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Smart Irrigation System with Arduino Automation

P. Sreesudha[1]
[1]*Assistant Professor, ETE Dept, G.Narayanamma Institute of Technology and Science, Hyderabad, India*

Abstract: ***The main objective of the proposed system is to provide water to the plants with the help of micro controller that is automatic method. Watering to plants or gardening work can be done automatically with the aid of micro controller. Some times when we are not available in homes and going on vacation then we need to bother about our neighbours, because of watering of plants in our homes. So the proposed system solves this issue. There are several methods possible for this kind of applications. But all are not working proper. Each one fails in some stages. There are flaws in drip irrigation also. The proposed micro controller based system provides best results and solves the issues.***
This model uses sensor technologies with microcontroller in order to make a smart switching device to help millions of people. In its most basic form, system is programmed in such a way that soil moisture sensor which senses the moisture level from the plant. Solenoid valve will control the water flow in the system, when Arduino reads value from moisture sensor it triggers the solenoid valve according to the desired condition. In addition, system reports its current states and sends the reminder message about watering plants and gets SMS from the recipient.
Keywords: Arduino, GSM Module, Micro Controller, Soil Moisture Sensors, Relay

I. INTRODUCTION

The main motivation of the proposed system is because of the problems of climate change in today's scenario. Because of ever increase of population there is always crisis for resources and there is a necessity to save the resources also. Sustainable development must be adopted by each one of us, both on a personal level and socio-industrial level. Water is one of the most importance resource and water must be saved and optimally utilized. Hence we see that water conservation is of utmost importance. Conventional irrigation methods use a lot of water, and needless to say, a lot of it is wasted on a daily basis. With the help of advanced methods of irrigation, which should ideally use just the correct amount of water needed for the plants, we could save a considerable amount of water. With the help of soil moisture sensors, we could use just the right amount of water needed for irrigation.

Many people like to have plants in their homes and backyards. These plants are dependent on breeding conventionally for instance provide the right amount of water supply to sustain life and growth. Many people forget to water their plant on a busy schedule of day and due to that many plants suffers disorder and ultimately died. Apart from that another big problem in the modern society is the shortage of water and the unplanned use of water inadvertently results in wastage of water. It is a big task to utilize water supply/resources in a proper way thus, a system is required to handle this task automatically. In automatic plant watering system, the most momentous advantage is that water is only supplied. This saves lots of water even in the bigger irrigation systems. All those problem can be rectified by using the automatic plant watering. Secondly, this system reduces the human effort and give them ease rather than watering the plants manually.

II. SYSTEM MODEL

The figure 1 shows the block diagram and the required components. In This system, Soil Moisture Sensor checks the level of moisture in the soil and if moisture level is small then Arduino switches on a water pump to give water to the plant. Water pump gets automatically off when it finds sufficient moisture in the soil. Whenever system switched on or off the pump, a signal message is sent to the user via GSM module, updating the status of water pump and soil moisture. This is very useful in Farms, gardens, home etc, system is completely aut**o**mated and there is no need for any human intervention.

1) *GSM Module:* GSM module is used for sending SMS to the user.
2) *Arduino:* used for controlling whole the process of this Automatic Plant Watering System.
3) *Soil Moisture Sensors:* The soil moisture sensor uses capacitance to quantify the water substance of soil, simply insert the sensor into the soil to be tested, and the volumetric water content of the soil is reported in percent. These sensors consisting of two electrodes and probes for estimating the soil resistance are frequently utilized for residential purposes. A higher average dielectric constant for the soil is caused by a higher water concentration.

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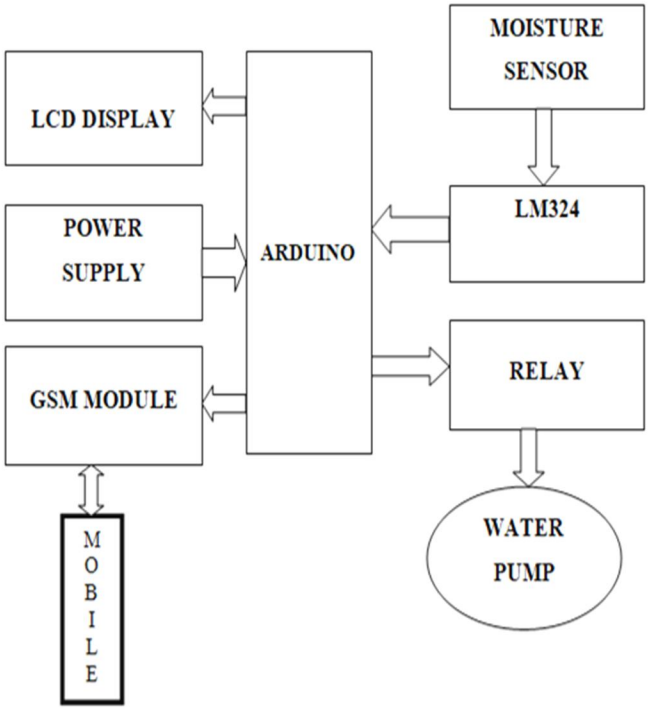

