HYDROPONICS

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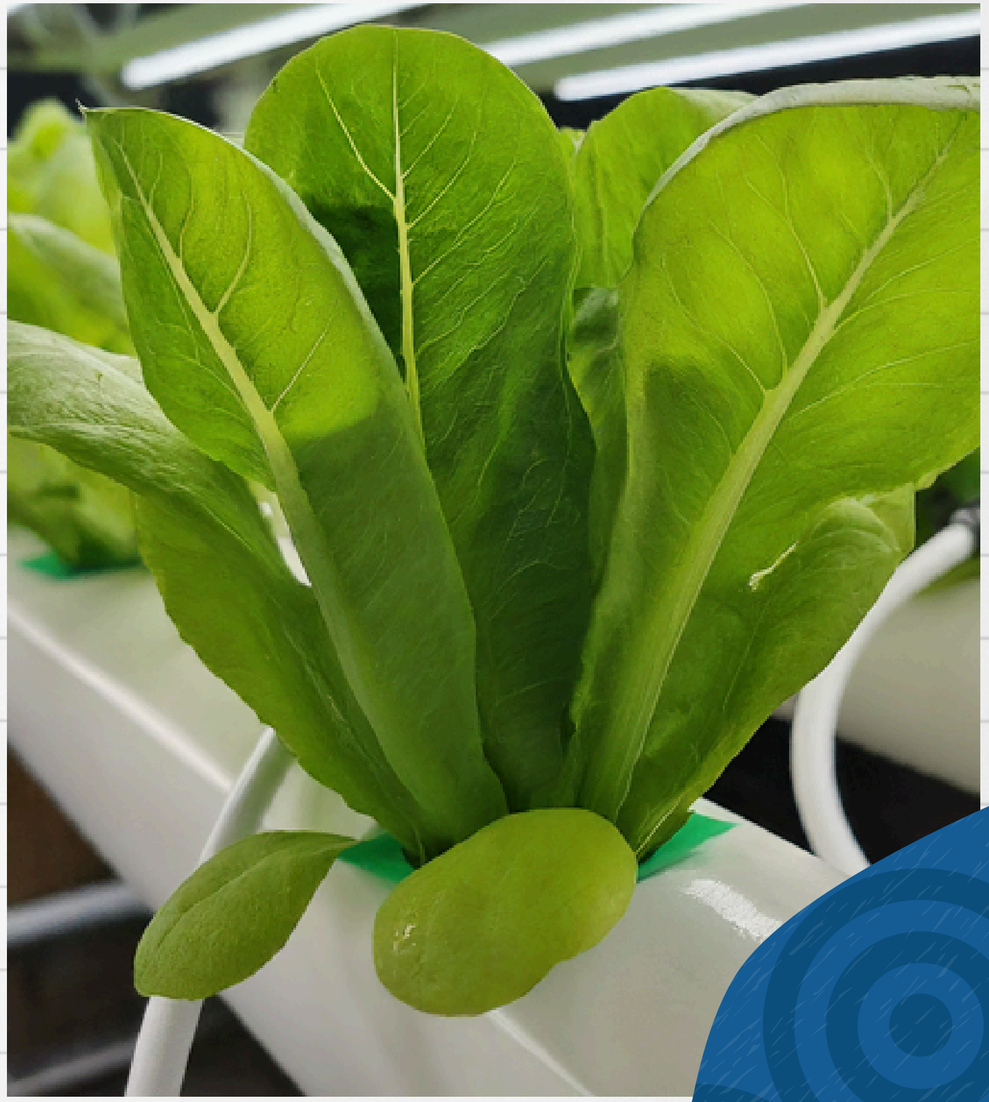
INTRODUCTION TO HYDROPONICS

Hydroponics offers a precise way to grow plants, but manually monitoring and adjusting nutrient levels can be time-consuming.

This presentation explores how the Internet of Things (IoT) can revolutionize hydroponics by providing real-time monitoring and automated control of Electrical Conductivity (EC), a crucial indicator of nutrient health for plants



IOT–BASED MONITORING AND CONTROL

The Internet of Things (IoT) can automate EC monitoring and control in hydroponics:

An IoT system integrates sensors, a microcontroller, and a Wi-Fi module to create a smart hydroponic system. Sensors continuously monitor EC levels, sending data to a microcontroller.

