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“Anti-Smuggling And Early Fire Warning System For Forest Tress”

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Abstract: The proposed system is all about smuggling of trees like sandle, red sandle, “sag wan” essential medicinal. These trees are very costly as well as less available in the world. These are used in medical sciences as well as cosmetics and medicine. Because of huge amount of money involved in selling of such tree woods lots of incidence are happening of cutting of trees and their smuggling. To restrict such smugglings and to save the forests around the globe some preventive measures need to be deployed. The system is developed which can be used to restrict this rustling which would in turn stop deforestation and maintain the environmental balance which would help to solve one of the issues with the global warming. The system consist of tree unit with three sensors, and this unit is fixed to tree ,the tree unit would be the primary unit for the implantation of the system. This unit is consist of three technologies to protect the tree from getting cut down, damage with fire, etc.

Keywords: Smart forestry systems,early fire detection, illegal logging prevention, anti smuggling measures, environmental monitoring, forest protection.

I. INTRODUCTION

During the last decades, the phrase “sustainability” has become very popular in the defination of utilising energy resources. Within the sense of development in the global environment and development commission report, the most general term and interpretation is known as sustainability.

In sustainable forest operations (SFO) is a holistic approach and strategy in an attempt to improve current and future problems effectively, where as integrating forest activities with economic and , environmental and socially development. Deforestation and forest degradation continue at exponential levels which greatly leads to continued

depletion of biodiversity. In basic terms, deforestation means fall and cutting down the trees permanently for agriculture expansion, forestry mining (logging or timber harvesting for domestic fuels or coal), the growth of infrastructure , including road construction and urbanization. Deforestation directly impacts the environment in terms of temperature , rain fall, ground level monitor, air quality , wild life and bio diversity forest fire is one of the cause of deforestation, as hundreds of trees are devastated each year because of forest fires in different parts of the world .

The warmest summers and milder winters are the reasons for this. Weather it is caused by human beings are by accident fires leads to major loss of forest cover. Forest trees are the major causative and accidental sources of biodiversity loss, deterioration of productivity of terrestrial habits and forest carbon stocks, deterioration in soil fertility and sub sequent crop production, increase in atmospheric pollution and increase in the severity of landslides sensitivity. Climate imbalance rise in global warming and green house emissions, soil erosions, floods occurrence, wild life extinctions and habitat loss, food insecurity, and loss of biodiversity are the effects of deforestation motivated by the prior remarks we introduce the intelligence systems for sensing, monitoring and methods for analysis to be used in applications such as forest fire incidents illegal logging of trees, poaching of tress [3].

Illegal logging driven by the allure of financial gain, undermines conservation efforts and threatens the sustainability of our forest. Concurrently, the escalatind frequency and intensity of forest fires exacerbate these concerns, causing irreparable damage to ecosystems and impacting neighbouring commities. In the face of these threats, a comprehensive solution is imperative one that not only combats illicit activities but also proactively detects ad addresses the onset of fires.This research introduces an integrated anti-smuggling and early fire detection system designed to safeguard forested areas. Leveraging cutting-edge technologies such as remote sensing, surveillance networks, and machine learning, this system aims to disturb

illegal activities while providing a swift response to potential fire incidents. by delving into the intricacies of this multi faciated solution, we explore how it can serve as a pivotal safeguard for our invaluable forested landscapes, ensuring their preservation for generations to come [4].

The vast expanses of our world's forests, crucial for ecological balance and biodiversity, face dual threats that demand immediate attention: illegal smuggling of valuable timber and the escalating risk of destructive wild fires. This challenges pose severe consequences, ranging from environment and degradation and loss of habitat to release the massive carbon emissions [4].

II. PROPOSED SYSTEM ARCHITECTURE

Designing an anti-smuggling and early fire warning system for forest trees involves integrating various technologies and components to effectively monitor and protect the forest ecosystem. Deploy a network of sensors throughout the forest area. These sensors should be capable of detecting various parameters such as smoke, motion, vibration.

Use high-resolution camera for visual monitoring and detection of any suspicious activities like smuggling or unauthorised entry. Collects data from sensors continuously and transmit it to a central processing unit.

Utilize thermal imaging cameras to detect temperature changes and identify potential fire outbreaks. Implement algorithms to analyse smoke smoke patterns and distinguish between natural phenomena and actual fire incidents.

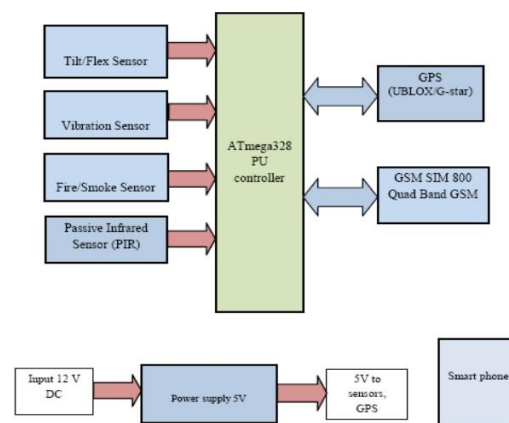


Fig 1: Block diagram

III. HARDWARE REQUIREMENTS

1 ATmega328 PU controller:

The ATmega328-pu is a low power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega328-pu achieves throughputs approaching 1MIPS per MHz allowing the system designer to optimize power consumption versus processing speed.

2 Tilt sensor:

Tilt sensor are known as inclinometers. They are a type of position sensor used to measure angles or the slope of an object. It is often used in bridge erection, railway laying, civil engineering, etc.

3 Vibration sensor:

It is a device that detects mechanical vibrations. It measures vibration levels in your machine and alerts you to any potential problems, like equipment failure or worn parts that need replacement. The maximum amplitude range of vibration being measured will determine the range of sensor that can be used. Typical sensitivity for accelerometers are 100 mV/g for a standard application.

