Development of Fully Automatic Plant Watering System

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Abstract–The need for this project emerges from the fact that India is a country that strongly relies on the agriculture sector and farming is one of the major occupation of a large population of the country. The cultivation of almost every crop grown in the country requires timely and well calculated watering. Not only the farm-based crops require timely watering but also our household plants need to be fed water at the right time on a regular basis for their proper and expected growth. Many of us face a lot of trouble in taking care of our plants, like their timely watering is a time-consuming issue and sometimes it also happens that we forget to water them. For this purpose, we usually employ professionals like gardeners and care takers, which in the long run appear to be very expensive and a sort of another contention. In such a situation, if the task of watering is fully automated and we don't need a person to look at to water them, it would surely relieve us of the worry of watering our plants on time. This will also save us a lot of money which we had to spend as labour cost and will also eliminate the case when we forget to water our plants.

The system is based on simple, relatively cheap and easily available electronic components like the Arduino Board (UNO variant), a Servo motor, a Soil moisture content sensor, some PVC pipe fittings and attachments.

Another issue that this system takes care of is that it can be accommodated with not only a single plant but by parallelising the water flow, this system can take care of the whole garden. The system is designed such that it is portable, easy to operate and runs on low maintenance.

Keywords: Arduino Board (UNO variant), PVC pipe fittings and attachment, Servo motor, Soil moisture sensor.

1.0 INTRODUCTION.

Having a closer look, explains us the mechanism through which this FULLY AUTOMATIC system works. This can be easily explained with help of a block diagram which gives a walkthrough to the working of the present work:

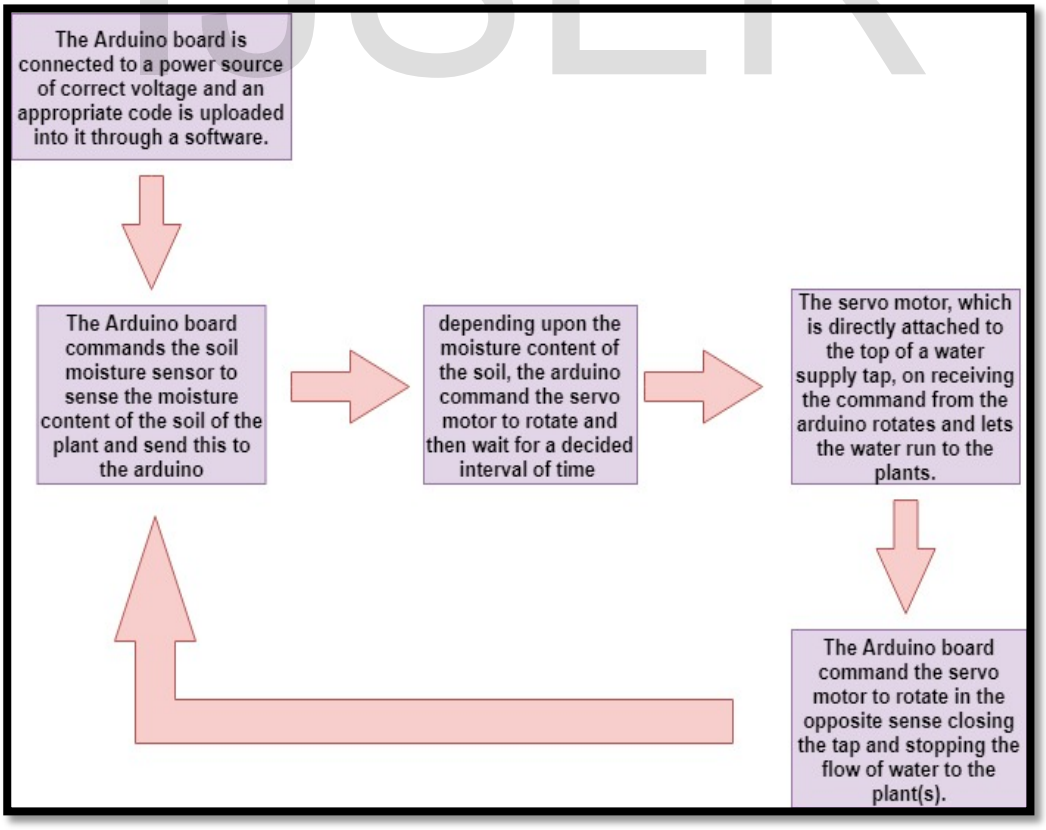

Figure 1. Block diagram of the present work.

An advantage which this system offers is, that it is FULLY AUTOMATED. The user just needs to attach the servo motor assembly to the top of a water supply tap and feed in the code to the Arduino once, then it only requires a 5 Volt power supply to operate.

2.0 ESSENTIAL COMPONENTS USED AND THEIR APPLICATION IN PRESENT WORK.

S. No.	Item	Quantity	Application
1.0	Arduino board (UNO variant).	01	It is the commanding centre and controls the functioning of other components.
2.0	Servo motor.	01	It controls the opening and closing of water tap and thus the water supply.
3.0	Soil moisture content sensor.	01	It measures the moisture content of the soil of the plant.
4.0	Jumper wires	Around 10-15	Used for making connections between various components.

Table 1. List of essential components used in the system.