The microcontroller analyzes the data and controls actuators, like nutrient pumps, to maintain optimal EC levels. A smartphone app allows for remote monitoring of EC data and control of the system, providing real-time insights and adjustments from anywhere

COMPONENTS REQUIRED

01
PH SENSOR

02
TDS MODULE

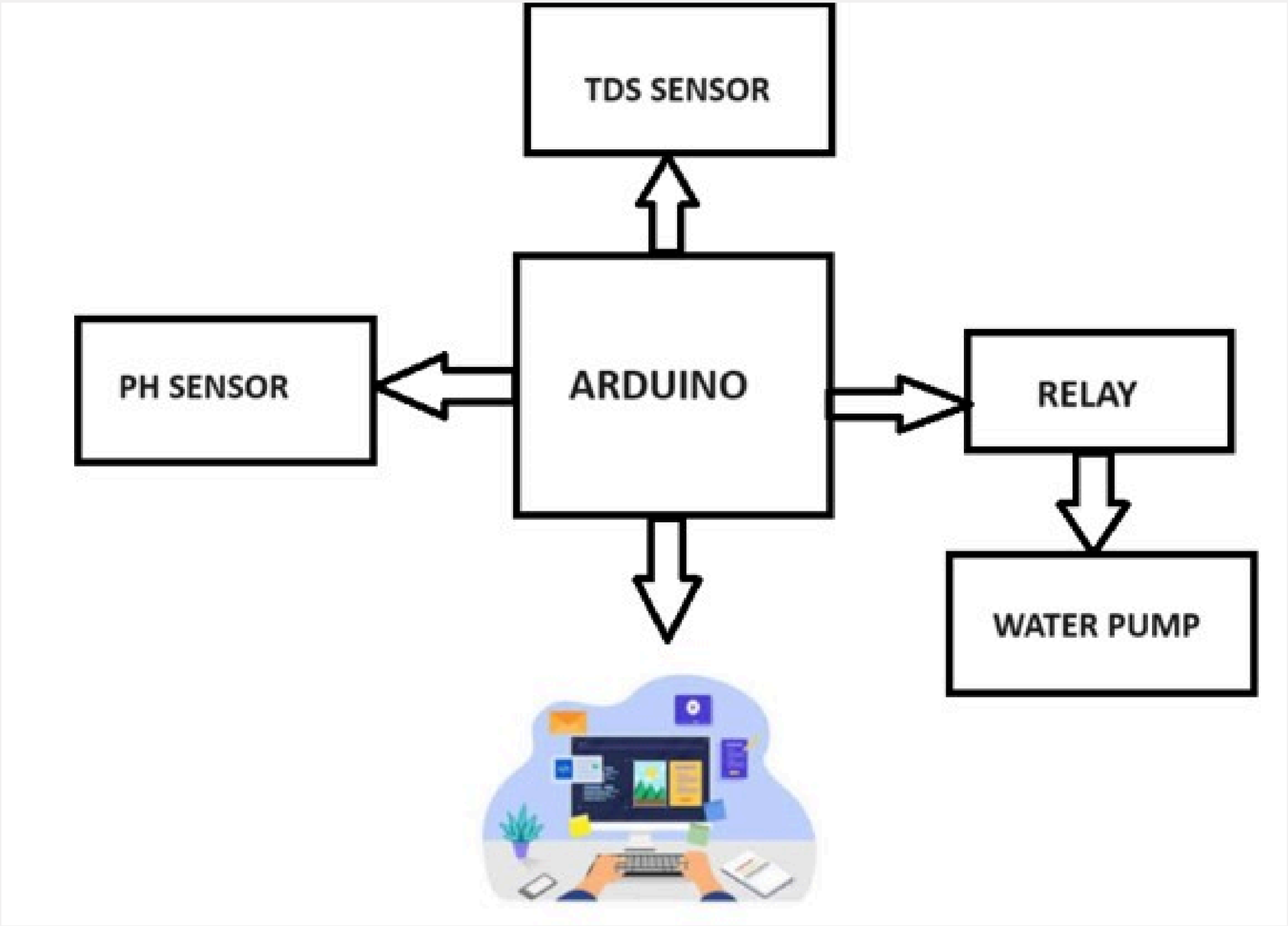
03
ARDUINO

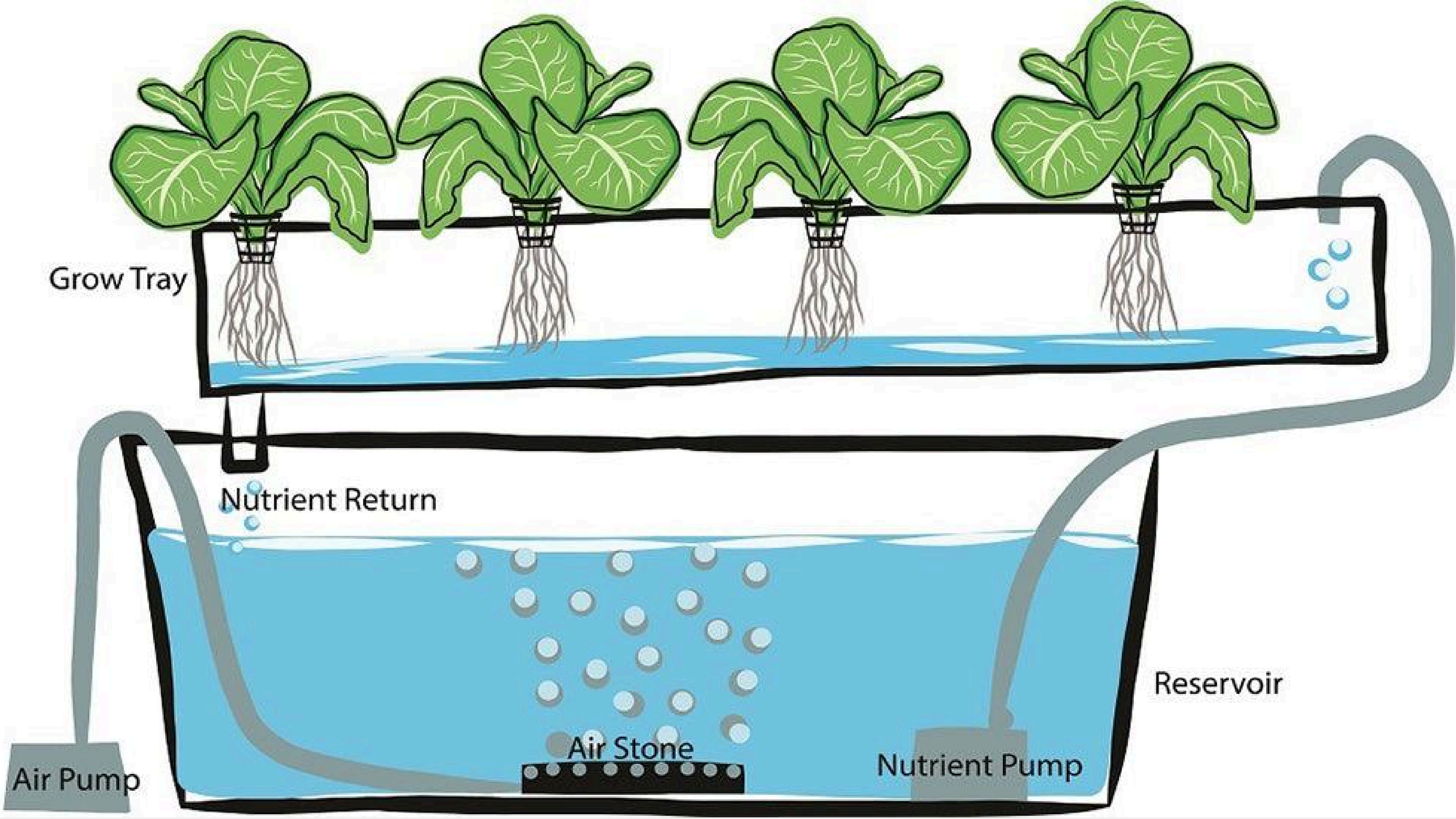
04
RELAY MODULE

05
WATER PUMPS

06
WATER TANK

BLOCK DIAGRAM




Grow Tray
Nutrient Return
Reservoir
Air Stone
Air Pump
Nutrient Pump

WORKING

- Sensor Suite: Monitors key factors like nutrients, water, and temperature.
- Automated Adjustments: System reacts to sensor data, managing nutrients and water.
- Mobile App Control: Monitor and control pumps remotely from your phone.

