Anti-Poaching Alarm System For Valuable Trees in the Forest

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Abstract: **For several days, we have been reading in the press about the smuggling of trees such as "sandal", "Sagwan," and so on. These trees are both expensive and scarce across the world. They are employed in both medical research and cosmetics. Due of the large sums of money involved in the sale of such tree woodlands, many incidences of tree cutting and smuggling occur. For many years, a known smuggler in the forests of Karnataka and Tamilnadu smuggled such plants in India. To reduce such smuggling and safeguard the world's forests, preventive measures must be implemented. We are designing a method that can be used to limit smuggling. Sandalwood smuggling has caused socioeconomic and law and order issues in areas bordering TamilNadu and other Indian states. The goal of this initiative is to rescue precious trees that are in great demand in the market, such as teak and sandalwood.**

I. INTRODUCTION

There have been several reports of hunting of commercially and environmentally vital trees in forest regions, such as sandalwood, teak wood, pine, and rosewood, in recent years.

Hunting/poaching is not limited to one nation; it occurs around the world. As a result, poaching endangers the ecosystem and its inhabitants. Forest fires and illegal harvesting of trees are currently the most prominent hazards in forests, while poaching relates to the same. Forest fires have existed for as long as woods have existed.

Not only do they harm the trees, but they also pose a major threat to all of the species that live in that area, particularly in the summer when there is no rain and the forest is more likely to catch fire and burn since the trees, leaves, and woodlands are so dry and easy to ignite.

The natural causes of fire in many woods include lightning, which may ignite trees, as well as high air temperatures and low humidity levels. These conditions are ideal for the spread of fire. Few fires that start when a cigarette, bare flame, bidi, electric spark, or any other spark comes into touch with combustible material can be attributed to human error.

The term "illegal logging of trees" is used to describe all illegal operations connected to the collection, processing, and exchange of wood. Illegality occurs when laws or rules are broken at any point, such as when trees are cut down without a permit or in a protected area, when logs are processed without a valid license, when illegal workers are employed, when specific taxes are not paid, or when goods are exported without paying export duties. All of these illegal acts take.

II.SURVEY CARRIED OUT

In survey paper [1], For the software, divided by two which are RGB image and Wavelet Analyzer. The raw image will be enhanced to RGB colour model and then into Y chrominance and luminance. When we discuss Artificial Intelligence alone then even the Artificial Neural Network (ANN) is one of the most important factors over which the major research is going on. ANN is one of most important tools for the machine learning. Under

