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AGRICULTURAL WATER DEMAND FORECASTING AND SOIL MOISTURE MONITORING SYSTEM

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Abstract

This system checks the moisture, temperature content in the soil, based on that pumping motor will automatically pumps the water into the field. Here we are using soil moisture sensor and temperature. By using these sensors, we can find whether the soil is wet or dry. If it is dry, pumping motor will pump the water. The main aim of our system presenting here is to monitor the moisture content in the soil in cultivating field. Based on soil moisture, temperature pumping motor will be automatically switched on or off. This saves the water at the same time and on the other hand the plant can get optimum level of water, so increasing productivity of crop. The purposes of our water irrigation system are to provide a water delivering schedule to the crops to ensure all the crops have enough water for their healthy growth, to reduce the amount of water wasted in irrigation, and to minimize the economic cost for the users. It is also possible to protect of the motor against some faults such as over current, higher/lower voltage, over temperature in windings, overloading of motor. Therefore, controlling, monitoring, and protection of the system are realized in real time. The GSM technology will send the sensor information to user mobile according to soil and motor condition.

Keywords: GSM module, Soil moisture sensor, Temperature sensor, Water level sensor, Humidity sensor, PIC16F887.

1. INTRODUCTION

India is basically an agricultural country, and all its resources depend on the agricultural output. Micro Irrigation is an artificial supplying of water to the root of plant. Irrigation has been used to assist in the growing of agricultural crops, maintenance of landscapes, and re-vegetation of disturbed soils in dry areas and during periods of inadequate rainfall. In crop production, irrigation helps in protecting plants against frost, suppressing weed growth in grain fields and preventing soil consolidation. Irrigation systems are also used for dust suppression, disposal of sewage, and in mining. The old method used for irrigation was the use of watering cans, water channels that have to be opened and closed manually or backpack sprinklers. In this case, a lot of water is wasted in the process. There is need for improvement on the existing or old forms of irrigation. An automated irrigation system needs to be developed to optimize water use for agricultural crops. An intelligent automatic irrigation system has to have all the components that autonomously monitor and control the level of water available to the plants without any failure or human intervention. 1.

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Continuously monitor the amount of soil water available to plants 2. Determine if watering is required for the plants based on the information obtained from monitoring the soil water content. 3. Supply exact amount of water required for the plants. This will be enhanced by how well it achieves requirement 4. Discontinue the water supply when the required amount has been delivered to the plants. This feature is important as the amount of water available for the irrigation system is not infinite, therefore water management is paramount. The advantages of automatic irrigation to the plants include saving money, water, conservation of labor and overall convenience.

