

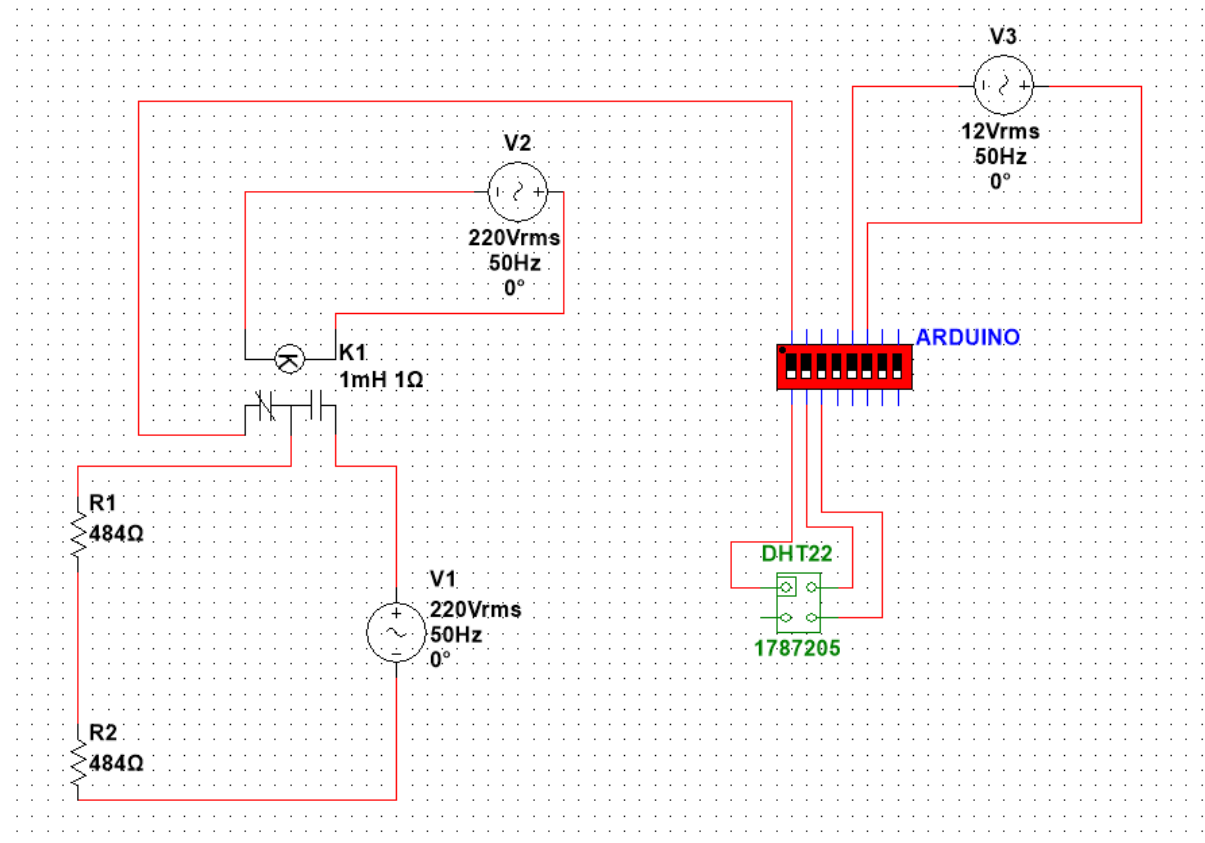
Abstract

To build an incubator I needed a closed system that could be heated and humidified according to the needs of an egg. We used an a controller that turned the heating on and off according to the rise or fall in the temperature. The egg needs an optimum temperature and humidity level in order to hatch. We provided that in a closed box.

Introduction

We built an incubator for our project. An incubator is a divided that is used to hatch eggs artificially. It provides the optimum humidity and temperature level to ensure a healthy chick. I achieved this using a humidity/temperature sensor, heating system, a control unit.

Diagram



Component details

Bulbs

- I used two 100 watts bulbs attached in series to act as the heating system for my incubator.

Relay

- I used a relay to turn the bulbs on and off according to the rise and fall in the temperature.

Sensor (DHT22 T/H probe)

- For sensing temperature and humidity, I simply used a sensor known as DHT22 T/H probe. It tells the humidity level and the surrounding temperature in Celsius.

Fan

- I used a fan to circulate the air inside the box so that the heat may not accumulate at a single place.

Wires

- I used different type of wires to conduct the current through out the system.

12 volt power adapter

- Attached to the main supply, it converted the 220 vols coming from the main to 12 volt that drove my Arduino UNO.

Arduino UNO

- It acted as the main controlling unit of the system. It turned the bulbs on and off, and also took input from the DHT22 T/H probe.

Working

The bulbs (connected in series) were connected by a wire to the main supply. They received 220 voltages and provided the heat inside the box. On the live wire attached to the bulbs, I connected the relay. The relay was attached to a separate 5-volt source. And then the relay was also attached to the Arduino. The -Vcc was attached to the live wire coming from the 5-volt source and then the +Vcc was attached to the 5-volt coming from the Arduino. The ground was used from the 5-volt source and then the in2 pin was connected to the pin number 7 of the Arduino. The sensor was provided 5-volt from the Arduino and the out wire of the sensor was connected to the pin number 2 of the Arduino UNO. The sensor sent the signal according to the temperature to the Arduino. And the Arduino further sent signal to the relay. If the temperature rose above a certain thresh hold (38 degree Celsius), the signal was sent from the Arduino and the relay turned on. Thus, the circuit was broken. And if the temperature dropped below a certain point the (37 degree Celsius) the Arduino sent a signal (1) and the relay turned off, turning the bulbs on.

Code

```
#include <DHT.h>;
```

```

#define DHTPIN 2           // what pin we're connected to
#define DHTTYPE DHT22      // DHT 22  (AM2302)
DHT dht(DHTPIN, DHTTYPE); // Initialize DHT sensor for normal 16mhz Arduino

int chk;
float hum;                 //Stores humidity value
float temp;               //Stores temperature value
int relay = 7;
void setup()
{
  Serial.begin(9600);
  pinMode(relay, OUTPUT);
  dht.begin();
}

void loop() {

  hum = dht.readHumidity();
  temp = dht.readTemperature();
  Serial.print("Humidity: ");
  Serial.print(hum);
  Serial.print(" %, Temp: ");
  Serial.print(temp);
  Serial.println(" Celsius");
  if (temp < 37)
  {
    digitalWrite(relay, HIGH);
    delay(1000);
  }
  else if (temp > 38)
  {
    digitalWrite(relay, LOW);
    delay(1000);
  }
}

```

Simulated results

The incubator worked perfectly. When the temperature rose above the designated value the bulbs turned off, when the temperature dropped the bulbs turned on.

Conclusion

The relay works as a switch that can either break or join a circuit. We always add the relay in series with out components. When the Arduino is sending signals (digital HIGH) to the relay,

the turns on. But when there is no signal incoming the relay turns off and the circuit is broken.

Reference

Just used youtube to understand the workings of the relay.

<https://www.youtube.com/watch?v=58XWVDnB7Ss>