Fig. 1 The Block Diagram of Arduino Based automatic plant irrigation

4) *Relay:* Relay is an electrically operated switch. Several relays use a magnet to automatically operate a switch, however alternative in operation principles are used, like solid state relays. Relays are used wherever it's necessary to regulate a circuit by a separate low-power signal or wherever many circuits should be controlled by one signal. The essential relays were handling in long distance communicate circuits as amplifiers, they unbroken the signal coming back in from one circuit and re-transmitted it on another circuit.
5) *Pipe:* Here it is used as a water channel, and pipe has been used for watering plant.
6) *LCD:* We come across LCD displays everywhere around us. Computers, calculators, television sets, mobile phones, digital watches use some kind of display to display the time. An LCD is an electronic display module which uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in circuits. The 16×2 translates a display 16 characters per line in 2 such lines.

III. WORKING MECHANISM

A. Algorithm

1) Giving the power supply to the whole components
2) Moisture Sensor reads the moisture contained in the Soil and feeds to the microcontroller(Arduino)
3) Microcontroller read the sensor value and communicate with GSM module
4) If soil condition wet Motor turned off, else soil condition dry Motor turn on
5) GSM sends message to the User about soil condition

Figure 2 shows the flow chart.

IV. NUMERICAL RESULTS

The figure 3 shows the working mechanism of proposed system. How the water is poured and getting signal alert in the mobile system.

V. CONCLUSION

In the above explained way the proposed system supports the watering operation to the plants including message alert to the phones with GSM module. It has been developed by integrated features of all the hardware components used. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. The system has been tested to function automatically. The moisture sensors measure the moisture level of the different plants, the moisture sensor sends the signal to the microcontroller which triggers the Water Pump to turn ON and supply the water to respective plant. When the desired moisture level is reached, the system halts on its own and the Water Pump is turned OFF. Thus, the functionality of the entire system has been tested thoroughly and it is said to function successfully. Save Water, accordingly our Requirement of water, depends upon water level quantity soil and crops. So by using this technique we can reduced water consumption, no nutrition pollution is released in to environment because of the controlled system and hence will have great saving of irrigation water, stronger, healthier plants and stable. In future the proposed method can be used for in building farming.