2. BLOCK DIAGRAM OF PROPOSED SYSTEM

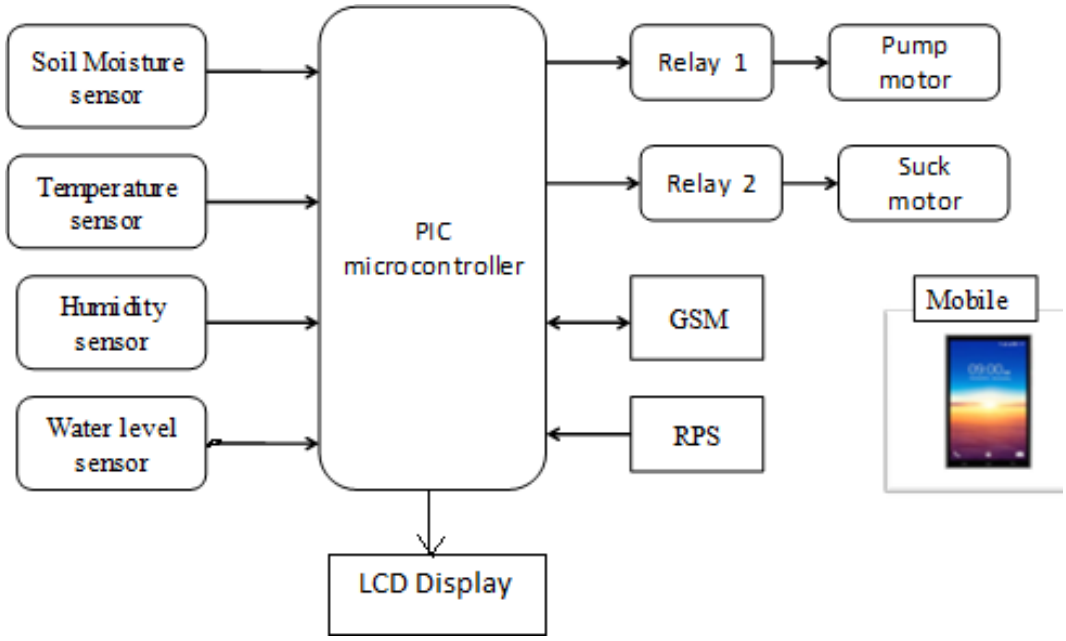

Fig 1 Block Diagram of Irrigation System

The water level sensor, temperature, soil moisture and humidity sensor is interfaced with microcontroller and it will continuously monitor the crops soil. The moisture, temperature content in the soil, based on that pumping motor will automatically pumps the water into the field. The microcontroller will receive the data and it will send to user mobile through GSM technology. The water level sensor is used to sense the water level in ground and also sense the crops water level during rain. If in case water level is increased in ground level, the microcontroller automatically pumps the water using motor to take unnecessary water from crops and it will flow into the water tank.

3. SOFTWARE DETAILS CCS COMPILER

A compiler is a computer program (or set of programs) that transforms source code written in a programming language (the source language) into another computer language (the target language, often having a binary form known as object code). The most common reason for wanting to transform source

