Loader.
- Hex file programmed into Target Micro controller device.

IV.RESULTS

Motor is controlled in a predefined manner as theory. DTMF(Dual Tone Multi Frequency) is responding fast as also microcontroller but notification goes in a delay about several seconds because of fluency of program also because of the slowness of the auxiliary interfacing device. The result is a scalable, implementable technology that we have tested and validated numerically and in the field. By using this sensor, we can find whether the soil is wet or dry. With the help of advanced sensors we can carry out automation. It will be helpful to farmers to work from remote location and he can get idea regarding his field through automated system. It will be helpful in minimizing farmers and labour work. It will also protect the motor from power related issues and it will work in any condition. With help GSM which is vastly available, system will work in any area. So it will helpful to everyone.
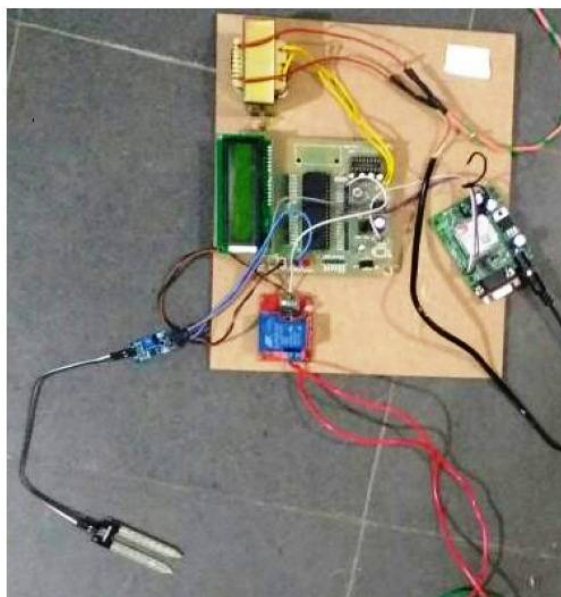

Fig.4.1 Hard ware developed module

V.CONCLUSION

Designing this project and implementing it, we gained practical experience. We tried to implement our theoretical knowledge successfully. This teaches us about the far difference between theoretical and practical knowledge. This project increases our ability to work as a group and it helps us in future life. But we face several problems because of unavailability of quality goods, technical support and inexperience. Despite that we enjoyed our work very much and successfully finished that work in perfection. In this dynamic world motor is the most convenient and useful tool in industry. Large rated motor required flexible control and protection. We hope our project can bring dynamic change in our industrial level motor controlling system. The Soil moisture content based irrigation system was developed and successfully implemented along with flow sensor. Salient features of the system are: Closed loop automatic irrigation system, temperature and water usage monitoring. User can easily preset the levels of the moisture and is regularly updated about current value of all parameters on LCD display. In future, other important soil parameters namely soil pH, soil electrical conductivity will also being corporate in the system. The extensive capabilities of this system are what make it so interesting. From the convenience of a simple cell phone, a farmer is able to control and monitor the motor in the agricultural field virtually from any distance. This makes it possible for the farmers to be rest assured that their motor activity is secure and that better water management can be made through the use of this project. The project will allow for improving the efficiency of the irrigation process. The end product has a simplistic design making it easy for farmers to interact with. This will be essential because of the narrow range of technical knowledge that most of the farmers have [10-15].

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BIOGRAPHY

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