Anti-poaching Alarm System For Tree in Forest

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Abstract - **It is commonly read in the News paper about the Smuggling of the Trees such as Sandal, Teak etc taking place throughout the world.Since the demands for these trees are more,the cost of such trees is also high. By selling the woods of such trees,a huge amount can be earned and hence the smuggling of such trees may take place which is considered to bean illegal act.In order to prohibit the illegal smuggling of these trees some measures are to be undertaken.The main objective of this system is to restrict the smuggling and save the valuable trees so to maintain balanced eco-system by preventing deforestation.The system also uses a chip(board)on which various Sensors(such as Flex Sensor and Fire Sensor)are embedded which are controlled through IOT. These sensors monitors and controls the parameters like tilting, burning and cutting of the trees,and these are accessed on Android App installed in Android Smartphone.**

keywords - **Accelerometer(Tilt Sensor), pH Sensor,Fire Sensor,Ultrasonic Sensor,Node MCU(microprocessor) Relay,Water pump,Buzzer**

I. INTRODUCTION

A Poaching isn't identified with India just, China, Australia and African nations are additionally battling with same issue. Indian sandalwood costs 12000 to 13000 INR for every kg [1] though in worldwide market Red Sanders costs INR 10 center for each ton. The Indian sandalwood tree has turned out to be uncommon as of late, trying to control its conceivable misfortune, the Indian government is attempting to restrict the exportation of sandalwood [2]. For an individual, most extreme admissible buy limit isn't to surpass 3.8kg according to Govt. On the off chance that the tree is as of now government controlled, at that point its evacuation is denied whether on private or sanctuary grounds until the tree is thirty years of age. Sneaking of sandalwood has made financial and peace issues in territories circumscribing in India. The fundamental goal of this undertaking is to build up a framework which can be utilized to confine sneaking of sandalwood trees.

II. OBJECTIES

Most fierce blazes in timberlands and forests today are brought about by individuals because of abuse of flame for change of woodlands to agrarian terrains. The goal of the task is to keep the sneaking, illicit logging and other anthropogenic exercises in the timberland. Such sort of framework can be utilized in any zone of backwoods which is exceptionally influenced by pirating and illicit cutting. There is no requirement for the watchman to travel entire woods. We can see the visuals of the considerable number of happenings in the backwoods at the base station. Accurate area of tree cutting can be found effectively as well. The microcontroller frames the core of the framework and all the sensor hubs are associated with the controller unit. The sensor information is prepared in the microcontroller and is transmitted to the collector unit. The recipient unit chooses whether the ecological conditions prompts woods fire or not and is likewise cautioned about the unlawful exercises assuming any.

III. LITERATURE SURVEY

This paper [1] proposes a microcontroller based anti-poaching system employing WSN technology, and MEMS accelerometer. WSN is widely used technology in remote monitoring applications. The micro-controller that is used over here is PIC16F877A. MEMS accelerometer senses the tilt of the tree. Sound sensor combines a microphone and some processing circuitry. It Capture sound from silence and outputs digital trigger signal. Fire sensor is used to detect the rise in temperature. Smoke sensor detects the lubricant gases in the surrounding environment. GPS gives the latitude, longitude and altitude values. For the purpose of serial communication UART is used. Internet of Things is used to transfer data without requiring human to human or computer interaction and objects, animals or people are provided with unique identifiers.

The main objective here [2] is to build a protection system using Bluetooth 4.0 and GSM to alert the concerned authorities in case of sandalwood robbery. IEEE standard for Bluetooth is 802.15.1. Technology called frequency-hopping spread spectrum is used in Bluetooth, where it makes use of 79 channels to transfer the packets. Version 4.0 of Bluetooth is called smart Bluetooth because it includes basic Bluetooth, low energy and high speed protocols. The protection mechanism proposed in this paper can be implemented using either cluster or distributed architecture. Cluster architecture is a master slave architecture in which each tree is treated as slave node. Whereas distributed architecture is collection of clusters in which for a particular master node, other master node acts as slave. This protection model consists of two parts; protection circuit which serves the function of slave node and mobile application which is installed in every master node and monitors all the slave nodes.