BENEFITS

Increased Efficiency:
Automates EC monitoring and control, saving time and effort.

Reduced Risk of Errors:
Eliminates human error from manual monitoring and adjustments.

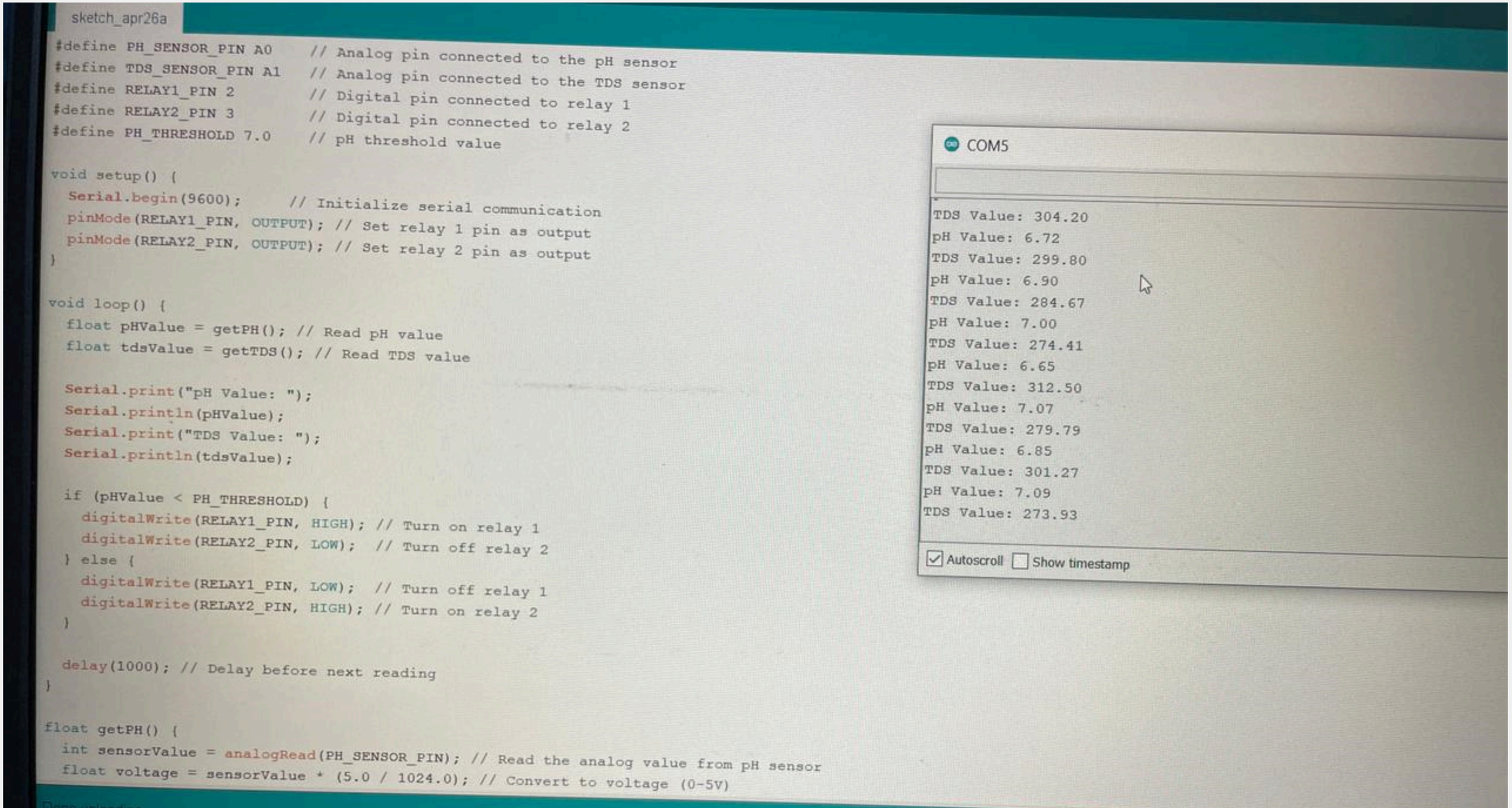
Improved Plant Growth:
Ensures consistent EC levels for optimal nutrient uptake and growth.

Scalability:
The system can be easily adapted to larger hydroponic setups.

Real-time Monitoring:
Provides remote access to EC data for informed decision-making.

