AUTOMATIC PLANT WATERING SYSTEM

A Project Submitted to

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELAGAVI – 590 018, KARNATAKA, INDIA

For the partial fulfilment of

Continuous Internal Evaluation (CIE)

PHYSICS

by

SOMASHEKHAR JAVOORU
4BD22EC096

Under the Guidance of

Dr. Krishna Kumar T K
Department of Physics
Bapuji Institute of Engineering and Technology
Davangere - 577 004, Karnataka, India

Bapuji Institute of Engineering and Technology,
Davangere - 577 004, Karnataka, India

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DECLARATION

I hereby declare that the thesis entitled **'AUTOMATIC PLANT WATERING SYSTEM'** submitted to Visvesvaraya Technological University for the partial fulfilment of **Continuous Internal Evalation (CIE)**, is the Project work carried out by me in the **Department of Physics**, **Bapuji Institute of Engineering and Technology, Davangere - 577 004** under the guidance of **Dr. Krishna Kumar T K**, Assistant Professor and Head, Department of Physics, Bapuji Institute of Engineering and Technology, Davangere, Karnataka.

I further declare that the thesis or part thereof has not been previously formed the basis of the award of any degree, associationship, fellowship etc., in the institution.

Place : Davangera **SOMASHEKHAR JAVOORU**

Date :11-09-2023 **4BD22EC096**

Bapuji Institute of Engineering and Technology Davangere - 577 004

CERTIFICATE

This is to certify that the thesis entitled **AUTOMATIC PLANT WATERING SYSTEM'** submitted to **Visvesvaraya Technological University** for the partial fulfilment of **Continuous Internal Evalation (CIE)** in Physics by **SOMASHEKHAR JAVOORU** bearing **USN: 4BD22EC096** is the result of bonafide research work carried out by him under our guidance in **Department of Physics, Bapuji Institute of Engineering and Technology Davangere - 577 004** Karnataka.

I further declare that the thesis or part thereof has not been previously formed the basis of the award of any degree, associationship, fellowship etc., in the institution.

Date : 11/09/2023
Place: Davangera

Dr. Krishna Kumar T K

Research Guide
Assistant Professor and Head
Department of Physics, BIET, Davangere

Dr. H.B.Aravinda
Principal
Bapuji Institute of Engineering and Technology Davangere - 577 004

