International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 07 | July 2020 www.irjet.net p-ISSN: 2395-0072

WSN BASED ANTI INTRUDE ALARM SYSTEM FOR TREES IN FOREST

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Abstract – The proposed system is all about smuggling of trees like sandal, sagwan, red sandal. These trees are very costly as well as less available in the world. To restrict such smuggling of and save the forests around the globe some preventive measures need to be developed. This paper designuses three different sensors namely, temperature sensor(to detect forest fires),sound sensor(for effective detection and illegal logging of trees i.e., sound generated while axing the trees is sensed). Data generated from these three sensors is continuously monitored by the forest officials with the help of Blynk server and Blynk app over the wifi module. A buzzer is activated when their conditions are violated. A water pump is also activated to put off the forest fires. Output devices are activated through relay switch. Forest officials notify when any event occurs so that appropriate action can be taken.

Key Words: Tilt Sensor, Temperature Sensor, Sound sensor, Tilt sensor, Relay switch, Arduino Uno, Wifi Module, Water pump, Buzzer.

1. INTRODUCTION

Forests are part of the important and indispensable resources for human survival and social development that protect the balance of the earth ecology. However, because of some uncontrolled anthropogenic activities and abnormal natural conditions, Forest Fires occur frequently. These fires are among the most serious disasters to forest resources and the human environment. In recent years, the frequency of forest fires has increased considerably due to climate changes, human activities and other factors. The prevention and monitoring of Forest Fires has become a global concern in Forest Fire prevention organizations. Currently, Forest Fire prevention methods largely consist of Patrols, Observation from watch towers, Satellite Monitoring and lately Wireless Sensor Network. Although observation from watch towers is easy and feasible, it has several defects. In the first place, this method requires many financial and material resources and a trained labor force. Second, many problems with fire protection personnel abound, such as carelessness, absence from the post, inability for real-time monitoring and the limited area coverage. Many days we are reading in the newspapers about smuggling of the trees like sandal, "Sagwan" etc.

These trees are very costly as well as less available in the world. These are use in the medical sciences as well as cosmetics. Because of huge amount of money involved in selling of such tree woods lots of incidents are happening of cutting of trees and their smuggling. To restrict such smuggling and to save the forests around the globe some preventive measures need to be deployed. We are developing such a system which can be used to restrict this smuggling. Researches regarding animal detection have been an important field to numerous applications.

2. LITERATURE SURVEY & PROBLEM STATEMENT

LITERATURE SURVEY

1. Unmanned aerial vehicle based forest fire monitoring and detection using image processing technique:

Early forest fire alarm systems are critical in making prompt response in the event of unexpected hazards. Cost-effective cameras, improvements in memory, and enhanced computation power have all enabled the design and real-time application of fire detecting algorithms using light and small-size embedded surveillance systems. This is vital in situations where the performance of traditional forest fire monitoring and detection techniques are unsatisfactory. This paper presents a forest fire monitoring and detection method with visual sensors onboard unmanned aerial vehicle (UAV).

2. *Wireless communication-based smoke detection system design for forest fire monitoring:*

Based on wireless communication technology, this paper designs a smoke detection system out of the need for forest fire monitoring. Firstly, this paper designs the hardware scheme for the key functional modules, and implements the integration of the entire system, as well as the functional debugging at the platform. Based on the hardware design, the overall scheme of software system is set up, which successfully gets through the experimental debugging. For communication, the data received from the sensor nodes is collected by a router to a coordinator, and subsequently sent to the GPRS module through a serial port. Finally, the

information is shown on the PC through the Internet. The overall system satisfies the particular need of forest environment monitoring, and presents a good prospect of application and promotion.

3. *Research on user relationship networks of SNS based on the Forest Fire model:*

This paper aims to construct a simulation model of user relationship network in SNS. The Forest model is put forward that it can achieve good results in user relationship network simulation despite some deficiency, through analysis of some existing network simulation models, and research on the regular patterns of the users behavior in SNS. Then, the characteristic value called Reciprocity of the forest model was improved, and some parameters of the improved model are also optimized. The results of the optimization are compared with the actual data of the user relationship of the four typical social networks. The experimental results show that the improved model is more similar to the real user relationship networks, and it is proved that the improved forest fire model is more effective in the simulation of user relationship network of SNS.

PROBLEM STATEMENT

Currently there is no system or any medium to detect illegal logging and cutting of trees. A mean by which, the forest officials know what's happening with trees should be installed. Such system would help in detecting and alerting so that proper actions could be taken. Putting this problem in mind, we are designing a system which help us to achieve our goal i.e. TO PROTECT NATURE. Forest Detection in boundaries is very vital. It is critical to have a system to monitor the health of wild animals and report it to the forest offices. Monitoring of trees in forest is at most important to save the environment and wild life.