this all the data presented before it is analysed & processed as a human brain but on extremely higher rate. So when we talk about forest management & regulation with advance technique than the major problem is that how that huge amount of data & information will be processed as the data associated with it is in huge amount. ANN perceived the data & evaluate or process it with the algorithms with is provided for this.
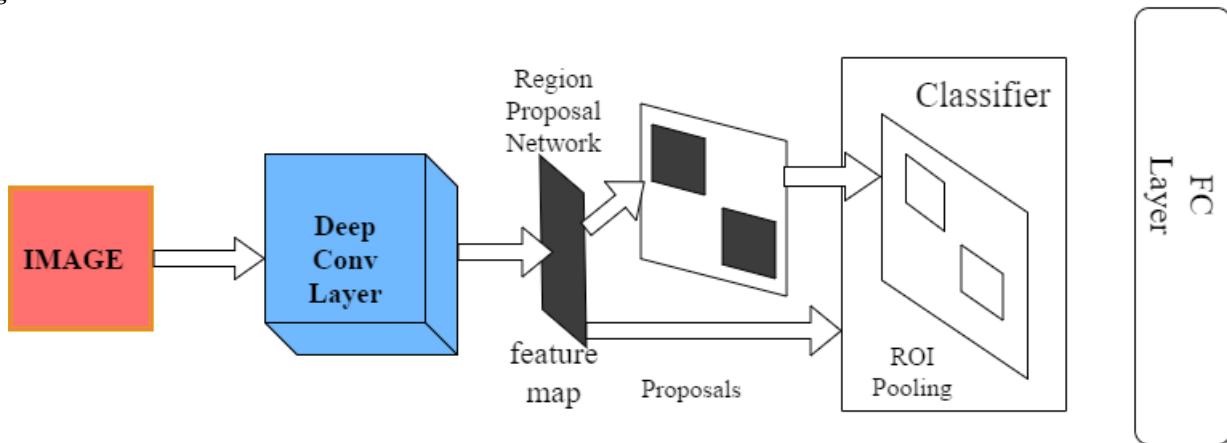
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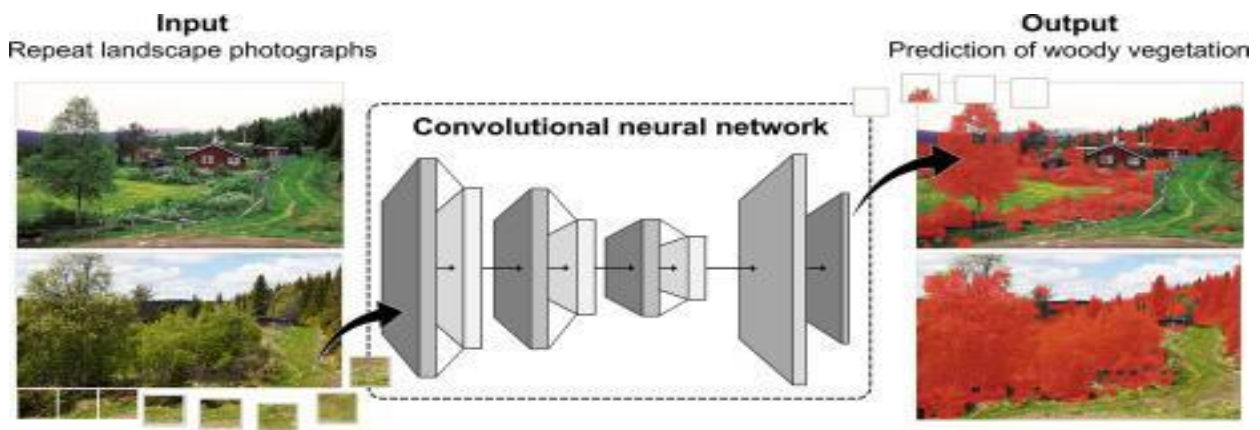

Figure 1: Block diagram

Figure 2: Prototype of Reciever section

The detection of urban trees in the optical image remains a challenge due to the difficulty of tree suppression and tree crown separations. Counting has been rarely conducted for tree crown detection using low-cost available Internet resources such as Google Earth. To obtain urban forest information cost-effectively and efficiently, in this study, we developed a novel deep learning ensemble model for ITCs detection based on Google Earth images. Our specific objectives were 1) to efficiently assess and delineate tree crowns in the highly diverse urban forest of New York's Central Park and 2) to apply the crown detection model to obtain tree attributes (e.g., number and area). By achieving these objectives, this study provides significant data to update the existing tree inventories. It also provides a new insight that using deep learning-based methods, large-scale information can be obtained from true color image data of natural system.

