# ANTI-POACHING SYSTEM OF TREES USING WSN AND IOT

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**Abstract:** *Now-a-days, trees are smuggling by the thieves. The foremost intention is to layout a framework or gadget which is utilized to hinder the sneaking of trees. It consists of wi-fi sensor mode and IOT statistics center. Each sensor node can be developed using the usage of an accelerometer, LM35 Temperature sensor, Vibration sensor, Zigbee wi-fi medium with the Voice recorder, Image capturer. The data amassed via the sensor node will be transmitted with the assist of Zigbee transmitter, on the different facet side receiver Zigbee collects the information and to restrict smuggling and to track the trees much easy. These data will consistently check with the blynk app cloud platform. Officials get alarm any event occurs so that appropriate operation will be taken.*

*Key Words:* WSN, Accelerometer, Vibration sensor, Zigbee, Camera, Voice Recorder

## 1. INTRODUCTION

In latest years poaching or smuggling of environmentally and economically essential species of bushes in forested areas such as sandalwood, Teakwood and Rosewood has been particularly increased. There have been countless initiatives undertaken by way of one-of-kind stakeholders - and in unique with the aid of Govt. of India, to mitigate these problems. These consist of recruitment, coaching and deployment of anti-poaching watchers and private/govt. Strict punishment for convicted offenders, as well as giving special incentives for anti-poaching activities were aimed for eradicating the menace from many days we are reading in the newspaper about the smuggling of precious trees like sandalwood, teakwood, rosewood etc., These trees are costly. These are mostly useful in the medical sciences and cosmetics. Because of huge amount of money involved in selling of such tree woods illegal activity like smuggling is taking place. The government has been taking so many steps to avoid the smuggling, they prevent as much as they can but the smuggling is still continuing. In previous days the government has taken steps by increasing the guards. The guards have to monitoring the forest all the time.

Anti-poaching and avoid smuggling forest trees. Smuggling can be easily prevented by continuous monitoring of the valuable trees (sandalwood, Rosewood, etc.,) in the forest automatically.

The main goal of the system is to enhance forest management efficiency and decrease tree illegal logging cases. Continuity sensor and also flammable detection gives robust monitoring of the trees being cutting down and immediate alert is given to forest guard patrol. So, they can take immediate actions. The transmitter kit has been placed in the trees, which is having the sensor to detect. Receiver kit will be place in control room which will be monitor by guard. This is accessible ways to avoid the cutting down the valuable trees. By using this system, we can easily detect the forest firing and we can save the most of other region of the forest and then we can save the animals and birds also. We can take steps immediately to stop the forest and then we can take steps immediately to stop the forest from the fire. By this system we can reduce the number of guards. Each tree will be monitor 24*7 continuously.

## 2. RELATED WORKS

IOT based Anti-poaching alarm system for valuable trees has been published on may 2020 by Ritika among three members proposed to design a portable wireless sensor node which will be part of a wireless sensor network.

IOT based Ani-poaching alarm system for trees in forest has been published on April 2019 by Naveen raj among three members proposed to distinguish robbery/sneaking adding to the insurance of vital and to increase our security area and to avoid deforestation.

The Forest Trees against poaching using WSN has been published on May 2018 by Anand among three members proposed to restrict the smuggling and for continuous monitoring of trees location.

Forest Monitoring system using WSN has been published on April 2018 by sagar paddhan to have a network with high throughput, minimal delay and able to predict the communication between the nodes.

Smuggling prevention system for trees in forest using IOT has been published on Chennai International journal of scientific research and innovations IX (2018)15-22 by Subhashini A to prevent the smuggling in forest.

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## 3. EXISTING METHOD

### 3.1 Protection of valuable trees from smuggling using RFID and Sensors

The framework comprises three sub-areas to be specific unit, sub-server and backwoods officer unit. Sensor which is fitted on tree will be tree unit, control area comprising-server unit lastly the backwoods officer cell phone or pc is the woods officer unit. Tree unit contains of vibration module one consisting of sensors and controller module which will be at tree spot and some other is android telephone.

### 3.2 Anti-Poaching Alarm System Using Tilt Sensor

The principal thought is to structure a versatile remote sensor hub which contains of two Modules one including sensors and controller Module which will be at tree spot and another is Android telephone. The Blynk application will consistently get senor information. This is an IOT based venture where the sensor information is consistently transferred to cloud (Blynk server) over a Wi-Fi Module. In the event of tilt sensor and the bell turns on when tree twists and for temperature sensor water siphon is turned on if there should be an occurrence of woods fire through hand-off switch.

