REGULATION OF INDOOR HUMIDITY FOR PLANT GROWTH

Project report submitted to the Central Board of Secondary Education in partial fulfilment of the requirement for the award of

Senior Secondary
By

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Under the guidance of

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CERTIFICATE

This is to certify that the project entitled REGULATION OF INDOOR HUMIDITY FOR PLANT GROWTH which is being submitted by Abinav Bino is the bonafide record of the work carried out by her in standard XII at Nirmala Matha Central School, Thrissur in the year 2022-2023.

External Examiner **Principal** **Teacher in Charge**

ACKNOWLEDGEMENT

I would like to express my special thanks and gratitude to Rev. Sr. Linsa Maria, Principal, Nirmala Matha Central School, Thrissur for granting me all the facilities for the completion of my project.

I would like to give special thanks to Mrs Rani Sankoorikal, Mrs Sinta and members of the Department of Biology, for their valuable advises, vital support and encouragement during the various phases of work.

Secondly, I would like to thank my parents and friends who helped me a lot in finalizing the project within the limited time frame.

ABINAV BINO

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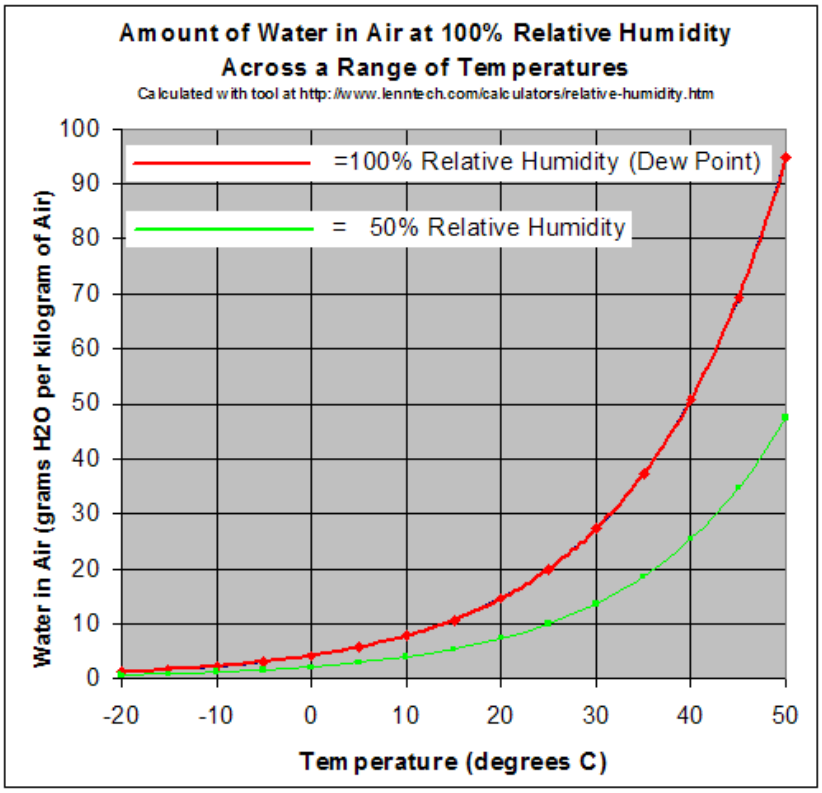
HUMIDITY

Humidity is the concentration of water vapor present in the air. Water vapor, the gaseous state of water, is generally invisible to the human eye. Humidity indicates the likelihood for precipitation, dew, or fog to be present.

The relative humidity of an air-water mixture is defined as the ratio of the partial pressure of water vapor in the mixture to the equilibrium vapor pressure of water over a flat surface of pure water at a given temperature



EFFECT OF HUMIDITY ON PLANTS

Plants absorb water through the roots and then give off water vapor through pores in their leaves. The drier or the hotter the air temperature, the faster the transpiration rate from the plant. However, the moisture deficit and transpiration rate are not directly related. This means that in very dry air, the increased rate of transpiration can only go so high in the plant and then it begins to wilt. For example, if the air is extremely dry, but the growing medium has enough water, the plant may wilt and, unless the humidity increases, the plant could die.

