

## GSM Based Automation in Agriculture

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**Abstract** - - Many new concepts are being developed in few recent years. In some respects how we done these tasks in the past to how we could do them using GSM. That is we are interested to make the GSM based system to reduce the important factor to the farmer is wastage of time, money, manpower and also the errors which made by the humans. To do this a large amount of information is captured by using the sensors and transmitted to the controller for the further processing. In our system we get the information about percentage wetness of grapes bed, rainfall by GSM and accordingly this information we irrigate for the grapes and tunnel the grapes garden. Many new concepts are being developed to allow grapes automation to nourish and deliver its full potential. In some respects how we done these tasks in the past to how we could do them using GSM. That is we are interested to make the GSM based system to reduce the important factor to the farmer is wastage of time, money, manpower and also the errors which made by the humans. To do this a large amount of information is captured by using the sensors and transmitted to the controller for the further processing. In our system we get the information about percentage wetness of grapes bed, rain fall by GSM and accordingly this information we irrigate for the grapes and tunnel the plant or garden.

**Key Words:** Android OS, GSM, Motor drive, LCD, Keypad, MAX232, Solenoid valve, AC motor, DC motor.

### 1. INTRODUCTION

Nowadays farmers takes various crops in his farm like grapes or pomegranate as like older techniques, so in this way very important factor to the farmer is like time, water, and also the money are get wasted. And also the farmers are take crops which is totally depends on the weather or natural conditions. That is if the Rain fall or Ice fall is present then crops will be totally damaged. Water is a basic component of all known life on Earth. Water is both sustain life in correct quantities and threaten life when it is not available. Water is a result is a limited natural resource that must not be wasted. If too little water is applied different problems arise such as turf burnout. The most important in irrigation is striking to correct balance for

optimal plant life with optimal use of water. The irrigation controller is a device to operate automatic irrigation systems such as lawn sprinklers and drip irrigation systems. Many of the controllers have a means of setting the frequency of irrigation, the start time, and the duration of watering. So, by focusing on this above problems we are introducing the new concept in the Agriculture that is Automation in Agriculture. To develop a device that allows for a user to remotely control and monitor multiple farm actions using a GSM communication. This system will be a powerful and flexible tool that will offer this service at any time and from anywhere over the world. That is we are interested to make the GSM based system to reduce the important factor to the farmer is wastage of time, money, manpower and also the errors which made by the humans. To do this a large amount of information is captured by using the sensors and transmitted to the controller for the further processing. To achieve the goal, the following objectives are:

### Need for weather monitoring system:

The system being design to focus an automating security and farming appliances for agricultural and related applications. This involves providing the feature of the status of appliances and manipulating them accordingly. The system also involves monitoring and remotely the controllable events. The proposed security and Agricultural automation system will also focus on user remote system connectivity that's why it can be manage by the user. The system will target controlling other agricultural and industrial processes which are being perform manually controlling motors and solenoid valves can be one of those processes

### 1.1 Organization of the project

The dissertation work was carried out at Shreeram Agro farm, Tarangwadi, Indapur. The scope of the project can be discussed as below:

**Design and development of the monitoring system:**

- Study of the current working system.
- Scope and need of monitoring in the system.
- To replace costly system by cheaper in cost & efficient system.

Moisture content of the soil is a major part determining plant’s growth, especially in irrigation systems. The basic objective of irrigation scheduling is to minimize water wasting of the plant, that of over the irrigation, and under the irrigation. The basic requirement is the ability to continuously obtain sensor output data. The measurement of soil water content and condition is an integral process in the process of developing an irrigation scheduling program that allows a better caring of plant and soil water contents. The objective of present work is to get an efficient weather monitoring system.

**2. ARCHITECTURE DESIGN**

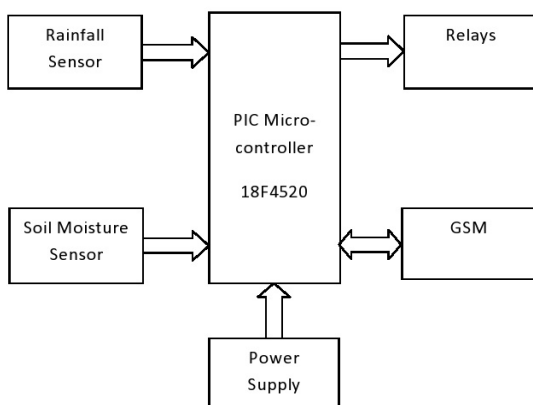


Figure2.1. System block diagram.

