



INNOVATIVE PROTECTION OF VALUABLE TREES FROM SMUGGLING USING RFID SENSORS

¹K Uma Rani, ²Kotha Shruthi, ³Ketha Punarvi Rochisha, ⁴Uppari Naveena

¹Assistant Professor, ^{2,3,4} Undergraduate Students,
Dept. OF EEE,

Bhoj Reddy Engineering College for Women, Hyderabad, India

ABSTRACT:

This study has been undertaken to prevent the smuggling of valuable trees like sandal trees, red sandal trees in the forest area. In the proposed system in order to detect transportation of valuable trees illegally, we use RFID technology. Trees prevent soil erosion, ensure water conservations and contribute to clean air. Preserving trees in forest is essential for maintaining ecological balance; however, some smugglers cut these trees and trade illegally. This causes huge loss to the government and also affects the ecosystem. In order to prevent this, this project focuses on forest conservation through an advanced sensor system.

The main idea presented in this paper is to design an IoT based forest monitoring system. It will be mounted on forest areas, capable of detecting theft, fire as well as intruders automatically and send alert signals through Wi-Fi module to the centralized monitoring station so that immediate action is taken. This project can be applied even in dense forest areas where manual monitoring is difficult and preventing cutting down of trees ecosystems can be protected.

INTRODUCTION:

Forests are the lungs of our planet, vital ecosystems brimming with biodiversity that play a crucial role in maintaining ecological balance. They absorb carbon dioxide, mitigate climate change, provide clean air and water, and harbor countless species. However, these vital ecosystems face a multitude of threats, including illegal logging, poaching, wildfires, and land use changes. These threats not only jeopardize the health of the forest but also have cascading consequences for human well-being and the environment at large. For many days we are reading in the newspapers about the smuggling of precious trees like sandalwood, teakwood, rosewood etc. These trees are very costly. These are mostly useful in the medical sciences and cosmetics.

Because of the huge amount of money involved in selling such tree woods illegal activity like smuggling is taking place. There have been several initiatives undertaken by different stakeholders and in particular by the Government of India, to mitigate these problems. These include the recruitment, training and deployment of anti-poaching watchers and private or government security guards across forests. Strict punishments for convicted offenders, as well as giving special incentives for anti-poaching activities were aimed at eradicating the menace. However, the punitive measures have remained largely ineffective. This problem isn't related to India only. China, Australia and African countries are also struggling with the same issues.

Therefore, safeguarding forests necessitates innovative and effective solutions. While traditional methods of forest protection have played a crucial role, technological advancements offer exciting possibilities to enhance these efforts. This project delves into the potential of Wi-Fi and RFID technology as a tool for forest protection, aiming to explore its unique capabilities and contributions towards a more sustainable future for our forests.

REVIEW OF LITERATURE SURVEY:

The literature survey on forest innovation for protecting trees from smuggling using Wi-Fi and RFID technology appears to be an intriguing approach. Wi-Fi and RFID technology can provide real-time tracking and monitoring of trees, aiding in the prevention of illegal logging and smuggling. The survey should cover existing studies on the effectiveness of Wi-Fi in forestry management, including its implementation, challenges, and potential benefits.

It's crucial to assess the reliability and accuracy of Wi-Fi and RFID technology in rugged forest environments and explore how it integrates with other surveillance methods. Additionally, the survey should highlight any policy implications and the potential for scaling up such innovative approaches to combat illegal logging globally.

ANALYSIS AND DESIGN:

PROPOSED SYSTEM:

The purpose of this project is to protect valuable trees like teak and sandalwood from smuggling and environmental threats. The system integrates RFID technology for tree identification, DHT11 sensors to monitor environmental conditions, fire sensors to detect potential fire hazards, and IR sensors to identify unauthorized movements near the trees. When a smuggler attempts to cut or move a tree, the sensors detect the activity, and the microcontroller processes the data. The information is sent via Wi-Fi to a central monitoring system, and alerts are instantly sent to the forest guards through a mobile app, enabling them to take timely action to safeguard the trees.

WORKING METHODOLOGY:

The project "Innovative Protection of Valuable Trees from Smuggling Using Wi-Fi, RFID Technology, DHT11, Fire, and IR Sensors" involves a comprehensive monitoring system for safeguarding

valuable trees. Each tree is tagged with an RFID for unique identification, and sensors are deployed to monitor environmental and physical conditions. The DHT11 sensor tracks temperature and humidity, helping detect environmental anomalies, while fire sensors identify potential fire hazards. IR sensors detect unauthorized movements near trees. The data from all sensors is processed by a microcontroller and transmitted via Wi-Fi to a central monitoring system (CMS). Alerts for fire, smuggling attempts, or environmental changes are sent to authorities in real-time, ensuring quick action. This system combines real-time monitoring, WiFi-based connectivity, and multi-sensor integration for effective and sustainable tree protection.

BLOCK DIAGRAM:

The block diagram of Innovative Protection of Valuable Trees from Smuggling Using RFID and Sensors

project can be divided into three main sections:

1.Sensor Section:

This section consists of various sensors that are deployed in the forest to collect data about the environment. These sensors may include: DHT11 sensor, Fire sensor, IR sensor, RFID Reader and Tags.

