IoT-Based Wireless Sensor Network using Poaching Alarm for Trees in Forest

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Abstract: *From so many days,it has been reported in the newspapers and magazines about the smuggling of trees like Sandalwood, and Sagwan. This is due to rising demand from both local and international markets. The illegal trade is driven by the high price that these trees can fetch, making it lucrative for smugglers. The rising demand is also due to the dwindling supply of these trees, as they take years to grow and are not easily replanted. This has led to an imbalance between demand and supply, making them highly sought after and expensive. These trees are very high-priced as well as less available around the world. These trees are very expensive and very rare worldwide. Notorious smugglers have been smuggling such trees for years in the jungles of the Indian states of Karnataka and Tamil Nadu. In order to limit this smuggling and save forests around the world, some precautions must be taken. Such precautions include increased surveillance of forests, stricter laws and regulations, and harsher penalties for those caught smuggling. Additionally, it would be beneficial to raise awareness of the issue so that people are more aware of the consequences of their actions. Because of the enormous amount of money involved in the selling of these trees, many accidents occur while trees are felled. In this case, we should provide protection for trees to limit smuggling In addition to these measures, we could also encourage more sustainable forestry practices that would limit the amount of trees felled in the first place. This would reduce the incentive to smuggle these trees, as well as decrease the negative environmental impacts of illegal logging. Within this frame of reference, we are supposed to provide protection to the trees, which can be restricted to prevent smuggling. We aim to save valuable trees like teak, sandalwood, and other trees that are in high demand on the market.*

Keywords: Wireless Sensor Network.

I. INTRODUCTION

The most trending thing currently in the society is internet. Therefore, the Internet of Things is an important technology that allows us to create various useful Internet applications. Nowadays, there is a lot of information about the smuggling of sandal, sagwan and other trees. These trees are very costly. They are used in medicine, cosmetics, etc. In order to limit the smuggling and save forests worldwide some precautions need to be taken. So, we have developed a system for this purpose.

II. LITERATURE SURVEY

[1].IOT Enabled Forest Fire Detection And Management
Author: Deepthi S, Shushma G Krishna, Sahana K B, Vandana H R, Latha M
Abstract: According to this paper, the project tells about identifying the forest fire using some technologies. Forest fire is very common but it leads huge impact on living organisms. Control measures has to be taken in order to prevent forest fire.

Prevention of forest fire requires man power, machines, technologies etc. But we are lagging in identifying where exactly the problem lies. In order to solve this problems we have come up with the solution using IoT technology. In this project DHT11 and flame sensors are used to detect the fluctuations in temperature and humidity. Node MCU microcontroller is a wifi module which is used to send the values regarding humidity and temperature to the cloud as

database. The forest department will be notified with an alert message if the values goes beyond the threshold. By taking these measures we can avoid forest fires.

Remarks: The main drawback of this paper is this method is insufficient and impractical for wide areas.

[2]. IOT Based Illegal Trees Cutting Prevention and Monitoring with Web App Using Raspberry Pi
Author: Lakshmi Devi P, Radhika B, Nikitha Kalashetty
Abstract: Smuggling of the costliest trees like sandalwood and sagwan are the news that we come across everyday. These kind of trees are very rich in medical benefits as well as in preparing of beauty products. As said above due to its cost cutting and smuggling of such trees will take place. This problem is not just limited too India but also in several countries like china, australia, africa and much more.

Indian sandalwood costs around 12000 to 13000 INR per kg. But the demand for the same wood in the international market will be as high as INR 10 crore per ton. So tracking and monitoring of sandalwood tree using IOT is discussed in this paper.

An alert message will be sent to the forest officiers throught GSM/GPRS modem as SMS. On receiving this message an immediate action can be taken. In this paper RF link station antenna is implemented using cellular architecture. This RF tag is used to transfer the data along with the port number to the reader from where it will be collected. On receiving this message the reader will be able to view the tag number, which is used to identify the correct cell and location of the tree. The data is transferred to microcontroller link unit which will further be forwarded to Zig-Bee module which helps in connecting with the central server.

Remark: Raspberry pi is not able to run on Windows Operating System.

[3]. IOT Based Anti-Poaching Sensor System for Trees in Forest
Author: Parthiban M, Dharani M, Kathiga M, Keruthika M
Abstract: There are several incidents taking place regarding illegally encroaching and cutting trees like Sandalwood, Blackwood, Agarwood and many more.

These practices due to monitory gains has impacted dangerously on society both in economical and in common way. IAPF have undergone several activities to prevent this problem.

In order to protect the forest from being cut around the world preventive measures is must. A framework is built which is limited for smuggling. An Iot based remote sensor is included in the framework which is implemented in a particular region to detect the activitie s like forest fire, cutting down of trees etc

This paper discusses about microcontroller which acts as wall of prevention for poaching framework using WSN innovation.

The basic idea discussed in this paper includes the modern technologies as a cutting edge through which the smugglers will be unhabitted effectively and there by disposes smuggers exercise.