Humidity Too Low	Humidity Too High
Wilting	Soft growth
Stunted plants	Increased foliar disease
Smaller leaf size	Nutrient deficiencies
Dry tip burn	Increased root disease
Leaf curl	Oedema
Increased infestation of spider mites	Edge burn (guttation)

HUMIDITY AND HOUSEPLANTS

Humidity can be a chief culprit when it comes to the health of your houseplants. Most houseplants come from tropical regions where humidity ranges between 77%-88%, almost double compared to our home environment! In nurseries, they are also provided with perfect humidity levels, like their native environment.

Tropical plants don't do well in low moisture. So, while you are doing your best to take care of them by reading up on all their requirements and marking the calendar for the watering schedule, you may still end up with dry, limp leaves. The humidity levels in your home can be the cause of any unhealthy appearance of your indoor plants.

0% -20%: While the air is too dry for most houseplants at this level, your cacti or succulents will be able to survive till around 10% lowest.

20% – 40%: This will be the average humidity level for most indoor places. Some plants will survive while others, especially tropical plants, will not flower and result in droopy leaves.

40% – 60%: This is the ideal humidity level for most houses during summer and the perfect humidity level for most plants to flourish. With specific ways to increase humidity, such as misting, other plants can also easily survive. This level is also ideal for flowering and vegetation.

60% – 80%: This humidity level can be difficult and uncomfortable to maintain at home but is perfect for a greenhouse. It's most suitable for tropical plants.

80% +: Though not possible at home, tropical plants such as pineapples have incredibly high humidity requirements of around 90%! This level is also perfect for germination and seedling growth.

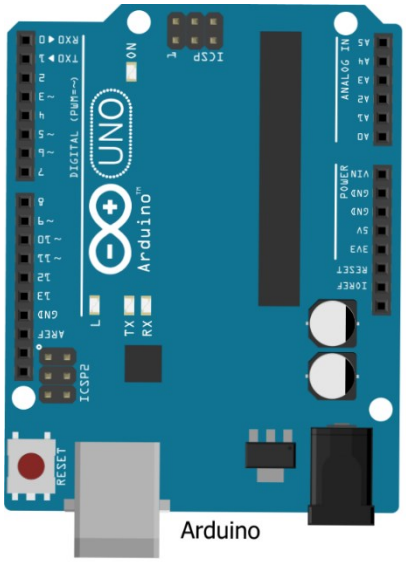
HUMIDITY REGULATOR

AIM

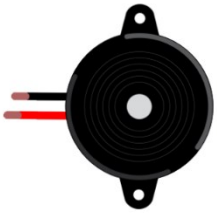
To regulate or maintain a constant humidity (which is higher than the present humidity) in a closed container for indoor plants

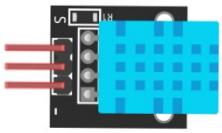
Requirements

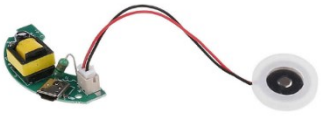
- Arduino UNO
- Breadboard
- Wires
- Buzzer (Optional)
- Humidity sensor (DHT11)
- Ultrasonic atomizer
- Plastic containers