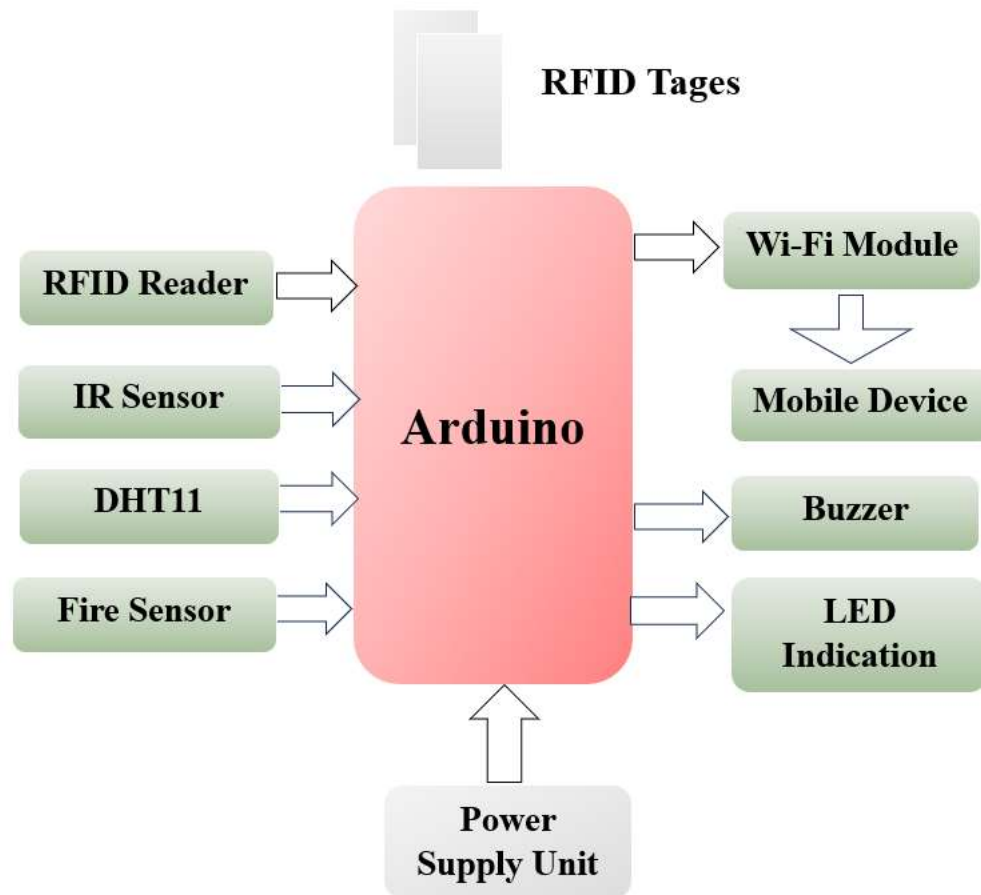
2. Wi-Fi Module:

This section is responsible for transmitting the collected sensor data wirelessly to a central monitoring station. . The data from all sensors is processed by a microcontroller and transmitted via Wi-Fi to a central monitoring system (CMS).