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SOMASHEKHAR JAVOORU

CONTENTS

ABSTRACT

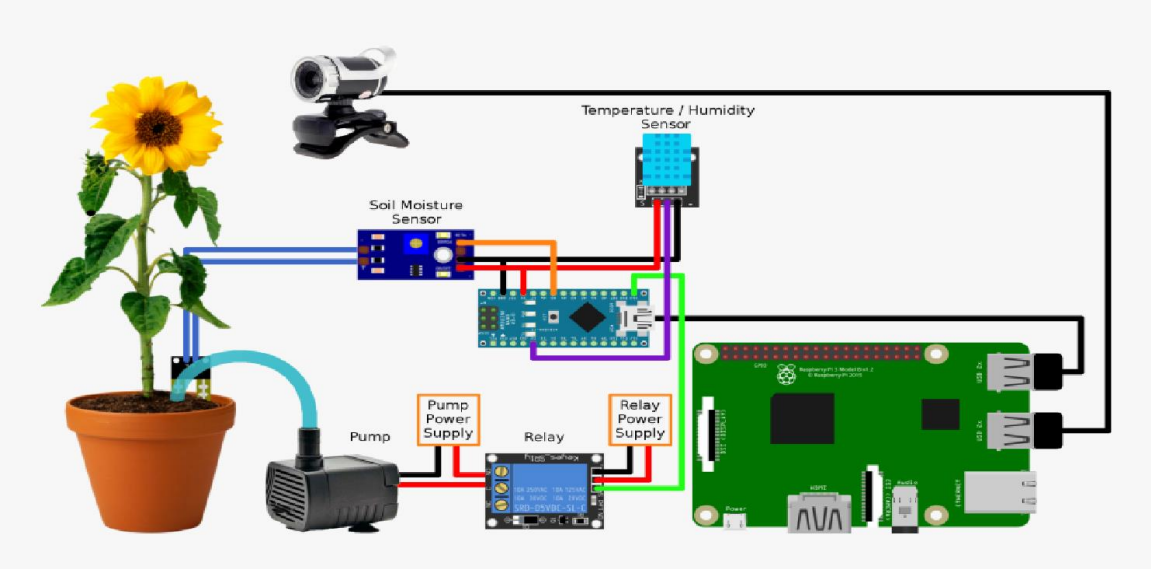
This project is taken up as India is an agriculture oriented country and the rate at which water resources are depleting is a dangerous threat hence there is a need of smart and efficient way of irrigation. In this project we have implemented sensors which detect the humidity in the soil (agricultural field) and supply water to the field which has water requirement. The project is PIC16F877A microcontroller based design which controls the water supply and the field to be which are not activated till water is present on the field. Once the field gets dry sensors sense the requirement of water in the field and send a signal to the microcontroller. Microcontroller then supply water to that particular field which has water requirement till the sensors is deactivated again. In case, when there are more than one signal for water requirement then the microcontroller will prioritize the first received signal and irrigate the fields accordingly. The project is PIC16F877AMicrocontroller. It is programmed in such a way that it will sense the moisture level of the plants and supply the water if required. This type of system is often used for general plant care, as part of caring for small and large gardens. Normally, the plants need to be watered twice daily, morning and evening. So, the microcontroller has to be coded to water the plants in the greenhouse about two times per day. People enjoy plants, their benefits and the feeling related to nurturing them. However for most people it becomes challenging to keep them healthy and alive. To solve this problem we made a project for those who cannot water the plant due to their busy schedule or when they go outside for long time. The system automation is designed to be assistive to the user. We hope that through this project people will enjoy having plants without the challenges related to absent or forgetfulness

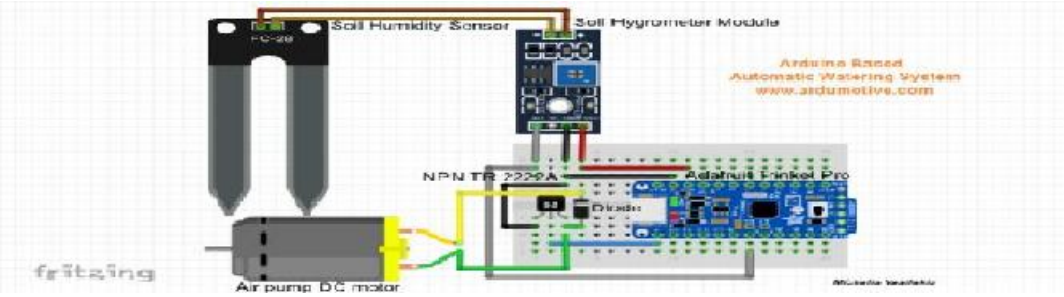
CHAPTER:01
INTRODUCTION

In present days, in the field of agriculture farmers are facing major problems in watering their crops. It's because they don't have proper idea about the availability of the power. Even if it is available, they need to pump water and wait until the field is properly watered, which compels them to stop doing other activities – which are also important for them, and thus they loss their precious time and efforts. But, there is a solution – " An Automatic Plant Irrigation System " not only helps farmers but also others for watering their gardens as wellThis automatic irrigation system senses the moisture content of the soil and automatically switches the pump when the power is on. A proper usage of irrigation system is very important because the main reason is the shortage of land reserved water due to lack of rain, unplanned use of water as a result large amounts of water goes waste. For this reason, we use this automatic plant watering system, and this system is very useful in all climatic conditions Since the relative humidity alone does not tell us anything about the absolute water holding capacity of air, a different measurement is sometime used to describe the absolute moisture status of the soil. The vapor pressure deficit is a measure of the difference between the amount of moisture the air contains at a given moment and the amount of moisture it can hold at that temperature when the air would be saturated. Pressure deficit measurement can tell us how easy it is for plants to transpire: higher values stimulatetranspiration (but too high can cause wilting), and lower values inhibit transpiration and can lead to

CHAPTER:02

CONSTRUCTION AND WORKING





A. <u>Microcontroller:</u>

In this work, the microcontroller board is the main component for WSN design & implementation purpose. The microcontroller board used in this design is ARDUINO UNO Board. ARDUINO is an open-source prototyping platform based on easy-to-use

hardware and software. ARDUINO boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output -activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so, the ARDUINO programming language (based on Wiring), and the ARDUINO NANO Software (IDE, Version 1.6.3) is used, based on processing [3][4].

