

“PLANT BIOACOUSTICS AND GENERAL WELLNESS”

ABSTRACT OF THE PROJECT:

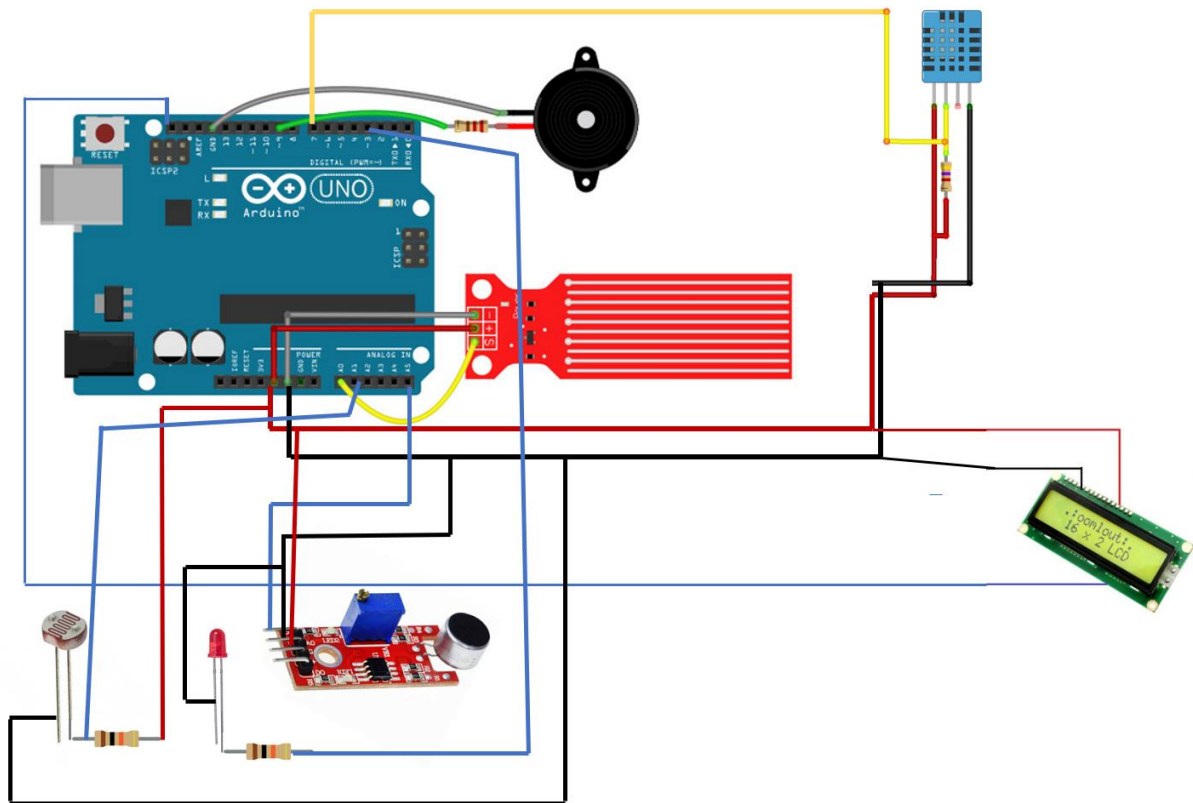
According to research, plants grow better when a tune of certain decibel is played as an effect of it's vibrations. With this project, we aim to detect the optimum intensity at which plants tend to grow better by continuously observing plant growth rates.

Along with this, we monitor temperature and humidity of the environment. We also monitor the amount of water used for watering the plant and give out an alert if it exceeds the required amount. We constantly check if the plant is receiving adequate light.

This project has been implemented using 'Arduino'. Water level sensor, temperature and humidity sensor, sound sensor and LDR has been used.

Once the data is obtained, we can create a dataset and implement a machine learning model on it to obtain a conclusion.

CIRCUIT DIAGRAM:



WORKING OF THE PROJECT

Once the ‘temperature and humidity’ sensor obtains the values, it is displayed on the LCD screen. While watering the plants, if water quantity exceeds the threshold, the passive piezo buzzer beeps. If LDR detects that there is lesser light than threshold, a LED switches on, indicating that the plant should be moved to a place with more sunlight.

The DHT11 sound sensor detects the sound level. We convert this into decibels using the formula

$$\text{dB} = 20 * \log_{10}(\text{Vout}/\text{Vref}) + \text{SPLref}$$

where,

Vout is the output voltage of the sound sensor

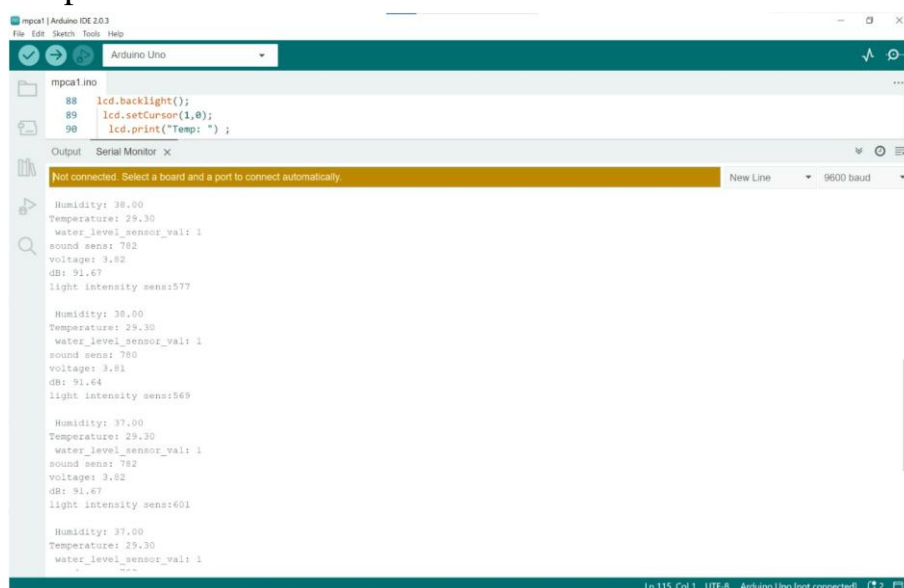
Vref is the reference voltage of the sound sensor

SPLref is the reference sound pressure level used for calibration

We aim to record all these readings against the height of the plant to obtain the optimum levels which are beneficial for plant growth.

The machine learning model that we have implemented checks for correlation between height of plant and temperature, humidity, water level, light intensity and intensity of tune played. With the help of linear regression, we observe that the growth rate of plant depends mainly on the intensity of the tune played. Hence, we conclude that playing a tune of about 90-95dB near the plant enhances it’s growth rate.

Output in serial monitor in Arduino IDE:

The screenshot shows the Arduino IDE interface with the serial monitor open. The code in the background includes `lcd.backlight();`, `lcd.setCursor(1,0);`, and `lcd.print("Temp: ");`. The serial monitor output displays a series of sensor readings: Humidity: 38.00, Temperature: 29.30, water_level_sensor_val: 1, sound_sens: 782, voltage: 3.82, dB: 91.67, and light intensity_sens: 577. These readings are repeated three times, with slight variations in the light intensity value (569 and 601 in the subsequent lines). The status bar at the bottom indicates 'Ln 115, Col 1 UTF-8 Arduino Uno [not connected]'.