Smart Irrigation System using IoT

T.E. mini-project report

By

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3.3 SYSTEM ARCHITECTURE

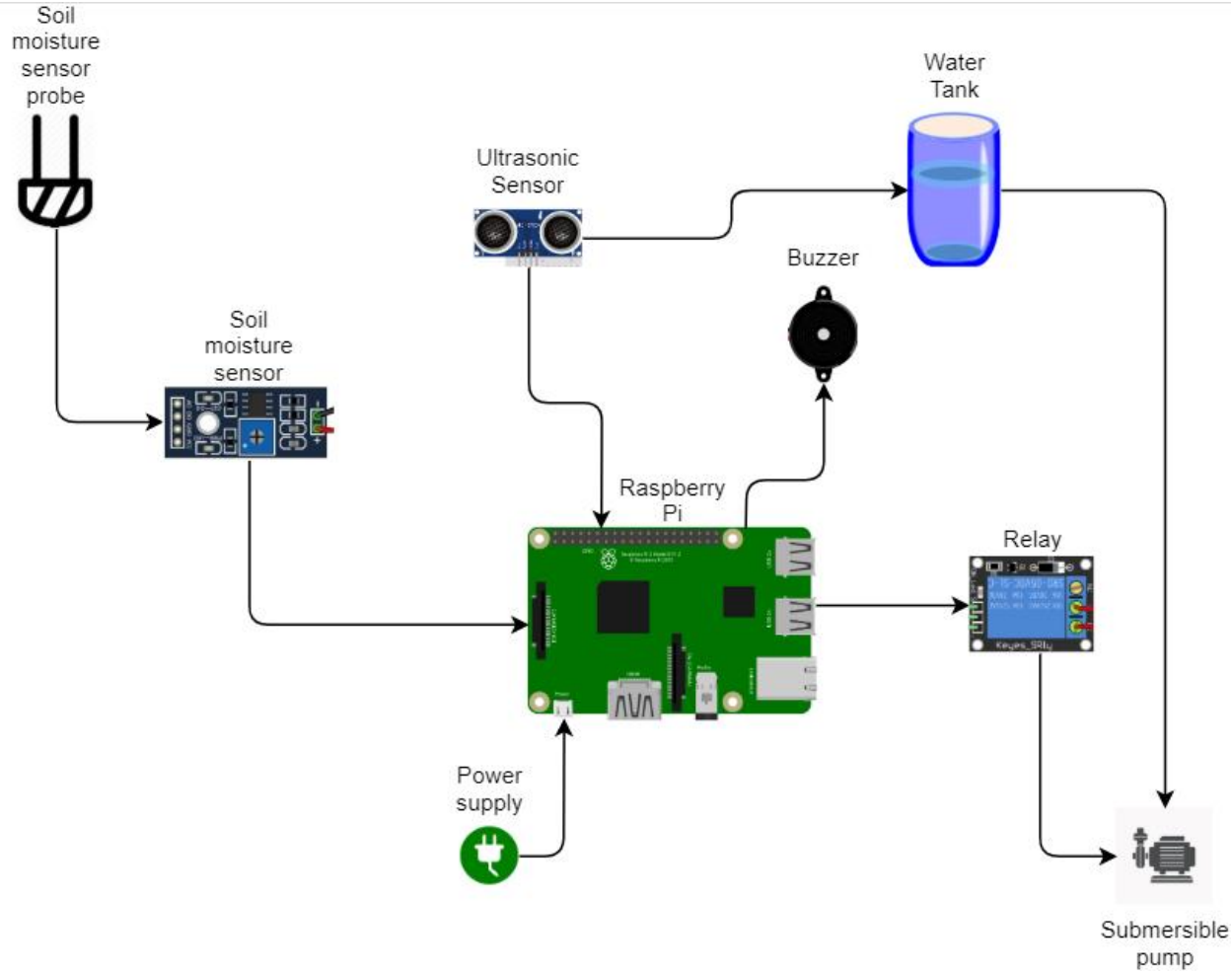

Figure 1: System Architecture

3.4 IMPLEMENTATION

The connection of all components of this project is been given below figure. There is raspberry pi, soil moisture sensor, ultrasonic sensor, relay and motor.