In paper [2],To monitor and prevent smuggling activities in the forest. PIC 16F877A is the main controller used in our project. This system uses IR sensor, flame sensor, RFID reader and tag. PIR sensor and MEMS which are placed in the trees. RFID readers and tags placed in the trees will be having a unique code, if any abnormal condition occurs, through this code we can able to identify the exact tree in a bunch. The zigbee in the system is for wireless transmission of data to the server and the gps is used to track the place and position. If any abnormal condition occurs, automatically alarm will be send to the concerned department, then the forest officer can reach the location and prevent the illegal activites, thus the natural environment is prevented from external factors.
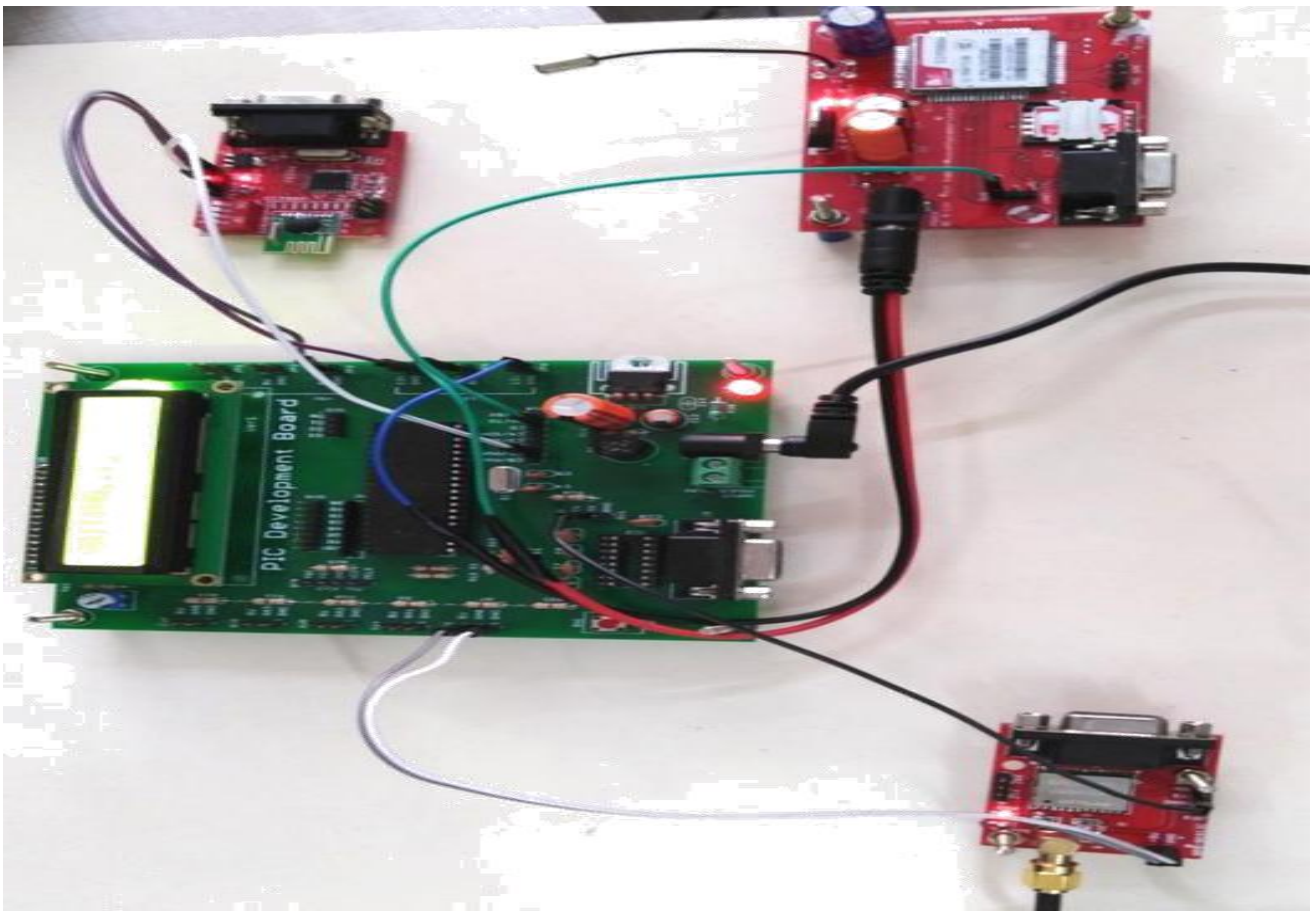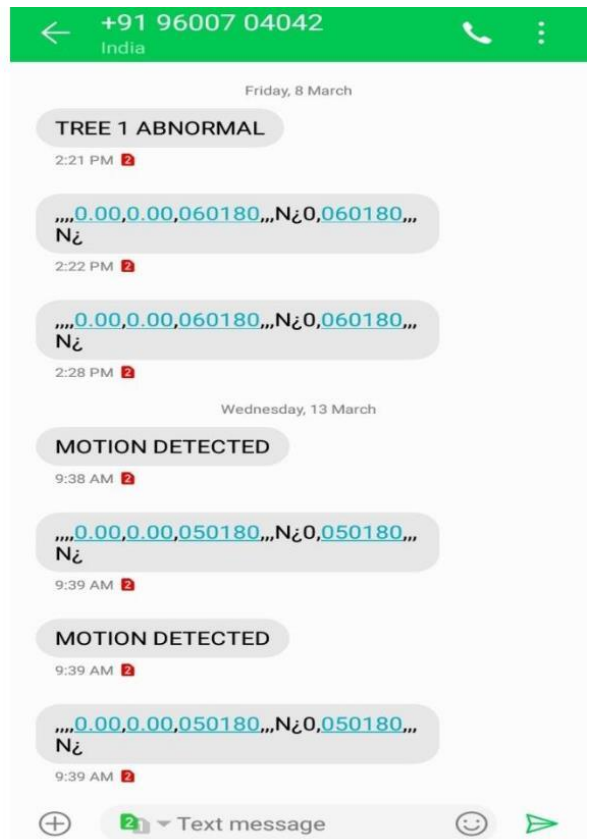
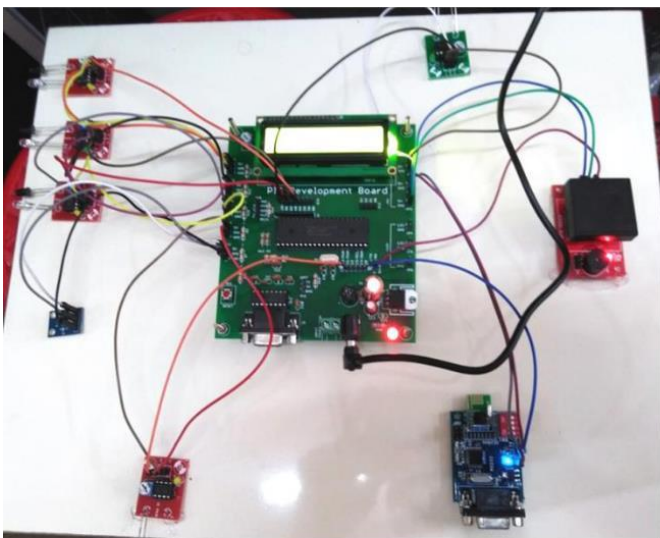**Figure 3**: Prototype of Reciever section