Existing System:

In existing system, the manual power had been used to avoid the human damage and to reduce the manual power we are going for the system. Existing research into wireless networks for tracking has resulted in homogeneous solutions. This is the 'one size fits all' approach, where a single type of tracking device has been designed. This has segmented the solution space into trees which can be tracked using wireless networks and those that cannot, due to weight restrictions placed on the tracking collar.

This paper is related to trees. Several million acres of forest are getting destroyed because of illegal cutting trees.

In forest due to heavy rain trees getting affected and collapse.

Also forests include the very valuable trees like sandalwood, medicinal trees. For the prevention of trees and prevent illegal smuggling of trees use WSN (Wireless Sensor Network). It includes sensors which senses vibration and temperature in specific areas and send them over Zig-Bee network.

Proposed System: The main idea is to design a portable wireless sensor node which will be a part of a Wireless Sensor Network. This system will consist of two modules one involving sensors and controller module which will be at tree spot and another one is Android phone. The Blynk application will continuously receive sensor data. This is an IOT based project where the sensor data is continuously uploaded to cloud(Blynk server) over a Wi-Fi module. In case of tilt sensor and the buzzer turns on when tree bends and for temperature sensor water pump is turned on in case of forest through relay switch.

3. DESIGN OF ALARM SYSTEM

It interleaves the activity of specification, development & validation. Developed as a series of version (increments).

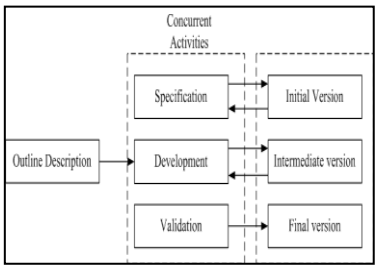


Fig 1: Incremental Development Model

Fig 1 Shows Incremental development is based on the idea of developing an initial implementation, exposing this to user comment and evolving through several versions until a complete system has been developed. It interleaves the activity of specification, development & validation. As for the hardware aspect of the project, there is limited flexibility in design and implementation. We cannot go on producing and then redesigning the end products upon changes.

4. WORKING AND RESULTS

WORKING

The proposed work combines the embedded technology with the Zigbee /wifi wireless communication technology, this paper deals with tracking of trees. This device tracks the trees space and also measures the signal by using Zigbee /wifi transceiver and GPS.

As we all know, the forest is considered as one of the most important and indispensable resources, the prevention and detection of the forest, have been researched hotly in worldwide forest prevention departments.

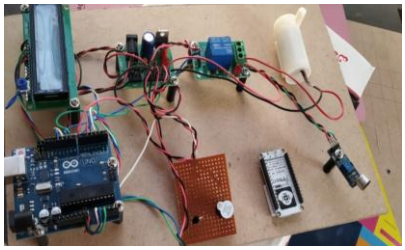
Based on the deficiencies of conventional forest and conservation detection on real time and monitoring accuracy, the wireless sensor network technique for trees and conservation detection was introduced, together with satellite monitoring.

The decision for fire-extinguishing or fire and conservation prevention can be made rightly and real-timely by related government departments.

A cluster-based wireless sensor network paradigm for forest fire real-time detection was put forward. In this paper, a wireless sensor network paradigm for real-time forest trees and conservation detection. The wireless sensor network can detect and forecast forest trees, increase in carbon-dioxide, decrease in soil moisture and also falling of trees more promptly.

This paper mainly describes the data collecting and processing in wireless sensor networks for real-time forest fire and conservation detection. A neural network method is applied to in-network data processing.

In this paper to the neck of trees this light weight designed system is attached such that temperature sensor will be hanged to the tree. Thus tree temperature is sensed and sends to microcontroller properly. GPS modem will receive string from satellites and send to microcontroller. Then microcontroller will extract latitude and longitude information from string and send it to the ZIGBEE modem and from there it will be sent to Server Room.



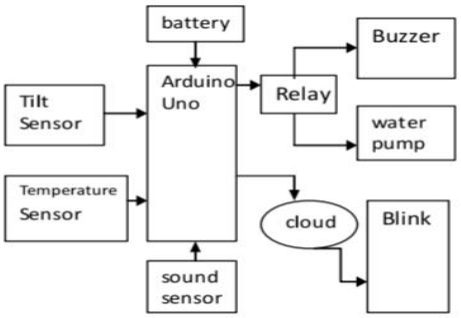


Fig 2: Block Diagram

Fig 2 shows block diagram of the alarm system in which various components are used and the description of each component is explained below.