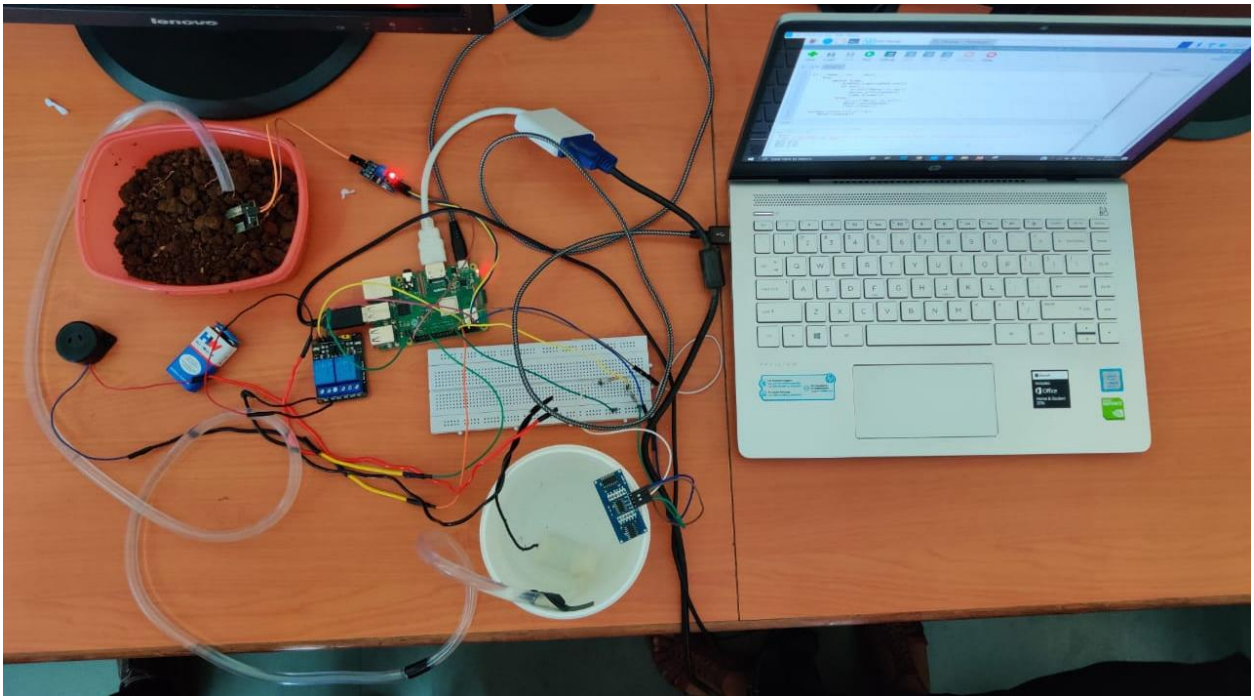

Figure 2: Hardware Connection

3.5 SYSTEM OVERVIEW

This system has function of the various components such as Raspberry Pi, soil moisture sensor, ultrasonic sensor and relay.

3.5.1 RASPBERRY PI

The sensor technology to automate irrigation improves water usage efficiency. The raspberry pi is a small single board computer which is been used to teach computer science. The raspberry pi is been used as computer where external memory can be used and it has four ports where any input devices can be connected. This project uses raspberry pi for easy process and installation.

3.5.2 SOIL MOISTURE SENSOR

Sensors are the devices which converts the physical parameter into the electric signals. The output of the sensor is analog signal; the signal is converted into digital signal and then fed into processor. The soil moisture sensor is used to measure the moisture content of the soil. The conductivity between the electrodes helps to measure the moisture content level. If the moisture content is low, the sensor sends signal to raspberry pi and then raspberry pi provides input signals to relay and it turns on the motor. After the detection of sufficient moisture content in the soil, the motor is turned off.

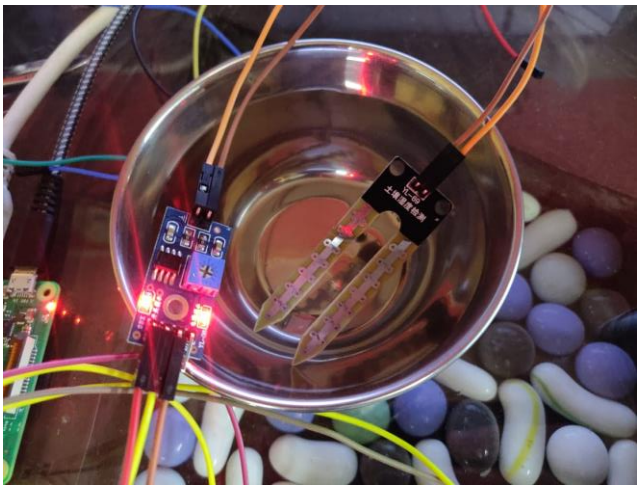

Figure 3: Soil moisture sensor

3.5.3 ULTRASONIC SENSOR

As the name indicates, ultrasonic sensor measure distance by ultrasonic waves. The sensor head emits an ultrasonic wave and receives the wave reflected back from the target. It measures the distance to the target by measuring the time between the emission and reception. In this system we use it to measure the distance from the ultrasonic sensor to the water present in the tank. Thus we can know, the tank from where the water is supplied to the plants has sufficient amount of water. The minimum length is predefined in the code. If the distance excess the value, ultrasonic sensor sends signals to raspberry pi and thus a buzzer beeps indicating the owner to fill the tank.

