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TALKING TREE

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ABSTRACT

The Talking Tree project is a smart and interesting idea that helps trees "communicate" their problems to humans. Normally, trees cannot tell us what they need, so we often fail to notice issues like lack of water, high temperature, or polluted air until it is too late. This project solves that problem by using IoT technology to monitor the tree's condition continuously.
In this system, sensors are placed near the tree to observe important factors like soil moisture, temperature, humidity, light, and air quality. All this information is collected and processed using an ESP32 microcontroller. When something goes wrong, the system does not just show complicated data—it gives simple alerts and even voice messages like "I need water."
This makes it easy for anyone to understand the problem. The system can also send updates through the internet, so users can check the tree's condition from anywhere. Overall, this project helps in early detection of problems and supports better care for plants.

Keywords: IOT, Talking Tree, Tree, Micro Controller, Soil Moisture

1.INTRODUCTION

The Talking Tree project is a smart system that helps trees "tell" us about their problems. Usually, trees cannot express what they need, so issues like lack of water, too much heat, or polluted air go unnoticed.

In this project, sensors are used to check the tree's surroundings such as soil moisture, temperature, humidity, light, and air quality. All this information is collected using an ESP32 controller.

When something goes wrong, the system doesn't just show numbers—it gives simple alerts and even makes the tree "speak" using voice messages like "I need water." This makes it very easy for anyone to understand. The system can also send alerts online, so users can monitor the tree from anywhere.

2.LITERATURE SURVEY

In recent years, technology has been playing an important role in improving agriculture and environmental monitoring. Many researchers have developed smart systems using IoT to help farmers take better care of crops and plants.
Some studies focused on using soil moisture and temperature sensors to monitor plant health. These systems help farmers understand when to water the plants, which saves water and improves crop growth. Other researchers worked on automatic irrigation systems, where water is supplied to plants based on sensor readings without manual effort. This reduces human work and increases efficiency.
There are also systems developed for air quality monitoring, which check pollution levels around plants. Clean air is important for plant growth, so these systems help in maintaining a healthy environment. In addition, some researchers introduced pest detection systems using cameras and image processing. These systems can identify pests at an early stage and help prevent damage to crops.
Another important area is the use of cloud technology and data analysis. Some systems store sensor data online and analyze it to give useful suggestions to farmers. This helps in making better decisions and improves overall productivity. A few advanced systems also use AI (Artificial Intelligence) to predict future problems based on current data.
Some researchers have worked on interactive systems, where devices communicate with users through messages or notifications. A few systems even use voice technology to make communication easier.

3. PROBLEMSTATEMENT

Farmers often face difficulties in monitoring the health of their trees and crops because many problems are not visible in the early stages. Issues like poor soil quality, lack of water, pest attacks, and sudden changes in temperature or humidity usually go unnoticed until they become serious. By the time these problems are identified, the damage has already affected crop growth, leading to lower yields, increased expenses, and stress for farmers. Traditional methods like manual inspection take a lot of time and may not always give accurate or timely information.
Although modern IoT systems are available to help farmers, most of them display information in the form of numbers, charts, or graphs. While this data is useful, it is not always easy for everyone to understand, especially for farmers without technical knowledge. Because of this, they may find it difficult to take quick and correct decisions when problems arise.
The main need is for a simple and user-friendly system that can clearly explain the condition of the plant. The Talking Tree project addresses this by allowing trees to communicate their problems through easy voice messages. This helps farmers understand the situation immediately and take action at the right time, improving crop health and supporting better farming practices.

4. PROPOSEDSYSTEM:

The Talking Tree system uses sensors and an ESP32 microcontroller to monitor the tree's condition continuously. Sensors collect data about soil moisture, temperature, humidity, light, and air quality.
This data is analyzed by the system. If everything is normal, the system continues

monitoring. If any issue is detected, it sends alerts and produces voice messages.

- "I need water"
- "Temperature is too high"
- "Air quality is bad"

This makes it very easy for users to understand the problem and take action quickly.