This framework has three different activities of reactions they are right of the bat in which the passages will be getting information regarding trees area utilizing sensor. The second activity is the perception where different pictures will prepare the methods on the basis of pictures received bounding trees and this method helps in understanding what makes the rapid growth of trees. The third activity deals with sending messages to PDA authority regarding trees and the sensors which lies in a certain range of area.

The higher officers of the backwoods are initimated that if any occasions happen the necessary steps can be taken.

Remote sensors helps in organizing and building up vivaciousness and also in tracking about the poaching of trees. This helps in prevention of cutting of trees.

Remark: As discussed in this paper smart phone is not Mandatory because there is no need to have an android app.

[4]. IOT Based Anti-Poaching Sensor System for Commercial Tree
Author: Shruthi K R, Jatin V, Rakshitha J, Sukruthi S, Tejaswin G
Abstract: Every now and then we will be hearing about the cutting and smuglling of trees like teekwood, rosewood etc. which is taking place throughout the world. Because of its availability which is very low the costs are very high. Due to this the smugglers will always target on these kind of trees and sell them by cutting it. So in order to avoid such

activities some of the control measures should be taken like implementing anti-poaching sensor system which helps in monitoring the smuggling of trees as well as forest fires using some modules like flex and flame and thereby alerting the user by messages.

Remark : Flex sensor is made in such a way to make it flexible but it is not up to the mark.

[5].Real Time Forest Anti-Smuggling Monitoring System Based on IOT

Author : Rakshitha G, Sarika S, Shobha S R, Tejashwini S S, Boregowda H B

Abstract : The motivation behind this paper is to identify the illegal activities like smuggling, robery, deforestation of all the precious trees like sandalwood, teak, sagwan etc. which will commercially benefit the smugglers by earning huge amount of money. By such acivity it not only affects the forest but the living creatures which are present in the forest. As the citizens it is our responsibility to protect our natural resources through latest technologies. As per the survey reports it states that there are less number of precious trees which costs more. These trees are used in medical fields like ayurvedic medicines, cosmetics, some trees cures skin related diseases and some of them are helpful in making highly valuable furnitures.

Saving forests should be one of our main agenda as a contribution for the society.

Remark: The sensors like flex are not effective.

[6]. Forest Fire Detection Using IoT Devices

Author: C Chaitra, Subiya Maryam, Shifa Samreen, N Shruthipriya, Shubhash

Abstract: It is very harder for everyone to protect the nature because of the current world situation which is upgraded with technologies. Both man-made and natural causes are leading to disasters nowadays. This also includes forest fires, deforestaion, global warmning, acid rain etc. from which the living beings suffer from various diseases, the forests will be completely damaged and there will be less availability of O_2. The objective discussed in this paper in order to avoid this tasks is to develop and implement an IOT based system which will predict the forest fire or any such activites and send the location of that area to the concerned officials at the starting stage itsself which would help them to stop that fire accidents. In order to achieve this objective different types of IOT sensors are used.

Remark: The cost effect will be high due to the use of many sensors.

III. PROPOSED SYSTEM

The concept behind designing the portable Wireless Sensor Node which is a part of a Wireless Sensor Network. The design includes hardware, firmware and software components, which will enable the Wireless Sensor Node to connect to the Wireless Sensor Network. To detect and measure the physical environment and communicate the data to the base station. The Portable Wireless Sensor Node will be designed to be small in size, relatively less powerand with small amount of money making it adjustable to different applications and environments. It will also be designed for the purpose of being versatile and reliable, for this reason it can be used in different fields for different purpose.

The proposed system consists of two different modules. First module is responsible for handling all the sensosrs, the second module which is called as the controller module will help to spot the trees. Sensors used in this system include tilt sensors, temperature sensors and sound sensors. The microcontroller acts as a controller for the system, receiving inputs from the sensors and sending signals to the output devices like the buzzer, water pump and relay switch. The tilt sensor will alert the concerned officials through a buzzer when the tree bends or breaks, the temperature sensor will get activated when there is high temperature which may lead to forest fire. Hence the water pump gets turned on.

In order to support for continuous monitoring of trees, the sensors values and camera are used. Each of the sensors will be having it's own values and will be differing based on the affecting factors. These sensor values are frequently sent to the Web Page and appropriate measures could be taken by the authorities if any suspensions are found. Similarly, a camera is placed in a tree module and at irregular intervals of time the captured images are sent to the authorities.

Sensor data are constantly being transferred from the sensor to a Web Page through the use of a Wi-Fi module. This means that the sensor module is able to collect data from the environment and then send it to the controller module, which will process the data and make decisions based on the data. The controller module then send the processed data to the Web Page where it can be accessed remotely.