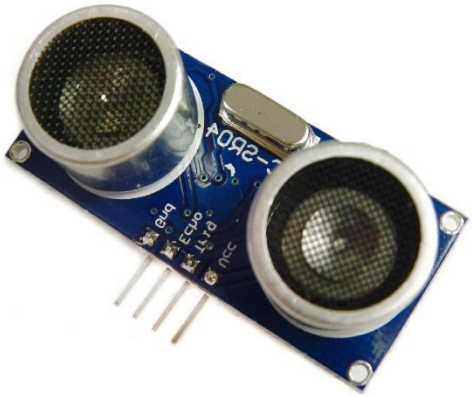

Figure 4: Ultrasonic sensor

3.5.4 RELAY

A relay is an electrically operated switch. It consist of a set of input terminals for a single or multiple control signals, and asset of operating contact terminals. The switch may have any number of contact in multiple contact forms, such as make contacts, break contacts, or combination. In our system we use to switch on or switch the motor.

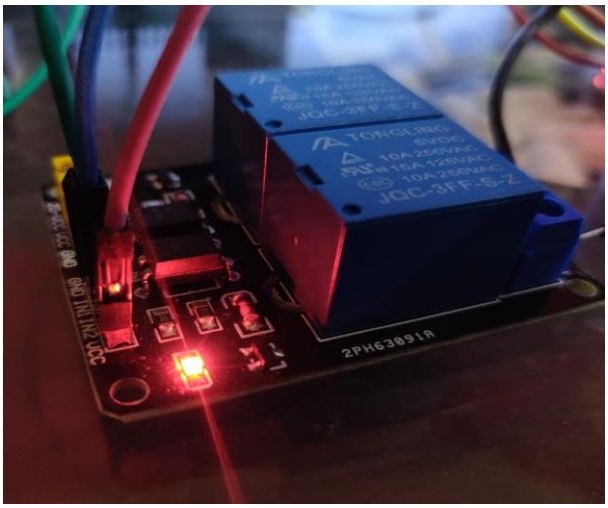

Figure 5: Relay

4.0 RESULTS

```
a1.py  a2.py

38
39  try:
40      while True:
41          distance = measure()
42          print ("Distance : %.1f" % distance)
43          if distance<=5:
44              GPIO.output(GPIO_SENSOR,0)
45          else:
46              GPIO.output(GPIO_SENSOR,1)
47
48
49          time.sleep(.5)
50  except KeyboardInterrupt:
51      GPIO.output(GPIO_SENSOR,0)
52      GPIO.cleanup()
53
54

Shell
>>> %Run a2.py

  Ultrasonic Measurement
  Distance : 6.6
  Distance : 6.5
  Distance : 6.6
  Distance : 6.5
  Distance : 6.5
  Distance : 6.5
  Distance : 6.6
  Distance : 6.4
  Distance : 5.5
  Distance : 6.4
  Distance : 6.1
  Distance : 5.7
```

Figure 6: Result of ultrasonic sensor

```
a1.py  a2.py

21
22  if __name__ == '__main__':
23      try:
24          while True:
25              a=GPIO.input(GPIO_soil)
26              if a==1:
27                  print("Motor is on")
28                  motor_off(channel)
29                  time.sleep(5)
30              else:
31                  print("Motor is off")
32                  motor_on(channel)
33                  time.sleep(5)
34
35      except KeyboardInterrupt:
36          GPIO.cleanup()
37

Shell

========== RESTART ==========
>>> %Run a1.py

  Start..
  a1.py:10: RuntimeWarning: This channel is already in use, continuing anyway.  Use GPIO.setwarnings(False) to disable warnings.
    GPIO.setup(channel, GPIO.OUT)
  Motor is on
  Motor is on
  Motor is off
  Motor is off
```

Figure 7: Result of soil moisture sensor

5.1 REFERENCES

[1] S.N. Ishak, N.N.N.Abd Malik, sN.M. Abdul Latiff, N. Effiyana Ghazali, M. A. Baharudin "Smart Home Garden Irrigation System Using Raspberry Pi", IEEE 13th Malaysia International Conference on Communication, 28-30 Nov. 2017.

[2] Chandan kumar Sahu, Pramitee Behera, "A Low Cost Smart Irrigation Control System", International Conference on Electronics and Communication System, 2015.

[3] Shavarsidha Gunde, Prof. A. K. Chikaraddi, Dr. V. P. Baligar, "IOT Based Flow Control System Using Raspberry PI", International Conference on Energy, Communication Data Analytics and Soft Computing, 2017.

[4] Vaishali S, Suraj S, Vignesh G, Dhivya S, Udhayakumar S "Mobile Integrated Smart Irrigation Management and Monitoring System Using IOT", International Conference on Communication and Signal Processing, April 6-8 ,2017, India.

[5] Website: www.cyber-omelette.com