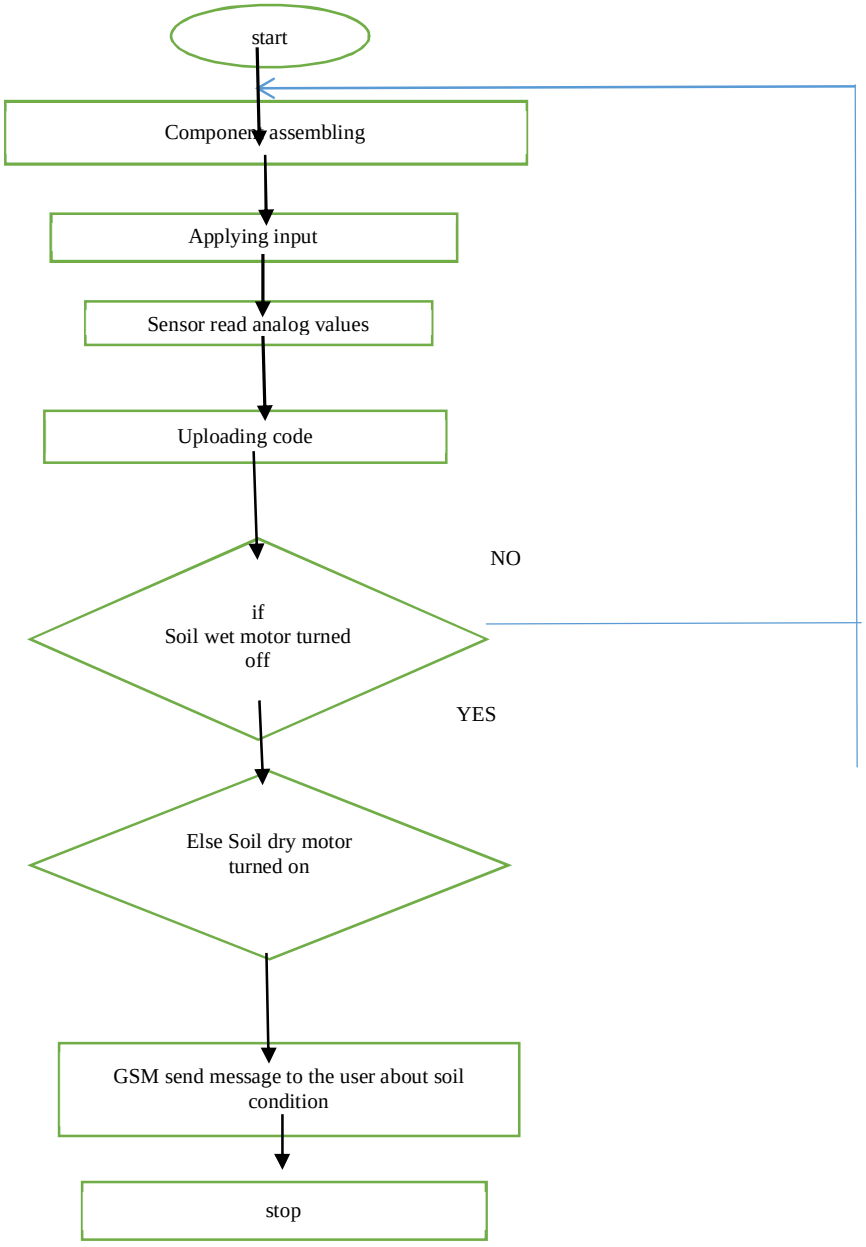

Fig. 2 Flowchart

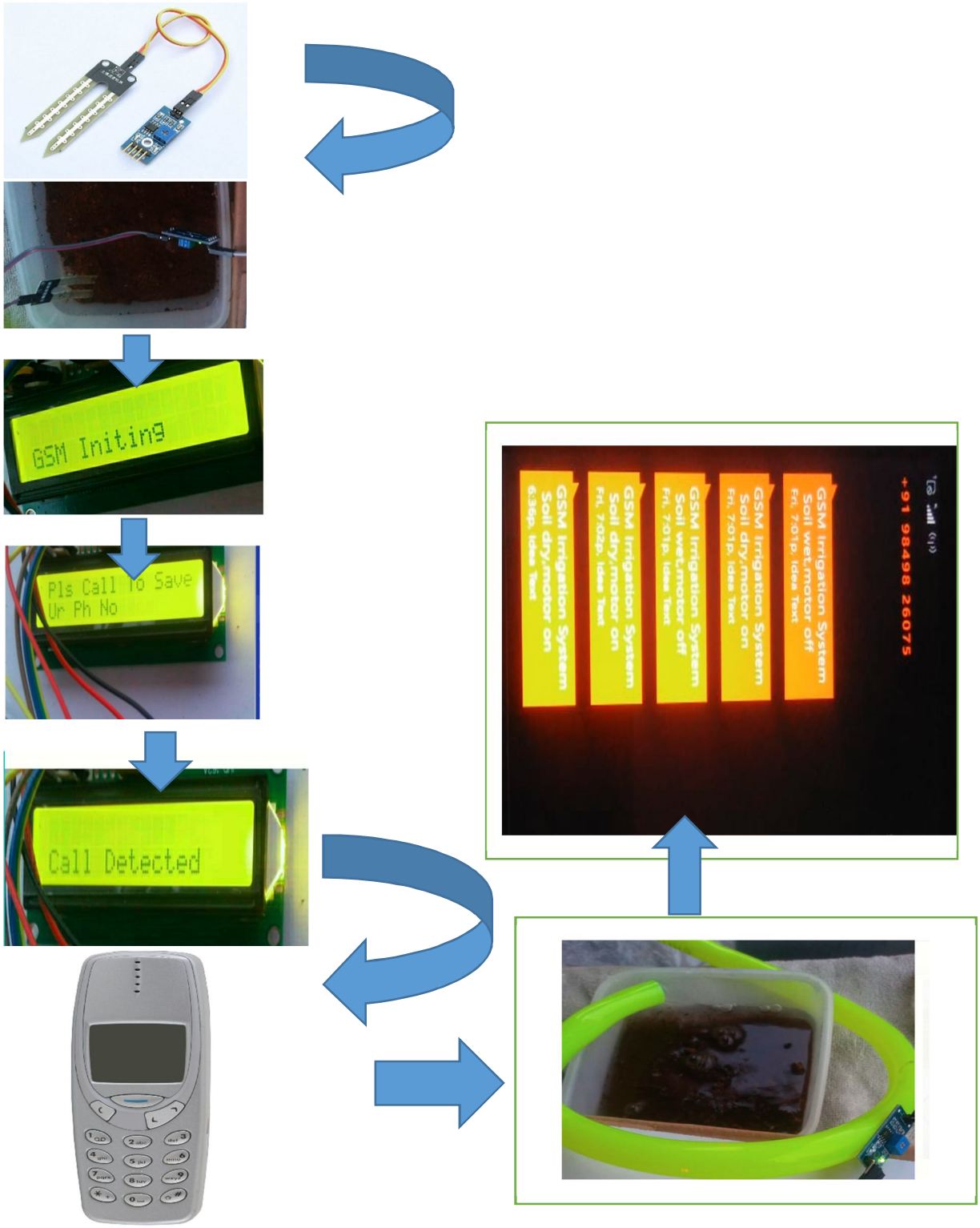

Fig. 3 Working of the system flow

