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CREATIVE USE OF RFID AND SENSORS TO PREVENT THE SMUGGLING OF PRICELESS TREES

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ABSTRACT:

The Creative Creation of Priceless Trees by Smuggling By using cutting-edge technology to detect and monitor tree production ,RFID and sensors seek to combat the illicit logging and smuggling of precious tree species. This technology ensures sustainable and legal sourcing by integrating a variety of environmental sensors and Radio Frequency Identification (RFID) tags to track trees in real time from plantation to harvest. To maximize growth, sensors track environmental factors including temperature, humidity, and soil quality, and RFID tags are affixed to individual trees. For ongoing monitoring, data is sent to a centralized system, which offers transparency and helps law enforcement identify and stop illicit activity.

Keywords:
Intrusion detection subsystem, GSM, LabVIEW, intrusion detection, and intrusion tracking.

INTRODUCTION

Illegal logging and the smuggling of valuable tree species are two of the most significant environmental problems that governments, environmental organizations, and local residents are currently facing. In addition to threatening biodiversity, illegally harvesting and transporting precious trees results in habitat loss, deforestation, and worsening of air and water quality. Many tree species that are prized for their commercial worth, like hardwoods and unusual timber, are under danger of going extinct as a result of careless harvesting practices. The impacts of illegal logging proliferate Sensor systems and Radio Frequency Identification (RFID) technology have advanced recently, making them effective tools for asset tracking and monitoring in a variety of industries. RFID systems use radio waves to monitor and identify objects, providing real-time location and condition data.

In the context of forestry and tree production, RFID tags can be used to track individual trees from planting to harvest, ensuring that only legally cut trees are allowed to enter the supply chain.When paired When combined with environmental sensors that measure things like temperature, humidity, moisture content, and soil quality, RFID technology can provide a comprehensive method of keeping an eye on and protecting valuable tree species. The combination of RFID tags and sensors provides a number of important advantages over traditional methods for managing and monitoring forests. First off, the real-time data collection capabilities of RFID and sensors allow for continuous monitoring of trees and environmental conditions. By attaching RFID tags to each tree, forestry management can keep an eye on its

growth and health and ensure that it meets all legal and ecological standards. The sensors can detect any changes in the environment that would indicate a hazard to the health of trees, such as disease, pest infestation, or drought. This proactive approach to forest management reduces the possibility that valuable trees would be destroyed due to un favourable circumstances or illegal activities by enabling early intervention. Additionally, RFID technology ensures supply chain accountability and transparency by enabling the tracking of a tree's entire journey from the forest to its destination. Another important aspect of using RFID and sensors for the innovative production of valued trees is the potential for data-driven decision-making. By collecting and analyzing data from a network of sensors positioned throughout the forest, researchers and forestry managers can get a significant deal of knowledge about the ideal conditions for tree growth. These findings can ultimately lead to improved yields and higher-quality timber by improving soil management, harvesting process optimization, and irrigation technique fine-tuning. In order to ensure that the entire supply chain conforms with legal and environmental criteria, the data collected by the RFID and sensor network may also be shared with relevant parties, such as consumers, law enforcement, and regulatory authorities.

LITERATURE SURVEY

RFID technology has been used by numerous researchers to create access control systems. An RFID-based monitoring and access control system comprising an RFID terminal, camera, server, and warning device has been created by Filipe [7]. The terminal takes a picture when it detects a transponder and sends the information, including the UID and picture, to the server over a TCP/IP connection. In order to grant or refuse access, the server searches the database for this specific query and relays the results back to the terminal. Additionally, the system tracks illegal activity, such as when someone tries to enter through an open door without completing the authentication process, and activates the alert device through online services. By installing RFID kits with antennas that cover a 10-cm range, the system's performance is evaluated, and positive outcomes are produced. An RFID-based embedded security authentication system with a unique facial recognition structure has been described by Xiang-Lei Meng [9]. There are two stages to the system: registration and recognition. Ten images of the user's face with various emotions are gathered during the registration phase, and an extraction method is used to extract the eigen information. The RFID tag bears this information as well as a UID. A camera tracks the face during the recognition phase, and an extraction method provides the face's eigen information. For authentication, this data is then compared to the data that is already saved on the tag.

