

Advanced Soil Moisture Control

Nayi Lalit Kashinath¹ Shaikh Irfan Pashu² Shaikh Mohsin Bashir³

Prof. Suhail Diwan⁴ Prof. Juned Shaikh⁵

^{1,2,3}Student ^{4,5}Assistant Professor

^{1,2,3,4,5}Department of Electrical Engineering

^{1,2,3,4,5}Jiems Akkalkuwa, India

Abstract— The greenhouse based modern agriculture industries are the recent requirement in every part of agriculture in India. In this technology, the humidity and temperature of plants are precisely controlled. Due to the variable atmospheric circumstances these conditions sometimes may vary from place to place in large farmhouse, which makes very difficult to maintain the uniformity at all the places in the farmhouse manually. It is observed that for the first time an android phone-control the Irrigation system, which could give the facilities of maintaining uniform environmental conditions are proposed. The Android Software Development Kit provides the tools and Application Programmable Interface necessary to begin developing applications on the Android platform using the Java programming language. Mobile phones have almost become an integral part of human life serving multiple needs of humans. This application makes use of the GPRS [General Packet Radio Service] feature of mobile phone as a solution for irrigation control system. GSM (Global System for Mobile Communication) is used to inform the user about the exact field condition. The information is passed onto the user request in the form of SMS.

Keywords: GSM Module (Mobile), Android, SMS, Automatic Irrigation, Microcontroller, Temperature Sensor, Soil Moisture Sensor, Regulated Power Supply

I. INTRODUCTION

Irrigation is a scientific process of artificially supplying water to the land or soil that is to be cultivated. Traditionally in dry regions having no or little rainfall water had to be supplied to the fields either through canals or hand pumps, tube wells. Conventional irrigation methods had severe problems such as increase in workload labor and often it lead to problem such as over irrigation or under-irrigation, and leaching of soil.

Develop android based automatic Farming system capable of controlling many an irrigation or field using android platform with a mobile handset, where data transmission is carried wirelessly. That's why design Wireless transmission media using WI interfacing peripherals for wireless data communication between Mobile Handset and appliances is our need. Hence to create a database of user interface in order to characterize the electric signals to atomize farming system. And to developed the GUI interface to monitor and change the current status of field on any android smart phones. Another important point is not only monitor the temperature and maintain moisture level in the field for proper growth of plants but also save water, Energy and man power in the agriculture Sector. So such a system that will be efficient and effort reducing of the farmer. Hence we design the System which is operated manually as well as automatically from remote locations by using Android.



Fig. 1: GSM based automatic irrigation control system

The GSM based irrigation system uses the flexibility to regulate and control the operations of their irrigation systems with little intervention to reduce runoff from over watering for improvement in crop yield. This enables users to take advantage of the globally deployed GSM networks with its low SMS service cost to use mobile phones and simple SMS commands to manage their irrigation system. It will be possible for users to use SMS to monitor directly the conditions of their farmland, schedule the water needs of control watering, and set control operational conditions in accordance with the water needs of crops. This will help minimize overwatering and crop production cost. Drip irrigation is artificial method of supplying water to the roots of the plant. It is also called micro irrigation. In past few years there is a rapid growth in this system.

II. ANDROID ARCHITECTURE

Android is a mobile operating system that is based on a modified version of Linux. It was developed by a start up of the same name, Android, Inc. In 2005, as part of its strategy to enter the mobile space, Google purchased Android and took over its development work (as well as its development team). The following Fig.2 shows the major components of the Android operating system. The main advantage of adopting Android is that unified approach to application development and their applications should be able to run different devices, as long as the devices are powered using Android Applications: These are applications written in Java. Some of basic applications include calendar, email client, SMS program, maps, making phone calls, accessing the Web browser, accessing your contacts list and others.

A. Application Framework:

This is the skeleton or framework which all android developers have to follow. The developers all framework APIs an manage phone’s basic functions like resource allocation, switching processes or programs, telephone applications, and keeping track of the phone’s physical location originally it offers as on numerous vices : can access between the location.

