Android Mobile And GSM Based Automatic Irrigation Control System

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Abstract: Agricultural sector is very important as far as Indian villagers. Productivity of agriculture fields depends on better matching of water supply with crop demand. The project is based on activation or deactivation of appliances wirelessly through a software stack called Android which is used for mobile devices and also humidity and temperature of plant precisely controlled. We are implementing two way communications in which motor also gives notification to user about motors condition like voltage level, temperature, soil moisture, motor is ON/OFF. Two access modes are available, open access where the GSM-AUTO will respond to any incoming call and secure access where it will only respond to programmed multiple authorized telephone numbers. GSM (Global System for Mobile Communication) is used to inform the user about the exact field condition. It is an effective way to reduce human effort and water wastage in agriculture land.

Key Words: GSM module (mobile), Android, automatic irrigation, microcontroller, Temperature sensor, soil
.   Moisture sensor regulated power supply.

1. INTRODUCTION:

India is basically an agricultural country, and all its resources depend on the agricultural output. With the rapid development of agriculture in India, many automatic technologies have been introduced into agricultural productions. The total rainfall in a particular area may be either insufficient, or ill-timed. In order to get the maximum yield, it is essential to supply the optimum quantity of water, and maintain correct timing of water. This is possible only through a systematic irrigation system-by collecting water during the periods of excess rainfall and releasing it to the crop as and when it is needed. Irrigation is the science of planning and designing an efficient, low-cost, economic irrigation system tailored to fit natural conditions. By the construction of proper distribution system, the yield of crop may be increased because of controlled water supply. At introduced GSM SMS remote measurements and control greenhouse 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 cost land need to calibrate varying temperature and soil type. Due to the alternative low cost sensor must be produced use of smart irrigation system in third world countries.

2. EXISTING SYSTEM:

In the existing system farmers have to travel to fields often at odd hours just to switch ON/OFF the motor due to erratic power supply. Existing aids like auto-starters are unreliable and incapable of communicating the operating state of the motor, to the farmer, especially when a farmer has more than one motor pump set; he has to run around to make sure that all the motor pumps are working when the power is available. At times, motor pumps are left running for longer than what is necessary because of the effort involved in switching OFF the motor. This leads to wastage of both electricity and water.

3. PROBLEM STATEMENT:

"Irrigation Control System Using GSM and Android application for efficient use of water" In recent year's research is on GSM based automatic motor control and protection system using SMS service but the service is not reliable and efficient. This project is focus on to modify the service and improve the use of proposed system using GSM and android application.

4. PROPOSED SYSTEM:

This system which includes android-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.

5. SYSTEM REQUIREMENTS:

Domain: Android System.

Hardware Requirement:

➤ Microcontroller
➤ Step down transformer 12v/500ma
➤ Voltage regulator lm7805
➤ Rectifier diodes 1n4001
➤ Electrolytic capacitors
➤ Lcd display
➤ Leds
➤ Sensing electrodes
➤ Operational amplifier
➤ Relay
➤ Water pump

Software Requirements:

➤ Windows 7 and above
➤ JDK 1.8
➤ Android Studio
➤ SQLite Database

Liquid/moisture sensor and precision centigrade temperature sensors:

Detects presence of liquid or moisture between two wire leads and gives active High output. The exposed wire is porous; therefore it allows transmission of water Vapors into the sensor. These exposed areas are engineered very thinly. Therefore the sensor responds very rapidly to changes in applied moisture, both when being dried (on process start-up) and when called into action if there is moisture ingress into a process. These are the types of sensors mainly used for, Interfacing with Microcontroller to detect liquid levels. Moisture detection for automatic watering of plants. •Liquid level detection by putting multiple probes at each liquid level

GSM:

The Global System for Mobile Communication is a standard set developed by the European Telecommunications Standards Institute (ETSI) to describe technologies (2G and 3G). . A GSM based homestead watering system framework has two noteworthy advancements behind it, essential being the "GSM" and optional one is the controller or processor. GSM (Global System for Mobile Communication) is a standard situated used to depict conventions for computerized cell systems.