Figure 4: Prototype of Tree Section

In survey paper [3],The proposed WSN has:

➢ 15- 20 Sensor Nodes: Each Sensor Node will have sensor inputs as data of Accelerometer and sound sensor.

➢ 1 Master Node: Receives the messages from all the sensor nodes and forward it to Base station. It has additional Intelligence i.e. it processes the messages from the Sensor Nodes and raises the alarms levels.

➢ 1 Base Station: Receives the messages from more than one master node and logs the messages to the server.

➢ 1 PC based Server Software with GUI: To give audio visual alarms. The developing such a system which can be used to restrict this smuggling.

Every tree will be equipped with one small electronics unit which consists of Micro Controller, MEMS sensor, GPand IOT module. In big forest, each tree will be having sensor unit which is fitted on stem of tree will Communicate with their server unit .The communication between tree unit and server unit take place by using IOT module. Tree cutting will be detected by sound sensor and MEMS. By using sound sensor we can predict the cutting tree.once the tree will fallen the nearest tree will sense the sound of fallen trees and send the signal to server. Sensor values having some fixed threshold value, once the threshold value will match to the current value, it will send the alert signal to server due to that signal the forest ranger may get more alert on that particular area. Due to nature disaster some trees may fallen, for that purpose we are using GPS module for continuous monitoring of trees location.