Reduced Labor Costs:
By automating tasks, growers can spend less time on manual monitoring and adjustments, freeing them up for other aspects of their operation.

CODE SNIPPETS



sketch_apr26a

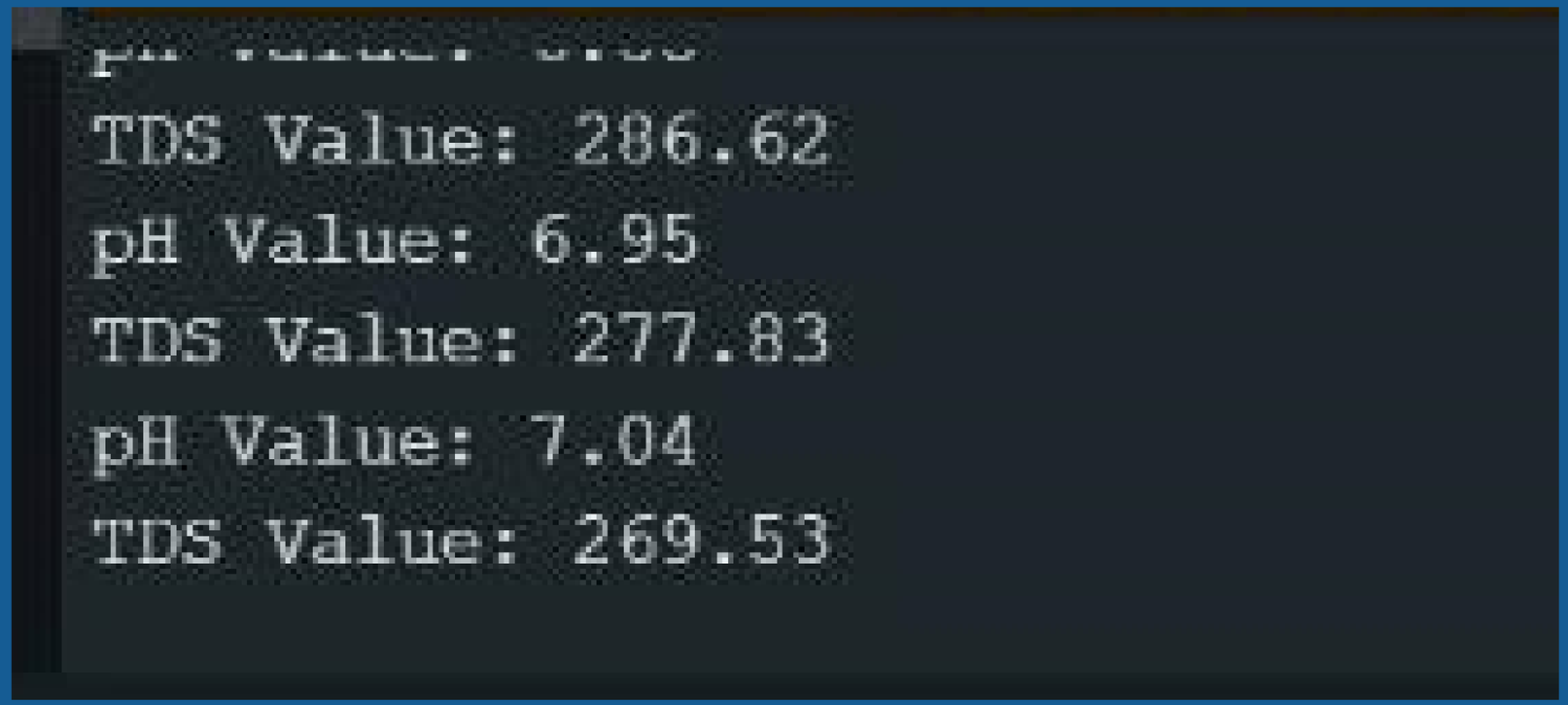
```
#define PH_SENSOR_PIN A0     // Analog pin connected to the pH sensor
#define TDS_SENSOR_PIN A1    // Analog pin connected to the TDS sensor
#define RELAY1_PIN 2         // Digital pin connected to relay 1
#define RELAY2_PIN 3         // Digital pin connected to relay 2
#define PH_THRESHOLD 7.0     // pH threshold value

void setup() {
  Serial.begin(9600);      // Initialize serial communication
  pinMode(RELAY1_PIN, OUTPUT); // Set relay 1 pin as output
  pinMode(RELAY2_PIN, OUTPUT); // Set relay 2 pin as output
}

void loop() {
  float pHValue = getPH(); // Read pH value
  float tdsValue = getTDS(); // Read TDS value

  Serial.print("pH Value: ");
  Serial.println(pHValue);
  Serial.print("TDS Value: ");
  Serial.println(tdsValue);

  if (pHValue < PH_THRESHOLD) {
    digitalWrite(RELAY1_PIN, HIGH); // Turn on relay 1
    digitalWrite(RELAY2_PIN, LOW);  // Turn off relay 2
  } else {
    digitalWrite(RELAY1_PIN, LOW);  // Turn off relay 1
    digitalWrite(RELAY2_PIN, HIGH); // Turn on relay 2
  }

  delay(1000); // Delay before next reading
}

float getPH() {
  int sensorValue = analogRead(PH_SENSOR_PIN); // Read the analog value from pH sensor
  float voltage = sensorValue * (5.0 / 1024.0); // Convert to voltage (0-5V)
```

