Automated Planting Solutions

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Introduction

- Designed to automate the process of watering plants based on environmental conditions.

- Incorporates sensors to measure soil moisture, water depth, temperature, and light intensity


Aim

- To create a sophisticated plant watering system that utilizes real-time sensor data to make informed decisions about watering plants.

- To automate the process by monitoring and analyzing environmental parameters

- To provide precise and timely watering, enabling optimal plant health and reducing water waste.
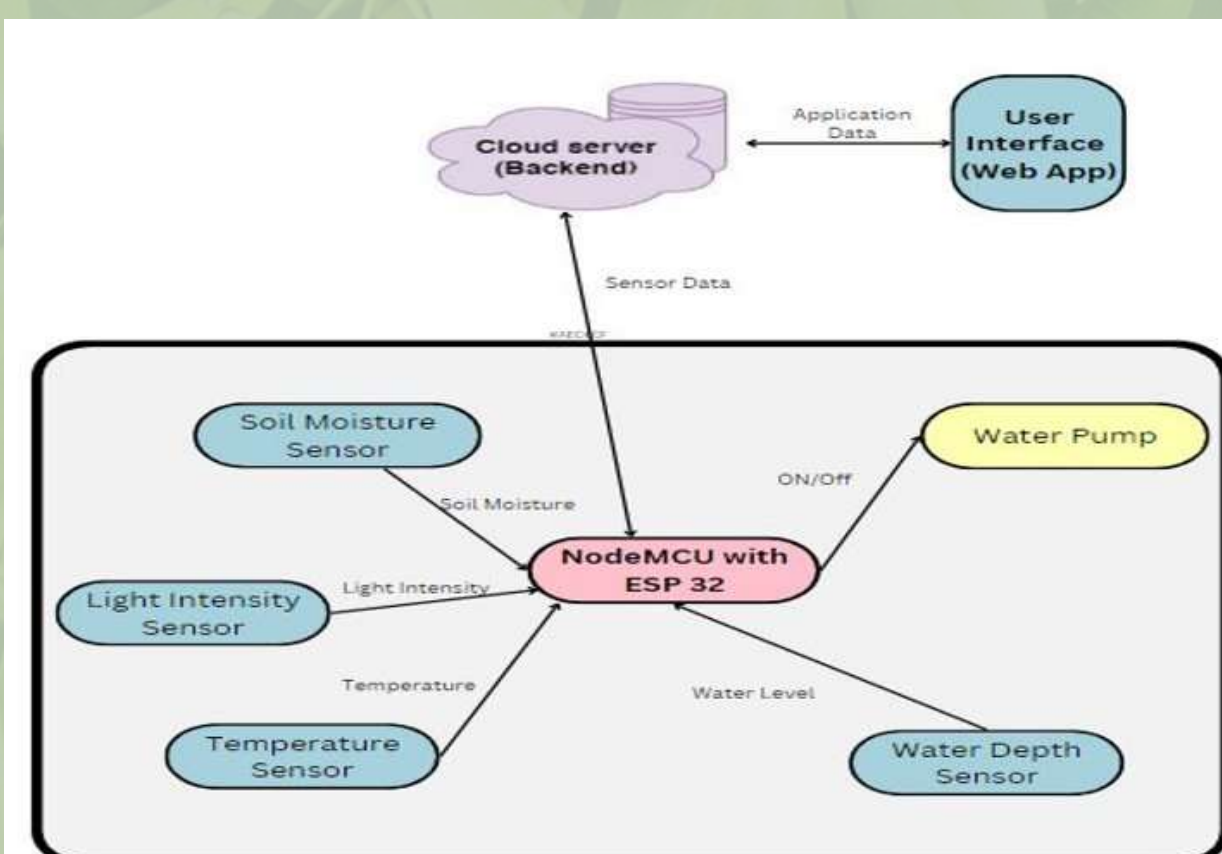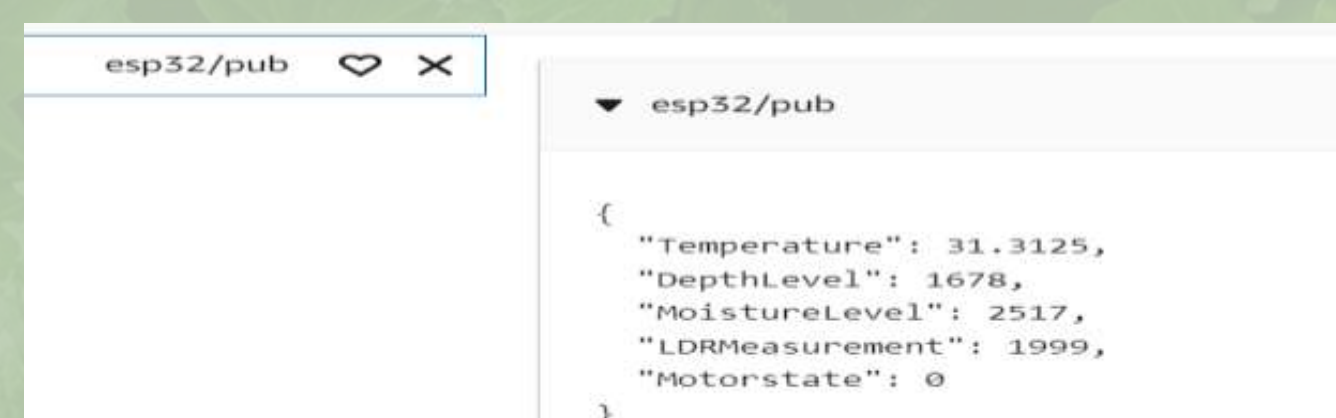

