The Assignment of IoT

(UE19CS313)

Implementation of physical computing project using sensors and actuators.

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Section: A

Semester: 5

Title: Heater and Fan Manoeuvring System.

a) Identification of a use case for the physical computing project.

The device designed aids a user in switching modes between heater and fan control. The presence of a control switch on the circuit board performs this action. According to the weather, the user has the freedom to select either of the choices.

b) Listing the features planned.

Imperative features:

1. Switch to control the operation between the heater and fan.
2. A temperature sensor to alter the temperature of the heater.
3. A potentiometer to manoeuvre the speed of the fan.
4. All manipulation is done over the Arduino board.

Discretionary features:

1. A servo motor as an actuator to examine the triumphant functioning of the components.
2. An oscilloscope to investigate the variation in the temperature/speed.
3. An LED to keep the amplitude of the wave controlled.

c) Listing the requirements of SW and HW components to realise the project.

Software components:

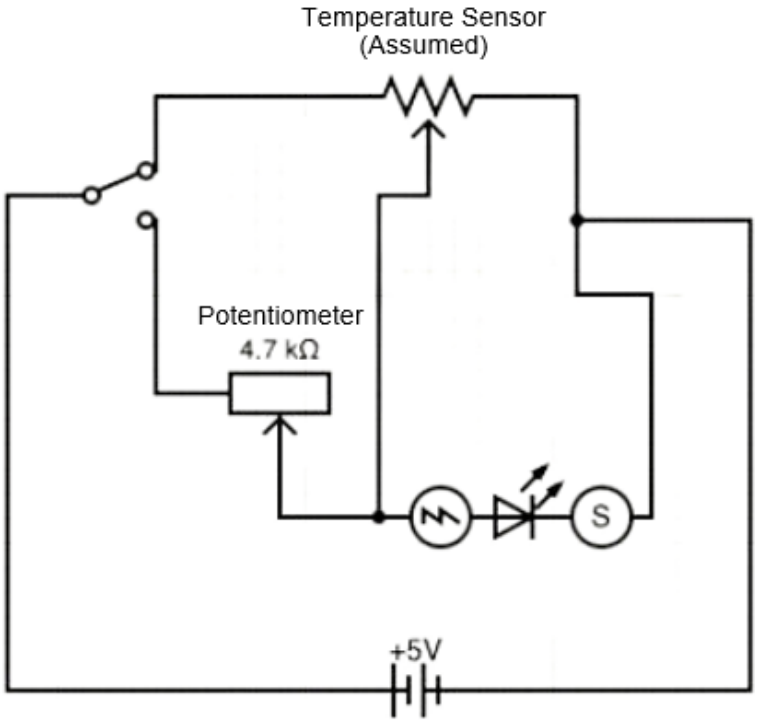
1. C Programme
2. Arduino board IDE

Hardware components:

1. Arduino UNO board
2. Breadboard
3. Servo motor
4. Temperature sensor
5. LED
6. Switch
7. Oscilloscope

d) Coming up with the circuit design for the project.