**2.1 The input parameters that are used by the system are:**

**2.1.1 Soil moisture**



Fig2.2. Soil moisture sensor.

The health of a plant is checked by many factors, one of the most important being there availability of moisture in the soil. Both on a small agricultural scale and in large-scale modeling of land/ atmosphere interaction. Vegetation and crops always depends more on the moisture available at root level than on precipitation occurrence. Water budgeting for irrigation, as well as for the actual scheduling. The gypsum block is used to measure soil moisture. The electrical resistance between electrodes placed inside the land is proportional to its water content. Thus, the wetter a block is, the lower the resistance measured across two electrodes. The resistance between the electrodes is determined by applying a small DC voltage. and field measured resistance should be corrected for differences between calibration and field temperature. It is simple and inexpensive. In the control stage desires soil moisture is compared with the measured soil moisture, a dynamic decision is made regarding the amount of water to given to the soil of irrigation action, requires soil moisture information. This stage is proposed to keep the definite soil moisture as close up as possible to the desired level. Its output is the valve control signal, which represents the amount of water that should given to the soil continuously in order to maintain a minimal deviation. It is a measure of moisture at different levels of the Earth's atmosphere. This variable should be defined as a continuous signal.

**2.1. Rain fall**

A rain sensor or rain switch is a device activated by rainwater. There are two main applications for rain sensors. The first is a water pump-set is connected to an automatic irrigation system that causes the system to shut down in the event of rainfall. In our project we use the Rain Sensor in which we sense the rain is present or not by using the continuity that is if few droplets are present on the sensor plate then shorted the two strips of the sensor then current flows from A to B. And we understand the rain is falling. The rain collect mechanism contains a standard measurement wounded coil. The Rain Collector is designed to measure rain water level. Rain enters the storage box and collected amount of water into the box.

**2.2 PIC Microcontroller**

It is built to perform general applications. It has 16-bit Central processing unit (CPU). While generally, C compiler optimized architecture: - Optional extended instruction set designed to optimize re-entrant code. Microcontroller collects data from sensors and compares it with predefined values and do further work according to requirement.

**The output parameters are**

- **GSM modem:**



Fig2.3. GSM kit.

Short Message Service (SMS) is GSM technique to transfer data from far-away places such as from one area to the area of the same city or from a different city. In our development we are using SMS technique to quick transfer of data to the user. It is a suitable facility of the GSM network. If the user's mobile unit is powered off or has left the coverage area, the message is saved in cloud and presented back to the user when the mobile is powered on. This function ensures that the message will be received. In our development we are using SIM900 for conveying the data. Interfacing with PIC is done with RS-232 through DB-9 connector.

• Relays

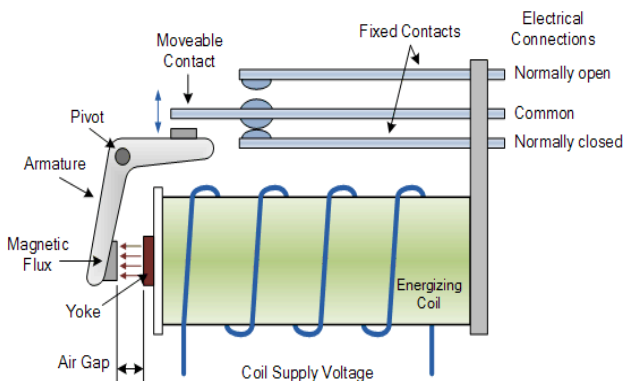


Fig.2.4. Relay Construction.

A relay is an electrical switch. Many relays use an electromagnet to mechanically operate a relay, but further operating principles also used, such as solid-state relays. Relays are used in this system to switching of pump-set, DC motor and solenoid valves.

**3. TESTING**

Testing is an important part of any planned work. This is essential to check whether the paper design is practically possible or not. It also realizes the likelihood of the hardware with the design software. The different test cases were designed for the program modules so as to find the

errors in the program and an effort was made to make it errorless.

**3.1 Steps done during testing phase**

Subsequent are the test cases that were performed during the testing phase of the development.