Wireless Sensor Network helps in detecting the cutting of trees by the vibration produced in the environment using the 3-axis MEMS accelerometer. This 3-axis MEMS accelerometer allows the network to accurately to detect vibrations and distinguish them from other environmental noises. This technology is particularly useful in remote areas that are difficult to monitor or patrol. It allows a network to be set up that can continuously monitor for suspicious activityeven if no one is physically present. By detecting unusual vibrations, the network can alert authorities to potential theft or illegal activity in the area. MEMS accelerometers are tiny sensors that measure acceleration in three directions (x, y, and z). They are used in many electronic devices, such as smartphones and wearables to detect the motion and orientation.

WSN (Wireless Sensor Network) technology can be used with MEMS accelerometers to enable remote monitoring in applications such as seismic monitoring, structural health monitoring and remote healthcare monitoring. The use of WSN technology in remote monitoring applications is widespread.
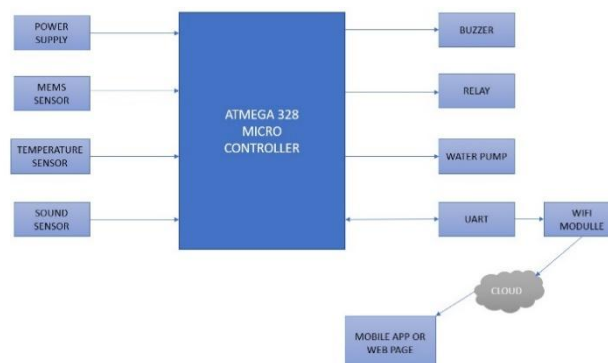
IV. DESIGN

The proposed design system has three sensors namely : a tilt,a temperature and a sound sensor.The tilt sensor helps to detect the angle of inclination of the system and can be used to trigger an action. For example, if the system is tilted beyond a certain threshold, it will trigger an alarm.The temperature sensor works by measuring the gravitational force acting on the system and comparing it with a pre-defined threshold. For instance, the tilt sensor can be used to detect if a machine is in an unstable position and the temperature sensor can be used to detect if the environment is too hot or too cold for optimal operation. If the force is greater than the threshold, an alarm is triggered, alerting the user to the fact that the system has been tilted beyond the acceptable range.The sound sensor works by detecting changes in sound levels and converting them into electrical signals, which are then analyzed by the system to determine if an alarm should be triggered. The sound sensor could detect a higher sound level than normal sound leveland send an alert to a monitoring center that would send to a security officer for further investigation.For both the sensors like tilt and sound sensor, a buzzer is implemented to alert the authorities whereas in temperature sensor water pump is activated.

All these sensors values are continuously sent at irregular intervals of time to the authorized station through Web Server. Similarly, a camera will be fixed at the tree module which captures the photographs and sends it to the authorized station. If any suspicious actions are observed than the appropriate measures can be taken accordingly.

The real time WSN and the record system which uses the cheap technologies makes monitoring more robust, dcent and predictable.

This system would allow the practical data to be collected and to be analysed from a variety of sources like temperature, fog, light and different environmental parts. It would also provide the ability to record and store data for future analysis. Additionally, it would enable the increased accuracy and more cost-effective monitoring. Wireless Sensor Network is most used and trending nowadays which is used in many applications for looking after it, maintaining and for security purpose. WSN is a network of geogaphically distributed sensors which are autonomous that helps in monitoring of environmental facts or physical factors like sound, pressure, volumn etc. and to pass their data securely through the network to the destination location. For instance, in precision agriculture WSNs are used for monitoring soil properties, crop yields and livestock.

There are several applications of WSN in forest areas including detecting fires in forests, detecting poaching of trees, monitoring the environment and detecting illegal logging. WSNs can be used to monitor temperature, moisture, tree growth and other environmental conditions. They can be used to detect smoke and movement in order to detect fires and illegal activities. These sensors can be deployed quickly and are relatively inexpensive, making them an attractive option for forest monitoring.

V. CONCLUSION

Finally, we would like to conclude by stating that we are going to propose a system that provides an alarm system for the protection of trees. This system would be designed to detect any signs of danger to trees in an area, such as fire, extreme weather, or malicious acts. By providing an alarm system, we hope to protect trees and prevent their destruction. The alarm system for trees is like a fire alarm in a building. Just as fire alarms are used to alert people to the presence of a fire, the alarm system for trees would be used to alert authorities to any potential dangers to the trees. This alarm system can help protect trees and prevent them from being destroyed.

One of the important technique to prevent smuggling is by monitoring it continously. The alarm system would use sensors to detect changes in temperature, humidity, and other environmental factors that could indicate a potential danger to the trees. Additionally, the system could be set up to detect any unauthorized activity near the tree, such as logging or poaching, and alert the authorities to intervene.

A light procedure is required for inserting some sensors with the help of microcontroller around the trees.

A tree protection device is designed to protect trees from damage, pests, or other threats.

In our project, we will be able to protect important trees from smugglers with the help of microcontrollers, IOT and different sensors. By using all this it is possible to detect any physical damage to the treesas well as detect any unauthorized access to the trees. This can provide an early warning of potential threats to the trees, allowing for quick and effective intervention. Additionally, the sensors can provide valuable data about the health of the treesallowing for more targeted interventions to protect and preserve them.

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