5. METHODOLOGY:

The system works in a simple step-by-step process. First, sensors collect data from the environment continuously. This data is sent to the microcontroller for processing.
The system checks whether the values are within the normal range. If everything is fine, it continues monitoring. If a problem is detected, it generates an alert.
The alert is then converted into a voice message and sent to the user. This process keeps repeating, ensuring that the tree is always monitored and protected.
appropriate action. The system supports early detection of problems, promoting proactive decision-making. It also encourages eco-friendly farming by optimizing pesticide usage. Overall, the methodology provides a user-friendly and efficient solution for smart agriculture.

6. ALGORITHM:

Step 1: Start the system.

Step 2: Initialize all the sensors such as soil moisture, temperature, humidity, light, and air quality sensors.

Step 3: Begin collecting data from all the sensors continuously.

Step 4: Send the collected data to the ESP32 microcontroller for processing.

Step 5: Compare the sensor values with the predefined normal limits.

Step 6: If all values are within the normal range, continue monitoring.

Step 7: If any value goes beyond the limit, identify the problem (like low water, high temperature, etc.).

Step 8: Generate an alert message based on the detected issue.

Step 9: Convert the alert message into a voice output.

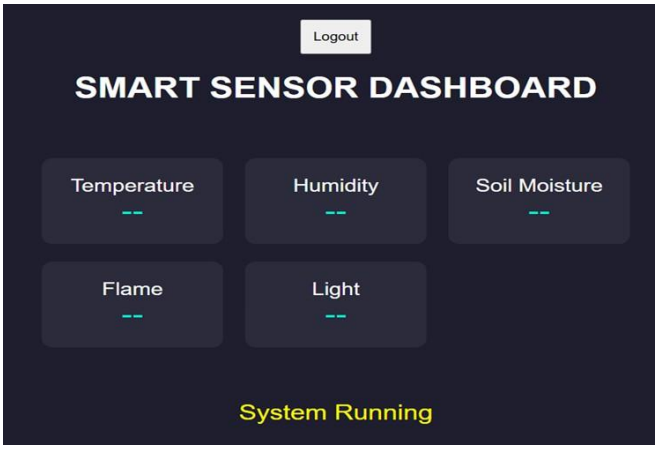
Step 10: Send the alert to the user through voice, message, or email.

Step 11: Repeat the process continuously for real-time monitoring.

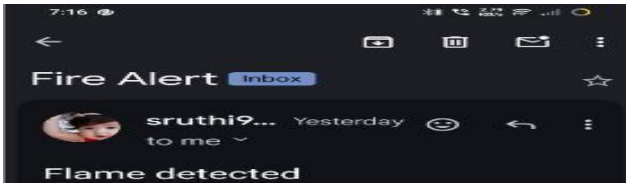
Step 12: Stop the system (if required).

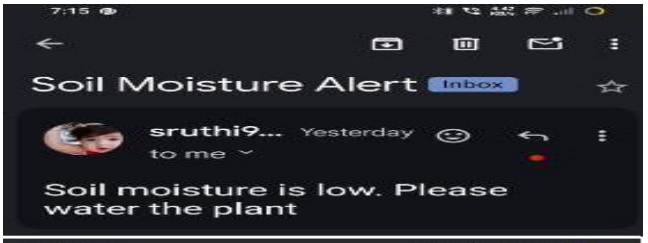
RESULTS:

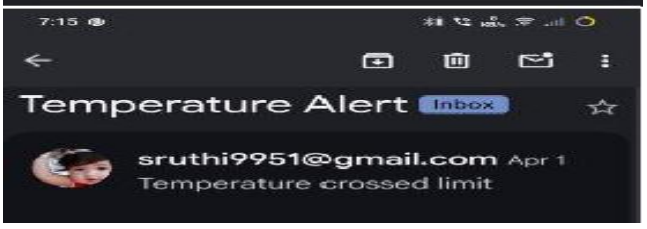
This is the login page where the user can login by giving the credentials given in the registration time.