B. GSM:

The Global System for Mobile Communication is a standard set developed by the Telecommunications Standards Institute (ETSI) to describe technologies (2G and 3G).

C. Libraries:

This layer consists of Android libraries written in C, C++, and used by various systems. the device how to handle different kinds of data and are exposed to Android developers via Application framework. Some of thes include media, graphics, 3D, SQL, web browser library etc. The Android runtime layer which includes set of core java libraries and DVM (Dalvik Virtual Machine) is also located in same layer.

D. Runtime Android:

This layer includes set of base lines required for java libraries. Every gets its own instance of DVM. Dalvik has been written so that a device can run multiple VMs efficiently and it executes files in executable (.Dex) optimized for minimum memory.

E. Kernel Linux:

This layer includes Android’s memory management programs, security settings, software and several drivers for hardware, file system access, networking and inter-process The kernel also acts as an abstraction layer hardware and the rest of the software stack. These libraries tell Android these libraries that are Android application power management communication.

III. GSM BASED IRRIGATION CONTROL SYSTEM

The connections between the two mobiles are done using GSM. The GSM module and microcontroller are connected using UART (universal asynchronous receiver / transmitter). When the moisture senses the low moisture content of the soil, it gives a signal to the microcontroller. The microcontroller then gives a signal to the called mobile (which is kept in the auto answering mode). The called mobile activates the buzzer.

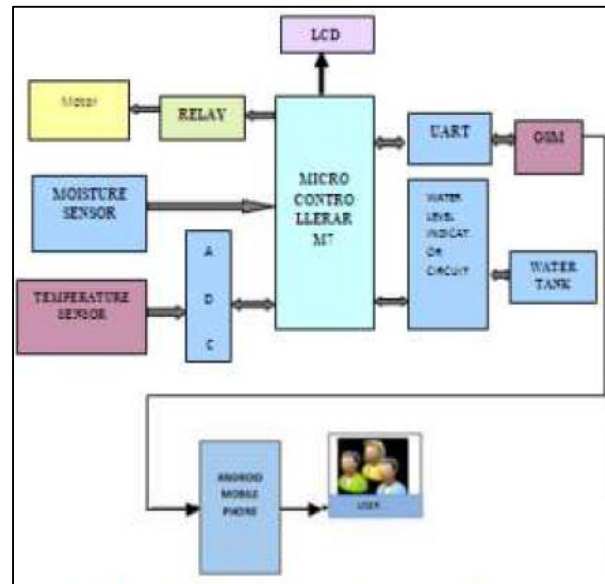


Fig. 2: Block Diagram of Irrigation Control System

Therefore when calling mobile calls, that buzzer is heard indicating the valve needs to be open. Pressing the button in the called function, the signal is given back to the microcontroller. The microcontroller gives signal to the valves which causes it to get open. The water is given to the root of the plant drop by drop, and when the moisture content becomes sufficient, the sensor senses this and gives back the signal to the Applications microcontroller and the buzzer becomes off. Then by press button in the calling function again, the off. The power supply needed by the controlling system is +5V. The entire unit is as shown in Fig.3.