In this paper [3], a low power MSP430 microcontroller along with RF modules is being used. WSN is widely cast-off technology in monitoring and controlling the remote applications. The design that is discussed over here has a portable wireless sensor node which is the part of a Wireless Sensor Networks. It will be attached on trunk of each tree, and is used to

identify robbery and also sends signals to Central Base Station. The system is designed to consume low power, and it works better with rechargeable batteries which can charge using natural solar system. A solar panel taken in the system is used for recharging node's batteries. The cluster of a node is around 5-10 trees. This can be formed into a cluster with a master node having extra properties and to communicate with central base station. The location of central base station is at the entrance of the forest which will communicate with node through RF network. The designed network will follow Star topology.

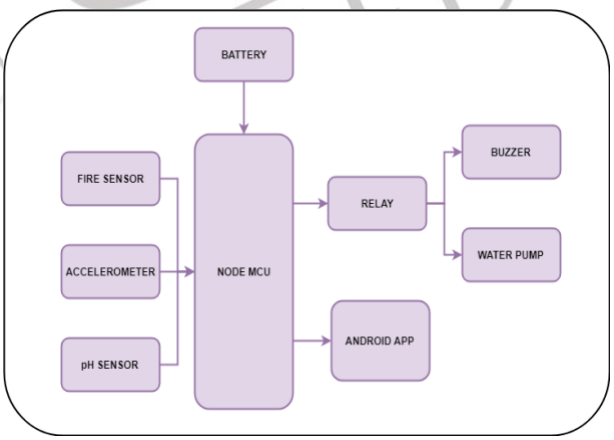
This paper [4] discusses the application of machine learning to prevent smuggling of trees. Inception-V3 model is the pretrained convolutional neural network used in the proposed system for training the system. System applies previous learning experiences to perform present or future classifications. The Application uses Infrared cameras to capture images of objects near the tree, captured images are processed to obtain high resolution images from low resolution images. The processed images are next sent to pretrained inception model for classification of objects in the image. On the basis of resemblance of classified images with bottlenecks probability of finding an intruder is calculated. Hence on detecting any abnormal value of probability, an intimation in the form of message is sent to the concerned authority.

The suggested system over here [5] consists of tree unit and main server unit. Each tree has a micro controller, Flex sensor, Accelerometer, temperature sensor, Zigbee and GSM module. The cutting down of tree is sensed by flex sensor and accelerometer. Tree unit gives the information about cutting down of trees when it catches fire and consists of three sensors accelerometer sensor, flex sensor and temperature sensor. There are several tree units and tree unit 1 is responsible to host the information from the multiple tree units. Each tree unit consists of ZigBee module and controller is accountable for data transmission from primary stage to final stage. Main server unit is responsible for user interface and displaying the data that was transmitted from stage 1. Once the base station is modified, the authorized person takes action accordingly.

IV. PROPOSED SYSTEM AND METHODOLOGY

In this system we have used multiple sensors like pH sensor, fire sensor, accelerometer, ultrasonic sensor.
The block diagram of various contents are as follows:

V. BLOCK DIAGRAM



i) Accelerometer:-

An accelerometer is an electromechanical device which is used to measure acceleration forces and proper acceleration. Such forces could be static. Acceleration gives measurement of the change in velocity. sensor's output signal specifications supported the level of acceleration and Which is typically specified in ±g. This is the greatest amount of acceleration, the part of acceleration can measure and accurately represent as an output. For example, the output of a ±3g. Most of the cases, accelerometer is linear with acceleration up to ±3g. If it is accelerated at 4g, then the output may rail.