3.0 ELECTRIC CIRCUIT DIAGRAM OF THE SYSTEM.

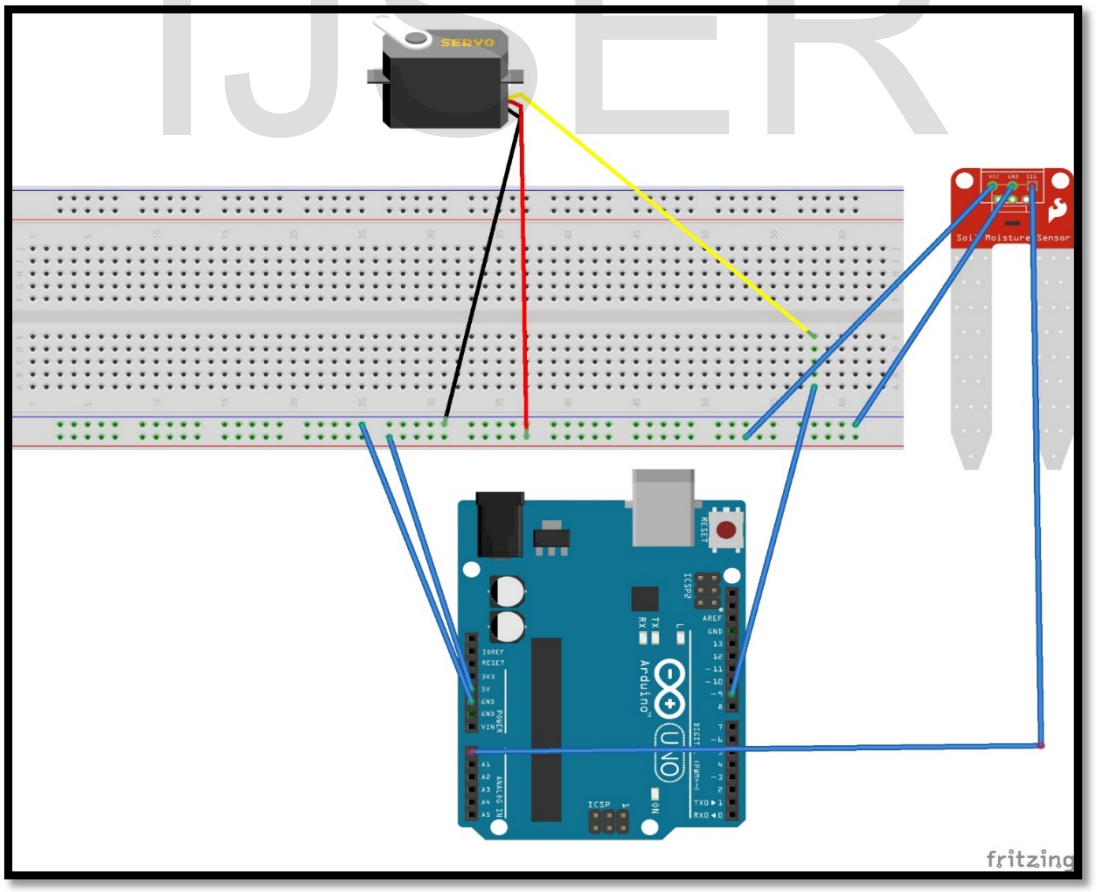

Figure 2. Electric circuit diagram of the present work.

4.0 WORKING METHODOLOGY.

STEP 1:

After setting-up all the electric connections as shown in the electric circuit diagram depicted by Figure 2, the working code is uploaded, which through the Arduino Board commands the moisture sensor to sense the moisture content of the soil.

STEP 2:

The soil moisture sensor returns the moisture content value to the Arduino which compares this value with an already fed correct and standard value of the moisture content.

STEP 3:

If the value is less than the standard value, then the Arduino commands the Servo motor, which is attached to the top of a water supply tap, to rotate, enabling the water to flow to the plant thereby watering it. Once watered, the motor rotates in the opposite direction closing the tap and thus the flow of water stops.

If the value is greater than or equal to the set value, the motor does not rotate and thus no water goes to the plant.

STEP 4:

After a certain desired interval of time, the Arduino again commands the moisture sensor to sense the moisture content value and STEP 1 is repeated.

5.0 DRIVING CODE OF THE SYSTEM.

```
Servo servo1;
int angle = 0;
int sensor_pin = A0;
int output_value;
void setup() {
  // put your setup code here, to run once:
Serial.begin(9600);
servo1.attach(9);
}

void loop() {
output_value = analogRead(sensor_pin);
output_value = map(output_value,550,10,0,100);
if(output_value<30)
{
  for(angle =0; angle<180; angle++)
  {
    servo1.write(angle);
    delay(15);
  }
  delay(5000);
  for(angle=180; angle>=1; angle-=5)
  {
    servo1.write(angle);
    delay(5);
  }
  delay(28800000)
}
```


Figure3. Driving code of the present work.

6.0 3-D CAD MODEL OF THE SYSTEM

A three-dimensional CAD model of the present work provides a better insight and understanding of the working of the system.