Micro controller-PIC89S51

The AT89S51 is a low-power, high-performance CMOS 8-bit microcontroller with 4K bytes of In-System Programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with In-System Programmable Flash on a monolithic chip, the Atmel AT89S51 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89S51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, two 16-bit timer/counters, a five-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry. In addition, the AT89S51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power down mode saves the RAM con-tents but freezes the oscillator, disabling all other chip functions until the next external interrupt or hardware reset.

Voltage Regulator (LM7805):

A LM7805 Voltage Regulator is a voltage controller that yields +5 volts. A simple approach to recollect the voltage yield by a LM78XX arrangement of voltage controllers is the last two digits.It yields 5 volts. The "78" section is

simply the tradition that the chip creators utilization to indicate the arrangement of controllers that yield positive voltage.

LCD:

LCD is an electronic visual showcase, or feature show that uses the light balancing properties of fluid gems. Fluid gems don't discharge light directly. LCDs are accessible to show discretionary pictures (as in a broadly useful PC show) or altered pictures which can be shown or covered up, for example, preset words, digits, and 7-section shows as in a computerized clock. They utilize the same fundamental innovation, with the exception of that discretionary pictures are comprised of an extensive number of little pixels, while different showcases have bigger components. LCDs are utilized as a part of an extensive variety of utilizations including PC screens, TVs, instrument boards, airplane cockpit presentations, and signage. They are basic in shopper gadgets, for example, DVD players, gaming gadgets, timekeepers, watches, number crunchers, and phones, and have supplanted cathode beam tube (CRT) shows in many applications. They are accessible in a more extensive scope of screen sizes than CRT and plasma shows, and since they don't utilize phosphors, they don't endure picture blaze in. LCDs are, nonetheless, powerless to picture ingenuity.

LED:

Light radiating diodes, regularly called LEDs, are genuine unsung saints in the hardware world. They do many diverse occupations and are found in a wide range of gadgets. In addition to other things, they frame numbers on computerized tickers, transmit data from remote controls, light up watches and let you know when your apparatuses are turned on. Gathered together, they can shape pictures on a large TV screen or enlighten an activity light. Fundamentally, LEDs are simply minor lights that fit effectively into an electrical circuit. Be that as it may, not at all like common brilliant globules, they don't have a fiber that will wear out, and they don't get particularly hot. They are enlightened exclusively by the development of electrons in a semiconductor material, and they keep going generally the length of a standard transistor. The lifespan of a LED surpasses the short existence of a brilliant knob by a great many hours. Minor LEDs are as of now supplanting the tubes that light up LCD HDTVs to make drastically more slender TVs. In this article, we'll inspect the innovation behind these pervasive signals, enlightening some cool standards of power and light simultaneously

Sensing Electrodes:

A particle particular cathode (ISE), otherwise called a particular particle terminal (SIE), is a transducer (or sensor) that changes over the movement of a particular particle broke down in an answer into an electrical potential, which can be measured by a voltmeter or pH meter. The voltage is hypothetically reliant on the logarithm of the ionic action, as per the Nernst comparison. The detecting piece of the cathode is normally made as a particle particular layer, alongside a reference terminal. Particle specific anodes are utilized as a part of scientific science and biochemical/biophysical examination, where estimations of ionic fixation in a fluid arrangement are needed, as a rule on an ongoing premise.

Relay:

It is an electrically worked switch. Various exchanges use an electromagnet to mechanically work a switch, yet other working models are similarly used, for instance, solid state exchanges. Exchanges are used where it is vital to control a circuit by a low-power signal (with complete electrical withdrawal amidst control and controlled circuits), or where a couple of circuits must be controlled by one sign. The main transfers were utilized as a part of long separation broadcast circuits as enhancers: they rehashed the sign rolling in from one circuit and re-transmitted it on another circuit.