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code is to create an executable program. This integrated C development environment gives developers the capability to quickly produce very efficient code from an easily maintainable high level language. The compiler includes built-in functions to access the PIC microcontroller hardware such as READ_ADC to PROGRAM. Functions such as INPUT and OUTPUT_HIGH will properly maintain the tri-state registers. Variables including structures may be directly mapped to memory such as I/O ports to best represent the hardware structure in C.

PROTEUS 7.0 SIMULATION TOOL

Proteus 7.0 is a Virtual System Modeling (VSM) that combines circuit simulation, animated components and microprocessor models to co-simulate the complete microcontroller based designs. This is the perfect tool for engineers to test their microcontroller designs before constructing a physical prototype in real time.

4. HARDWARE DETAILS

- PIC Microcontroller
- Regulated Power Supply
- Soil Moisture sensor
- Temperature sensor
- Humidity sensor
- Water level sensor
- GSM Module
- LCD Display

5. REUSLTS AND DISCUSSION

A. SOFTWARE RESULTS

PUMP MOTOR WORKS AT MANUAL MODE

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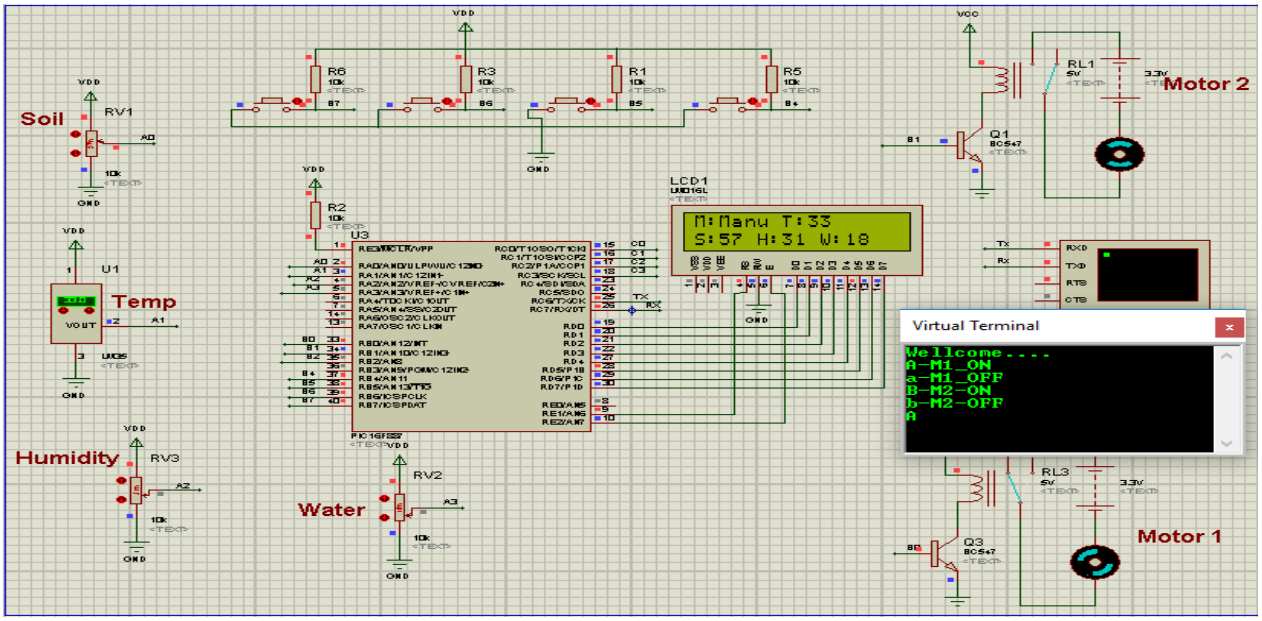