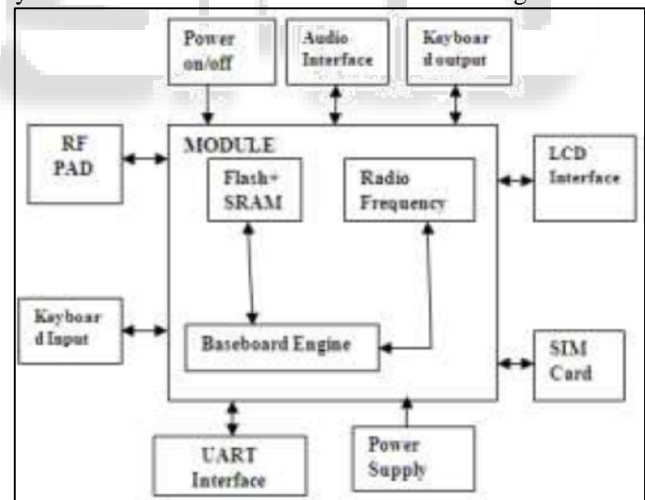


Fig. 3: GSM Module Structure

An UART is responsible for performing the main task in serial communications with compute changes incoming parallel information to serial data which can be sent on a communication line. UART can be used to receive the information. The UART performs all the tasks, timing, parity checking, etc. needed for the communication. The only devices attached are line driver chips capable of transforming the TTL level signals to line and vice versa. The Microcontroller ARM7 structure is a general purpose 32-bit microprocessor, which offers high performance and very low power consumption. The ARM architecture is based on Reduced Instruction Set Computer and the instruction set and

related decode mechanism are much simpler than those of Complex Instruction Set Computers Can control water flow.

IV. STRUCTURE OF GSM MODULE

At present the GSM module is used for Remote Control activities such as Gate Control, Control etc. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS 232, USB) for computer. The such modules. They generate, transmit or decode data from a cellular network communication between the cellular network and the computer.

An RS-232 port was once a standard feature of a personal computer for connections to printers, mice, data storage, un supplies, and other peripheral devices. However, the limited transmission speed, relatively large voltage swing, and large standard connectors motivated development of the universal displaced RS-232 from most of its peripheral interface roles. Many modern personal 232 ports and must use an external converter to connect to older peripherals. Some are still found especially in industrial machines or scientific instruments.

A. Liquid/Moisture Sensor and Precision Centigrade Temperature Sensors

Detects presence of liquid or moisture between two wire leads and gives active High output. wire is porous; therefore it allows transmission of water vapors into the sensor. These exposed areas engineered very thinly. Therefore the sensor responds very rapidly to changes in applied moisture, both when being dried (on process start-up) and which 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.

Another important feature of this circuit is induction of Precision Centigrade Temperature sensors. The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical proportional to the temperature (in °C). With an LM35, temperature can be measured more accurately than using a thermostat. The sensor circuitry is sealed and not subject to oxidation.

B. Water Level Indicator

The model consists of a series of tanks arranged on below the other. The volume of the tanks is descending order. Water flows from the top tank through outlets at the bottom. Three tanks or tropic levels chosen for the model is the optimum number required to analyze the effect of top down and bottom up controls.

V. SOFTWARE IMPLEMENTATIONS ANDROID SOFTWARE DEVELOPMENT KIT

Android software development is the process by which new applications are created for the operating system. Applications are usually developed in the Java programming language using the Software Development Kit. The Android software development kit (SDK) includes a comprehensive

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 developers wish to target their applications at older devices. Development tools are downloadable components, so after one has version and platform, older platforms and tools can also be downloaded for compatibility applications are packaged in .apk format and stored under /data/app folder on the Android is accessible only to the root user for security reasons). APK package contains .dex byte code files called Dalvik executable), resource files, etc.

VI. CONCLUSION

Irrigation has been the backbone of human civilization since man has started agriculture. As the generation evolved, man developed many methods of irrigation to supply water to the land. In the present scenario on conservation of water is of high importance. Present work is attempts to save the natural resources available for human kind. By continuously monitoring the status of the soil, we can control the flow of water and thereby reduce the wastage. By knowing the status of moisture and temperature through GSM with the use of moisture and temperature sensors, water flow can be controlled by just sending a message from our mobile. Conservation of water and labor: Since the systems are automatic, they do not require monitoring by labor. System and operational flexibility: As desired, any valve can be controlled along with the pump and increases the efficiency of water use. If water is stored in tanks at irrigation lands, one can get the status of the status level, temperature sensor and moisture content in soil through SMS generator by microcontroller the irrigation land. 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 in case of 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. The main advantage is that the system's action can be changed according to the situation (crops, weather conditions, soil etc.). By implementing this system, agricultural, horticultural lands, parks, gardens, golf courses can be irrigated. Thus, this system is cheaper and efficient when compared to other type of automation system. In large applications, high sensitivity sensors can be implemented for large areas of agricultural lands. stand by battery or solar cells can be implemented which comes into use in case of power cuts. Secondary pump can be used in case of failure of the pump

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