Moisture Sensor:

Distinguishes vicinity of fluid or dampness between two wire leads and gives dynamic High yield. The uncovered wire is permeable; consequently it permits transmission of water vapors into the sensor. These uncovered zones are built daintily. Hence the sensor reacts quickly to changes in connected dampness, both while being dried (on methodology start-up) and when called vigorously if there is dampness entrance into a procedure. These are the sorts of sensors essentially utilized for, •Interfacing with Microcontroller to identify fluid levels. •Moisture recognition for programmed watering of plants. •Liquid level discovery by putting different tests at every fluid.

UART:

Universal asynchronous receiver or transmitter is a computer hardware device for asynchronous serial communication in which the data format and transmission speeds are configurable. The electric signaling levels and methods (such as differential signaling, etc.) are handled by a driver circuit external to the UART.

5.1 SYSTEM ARCHITECTURE:

The connections between the both mobile are done By GSM. The GSM module and microcontroller are both connected using UART (universal asynchronous receiver transmitter). As the moisture sensor sense the low moisture content in the soil, it transmits a signal to microcontroller. The microcontroller then sent a signal to the called mobile (which is kept in the auto answering mode). The called mobile enable the buzzer. Therefore when calling mobile call, that buzzer is hear byindicating the valves needs to open. By pressing the button in the called function, the signal is sent back to the microcontroller. The microcontroller transmit signal to the valves which causes it should get open. The water which is given to the root of the plant, and when the moisture content become sufficient, the sensor senses this and transmit back the signal to the microcontroller and the buzzer went off. By pressing the button in the call function again, the valve is made to be off. The power supply needed by the controlling system is positive 5V. The whole unit is as shown in fig. An UART is responsible for performing the main task in serial communications with system. The device changes incoming parallel information to serial data which can be transmit on a communication line. Another UART can be used to get the information. The UART performs all the parity checking ,tasks, timing etc. needed for the purpose of communication. The additional devices attached are line driver chips capable of send the TTL level signals to line voltages call function again, the valve is made to be off. The power supply needed by the controlling system is positive 5V. The whole unit is as shown in fig.
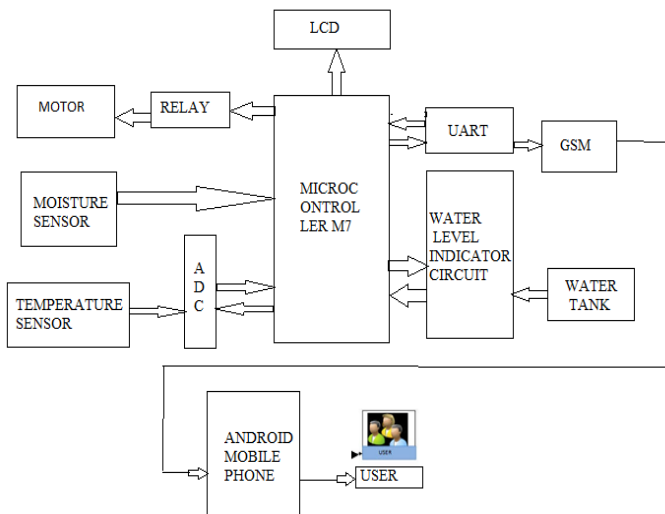

Fig.1. Flow chart

4. ADVANTAGES:

- Low power consumption
- Global range
- Easy to operate
  Save Water and Time
- Auto switch mode control
- Low cost
- GSM Technology

5. CONCLUSION:

The design is low power, small size, low cost, robust and high versatile. Thus, that system avoid excess irrigation, top soil, under irrigation, erosion and reduce the wastage of water. The system is android-based communication, mobile alerts and weather adaptive systems. This idea implemented to large scale farms in the form of sensor grids in which each sensor will be treated as a GSM.

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