Instead of using a computer terminal or server, the entire processing is carried out on an embedded ARM11 processor, the S3C6410. This has led to a faster response time of roughly 57 ms and an authentication accuracy of up to 86.5%. Comparing the system's performance to that of the current database systems, it is discovered that it has significantly faster response times while maintaining the same level of authentication accuracy. An RFID-based access control system combined with neural network-based facial recognition has been described by Dong-Liang Wu[10]. When someone is detected to be unlawful, the system blocks entry after recognizing their face from their RFID card. The face of authorized individuals has been learned using radial basis function neural networks (RBFNNs). The image's features were

extracted using principal component analysis (PCA), and these features were then refined using linear discriminant analysis (LDA). To improve its generalization capabilities, the network is trained using the localized generalization error model (L-GEM).

EXISTING SYSTEM

The creation of a prototype RFID reader-based security system is the aim of this proposed project. A prototype RFID security system based on Arduino. Every RFID tag has a unique code. An RFID reader detects the unique code. To test this technology, the RFID tag was positioned on the RFID reader. The door won't open until the developer's unique code and the unique code match. In all other cases, the door will remain closed. Repeated testing revealed that the technology is highly accurate. Security was enhanced using an RFID-based access control system. The existing RFID-based security solution only protects home applications.

The user (forest officer) is responsible for entering the tree's information into the database. An RFID has been implanted on each tree to serve as a unique identifier. A forest officer would hold the tracking gadget, which has an RFID reader. He is walking through the forest. Once the tags are within the reader coverage area, the detector will identify them. The reader would deliver an encoded radio frequency signal to the tag buried in the tree, stimulating the current in the tag's antenna to power the tag. The tag would modify and reflect back its unique number and other identifying information in response. The same information (the tag identifier) would be transmitted to the workstation at the back office via 3G connectivity that was enabled at the handheld reader device. By including fresh tagged trees The user should be able to utilize the workstation's system to update the database and remove tags as trees are logged or die.

DEMERITS:

- Tree logging cannot be detected by the equipment until it is totally felled.
- The machinery cannot detect tree logging until the tree has been completely down.
- Database upkeep is a crucial process.

VIBRATION SENSOR: An instrument for detecting and measuring oscillations or vibrations in a particular system, structure, or environment is a vibration sensor. These sensors are widely used to monitor mechanical systems, machinery, and environmental variables. The sensor detects vibrations in the physical environment and converts them into an electrical signal that can be used for control, monitoring, or analysis.

METAL SENSOR: A metal sensor is a device that detects the presence, composition, and/or properties of metal objects or materials in a specific location. These sensors are widely used in security, industrial, and material sorting applications. By looking at changes in vibrations, electromagnetic waves, or other physical properties they can identify metals because of the way the metal interacts with the sensor.

FIRE SENSOR: An apparatus that can detect smoke, fire, or temperature variations that can indicate an approaching fire is called a fire sensor. Because they alert people and fire safety systems to act promptly to prevent or lessen the damage that fire hazards could cause, fire

sensors are crucial parts of safety systems. These sensors are commonly found in constructions, industrial locations, and outdoor environments.

RFID RECEIVER: An RFID (Radio Frequency Identification) receiver is a crucial component of an RFID system. It receives radio waves from an RFID tag and transmits the data to a reader or processing device for further analysis. RFID technology is widely used for inventory management, tracking and identifying goods or persons, and automating multiple processes in industries like logistics, healthcare, retail, and security.

POWER SUPPLY: A power supply is a crucial component that provides electrical energy to RFID scanners, tags, and the underlying network architecture. It ensures that in real-time situations, mobile RFID systems will function reliably.

THE BLINK APP: The Blink software is a smartphone app designed especially for monitoring and managing Blink cameras and video doorbells, among other smart home security devices. It enables users to view recorded video, get real-time alerts, and remotely monitor their property using an easy-to-use interface.

PROPOSED SYSTEM

The Ingenious Production of Valuable Trees via Smuggling RFID and sensors use state-of-the-art technology to identify and track tree production in an effort to stop illegal logging and the smuggling of valuable tree species. By combining a range of environmental sensors and Radio Frequency Identification (RFID) tags, this technology tracks trees in real time from plantation to harvest, ensuring sustainable and legal sourcing. Sensors monitor soil quality, temperature, and humidity, and RFID tags are attached to individual trees to control growth. Data is transferred to a centralized system for continuous monitoring, which provides transparency and aids law enforcement in identifying and halting illegal conduct. This innovative approach promotes sustainable tree-farming practices, enhances forest management, and combats illegal logging—all of which contribute to conservation initiatives and the preservation of priceless tree species.