Arduino

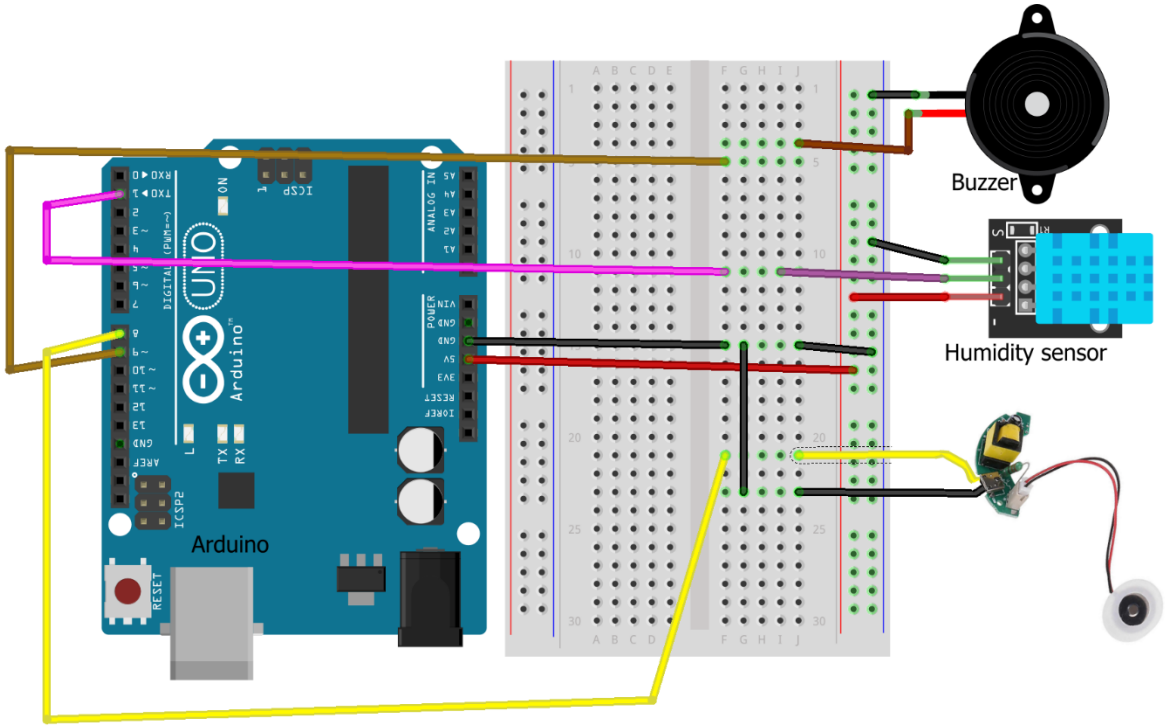

Buzzer


Humidity sensor


Ultrasonic Atomizer

Procedure

1. Connect the following according to the diagram given below



2. Connect the Arduino UNO to the computer and upload the code given below (80% humidity is set as default)

```
int requiredhumidity = 80 ;
// change the above variable to change the humidity

const int atomizer = 8;
const int buzzer = 9 ;
#include "DHT.h"
#define DHTPIN 2
#define DHTTYPE DHT11
  DHT dht(DHTPIN, DHTTYPE);

void setup() {
  Serial.begin(9600);
  Serial.println(F("My auto humidifier Made by Abinav"));
  pinMode(atomizer, OUTPUT);
```

```
  pinMode(buzzer, OUTPUT);

  dht.begin();
}

void loop() {
  // Wait a few seconds between measurements.
  delay(10000);

  // Reading temperature or humidity takes about 250 milliseconds!
  // Sensor readings may also be up to 2 seconds 'old' (its a very
        slow sensor)
  float h = dht.readHumidity();

  // Check if any reads failed and exit early (to try again).
  if (isnan(h)) {
    Serial.println(F("Failed to read from DHT sensor!"));
    return;
  }
  Serial.print(F(" Humidity: "));
  Serial.print(h);
  Serial.println();

  Serial.print(". . . . . .");
  Serial.println();
  if (h < requiredhumidity ) {
    // turn LED on:
    digitalWrite(atomizer, HIGH);
    digitalWrite(buzzer, HIGH);

  } else {
    // turn LED off:
    digitalWrite(atomizer, LOW);
    digitalWrite(buzzer, LOW);
  }
}
```

3. To change the set the needed humidity change the value of `requiredhumidity = 60` to the value of humidity you require