1. Confirmation of PCB layout.
  - a. Tracking of layout.
  - b. Testing of continuity between the tracks.
2. Circuit testing.
  - a. inspection for dried up solder.
  - b. Testing output of power supply.
  - c. Checking of availability of supply at various points on PCB.
  - d. Testing of IC's on IC testers.
  - e. Software testing for sensors relays using microcontroller.
3. After finishing point of PCB testing, the power supply testing is done.
4. Then power supply from 12V battery is given to main board and specific pin of IC are tested for VCC and GND. It is found OK, if occasionally power supply at particular place is not found then the track is checked for discontinuity. Same process is applied for other pins for connectivity of other IC's.
5. The IC's are mounted on PCB's and retested and test the hotness of IC's.
6. For microcontroller we have checked the reset pin, crystal voltage and output pins. The crystal voltages are found OK i.e. 1.5 and 0.5 which indicate that microcontroller is working correctly.

**4. RESULTS**

The proposed work will follow procedure:

All Sensors are used to determine the moisture level and Rainfall at the root zone. Microcontroller receives sensor data per minute. Microcontroller should analyze the data, take correct action. Soil moisture sensor is a sensor placed inside the land that measure soil moisture content in the land. Microcontroller sends message to user through GSM containing moisture level of soil. Soil moisture sensors, but while rain sensors measure water level into box where sensor

is placed, if water is more, then sensor gives more voltage reading and vice versa. Microcontroller based system monitors and controls all the activities of system continuously. The moisture of the soil will be measured and water is supplied to the crop accordingly which prevents water wastage. Thus the system is time saving, and helps to reducing human errors. Hence system increases the net profit of farmers. Following figures shows experimental setup and turned on pump-set into field of agriculture.

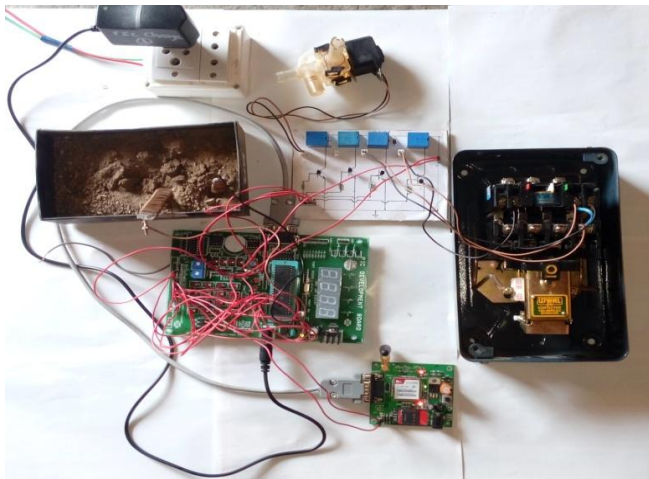


Fig.4.1. Experimental setup.

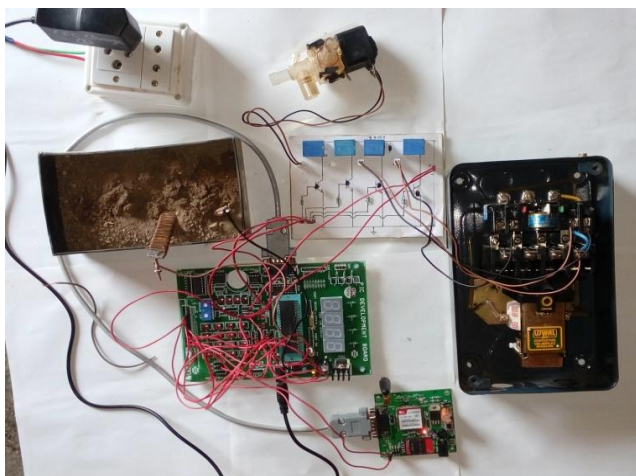


Fig4.2. Indicating Pump-set turned on.

### ADVANTAGES

- Works accordingly Soil condition.
- Reduction of manpower.
- Wastage of water can be minimized.
- Product quality should be increased.
- Maintaining healthiness of crops.
- Protection of crops from the Hazardous natural factors.
- Productivity Increases.

### CONCLUSIONS

With the use of this method we can reduce water consumption. It can be set to lower and upper thresholds to maintain best possible soil moisture and minimize plant wilting. The Microcontroller based system monitors and controls all the activities of irrigation system properly. The moisture of the soil will be measured and water is supplied to the crop accordingly which prevents water clogging. This system saves water because the water is directly fed to the root and the quality of the crop gets improved.

### APPLICATIONS

- In Lawns.
- In highly remote areas.
- All types of crops.
- Home gardens.

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