Fig 4.1 Pump Motor Works At Manual Mode

The pump motor works at manual mode, when "A" given the motor starts running and when small "a" given the motor stop running The pump motor runs and stops automatically, when the sensors increases or decreases from there fixed value.

SUMP MOTOR OPERATED AT MANUAL MODE

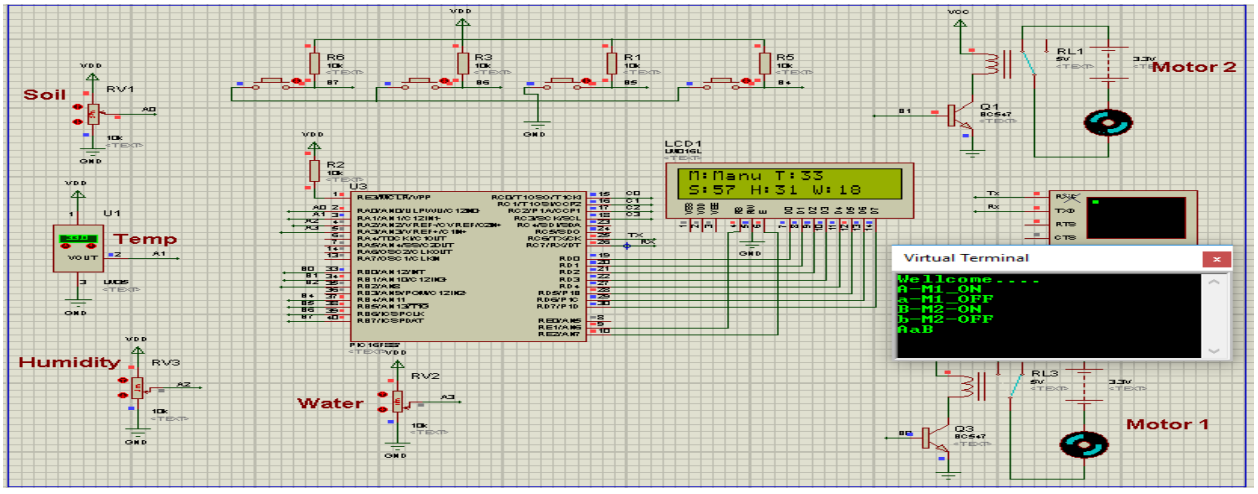

Fig 4.2 Sump Motor Operated at Manual Mode

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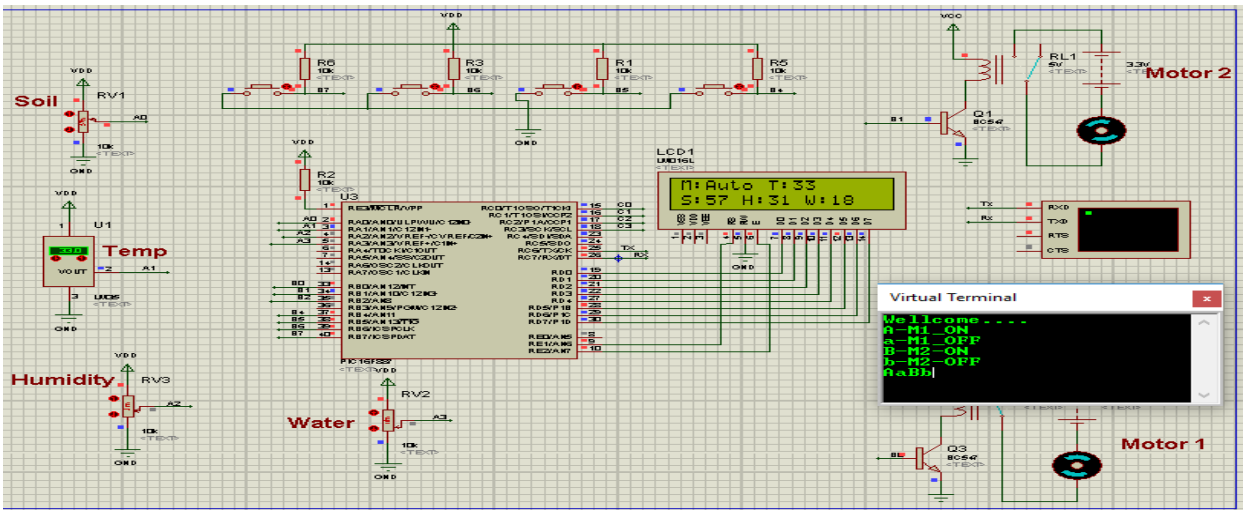
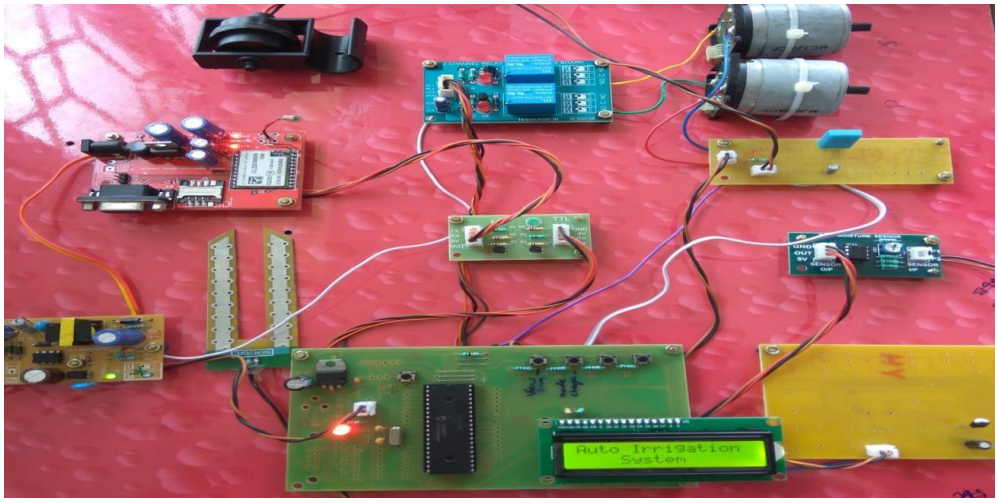
The suck motor works at manual mode, when “B” given the motor starts running and when small “b” given the motor stop running.