Arduino:
The Microcontroller Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output, 6 analogue inputs, a 16 MHz ceramic resonator, a USB connection, a power jack. A program written with the IDE for Arduino is called a "sketch". Sketches are saved on the development computer as files with the file extension info.

Tilt Sensor:
The tilt sensor is a segment that can identify the tilting of an article. Anyway, it is just the comparable to a pushbutton actuated through an alternate physical instrument. This kind of sensor is the ecological inviting form of a mercury switch. It contains a metallic ball inside that will drive the two pins of the gadget from on to off and the other way around if the sensor achieves a specific point.

Temperature Sensor:
Temperature sensors are contraptions used to measure the temperature of a medium. There are 2 sorts on temperature sensors: 1) contact sensors and 2) noncontact sensors. Nevertheless, the 3 essential sorts are thermometers, restriction temperature locators, and thermocouples.

Sound sensor:
The Sound Sensor is a board that combines a microphone and some processing circuit. It not only provides an audio

output but also a binary indication of the presence of sound and an analogue representation of sound's amplitude.

Relay Switch:

Switch High voltage electronic devices can be controlled using relays. A Relay is a switch which is electrically operated by an electromagnet. The electromagnet gets activated with a low voltage, for example 5 volts from a microcontroller and it pulls a contact to make or break a high voltage circuit.

Blynk Application:

Blynk was designed for the Internet of Things. It can control hardware remotely, display sensor data and can store data . It has 3 components: Blynk App – It allows to create amazing interfaces using various widgets provided. Blynk Server – It is responsible for all the communications between the smart phone and hardware. Blynk Cloud run private Blynk server locally. Its open-source, could easily handle thousands of devices Blynk Libraries - for all the popular hardware platforms - enables communication with the server and process all the incoming and out coming commands.

RESULTS

Successful implementation of the system results in monitoring the trees in forest and preventing the smuggling. The WiFi module associated with the Arduino can send the alert to the nearest Hub or node, so that it can be forwarded to the forester along with GPS information through GSM or any other communication mode.

Fig 3: Normal Blynk

Fig 4: While Tree Cutting

Fig 3 & Fig 4 shows that Deforestation can happen quickly until tree smuggling is stopped in forest area to increase security area. It can also happen gradually as result of ongoing forest degradation as temperature rise due to climate change cause by human activity.

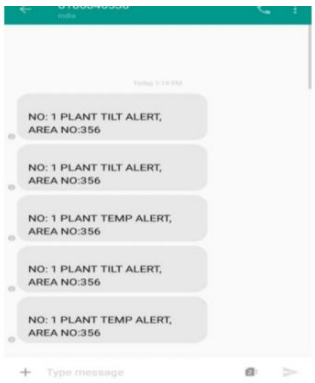


Fig 5: Signal Alert

Fig 5 shows this undertaking presents a Microcontroller, sound sensor and IOT based WSN hub to distinguish robbery/sneaking adding to the insurance of vital and expensive types of tree. Reproductions and trial results have been contrasted with approve the proposed structure.

The shared correspondence between the hub and the PC is executed . The future extent of work is execution of Multi-hub system and fuse of mouthpiece, movement identifier sensor and temperature sensor to make frameworks increasingly powerful to obtain information such human or creature obstruction, tree location.

This paper can be applied in forests to save the trees. It can be used in all the parks for providing security. The concept can be used in saving the sandalwood trees. It can be used in plantations and estates.

This paper is to provide cost efficient and reliable monitoring of trees with the help of RF design and IOT technology. Trees can be prevented by getting robbed. In case anybody tries to cut the tree the location will be tracked and information will be sent to the control room immediately. Since all the trees are connected to sensors individual attention is given on all the trees .Sensors work accurately so it is easier to operate with good results. Data base of all the trees can be maintained.

Wireless Communication in this system used zig-bee Module which is very slow and has lesser range than Wi-Fi Module which is used in Proposed System. Flex Sensors are merely sensors but tilt sensors are incline meters (which are used to

measure slope or elevation and readouts apart from just signals).The existing system is not practically implemented.

CONCLUSION

Through the system we can stop the tree cutting in forest and regulate the trafficking of trees in forest where the human beings not gifted to offer security. The major challenge is to prevent smuggling of trees to stop this idea also helps the government for the concerned person to know where the smuggling is happening with the help of GPS, like cutting of trees, by fire or because of the high temperature around the surroundings of the forest.

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