EMBEDDED SYSTEM & INTERNET OF THINGS LAB

Title: Automatic Plant Watering System Using Arduino Uno

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**Requirements**:

* Arduino Uno
* Moisture Sensor
* 5V DC motor
* Jumper Wires
* Bread Board
* Water Tube

Moisture sensor specification:

Soil moisture sensor FC-28

Input voltage: 3.3 – 5V

Output Voltage: 0 – 4.2V

Arduino Uno specifications:

Operating Voltage: 5 Volts

Input Voltage: 7 to 20 Volts

Digital I/O Pins: 14

Clock Speed: 16 MHz

**Working principle**:

In this system, soil moisture sensor senses the moisture level of the soil. If soil will get dry, then sensor senses low moisture level and automatically switches on the water pump to supply water to the plant. As plant get sufficient water and soil get wet then sensor senses enough moisture in soil. After which the water pump will automatically turn off.

DC Motor:

We used DC motor to make water pump. DC motor has two leads one is positive and another one is negative. If we connect them directly to the Arduino board then it will damage the board. To overcome this problem, NPN transistor is used to control the switching activity of the motor according to the code.

Soil moisture sensor:

The soil moisture sensor consists of two leads that are used to measure volume of water content in soil. These leads allow the current to pass through the soil and in return calculates the resistance value to measure the moisture level. If there is more water in soil then soil will conduct more electricity, means less resistance value along with high level of moisture. In the same manner if there is less water in soil then soil will conduct less electricity, means high resistance value along with low level of moisture.

Diagram

Description automatically generated

Black coloured wire for ground, red-coloured wire for VCC and blue coloured wires for Arduino inputs.

Arduino pin 13 (named as WATERPUMP in code) is used to turn on and off the transistor. According to the code to control the speed of the motor we need to enter a value between 0 and 255 in the Serial Monitor. We used 200 value for the speed of the motor.

Code:

int WATERPUMP = 13; //motor pump connected to pin 13

int sensor = 8; //sensor digital pin vonnected to pin 8

int val; //This variable stores the value received from Soil moisture sensor.

void setup() {

pinMode(13,OUTPUT); //Set pin 13 as OUTPUT pin

pinMode(8,INPUT); //Set pin 8 as input pin, to receive data from Soil moisture sensor.

//Initialize serial and wait for port to open:

Serial.begin(9600); // opens serial port, sets data rate to 9600 bps

while (! Serial);// wait for serial port to connect. Needed for native USB

Serial.println("Speed 0 to 255");

}

void loop()

{

if (Serial.available()) //loop to operate motor

{

int speed = Serial.parseInt(); // to read the number entered as text in the Serial Monitor

if (speed >= 0 && speed <= 255)

{

analogWrite(WATERPUMP, speed);// tuns on the motor at specified speed

}

}

val = digitalRead(8); //Read data from soil moisture sensor

if(val == LOW)

{

digitalWrite(13,LOW); //if soil moisture sensor provides LOW value send LOW value to motor pump and motor pump goes off

}

else

{

digitalWrite(13,HIGH); //if soil moisture sensor provides HIGH value send HIGH value to motor pump and motor pump get on

}

delay(400); //Wait for few second and then continue the loop.

}