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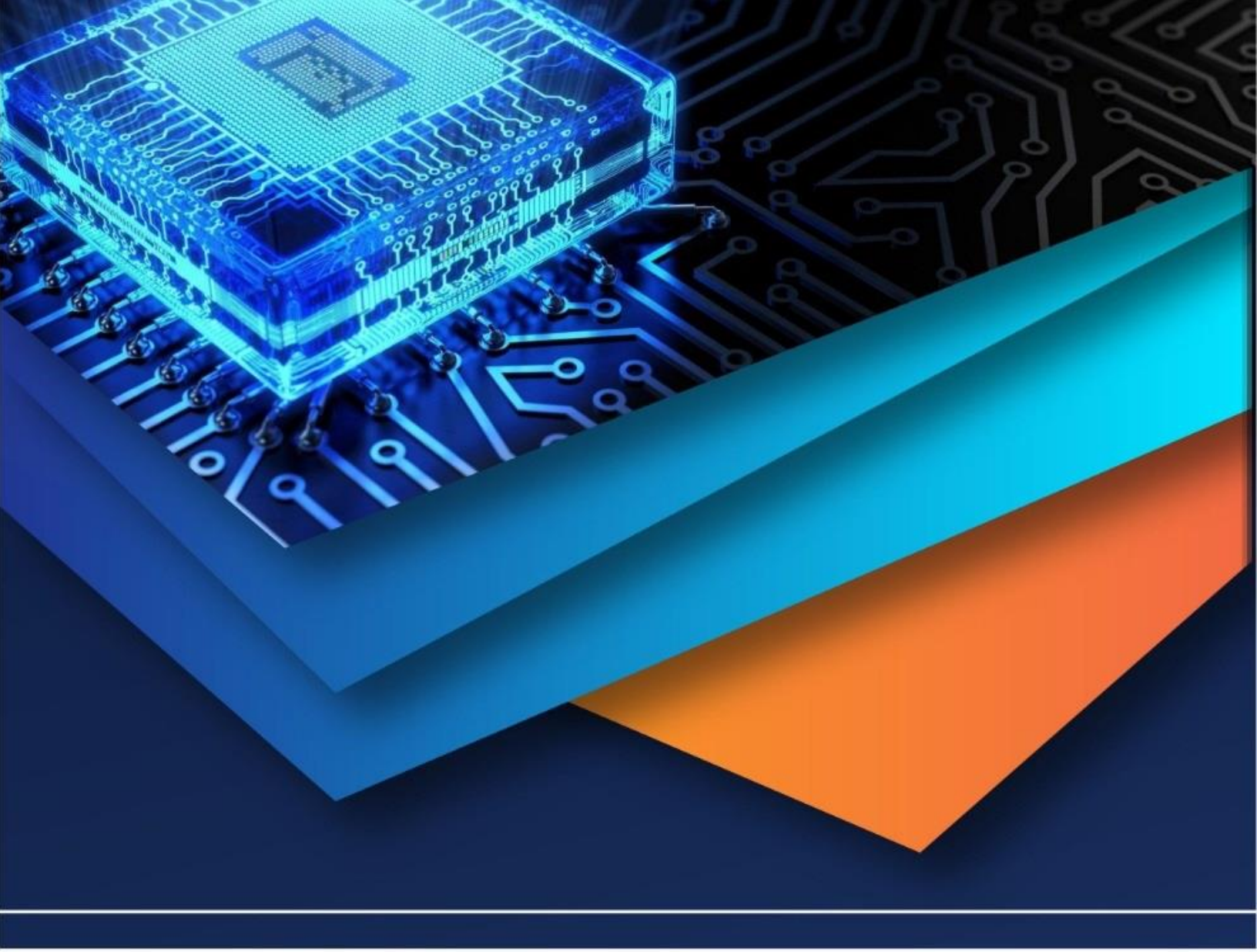

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