Figure 5: Output

In [3],Jayaram K , Janani K, Jeyaguru R, Kumaresh, Muralidharan N (2019) have proposed the work on forest fire alerting system with GPS coordinates using IOT. This system is designed in such a way that it detects forest fire. In this system the microcontroller is used, its job is to control system activities and also some sensors are used to detect fire in the forest the solar panel is attached with battery is used for supply voltage. Arduino is interconnected with some sensors like smoke Sensors and temperature sensor. Arduino is also connected with WI-FI module and GPS Module.

In [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.

In [5] ,Akshay D. Sonwane, V. N Bhonge and Ajay Khandare have proposed the work on wireless sensor nodes for Anti-Poaching. They used a microcontroller and WSN protocol, using a MEMS accelerometer it monitors vibrations produced while cutting the trees. The microcontroller used in this is low power msp430f5528 along with 2.4GHz CC2500 transceiver for communication. The main idea here is to design a portable Wireless sensor Network and It is mounted on the trunk of each tree. Even they used FFT for signal processing.

In [6],The study on a "IOT based Anti-poaching alert system for trees in woods" has been proposed by Mrs. P. Madhavi, SK Razeena, SK Nowshad, Y. Susmitha, and M. Sweety. Tilt sensor, temperature sensor, Arduino Uno, and Wi-Fi module were utilised in this project. To monitor the data gathered and submit it to forest authority, they utilised the Thingspeak server and app. It comprises of two modules, one of which is the controller module and the other of which is the sensor module. Sensor data will be continually received by the Thingspeak application.

In [7], it's main objective is to detect the fire in the forest and also to alert the forest officer about the fire in the forest. Trying to understand what causes these forest fires, based on the research done it is concluded that almost 85% of the forest fires are caused by human and the other by natural causes like lightning, Lightning is described as having two components—leaders and strokes. The leader is the probing feeler sent from the cloud. The return streaks of light are a series of strokes that produce the actual lightning

bolt or flash that we see. There are two types of lightning, cold lightning and hot lightning. Cold lightning is a return stroke with intense electrical current but of relatively short duration. Hot lightning has currents with less voltage, but these occur for a longer period of time. Fires are usually started by unusually long-lasting hot lightning bolts. Here our advanced IOT processor is used to control the system activities, some sensors are used to detect the fire in the forest, the sensors include temperature sensor, smoke sensor and fire sensor, with detecting the fire the exact location of the fire is detected and located to the nearby forest officer, to do this the model contains a GSM module and Bluetooth module. When a fire catches, the sensors will detect unusual occurings, when it happens the code in the Arduino will be executed and the gsm modules will alert the respective personnel. In addition to this, the system is completely IoT based and the activities of the system are continuously monitored and the monitoring details are stored in online pages which can be viewed by office personnel regularly. The details are stored as a data and this data can be viewed at any time.