Method

Sensor Integration:

- Soil moisture sensor
- Depth sensor
- Temperature sensor
- Light intensity sensor
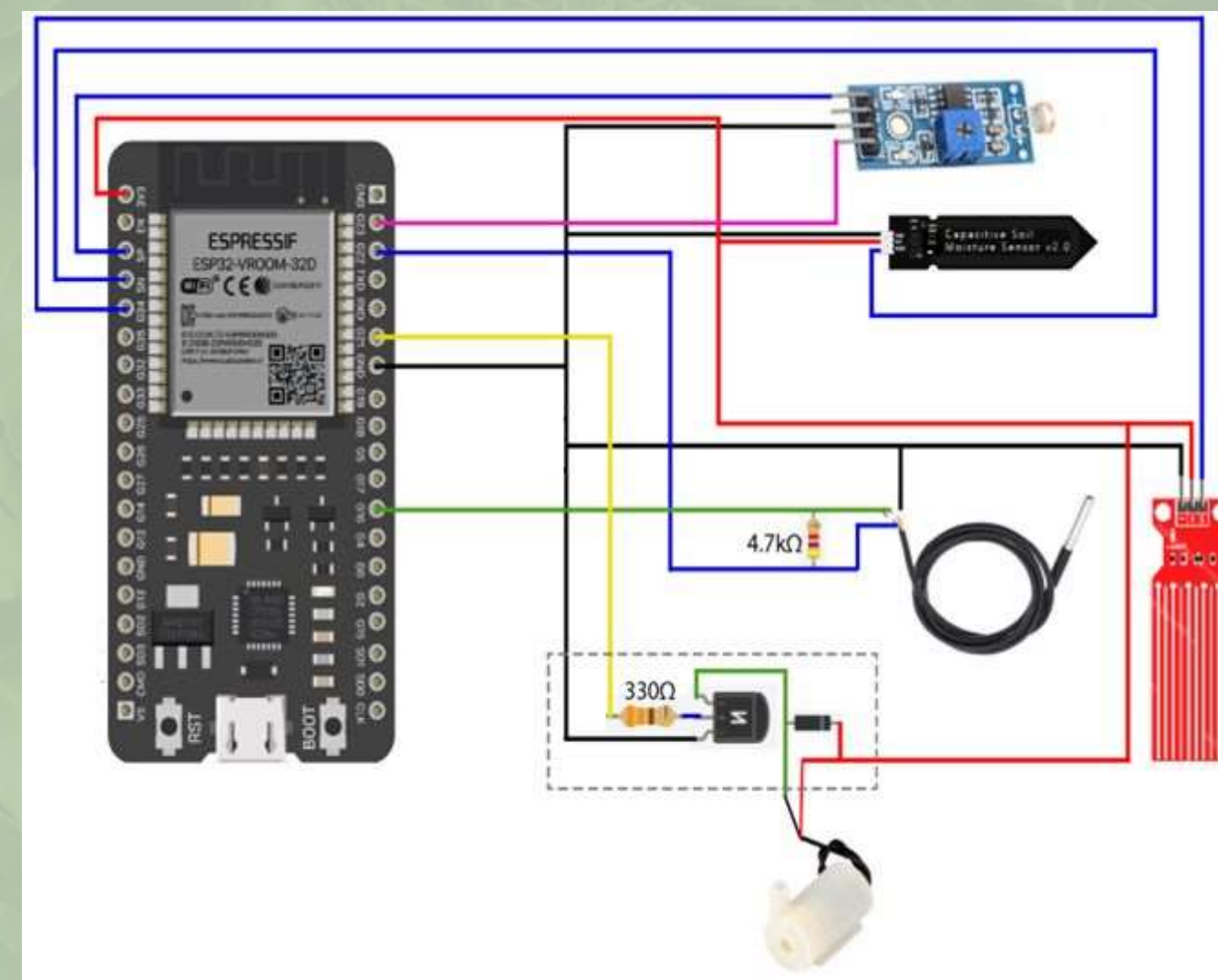
Cloud Connectivity:

- Utilizes MQTT protocol to securely transmit sensor data from the plant to AWS IoT Core.

```
esp32/pub    ♥ ✕

▼ esp32/pub

{
  "Temperature": 31.3125,
  "DepthLevel": 1678,
  "MoistureLevel": 2517,
  "LDRMeasurement": 1999,
  "Motorstate": 0
}
```

Data Collection:

- Sensor data, along with timestamps, is collected and stored in DynamoDB.

Items returned (300)				⟳	Actions ▼	Create item
					‹ 1 …) ›	⚙ ⛶
☐	TS ▽	DepthLevel ▽	LDRMeasurem... ▽	MoistureLevel ▽	Motorstate	
☐	1685456937719	1507	2670	2885	1	
☐	1685521995346	1679	2111	2439	0	
☐	1685417875089	1443	1535	2359	0	
☐	1685417568033	1395	1390	2368	0	

Data Analytics:

- Analysis using AWS Sagemaker.

- EDA techniques are applied.

- Predictive analytics models developed to predict watering needs based on sensor readings.
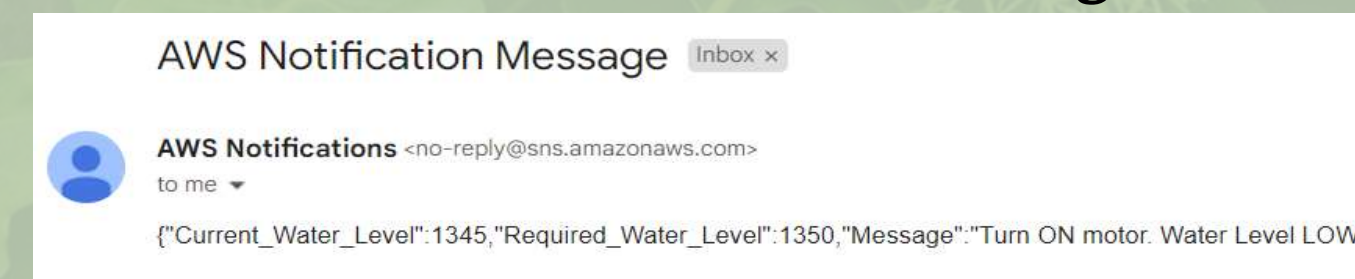
Decision-Making and Automation:

- Intelligent algorithms to analyze the sensor data

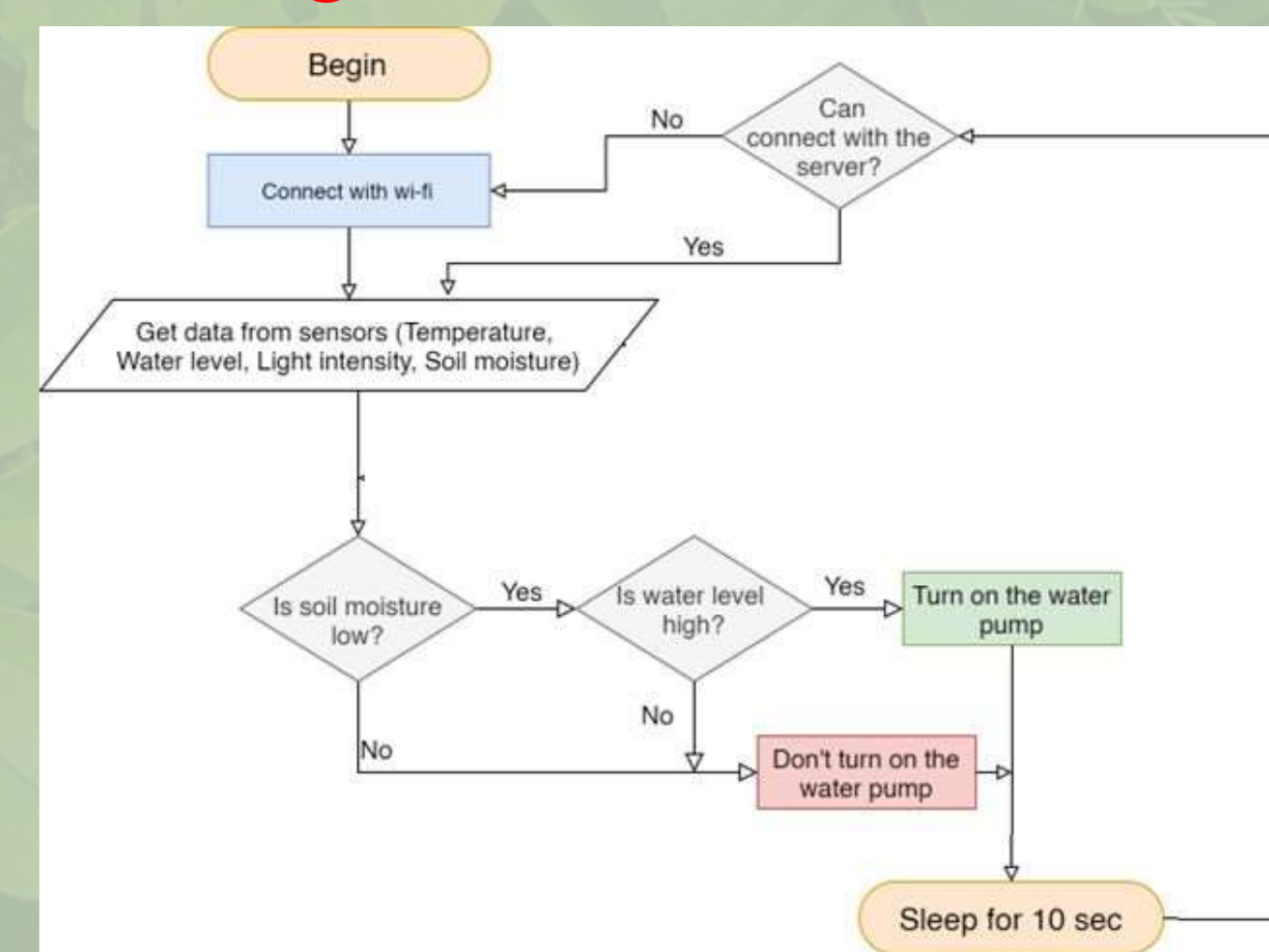- Make watering decisions based on predefined thresholds.

```
if ((soilMoistureValue > 2700) && (depthValue > 1350))
{
    digitalWrite(RELAY_PIN, LOW);
    motorstate=1;
}
else
{
    digitalWrite(RELAY_PIN,HIGH);
    motorstate=0;
}
```
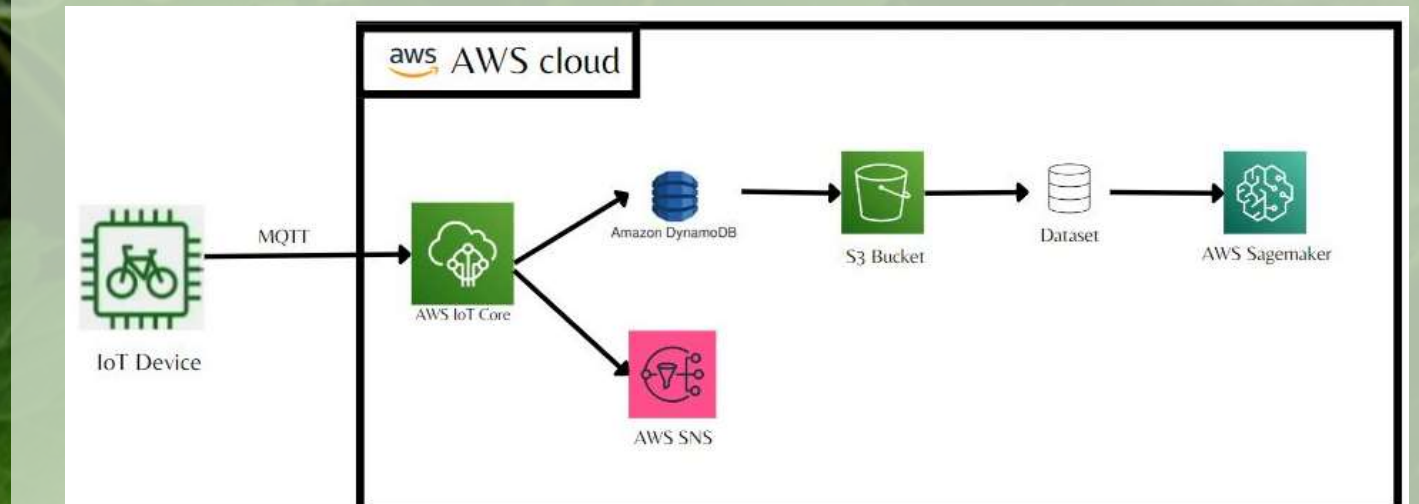
User Notifications:

- AWS SNS to send notifications to users via email when the water level in the tank is insufficient for watering.

AWS Notification Message Inbox ×

AWS Notifications <no-reply@sns.amazonaws.com>
to me ▾

{"Current_Water_Level":1345,"Required_Water_Level":1350,"Message":"Turn ON motor. Water Level LOW"}

Working

Results

- Successfully automated and optimized the plant watering process based on sensor data.

- Analysis revealed a correlation between soil moisture and motor state and between water depth level and motor state

- Real-time data visualization on a web server allowed users to monitor plant conditions

LIVE READINGS

Temperature in °C	Light Intensity	Soil Moisture Level
30.81	2310	2587

Depth Level	Pump State
1648	OFF

Chart title

- AWS SNS notifications alerted users when water levels were insufficient.

- The project's results demonstrate the system's effectiveness in promoting efficient water usage and healthy plant growth.