P.T.O



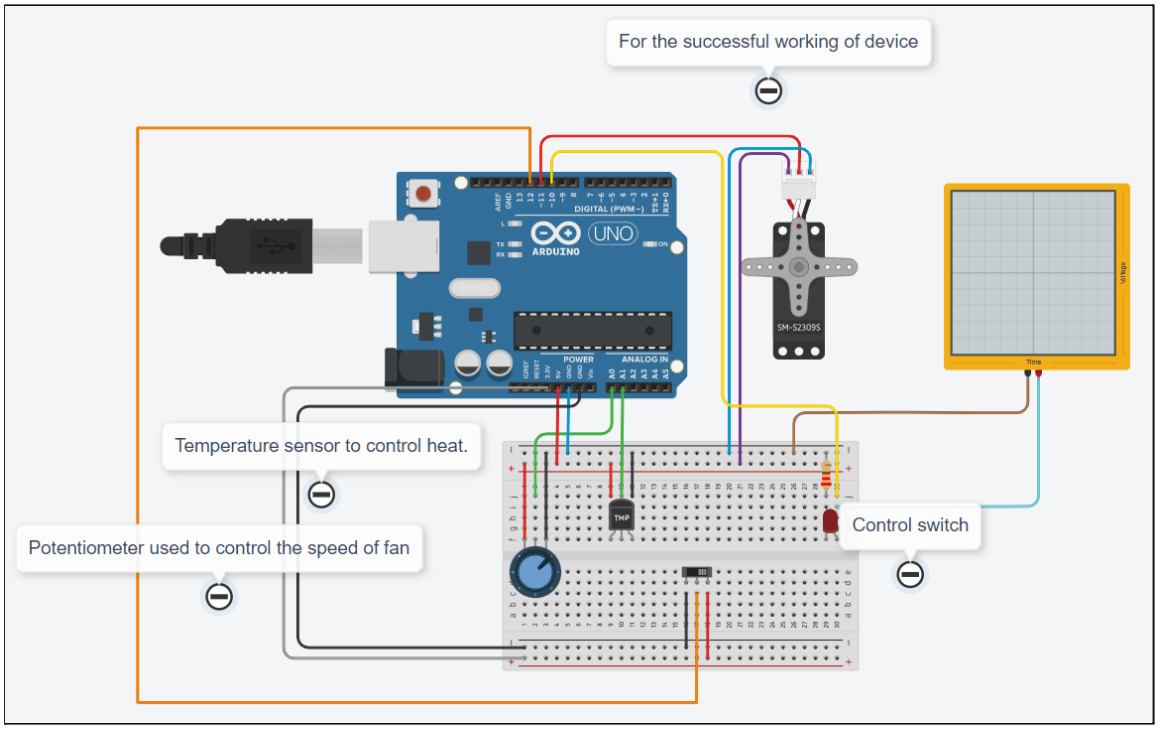
e) Coming up with the necessary logic to implement all the listed features in (b).

```
#include <Servo.h>

int reading=0;
int duty;
int angle;
int switch_pin = 12;
int LED_PIN = 10;

Servo servo_11;

void setup()
{
  pinMode(switch_pin, INPUT);
  pinMode(A0, INPUT);
  pinMode(LED_PIN, OUTPUT);
  servo_11.attach(11);
  pinMode(A1, INPUT);
}
```

```
void loop()
{
  if (digitalRead(switch_pin) == 0) {
       reading = analogRead(A0);
       duty= map(reading,0,1023,0,225);
       analogWrite(LED_PIN, duty);
       angle= map(reading,0,1023,0,180);
       servo_11.write(angle);
  }
  else {
       reading = analogRead(A1);
       duty= map(reading,20,359,0,255);
       analogWrite(LED_PIN, duty);
       angle= map(reading,20,359,0,180);
       servo_11.write(angle);
  }
  delay(100);
}
```

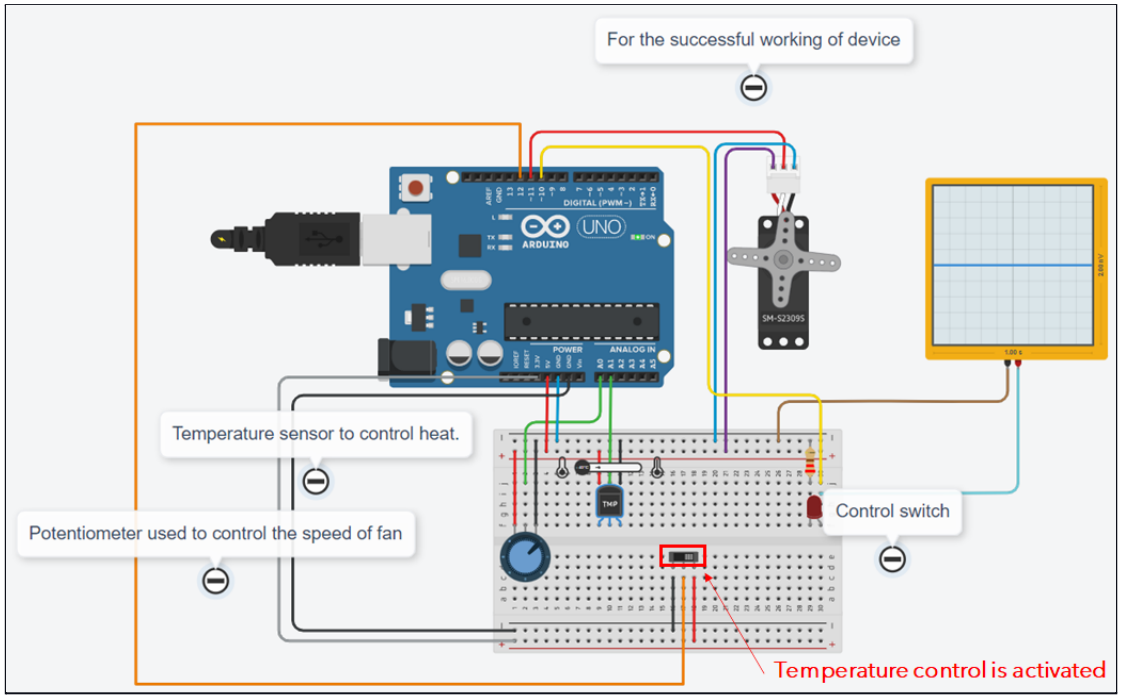
f) Testing and Packaging the circuit.