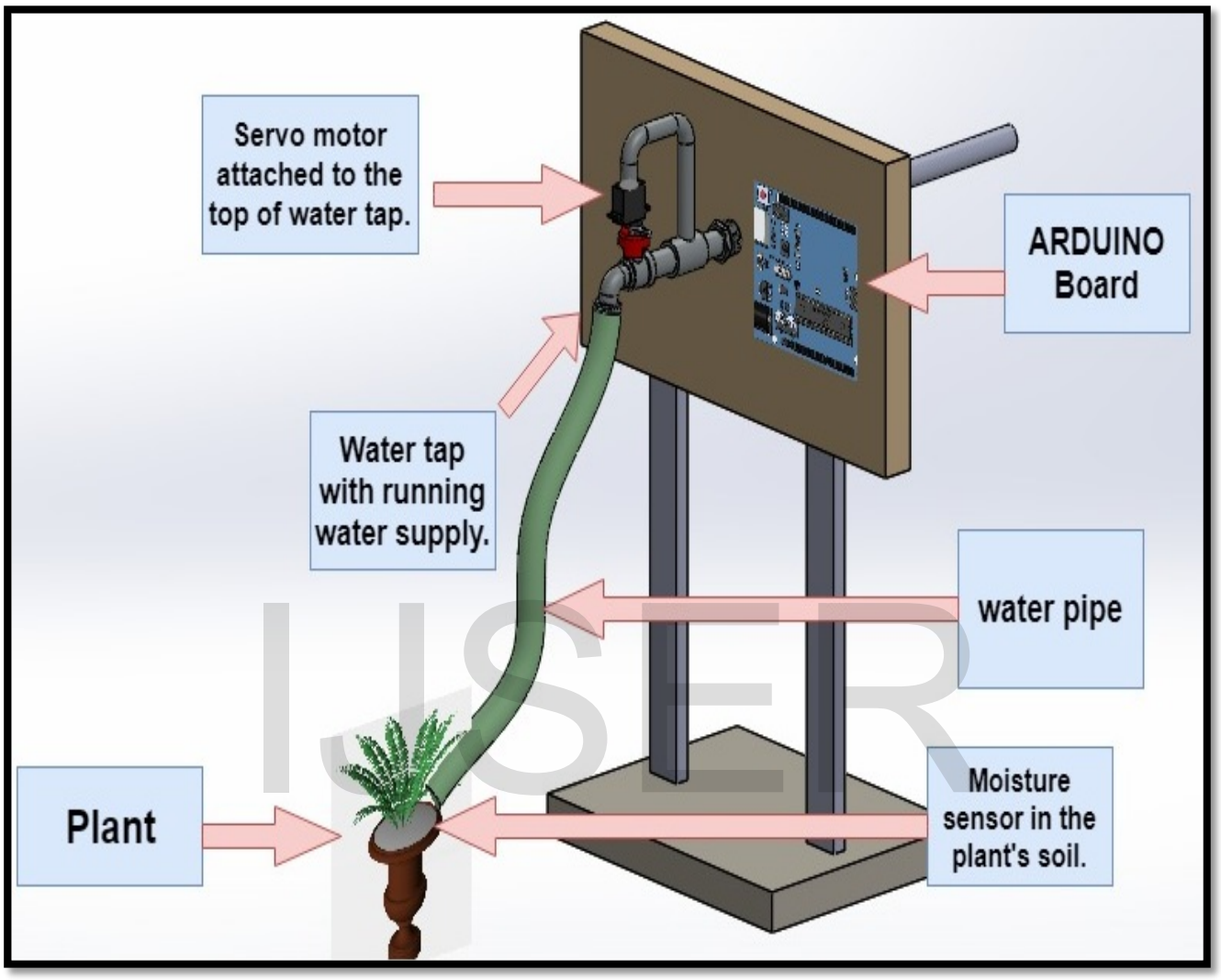

Figure 4. 3-D CAD Model of the present work.

7.0 CONCLUSION

The present setup was tested for the job intended and was found to be working satisfactorily. The work on this project is expected to promote automation and intends to facilitate the society. This system has been designed not only to reduce human effort but also support the users by reducing their financial expenses. This project also illustrates how technology can be successfully incorporated within day to day simple tasks even like watering our plants. This project has also been designed to be applied in agriculture sector and work on a larger scale after having done some modifications.

Application of technology for reducing the efforts and providing an assistance in any possible way is its best utilization, which this system intends to achieve.

8.0 REFERENCES

[1] Arduino Based Automatic Plant Watering System by S.V. Devika, Sk. Khamuruddeen, Sk. Khamurunnisa, Jayant Thota, Khalesha Shaik. (Accessed on 10-06-2018)

[2] Automatic Plant Watering System by Abhishek Gupta, Shailesh Kumawat, Shubham Garg. (Accessed on 10-06-2018)

[3] Sensor Based Automated Irrigation System by Darshana Chaware, Ashwini Raut, Mrunal Panse, Aniruddha Koparkar. (Accessed on 10-06-2018)

[4] Fritzing (schematic diagram making open software).

[5] www.draw.io (Accessed on 20-06-2018).

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