# Automated Plant Watering System

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***Abstract* — In daily operations related to farming or gardening watering is the most important practice and the most labor-intensive task. No matter whichever weather it is, either too hot and dry or too cloudy and wet, you want to be able to control the amount of water that reaches your plants. Modern watering systems could be effectively used to water plants when they need it. But this manual process of watering requires two important aspects to be considered: when and how much to water. In order to replace manual activities and making gardener's work easier, we have create automatic plant watering system. By adding automated plant watering system to the garden or agricultural field, you will help all of the plants reach their fullest potential as well as conserving water. Using sprinklers drip emitters, or a combination of both, we have design a system that is ideal for every plant in the yard. For implementation of automatic plant watering system, we have used combination of sprinkler systems, pipes, and nozzles. In this paper we have used ATmega328 microcontroller. It is programmed to sense moisture level of plants at particular instance of time, if the moisture content is less than specified threshold which is predefined according to particular plant's water need then desired amount of water is supplied till it reaches threshold. Generally, plants need to be watered twice a day, morning and evening. Thus, the microcontroller is programmed to water plants two times per day. System is designed in such a way that it reports its current state as well as remind the user to add water to the tank. All this notifications are made through mobile application. We hope that through this prototype we all can enjoy having plants, without being worried about absent or forgetfulness.**

***Keywords*— *Farming, watering, automatic system, sprinkler systems.***

## I. INTRODUCTION

We all know that plants are very beneficial to all human beings in many aspects. Plants helps in keeping the environment healthy by cleaning air naturally and producing oxygen. Many people love to have plants in their backyard. But due to civilization and insufficiency of place many people used to grow plants in a mold or dirt, pot, and placed on the windowsill. This plant are dependent on conventional breeding - watering, and provide the right amount of sun to sustain life and growth. In busy schedule of day to day life, many time people forget to water
their plants and due to this plants suffers many disorders and ultimately died. In addition, the world's biggest problem in modem society is the shortage of water resources, agriculture is a demanding job to consume large amounts of water. It is very essential to utilize the water resources in proper way. Thus, a system is required, to handle this task automatically. Automated plant watering system estimate and measure the existing plant and then supplies desired amount of water needed by that plant. It is minimizing the excess water use as well as keeping plants healthy.

## II. PROBLEM STATEMENT

During day to day activities many people often forget to water their plants and thus it becomes challenging for them to keep their plants healthy and alive. Also it is a challenge for farmers to maintain their fields and manage watering of plants during shortage of water. Based on the above background, we thought that it is necessary to implement the automated system which

Fig 1: Illustrate the scenario when owner negate to water a plant

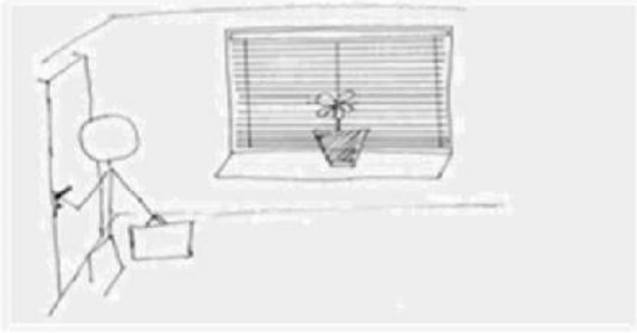

Fig. 2: Illustrating scenario where closed window binds the necessary sunlight

will take care of plants considering all the different aspects of home gardening system (for system based on household purpose) as well as larger landscape (for the system based on

agricultural farms) and helps them to grow healthy. We also believe that technology can help people in cultivating plants, not just by automation but also through digital communications (such as to notify the user with the current status of the plant is important to note). Therefore, our project aims to implement a simple system, using automatic irrigation, watering a small potted plant or crop with minimal human intervention.

## III. PROPOSED IDEA

There are two functional components in this paper. They are moisture sensor and motor / pump. Arduino board is programmed using the Arduino IDE software. Humidity sensor is used to detect the soil moisture content. Motor / pump is used to supply water to plants. Soil moisture and temperature predetermined range is set particularly for specific plants requirement, and according to that system is being operated. Microcontroller (ATmega328), is the brain of the system. Both humidity and temperature sensor is connected to the controller's input pin. Pump and servo motor coupled to the output pin. In case of soil_moisture value is less than threshold system automatically triggers water pump on till sensor meets threshold and then sets off automatically. The overall activity is reported to the user using mobile application.