B. Sensor:

In this work, sensor nodes used is the Soil Moisture Sensor which is easily available and cost effective. The contact type moisture sensor with high sensitivity senses the humidity level of the soil of the potted plant to be watered [3].

C. Servo Motor:

It provides a rotator platform for the watering system so that by providing suitable angular displacement, the watering pipe waters the entire soil area of the potted plant.

D. H Bridge Motor Driver Board:

It is a driver board containing motor driver IC L298N that drives the motor by providing the necessary current and voltage requirements to the motor. The board provides the necessary platform for interfacing the motor leads, external power supply and the enable signals.

E. Mini Water Pump:

This lightweight mini submersible water pump is used to draw water from the water source, and direct it to the thirsty soil through a pipe [3].

Table 1: Circuit Connection of moisture sensor

Soil Moisture Sensor Pins	Arduino UNO Pins
Vcc	5V
GND	GND
A OUT	A0

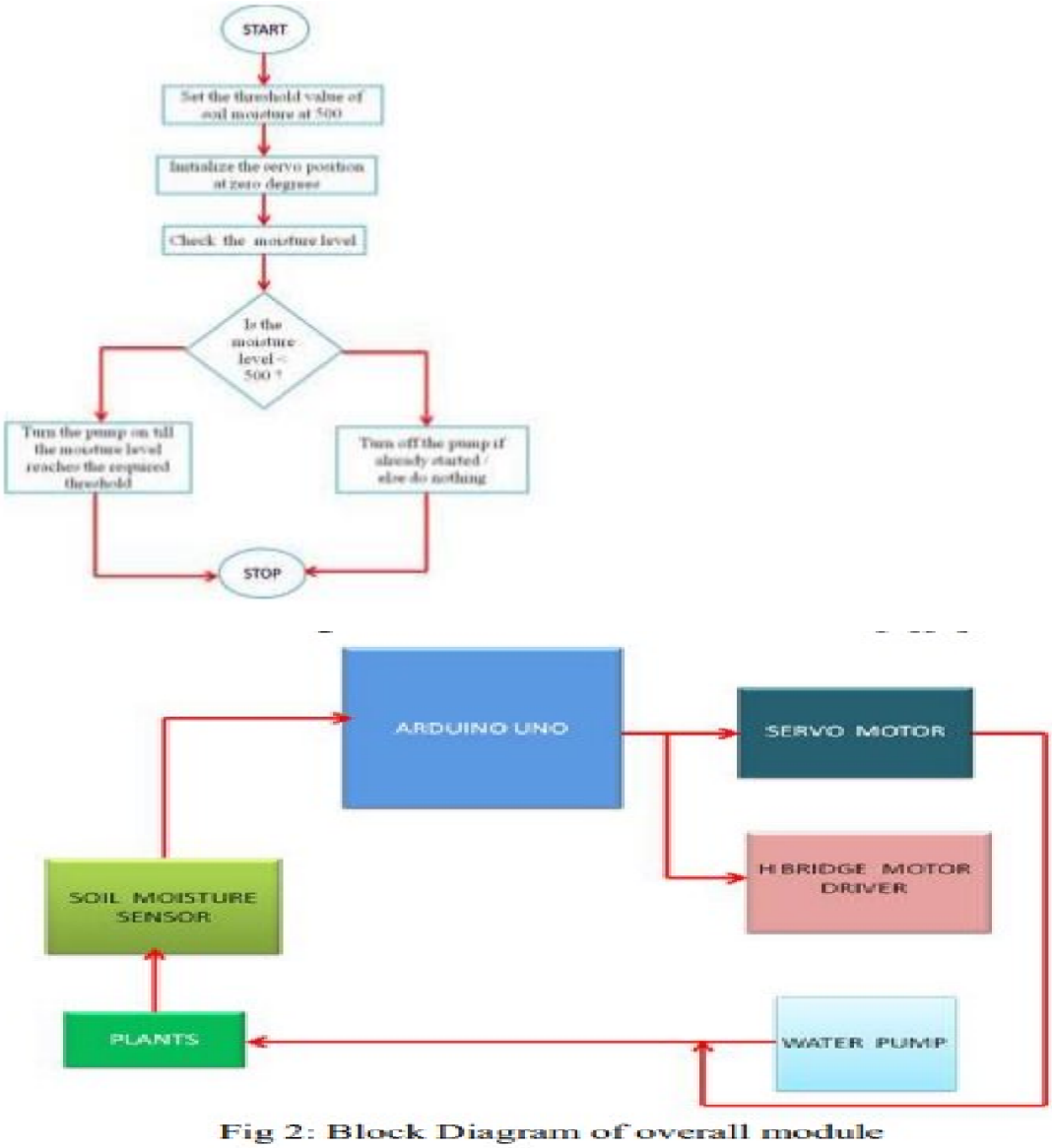


Fig 2: Block Diagram of overall module

A. Testing of soil moisture using soil moisture sensor

In this working module one of the major objectives is to arrive at the threshold value of soil moisture level using soil moisture sensor. The soil moisture sensor has been tested using Arduino board

b) Circuit Description

In the given block diagram describe the connections where the sensor has three pins as Vcc, ground and an analog out. The Vcc pin is connected to the 5V pin of Arduino, ground to the ground while the analog out is connected to the A0 pin of the Arduino. This sends the analog value of moisture content of the soil to the Arduino.

B. Sweep the shaft of a servo motor back and forth across 180 degrees.

In this proposed module, the design is to test the sweeping action of the servo motor has been described.

a) **Circuit Description**

The servo motor has a female connector with three wired pins whose connections are described in the table above. The orange wire (control signal wire) connects to pin

C. Testing the workability of the water pump using H bridge Motor Driver (IC L298N) and Arduino UNO Board

. The objective of this section is to switch on/off the water pump using H Bridge Motor Driver (IC L298N) and Arduino UNO Board. The basic block has described in this section.

a) **Circuit Description As described below**

The out1 and out 2 pins are used to connect the two leads of the pump. The and the GND pins are for connecting the external power supply (a 9V battery), needed to support the pump while the In2 pin goes straight to the digital pin 3 of the Arduino so as to receive signal to control the on/off function of the pump

D. Automated plaint watering system

The ultimate goal of this paper is to combine the above stages and with little modification to the above test codes, make our model that is Arduino based plant watering system.

a) Circuit Description

The connections are made as shown above. The analog pin A0 on the Arduino receives the moisture content of the soil from the moisture sensor that is inserted into the soil. A decision is made by the microcontroller whether to active the pump, on the basis of comparison of the received moisture value with a pre-set threshold value [6]. If the