4 Passive Infrared Sensor (PIR):

A passive infrared sensor is an electronic sensor that measures infrared light radiating from objects in its field view. They are most frequently utilized in PIR based motion detector. PIR sensors commonly utilized in security alarms and automatic lighting applications.

5 Smoke sensor MQ3/ MQ135:

A smoke sensor is a device that senses smoke, typically an indicator of fire. Smoke detector are usually housed in plastic enclosures, typically shaped like a disc. Smoke can be detected either optically or by physical process. Detectors may use on or both sensing methods. Sensitive alarms can be used to detect smoking in banned areas.

6 Global positioning system (GPS):

GPS is a space based radio-navigation system consisting of a constellation of satellites broadcasting navigation signals and a network

of ground stations and satellite control stations used for monitoring and control.

7 Global system for mobile communication (GSM):

GSM is a standard developed by European telecommunication standards institute to describe the protocols for 2G generation digital cellular network used by mobile services such as mobile phone and tablets. GSM is also a trade mark owned by the GSM Association. GSM may also refer to the full rate voice codec.

IV. FLOW CHART:

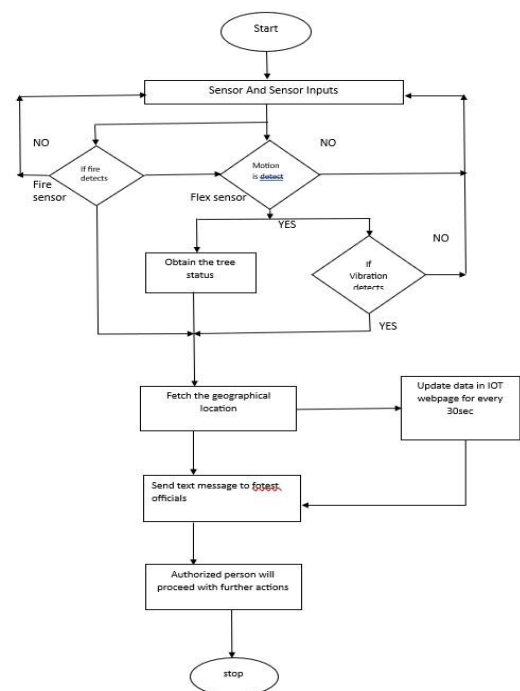


Fig 2: flow chart of anti-smuggling for early fire system for forest trees.

Begin with the start and it collect the information on the potential smuggling activities and fire risk. Develop a process for monitoring and detecting smuggling activities. If suspicious activity is detected, proceed to the next step. Establish alert system to notify relevant authorities. Include communication channels like emails or mobile alerts. If the risk is high, initiate an early fire detection system. Integrate firefighting measures to suppress the fire in its early stages. Implement continuous monitoring to prevent recurrence. Integrate control measures to ensure the effectiveness of the system.

V. RESULT ANALYSIS :

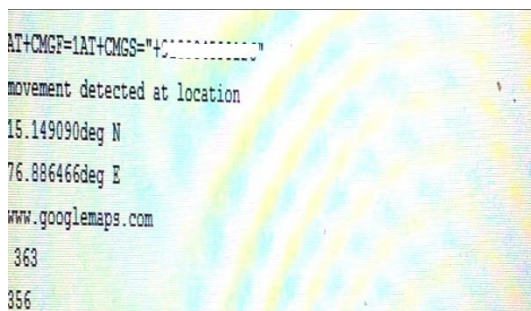


Fig 3: Movement detected at location

It has detected the human movements around the tree or forest area sensed by the passive infrared sensor.

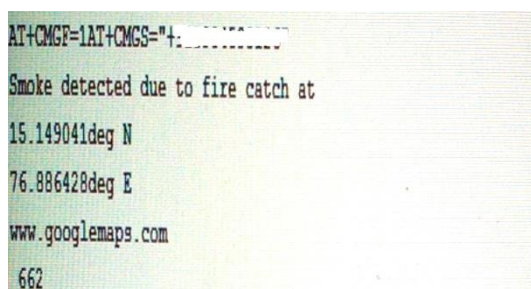


Fig 4: Smoke detected due to fire catch

It has detected the fire catch to the tree or portion of forest area where it can be sensed by the fire/smoke sensor.

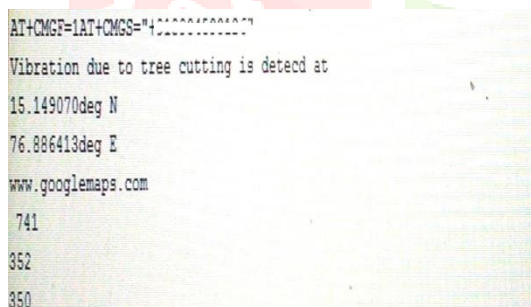


Fig 5: vibration due to tree cutting

It has detected the tree cut is by sensing vibration due to tree cut and it is sensed by vibration sensor. And where it can send the alert notification to the concerned authorities.

VI. CONCLUSION:

Implementing the effective anti-smuggling measures and early fire detection system for the forest trees is crucial for environmental conservation. Additionally promoting community awareness, enforcing stricter regulations, and leveraging advanced technology can contribute to the overall success

of these initiatives. Collaboration between governments, NGOs, and local communities remains essential in safeguarding our forests against illicit activities and mitigating the risk of wildfires. Anti-smuggling measures the early fire detection system is imperative for the preservation of our forests. By combining technological advancements with stringent enforcement and community engagement, we can create a comprehensive strategy to safeguard our natural resources. It is crucial to prioritize these efforts to ensure the sustainable health of our forest.

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