COM5

```
TDS Value: 304.20
pH Value: 6.72
TDS Value: 299.80
pH Value: 6.90
TDS Value: 284.67
pH Value: 7.00
TDS Value: 274.41
pH Value: 6.65
TDS Value: 312.50
pH Value: 7.07
TDS Value: 279.79
pH Value: 6.85
TDS Value: 301.27
pH Value: 7.09
TDS Value: 273.93
```

Autoscroll Show timestamp

OUTPUT RESULT



CONCLUSION

Hydroponics offers a controlled and efficient way to cultivate plants. This innovative method unlocks year-round growing, minimizes water usage, and optimizes nutrient delivery for impressive yields.

As technology advances, IoT integration promises to further revolutionize hydroponics, creating a future of smarter and more sustainable agriculture.

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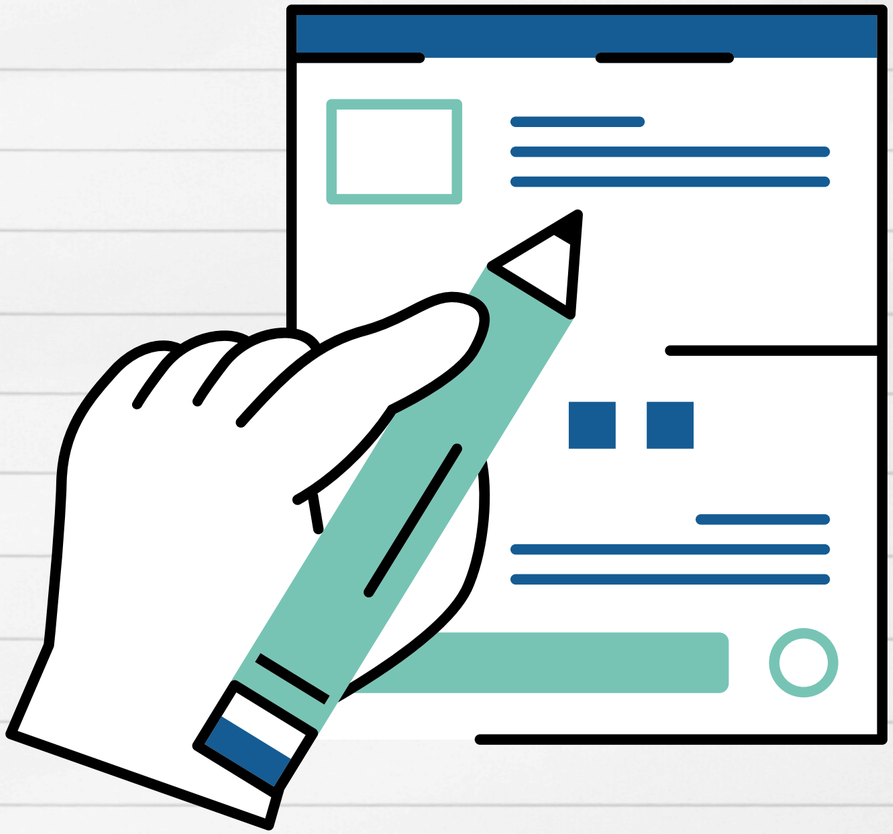

References

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THANK YOU !