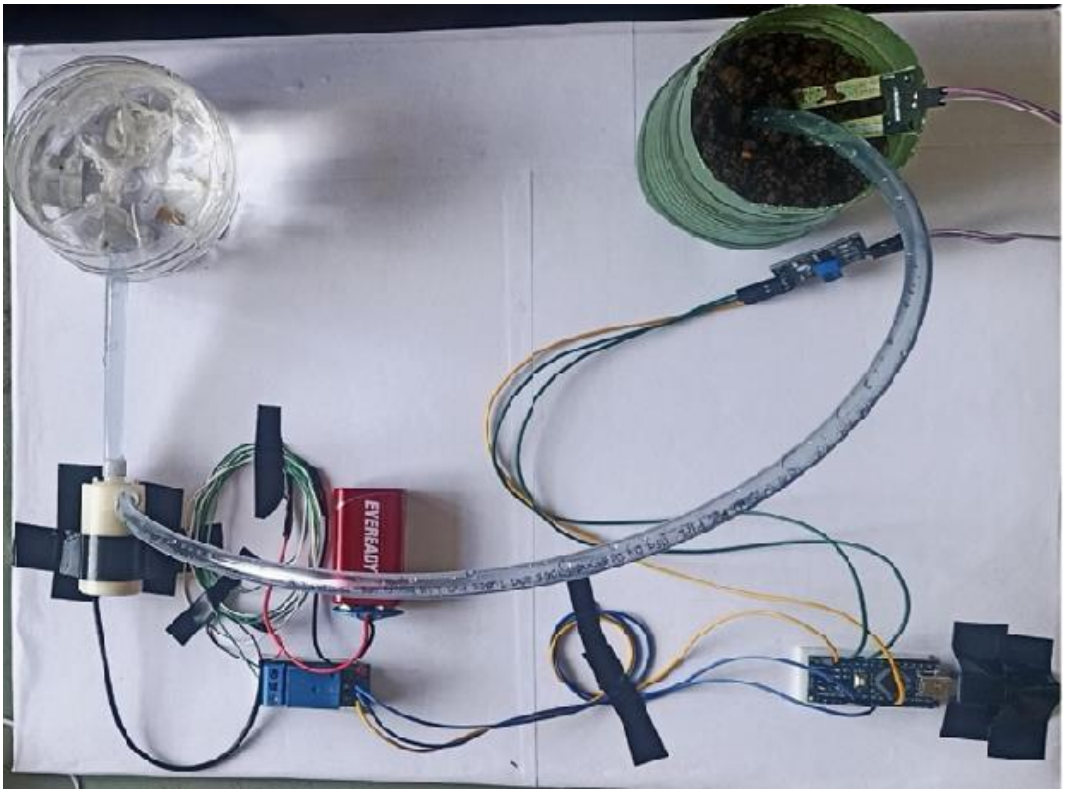
detected moisture value is less than the threshold, the motor driver module receives a signal from the controller through pin 3 to switch ON the pump and get ready to water the plant. The servo motor, in the meantime also receives the position of the plant from pin 9 to swipe and direct the pipe attached to its shaft towards the plant. Now the plant is watered. As the moisture level goes up, reaches or exceeds the threshold, the pump is switched OFF by the driver. If the moisture level is more than the threshold, the microcontroller knows that the soil is moist enough. So, the pump remains off [7][8][9].

PROGRAM FOR ARDIUNO NANO

```
int water; //random variable
void setup() {
pinMode(3,OUTPUT); //output pin for relay board, this will sent signal to
the relay
pinMode(6,INPUT); //input pin coming from soil sensor
}
void loop() {
water = digitalRead(6);  // reading the coming signal from the soil sensor
if(water == HIGH) // if water level is full then cut the relay
{
digitalWrite(3,LOW); // low is to cut the relay
}
else
{
digitalWrite(3,HIGH); //high to continue proving signal and water supply
}
delay(400);
}
```

LIST OF PHOTOGRAPHS

1.Construction of automatic sytem for watering plants:

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CHAPTER:3
CONCLUSION

Design and implementation of automated plant watering system using Arduino was successfully established and tested. 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 sensor measures the moisture level (water content) of the potted plant. If the moisture level is found to be below the desired level, the moisture sensor sends the signal to the Arduino board which triggers the water pump to turn ON and supply the water to plant using the rotating platform of the servo motor. 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. In our model, we have used a single soil moisture sensor. We can extend it to water five more plants by using more sensors connected to the rest of the analog pins of Arduino Uno. Moreover, if we use Arduino Mega 2560, we can water more plants since it has more number of analog input pins. A Light Emitting Diode and a buzzer can be used to indicate that the water tank is empty and it needs to be refilled. We can add a bluetooth module or a GSM module to wirelessly control the watering of the plants. Finally, we can also add an Ethernet or Wireless-Fidelity shield and use the Twitter library, which will tweet from your plants side to send messages.

REFERENCE:

- **https://youtu.be/iwkE_HWU-6M?feature=shared**
- **https://youtu.be/EFvbS6XzTVo?feature=shared**