3. Central Monitoring Station:

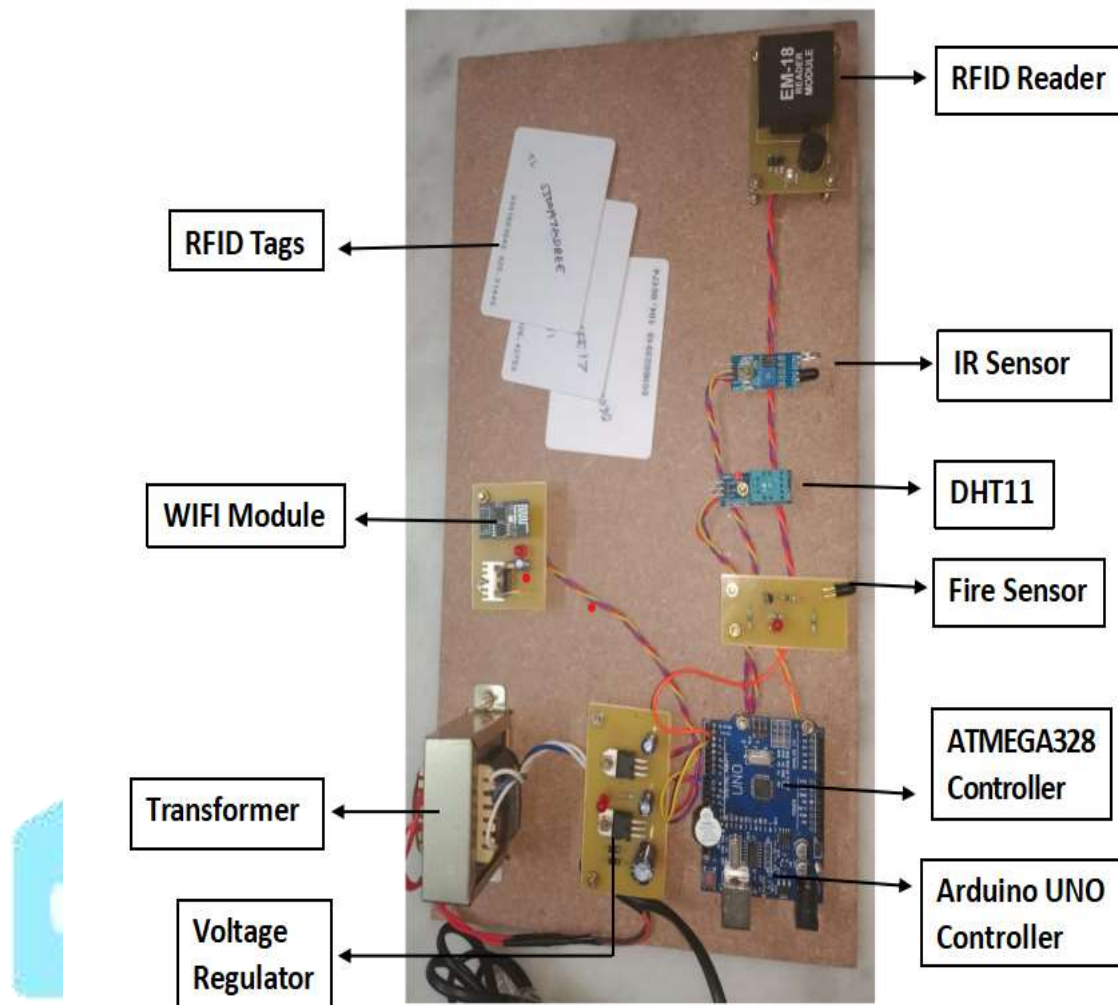
This section receives the sensor data from the Wi-Fi module and processes it to identify any anomalies or potential threats to the forest. The central monitoring station may consist of: An Serial WIFI Terminal app is installed in the android where all the information can be seen and an alarm system to alert authorities in case of any threats.

The block diagram should illustrate the connection between these sections, showing how the sensors collect data, transmit it via Wi-Fi to the central monitoring station, where it is processed and , where it is processed and used to trigger alarms or other actions.

**RESULT:**

The system includes RFID tags for tree identification and sensors like DHT11, fire, and IR to monitor environmental conditions and detect unauthorized activities. These sensors send signals to a microcontroller when anomalies such as cutting, fire, or unauthorized movement are detected. The microcontroller processes these signals and uses a Wi-Fi module to send real-time alerts to a central monitoring system or a mobile application.

This setup enables immediate action by the forest guards or relevant authorities, ensuring real-time protection and efficient monitoring of valuable trees.



REFERENCES:

- [1] Sheng Zhengguo, Yang Shusen, Yu Yifan, V. Vasilkos Athanasios, A. Mccann Julie and K. Leung Kin, "A Survey On The IETF Protocol Suite For The Internet Of Things: Standards Challenges And Opportunities", IEEE Wireless Communications, pp. 91-98, 2013.
- [2] S.M.C.U.P. Subasinghe, "Restoration of Santalum album L Resource in Sri Lanka: Distribution Seed Storage Germination and Establishment", Journal of Department of Wildlife Conservation, pp. 155-164, 2014.
- [3] Santhosh Hebbar, Praveenraj Pattar, Rajeshwari Madli, Varaprasad Golla, "Sandalwood tree protection using Bluetooth version 4.0", in International Conference on Computing and Network Communications (CoCoNet), December 2015. (IEEE)
- [4] Hebbar, S., Pattar, P., Madli, R., & Golla, V.(2015, December). Sandalwood tree protection using Bluetooth version 4.0. In Computing and Network Communications (CoCoNet), 2015 International Conference on (pp. 620-626).IEEE
- [5] Suguvanam K R, Senthil Kumar R, Partha Sarathy S, Karthick K, Raj Kumar S "Innovative Protection of Valuable Trees from Smuggling Using RFID and Sensors", in International Journal of Innovative Research in Science, Engineering and Technology, Vol.6, Issue 3, March 2017.
- [6] Mohan Sai. S, Naresh K, RajKumar.S, Mohan Sai Ganesh, LokSai Abhinav October (2018) Vol.4, Issue 2 'An Infrared Image detecting System model to monitor human with weapon for controlling smuggling of Sandalwood Trees'
- [7] Prof. Tambe Kiran Sopan, Prof. Dharne Jayesh Arun, Prof. Rathod Gajanan Gulab, Prof. Dept. of Electronics and Telecommunication Engg., Amrutvahini Polytechnic, Sangamner, 'Innovative Protection of Valuable Trees from Smuggling using AI and Image Processing India JETIR April 2022, Volume 9, Issue 4.
- [8] M. Indira (2024) 'Forest Innovation Protection of Trees from Smuggling' in International Journal of Innovative Research in Science, Engineering and Technology.IJCRT | Volume 12, Issue 4 April 2024 | ISSN: 2320-2882.