We are developing a system that will stop trees from being illegally brought into forests where people are unable to offer security. In the forest, where trees are costly and preservation is essential, we are establishing such a system. We proposed an innovative system in this area. We are developing a system that will stop trees from being illegally brought into forests where people are unable to offer security. In the forest, where trees are costly and preservation is essential, we are establishing such a system. We proposed a novel system in this area.

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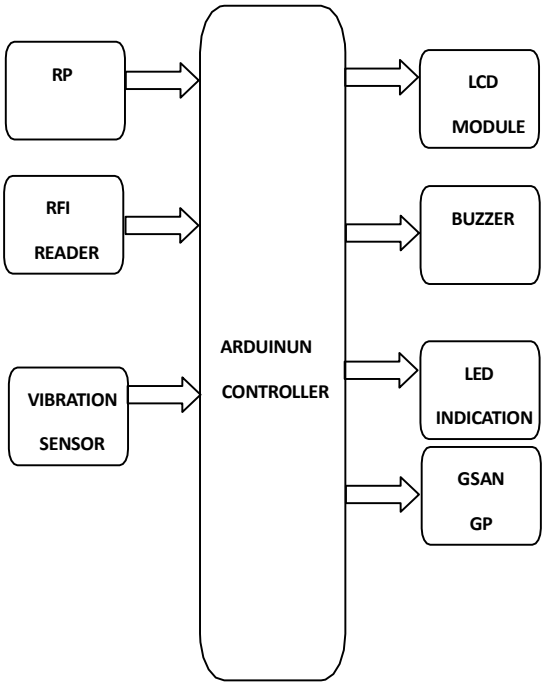

MODULES DESCRIPTION:

REGULATED POWER SUPPLY:

INTRODUCTION:

An electrical power source is called a power supply. An apparatus or system that supplies electricity or other types of energy to an output load or group of loads is known as a power supply unit, or PSU. This phrase most commonly refers to electrical energy sources, followed by mechanical ones and, less frequently, by the others specifically. Primary or secondary energy sources, such as a power distribution system or the transformation of electrical power from one desired form and voltage to another—such as converting AC line electricity to a lower-voltage DC that is carefully regulated for electronic equipment—can be included in a power supply. Low voltage, low power DC power supply units are commonly integrated into devices such as computers and other home gadgets.

- Batteries.
- Chemical fuel cells in addition to other energy storage technologies.
- Solarpower
- Alteration organizers.

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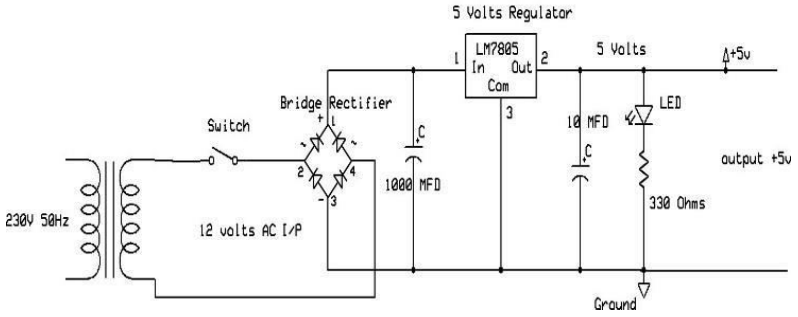
REGULATED POWER SUPPLY

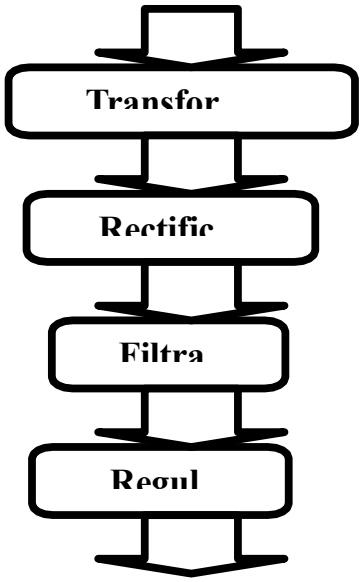


Components used in above figure are

- A 230 VA main transformer,
- A bridge rectifier (diodes),
- A capacitor,
- A voltage regulator (IC7805),
- A resistor,
- And an LED (light emitting diode).