4. Construct a container with small ventilation so that the humidity lowers slowly and place the household plant in it

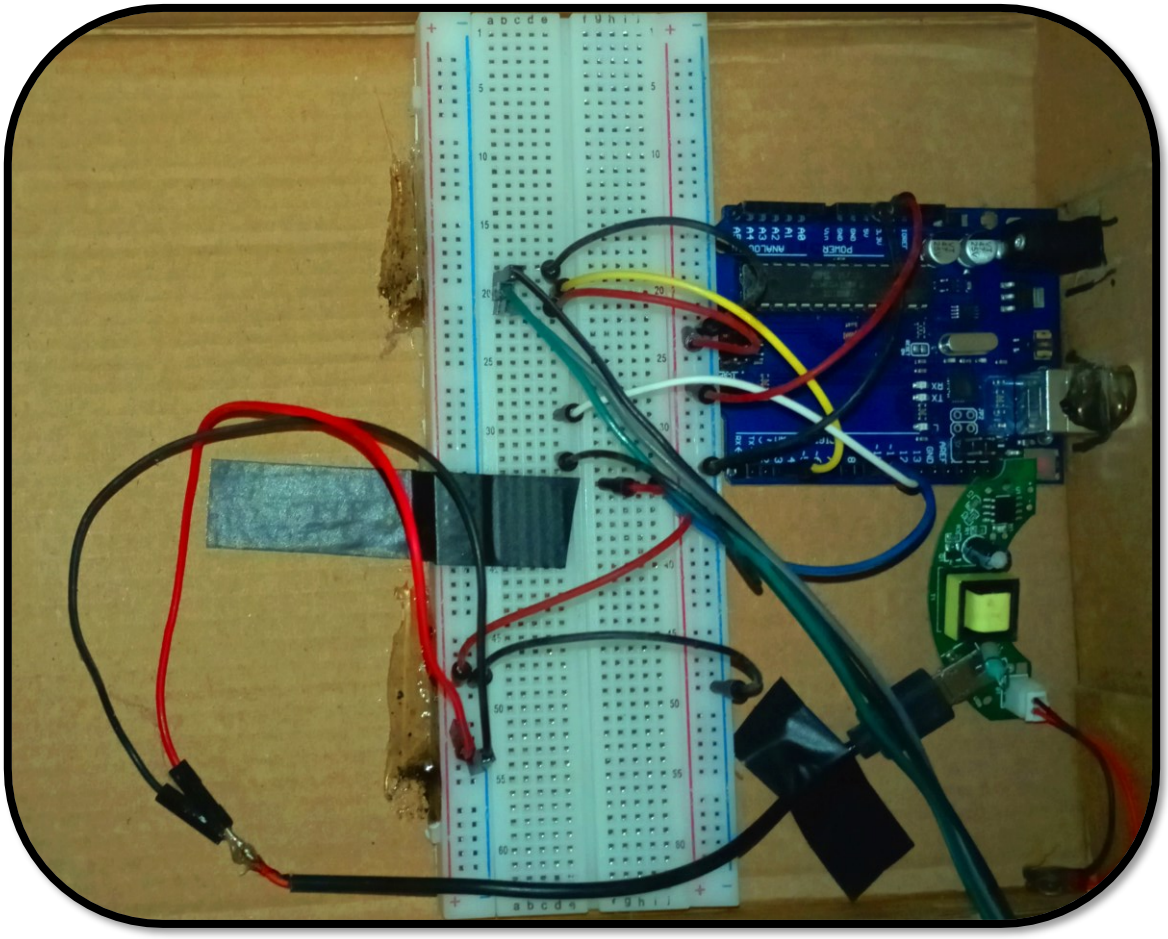
5. Fix the Humidity sensor above the container
6. Place the piezoelectric discs of the Ultrasonic atomizer in the water next to the plant
7. Plug the Arduino to a 7 to 12V (Volts) of DC (Direct Current)

Result

The indoor plant is grown in a humidity required by the plant

Precautions

1. Always place the piezoelectric discs in the water
2. Make sure the container is properly ventilated because the regulator can only detect the current humidity and raise it to the required humidity



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