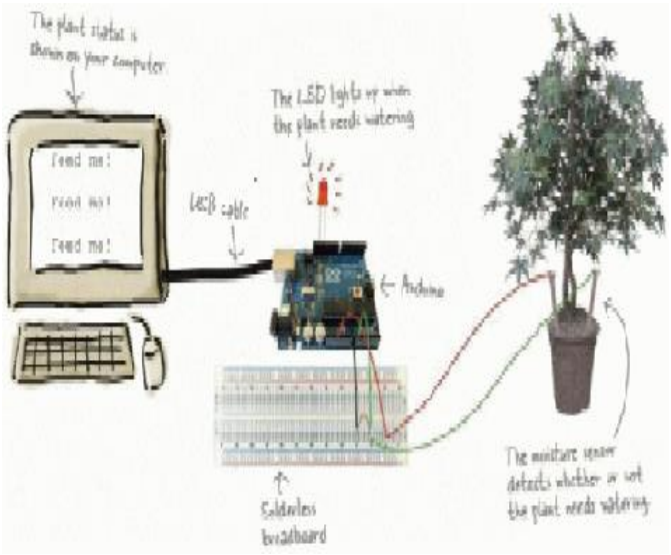


Fig. 3: Real-time view of proposed Automated Gardening System

### *A. Detecting Moisture Content:*

This will be achieved by soil moisture sensor. They are connected to an Arduino microcontroller board. Arduino board is programmed using the IDE software. Humidity sensor senses to indicate that the plant needs watering humidity levels in the soil, and sends the signal to the Arduino.

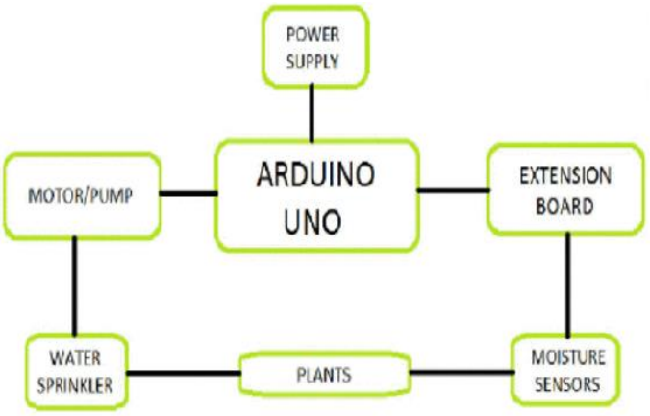


Fig. 4: Block diagram of Automated Gardening System

### *B. Automatic Watering To The Plant And User Notifications:*

On receiving logic high signal, Arduino will notify the user by turning on the first buzzer. In this work we have used an Arduino microcontroller in combination with relay control switch to control the motor and overall functioning. Motor may be driven by external 9V battery with interfacing to microcontroller.

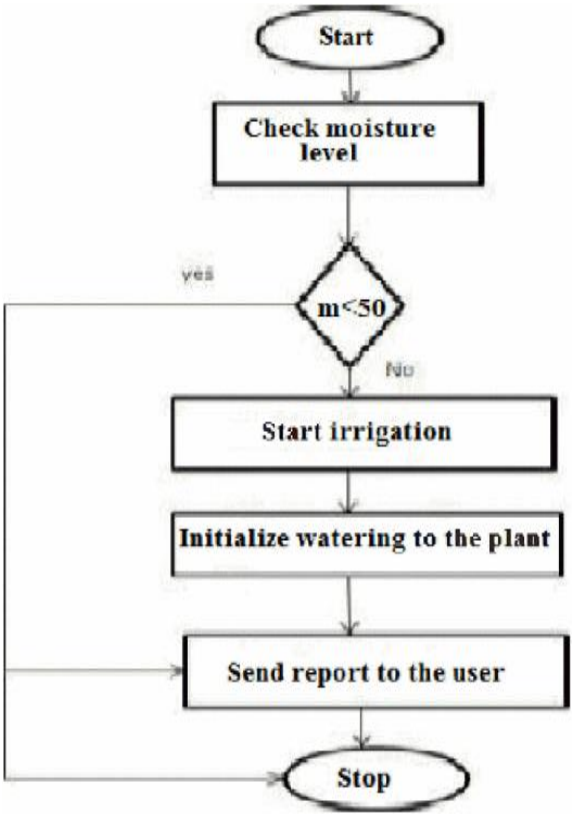


Fig. 5: Flowchart of Automated plant watering system

## IV. COMPONENTS USED FOR IMPLEMENTATION OF SYSTEM

### *A. Arduino Uno*

Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input / output pins (of which 6 can be used as PWM outputs), 6 analog inputs, 16 MHz ceramic resonator, USB connection, power jack, ICSP plug, and a reset button. It contains everything needed to support the microcontroller; simply use the USB cable or power it with a AC-to-DC adapter or battery is connected to a computer begins.