The finalised circuit:

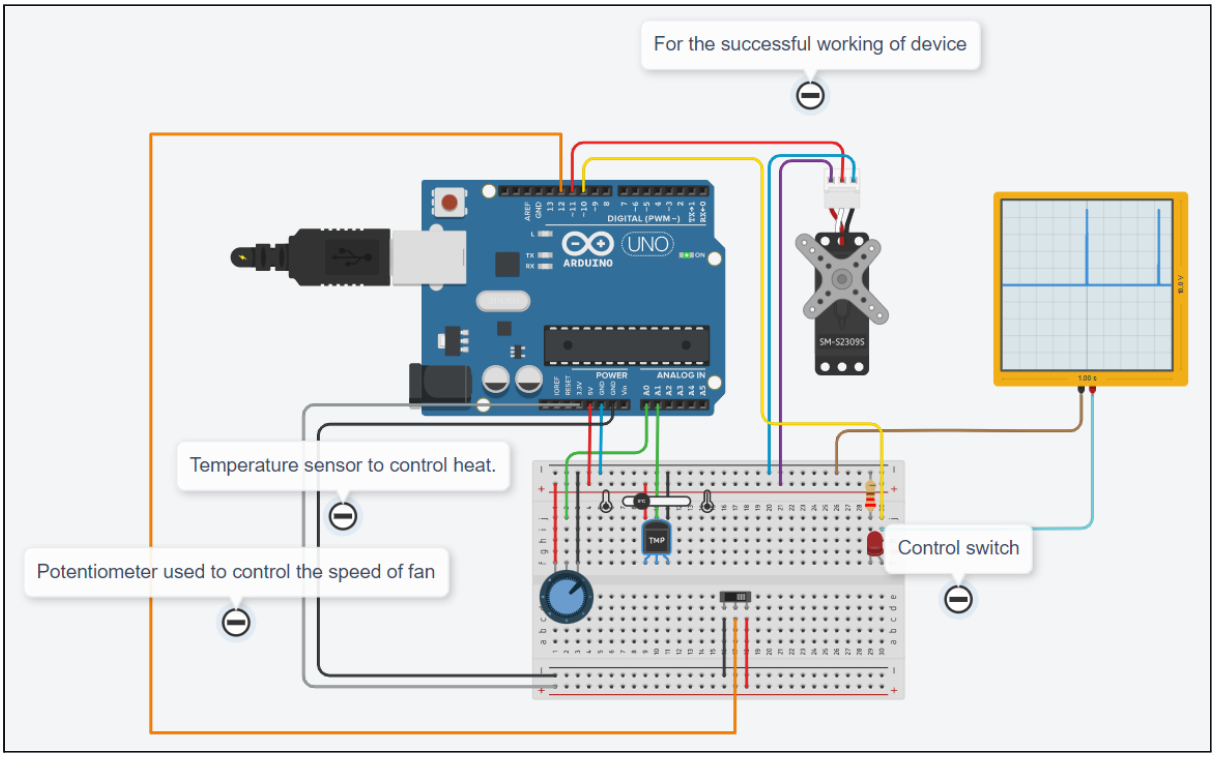


Testing/Simulating the devised circuit:

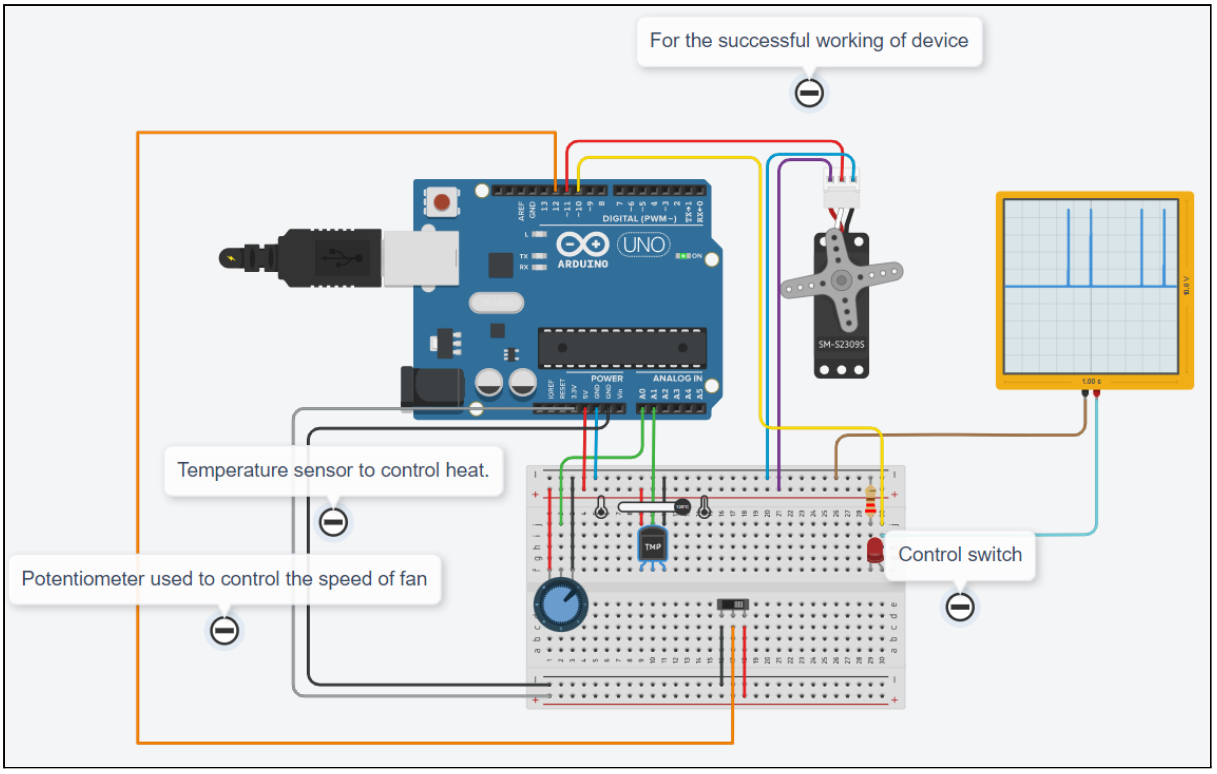
1. Manipulating the temperature (heater):



The servo motor stays immobile at -40 degrees and there's zero deflection in the waveform on the oscilloscope.