PUMP MOTOR WORKS AT AUTOMATIC MODE





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6. HARDWARE RESULTS

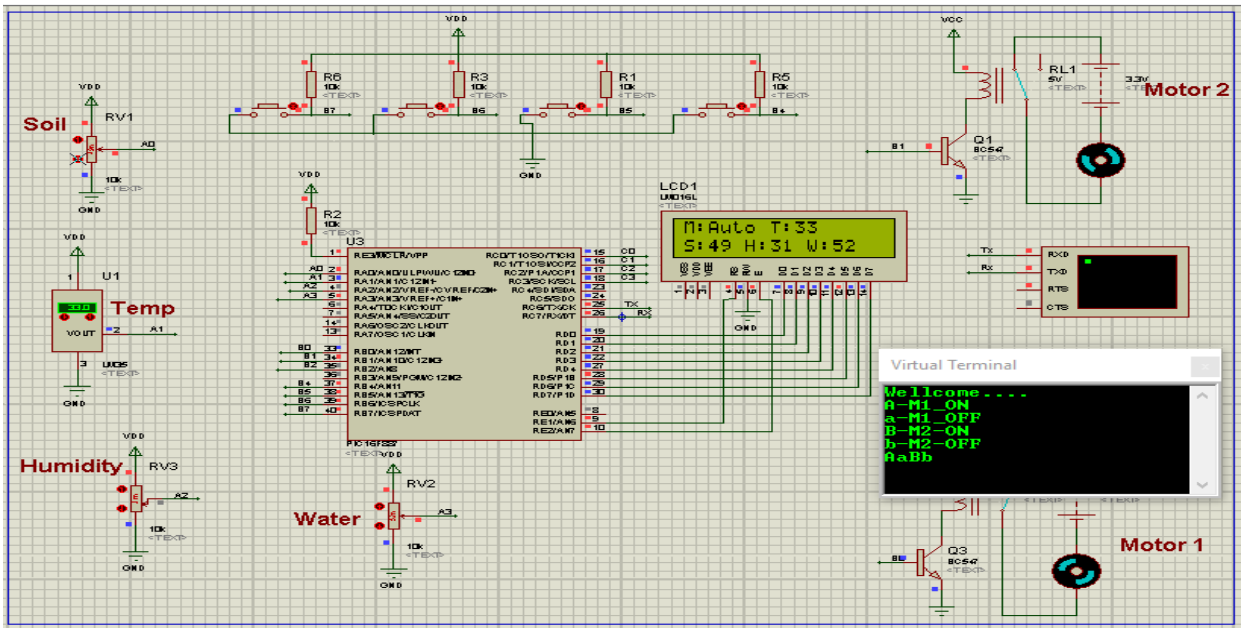

Fig 5.1 Initial Condition of Irrigation System

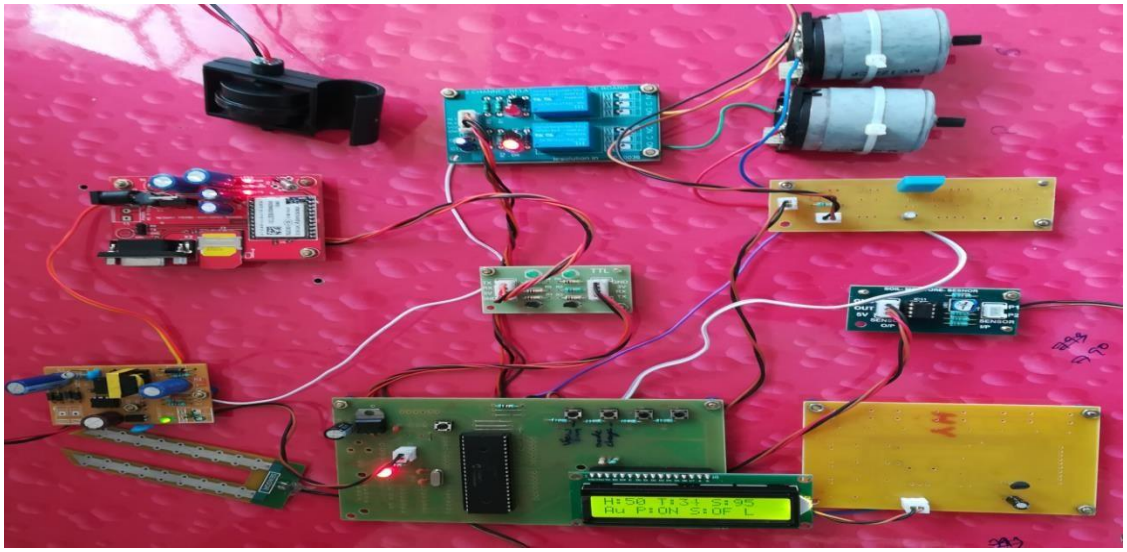

Fig 5.2 Motors Operated at Automatic Condition

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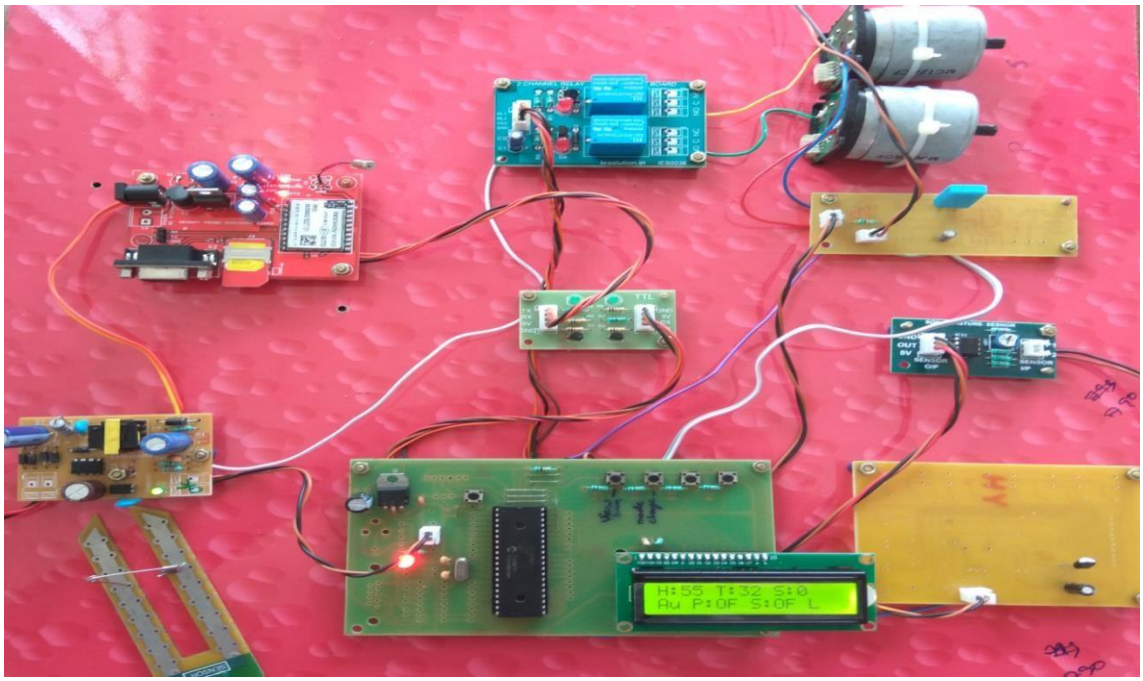

Fig 5.3 Motors Switch

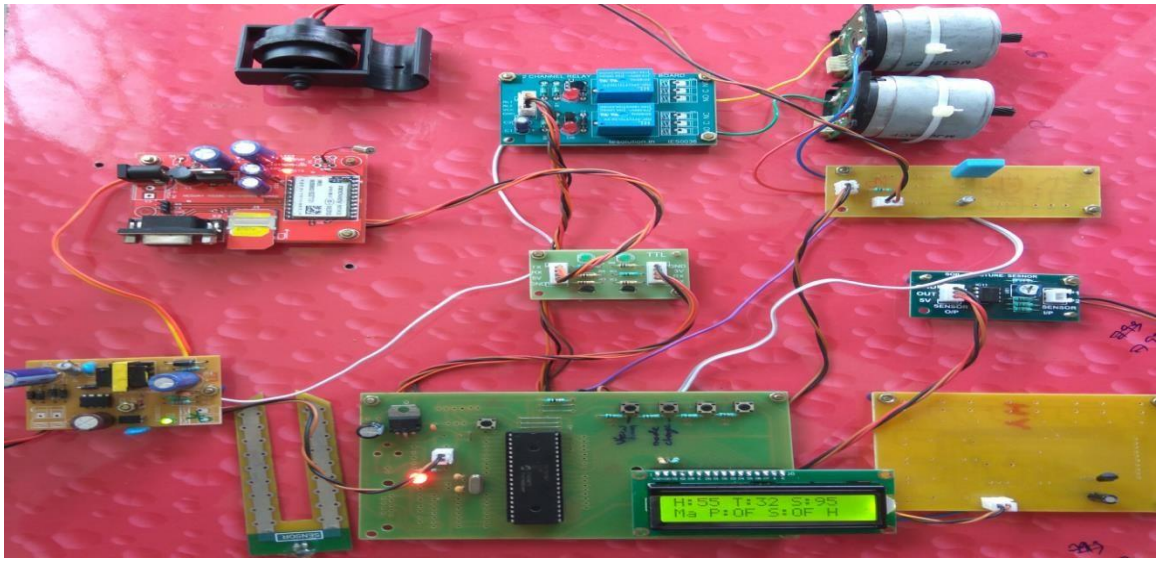

Fig.5.4 Operated OFF at Automatic Condition

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Fig 5.5 Motor switched OFF at Manual Mode using GSM Module

CONCLUSION

The proposed system is open architecture so any one can make this type of system using any way or path. The system uses moisture sensor to observe the moisture level which increases further accuracy of the system as it identifies the moisture level very accurately than human. The system also observes different environmental conditions such as humidity, soil moisture and temperature which human cannot measure accurately by open eyes to decide the plant health so the accuracy of the system is high. It also involves watering mechanism which reduces human labor and we can reduce labor further by modifying the system further for other agricultural work such as picking, harvesting, weeding.

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