Fig. 6: Arduino Uno

### *B. Moisture Sensor*

Soil moisture sensor measures the soil water content. Soil moisture probe consists of a plurality of soil moisture sensors. Soil moisture sensor technology, commonly used are:

•Frequency domain sensor, such as a capacitive sensor.

• Neutron moisture meter, characteristic of the use of water in the neutron moderator.

• Soil resistivity. In this particular project, we will use the soil moisture sensors which can be inserted into soil to measure the soil moisture content

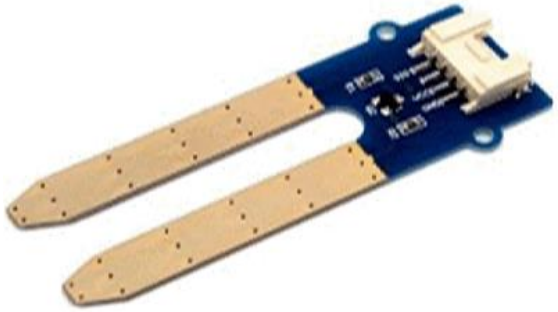

Fig. 7: Moisture Sensor

### *C. Water Pump*

Water is used to perform a specific task of artificially pumping. It can be controlled by an electronic microcontroller. It can be on 1 triggered by sending the signal and turned off as needed. Artificial process is called Water Pumping Station. There are many varieties of pumps. This project uses a small pump connected to the H-bridge.

Fig 8: Water pump

### *D. The Relay Module*

Relay is an electrically operated switch. Many relays for switching solenoid mechanism mechanically operated, but can also be used for other principles of operation. Relays are widely used in early computers to telephones and perform logical operations.

### *E. Arduino IDE Tool*

Arduino open-source environment, you can easily write code and upload it to the 110 board. It runs on Windows, Mac OS X and Linux. Environment is written in Java, and according to the processing, AVC-GCC, as well as other open source software.

## V. PROPOSED METHODOLOGY

### *A. Build System Relay*

We create connections to the solid state relays, Arduino, and small fountain pump system, Arduino allows the pump open or close automatically. A striped cut through the inner tube of the pump segment insulated wire, only half. Install the new cut wire, there are two output relays at both ends.We put on the bare electrical tape. Finally, the ground relay is connected to the Arduino ground and relay input to the Arduino digital pins.

### *B. Build up System Reservoir*

Submerged pump supplies a desired amount of water needed by the plant in order to work properly. Automate this process, we use a float valve, which you need to open whenever needed, close the connection when the water level rises and water hoses. Drilling is high enough to ensure that the float valve chamber, sufficient to accommodate the width of the tank float.

### *C. Build System tubing and connect*

Connection to plastic lob feed pumps and drilling small holes through which water droplets. All of the trunk circuit.

### *D. Code*

Automated plant watering system is programmed using Arduino IDE software. Arduino microcontroller checks soil moisture level, if low, triggering a water pump on until sensor reaches threshold. After this, the system will re-check the soil moisture between periodic intervals to see if you need

more water. If the water in the initial inspection, no water or comment, the system waits 24 hours, and repeat the process.

## VI. RESULTS AND DISCUSSIONS

From this work, we can control the moisture content of the soil of cultivated land. According to soil moisture, water pumping motor turned on or off via the relay automatically. This saves water, while the water level can be obtained in a preferred aspect of the plant, thereby increasing productivity of crops. Servo motor from vegetation water uniformly dispersed in water, in order to ensure the maximum utilization of absorption through. Thus, there is minimal waste of water. The system also allows the delivery to the plant when needed based on the type of plant, soil moisture, and observed temperature. The proposed work minimize the efforts of major agricultural regions. Many aspects of the system can be customized and used software to fine-tune the requirements of the plant. The result is a scalable, supporting technology. Using this sensor, we can see that the soil is wet or dry. If it is dry, the motor will automatically start pumping water.

## VII. CONCLUSIONS

Automatic system using a microcontroller, moisture sensor and other electronic tools were been developed. It was observed that the proposed methodology controls the moisture content of the soil of cultivated land. The motor automatically start pumping water if the soil is dry and need water and stops when the moisture content of the soil is maintained as required.

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