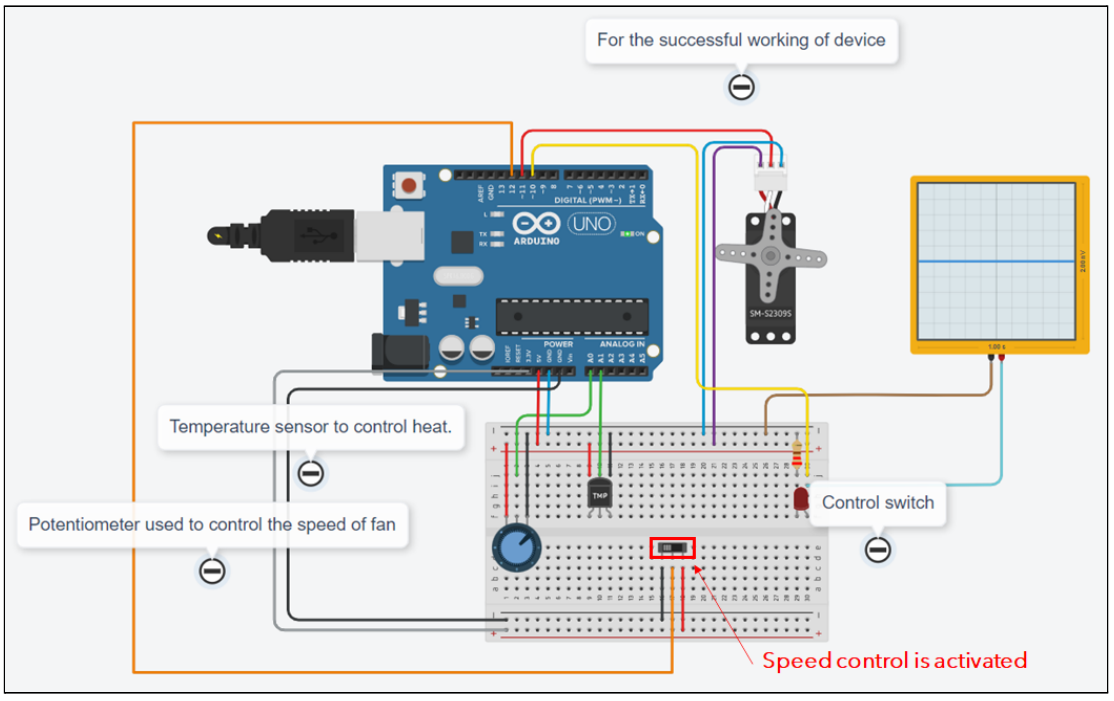


There's deflection observed in both, the servo motor and the oscilloscope on increasing the temperature to zero degrees. The LED bulb too, lights up.

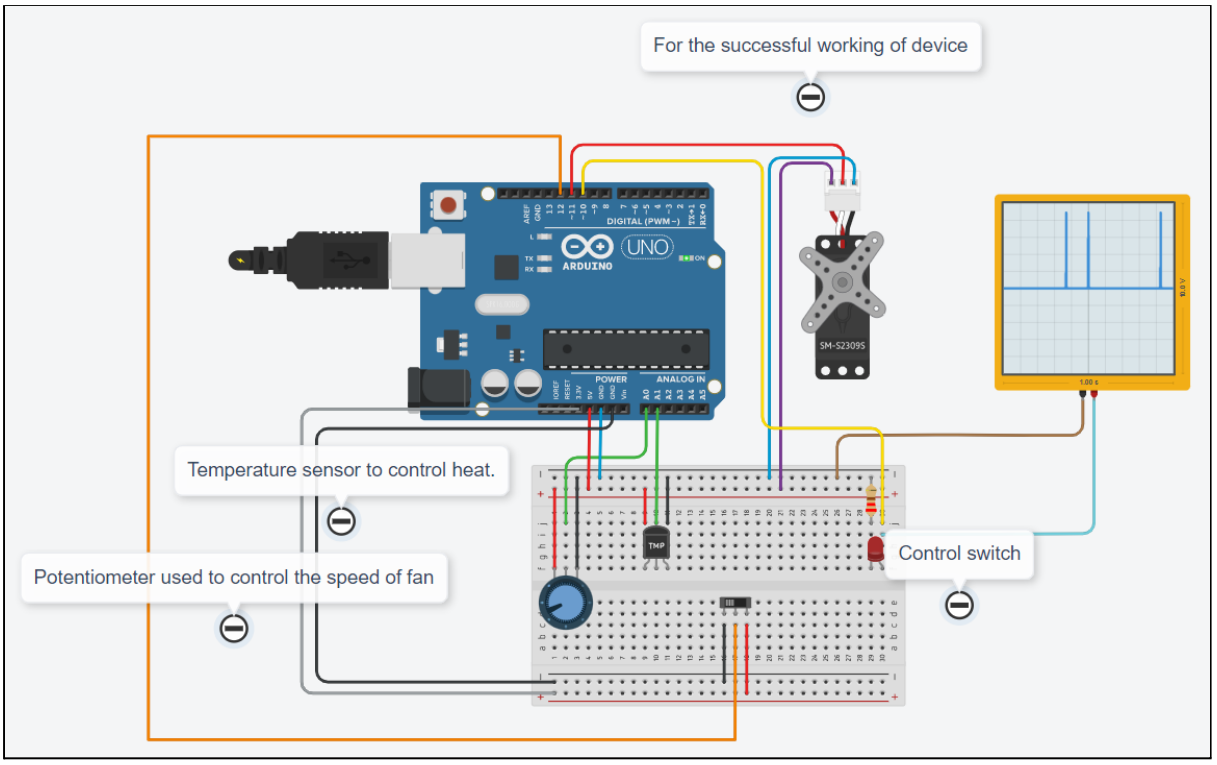


For full temperature, a massive rise in the crests of the oscilloscope is observed. The servo motor also shows great movement. Henceforth, the heater functions triumphantly.

2. Manipulating the potentiometer (fan):



The servo motor stays immobile when the potentiometer remains untouched, and there's zero deflection in the waveform on the oscilloscope.



On altering the value read by the potentiometer, the servo motor and the oscilloscope displays deflection. Henceforth, the fan is manipulated triumphantly.

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