POWER SUPPLY DESIGN:

INPUT 230 VOLTS A.C



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A detailed explanation of each block and component mentioned above is provided below:

1.**TRANSFORMATION:**

The process of transferring energy from one device to another is called transformation.4gu8Energy is transformed via transformers.

TRANSFORMERS:

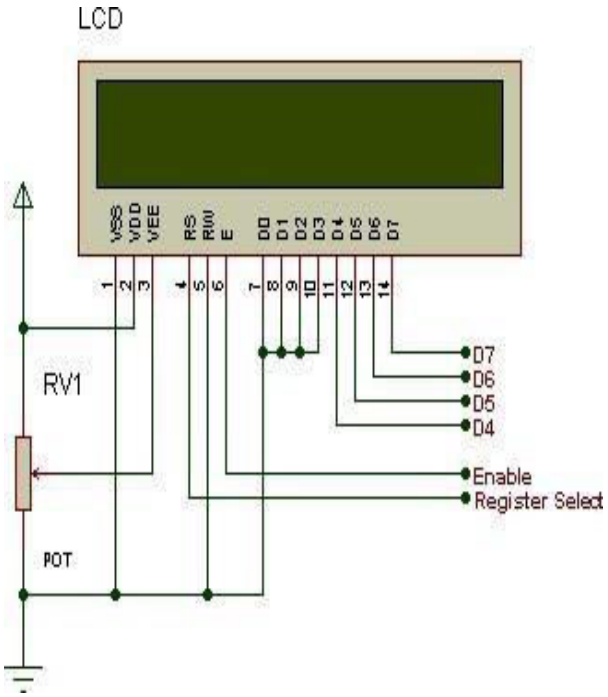
A transformer is a machine that transfers electrical energy between circuits without changing its frequency by using inductively linked conductors. a varying current in the first winding or primary.

2.LCD:

LCD BACKGROUND:

One of the most often attached devices to a microcontroller is an LCD display. Among the most popular LCDs connected to the various microcontrollers are 16x2 and 20x2 LCDs. As a result, 16 and 20 characters are separated by two lines, respectively. A basic 16x2 LCD with characters.

LCD PIN DIAGRAM:



3.SOFTWARE IMPLEMENTATION:

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The following software is used to complete this project

- Proteus7 (EmbeddedC): for the simulation section.
- Arduino does not have an IDE compiler for the compilation portion.
- Express PCB: for circuit design.

THE USER INTERFACE:

A yellow outline will appear when a project is first launched. The PCB's dimensions are shown by this yellow outline. Usually, the PCB is cropped to the proper size after the parts and traces have been moved to their final positions. However, before beginning to construct a board with a certain size restriction, crop the PCB to the appropriate size.

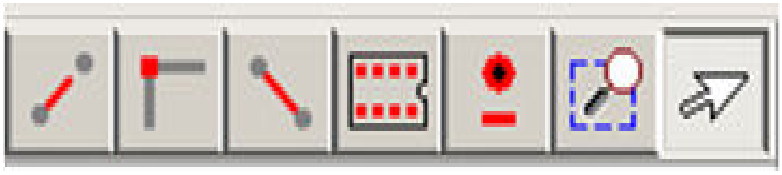

Fig:Tool Bar necessary for Interface

The tool for selection: What this does is quite clear. You can move and manipulate pieces with it. When this tool is selected, buttons to rotate and move traces to the top or bottom copper layer will appear in the top toolbar.

4.PERFORMANCE EVALUATION:

In this project, an intrusion detection and auto-destruct system will be designed, simulated, and tested. The developed prototype was used for testing, while LabVIEW was used for simulation. The communication between the microcontroller and GSM module is Additionally,look at the

Lab VIEW flow that is used for the corresponding TIC messages in the TTCs.

CONCLUSION:

The Ingenious Production of Priceless Trees through Smuggling RFID and sensors are a novel approach to halt illegal logging and promote sustainable forestry practices. This system ensures the most ethical and legal harvest while optimizing development conditions by enabling real-time tracking of individual trees through the use of RFID technology and environmental sensors. Because it increases supply chain transparency, accountability, and traceability, it makes it more difficult for illicit activities like tree smuggling to occur. Furthermore, the information obtained by this system helps forestmanagers to make data-driven, well-informed decisions that promote forest protection and sustainable tree farming. Ultimately, this innovation reduces environmental harm, helps save valuable tree species, and promotes a more ethical and sustainable approach to tree cultivation.

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