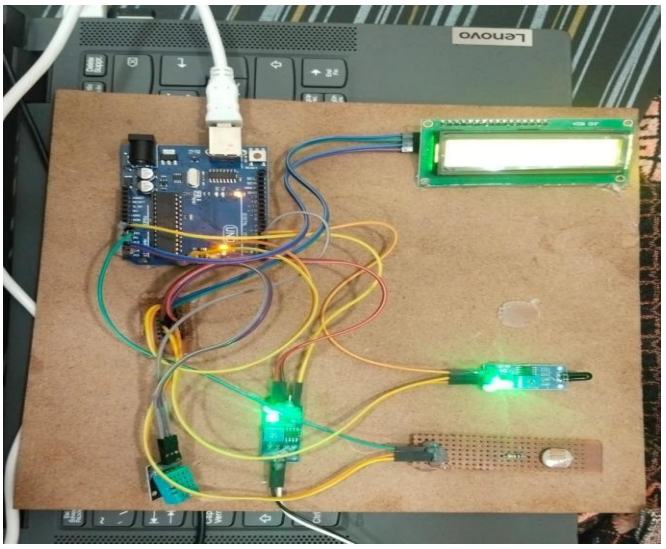
This is dashboard where the user can view the sensors that are connect to the IOT board and view the values as per the required.







The above figure depicts the email that the user gets when the sensor activates where the receiver is getting is his voice.
The Temperature Alert email notifies the user when the monitored temperature exceeds a predefined safe limit, ensuring timely awareness of environmental changes.



The Soil Moisture Alert email informs the user that soil moisture has dropped below the required threshold, prompting immediate watering to maintain plant health.

The Fire Alert email signals that a flame has been detected, serving as a critical safety warning to prevent fire hazards

8. CONCULSION:

The Talking Tree project shows how technology can help us take better care of plants. By allowing trees to communicate their needs, the system makes monitoring simple and effective.
It helps in early detection of problems, reduces manual effort, and improves plant health. It also supports eco-friendly farming practices and encourages better use of resources.
Overall, this project builds a strong connection between humans and nature.

9. FUTURESCOPE:

In the future, the Talking Tree project can be improved by adding more advanced sensors to monitor soil nutrients, detect pests, and analyze weather conditions in detail. The system can also be connected to an automatic irrigation setup so that it can water the plants whenever needed without human effort. By using Artificial Intelligence, the system can even predict problems before they occur and give early warnings. A mobile application can be developed to allow users to monitor and control the system from anywhere. Adding support for multiple languages will make it easy for people from different regions to use it. The system can also be connected to cloud technology to monitor many plants at the same time. It can be widely used in farms, gardens, parks, and smart cities. Advanced features like AR/VR can help users visualize plant health in a better way. Overall, the project can become more intelligent, automated, and useful for sustainable agriculture and environmental protection.

10. REFERENCES:

1. Internet of Things: A Hands-On Approach – This book explains the basic concepts of IoT technology and how sensors and devices communicate with each other in smart systems.
2. IEEE Research Papers – Various papers related to smart agriculture and IoT-based

environmental monitoring were used for understanding modern farming technologies.
3. Arduino IDE Documentation – Used for programming and testing the microcontroller in the project.
4. Espress if Systems Official Documentation – Provided information about ESP32 microcontroller features and implementation.
5. Food and Agriculture Organization Reports – Used to understand agricultural challenges and the importance of smart farming technologies.
6. D. Shanthi, R. K. Mohanty And G. Narsimha, "Application Of Machine Learning Reliability Data Sets", Proc. 2nd Int. Conf. Intell. Comput. Control Syst. (ICICCS), Pp. 1472-1474, 2018.
7. D Shanthi, "Smart Water Bottle With Smart Technology", Handbook Of Artificial Intelligence, Benthem Science Publishers, Pg. No: 204-219, 2023.
8. P. K. Bolisetty And Midhunchakkaravarthy, "Comparative Analysis Of Software Reliability Prediction And Optimization Using Machine Learning Algorithms," 2025 International Conference On Intelligent Systems And Computational Networks (ICISCN), Bidar, India, 2025, Pp. 1-4, Doi: 10.1109/ICISCN64258.2025.10934209.
9. Shanthi, Dr. D., G. Ashok, Chitrika Biswal, Sangem Udharika, Sri Varshini, and Gopireddi Sindhu. 2025. "Ai-Driven Adaptive It Training: A Personalized Learning Framework For Enhanced Knowledge Retention And Engagement". Metallurgical and Materials Engineering, May, 136-45. https://metall-mater-eng.com/index.php/home/article/view/1567.
10. Shanthi, D., Aryan, S. R., Harshitha, K., & Malgireddy, S. (2023, December). Smart Helmet. In International Conference on Advances in Computational Intelligence (pp. 1-17). Cham: Springer Nature Switzerland.