Features:
It has complete 3-axis sensing
It can measure the static acceleration of gravity in tilt sensing applications, as well as dynamic acceleration and we get result from motion, shock, or vibration.
It is Small and thin in size.
And it has low-profile package.
It is Low power - 350 μA (typical)
it provides Single-supply operation upto
1.8 V to 3.6 V. it has Excellent temperature stability and BW adjustment with a single capacitor per axis.

Output Data Rate:
In digital-output accelerometers, it defines the rate at which data is sampled. the highest frequency signal is Bandwidth and that can be sampled without aliasing by the specified Output Data Rate.
In analog-output accelerometers, bandwidth is defined as the signal frequency at which the response falls to -3dB of the response to DC acceleration.

Total Noise:
The random deviation from the ideal output and it is equal to the multiplied product of the Noise Density and the also it is square root of the Noise Bandwidth. The units for this parameter are typically mg-RMS.

ii) Ultrasonic Sensor-

Ultrasonic Ranging Module HC - SR04

λλ features:
Ultrasonic ranging module HC - SR04 . These modules includes ultrasonic transmitters, receiver and control circuit.
The basic principle of work:
(1) they Using IO trigger for at least 10us high level signal,
(2) The Module automatically sends eight 40 kHz and it detect whether there is a pulse signal back.
(3) IF the signal back through the high level , then time of high output IO in duration is the time which is from sending ultrasonic to returning.
Test distance = (time of high level × velocity of sound (340M/S) / 2,
λλ Wire connecting direct as following:
5V Supply
Trigger Pulse Input
Echo Pulse Output

iii) pH Sensor:-
introduction:
There is Need to measure water quality and other parameters . but haven't got any low cost pH meter? and it is difficult to find low cost pH using with Arduino? Here using an analog pH meter, specially designed for Arduino controllers and it has built-in simple, convenient and practical connection and features. It has an LED which works as the Power Indicator, and a BNC connector and PH2.0 sensor interface. so You can just connect the pH sensor with BNC connector, and then plug the PH2.0 interface into any analog input on Arduino controller to read pH value easily.

Specification:
- Module Power: 5.00V
- Circuit Board Size: 43mm×32mm
- pH Measuring Range: 0-14
- Measuring Temperature: 0-60 Ꮒ
- Accuracy: ± 0.1pH (25 Ꮒ)

- Response Time: ≤ 1min
- pH Sensor with BNC Connector
- PH2.0 Interface (3 foot patch)
- Gain Adjustment Potentiometer
- Power Indicator LED

The pH meter measures the difference in electrical potential between a pH electrode and a reference electrode, and the pH meter is sometimes referred to as a "potentiometric pH meter". pH meter indicating its acidity or alkalinity and then it expressed as pH . And also it is used to monitoring the pH value of soil. The pH meter is used in many applications such as in laboratory experimentation and also used to quality control.

iv) Fire Sensor

This Flame or fire Sensor can be used to detect fire source or other light sources of the wave length in the range of 760nm - 1100 nm. and It is based on the YG1006 sensor which is a high speed and high sensitive NPN silicon phototransistor. Because of its black epoxy, the sensor get sensitive to infrared radiation. Sensor is great addition in a fire fighting robot, and it can be used as a robot eyes and which find the fire source. When the sensor detects flame then the Signal LED will light up and the pin D0 get LOW.

Features:
High Photo Sensitivity
Fast Response Time
Sensitivity adjustable

Specification:
Woriking voltage: 3.3v - 5v
Detect range: 60 degrees
Digital/Analog output
On-board LM393 chip

VI. Future Work

- More area can be converted using more sensors.
- Device size can be reduced effectively.

VII. Conclusion

The main purpose of this project is to protect the valuable trees such as sandalwood, teakwood, rosewood etc. Using this system, we can easily track the poaching activity which reduces deforestation and helps in maintaining the ecological balance and also protects the wildlife. It uses various sensors such as pH sensor and Accelerometer to detect the vibration and the angle of tree while it is being cut. Ultrasonic sensor, fire Sensor are also used.

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