In [8] Dr.M C Hingane,Vandana Datta Ingale,Snehal Chaudari ,Sonal Awachare proposed a work on protecting trees in forest using NODEMCU as controller ,Android app and sensors. Here they used accelerometer, fire sensor, PH sensor is for measuring quality of water, ultrasonic sensor for measuring sounds, buzzer and water pump turns on with the help of relay when any poaching activities occur.
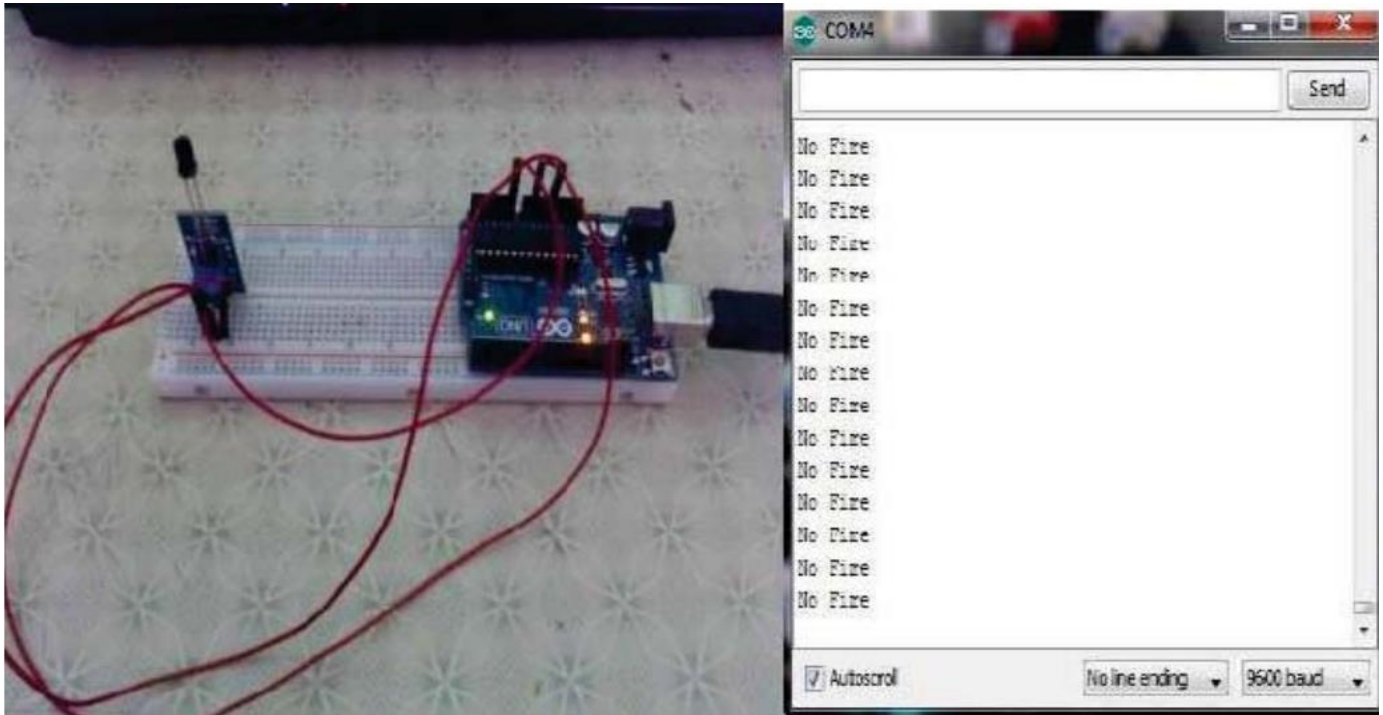

Figure 6.Normal Condition

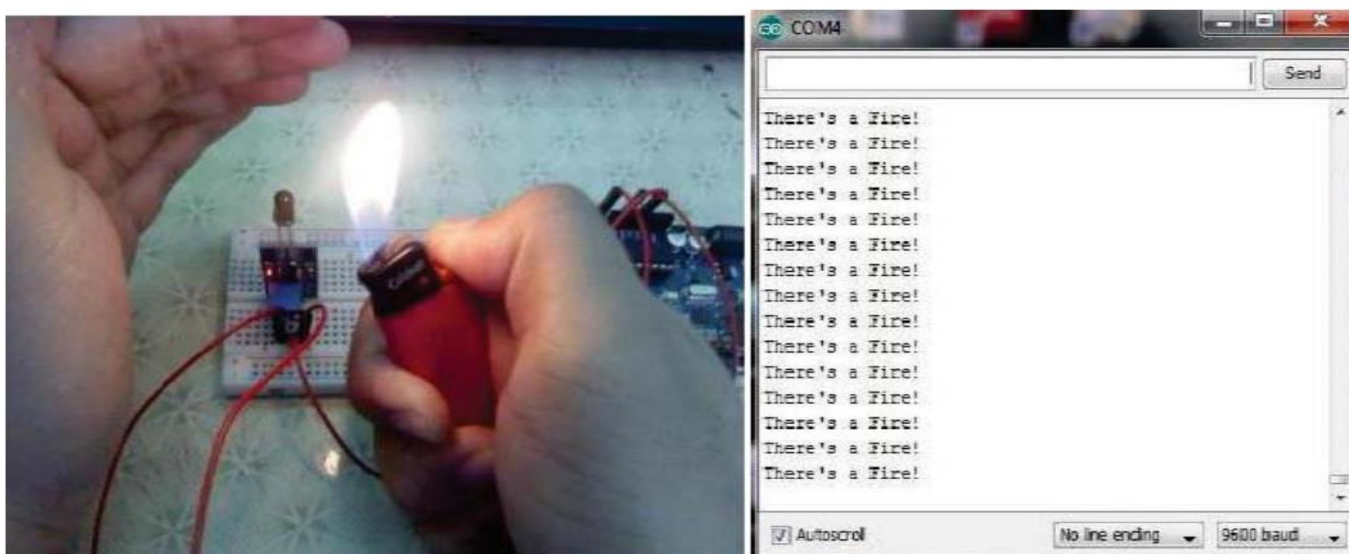## When exposed to the fire of an ignited lighter

Figure 7: Fire detection

In [9]. N.Shilpa and C H Sundharani proposed a work on IOT based anti_poaching of trees. Here they used opamp as a controller, Gyro sensor to detect the bow of tree over certain point and temperature sensor, RF TX is for transmitting information from tree section and RF RX is used for receiving information to main server section, the Arduino uno is used as controller in server section, GSM, wi-fi module, cloud platform (thingspeak) is implemented here. The information is sent from tree section to server section and SMS is sent to authorities from GSM module, when sneaking action takes place

In [10],Proposed system is smart technique to detect the theft of trees from the smugglers. Here the pic microcontroller controlled the whole system connected with three sensors namely temperature sensors, vibration sensor and acceleration sensor which sense the fire and cutting of trees. The Raspberry interfacing with camera and voice recorder is used to capture and store the image and the audio during the theft or firing was detected. Here Zigbee act as wireless sensor network which is used to send the received information from those sensors to the corresponding authorities through the network. The collected information is received through the Blynk application. The block diagram contains two sections. One is transmitter block and another one is receiver block. whenever the trees have been fired or cut down by the smugglers assist of wireless sensor network the microcontroller sends the data to the receiver and it is intimated to the corresponding higher authorities. LM35 temperature sensor identifies the fire and flame and the data has been assisting of ZigBee transmitter which transmits further information to ZigBee receiver. Accelerometer and vibration sensor helps to identify the smuggling of trees. assisting connected with cup helps to sends information to higher authorities using blynk application and also this information is displayed in an LCD.

CONCLUSION

In addition to providing an overview of various technologies and their uses for preventing the theft of trees, this study also included an assessment of current systems.

The detection of fire and the smuggling of trees in diverse regions is particularly successful with IOT-based WSN.Many sensors are employed to find changes in the environment, and the data is delivered to the controllers, who then send messages to the authorities. Here, sensors such as accelerometers, fire sensors, tilt sensors, gyro sensors, photoelectric sensors, and ultrasonic sensors are employed. The controller data is subsequently transferred to the cloud, where it is then accessible by the Authorities that receive the messages. An overview of several technologies and their uses in anti-tree-poaching efforts has been covered in this study.The IOT-based WSN is particularly good in finding fires and moving trees into different areas.

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