## 4. PROPOSED SYSTEM

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 as shown in below figure 1 and 2.
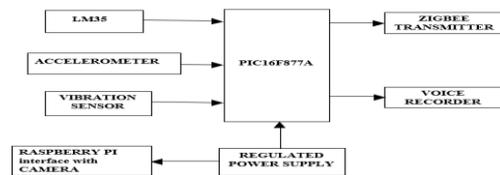


**Fig.-1**: Transmitter circuit diagram of anti-poaching of trees using WSN and IOT
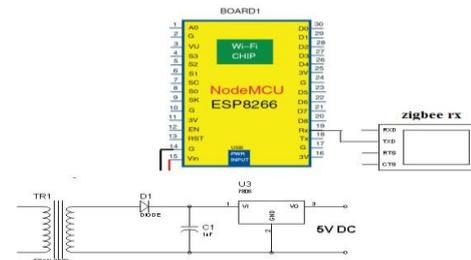


**Fig-2**: Receiver circuit diagram of anti-poaching of trees using WSN and IOT

## 5. SYSTEM ARCHITECTURE

### 5.1 LM35 Temperature sensor

LM35 temperature sensor, LM35 is a precession Integrated circuit Temperature sensor, whose output voltage varies, primarily based on the temperature around it. It is a small and inexpensive IC which can be used to measure temperature somewhere between -55°C to 150°C. Output voltage is directly proportional (Linear) to temperature (i.e.) there will be a rise of 10mV (0.01V) for every 1°C rise in temperature., ±0.5°C Accuracy Drain current is less than 60uA Low-cost temperature sensor.

As shown in below figure 3 it can without difficulty be interfaced with any Microcontroller that has ADC feature or any improvement platform like Arduino.



**Fig-3**: LM35 Temperature sensor

### 5.2. Accelerometer

An accelerometer is a gadget that measures the vibration, or acceleration of action of a structure. The pressure induced via vibration or an exchange in action (acceleration) reasons the mass to "squeeze" the piezoelectric fabric which produces an electrical cost that is proportional to the pressure exerted upon it as shown in figure 4.
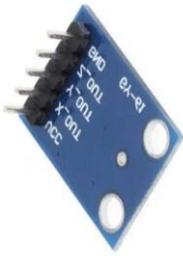
**Fig-4**: Accelerometer          **Fig- 5**.: Vibration sensor

## 5.3. Vibration Sensor

Vibration sensor is a system that measures the quantity and frequency of vibration in a given system, machine, or piece of equipment. A piezoelectric transducer is a gadget that makes use of the piezoelectric impact to measure modification in acceleration, pressure, strain, temperature or pressure by using changing this power into an electrical cost as shown in below figure 5.

## 5.4. PIC16F877A

This effect (200 nanosecond guidance execution) easy-but easy to-program (only 35 single phrase instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's effective PIC® structure into a fourth package deal and is upwards well suited with the PIC16C5X. The PIC16F877A facets 256 bytes of EEPROM statistics, memory - programming, an ICD.

The 2-wire Inter-Integrated Circuit (I²C™) bus and a Universal Asynchronous Receiver Transmitter (USART) as shown in below figure 6.



**Fig-6**: PIC16F877A microcontroller

## 5.5. ZigBee

The science described through Zigbee specification is meant to be less complicated and much less luxurious than different wi-fi private place network, such as Bluetooth or extra familiar Wi-Fi networking such as Wi-Fi. Applications encompass Wi-Fi mild switches, domestic power monitors, visitor's administration management systems, and different purchaser and industrial gear that requires short-range low-rate Wi-Fi records transfer. Its low electricity consumption limits transmission distances to 10–100 meters line-of-sight,

relaying on electricity output and environmental characteristics.
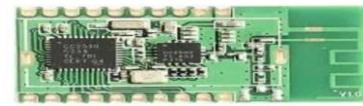


**Fig-7**: Zigbee

As shown in above figure 7 Zigbee verbal exchange is specifically constructed for mange and sensor networks on IEEE 802.15.4 wide spread for Wi-Fi non-public region networks (WPANs), and it is the product from Zigbee alliance.

## 5.6. NodeMCU ESP8266

NodeMCU is an open-source Lua primarily based firmware and improvement board especially centred for IoT based totally Applications. It consists of firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based totally on the ESP-12 module as shown in below figure 8.



**Fig-8**: NodeMCU ESP8266

## 6. RASPBERRY PI INTERFACE WITH CAMERA

Pi Camera module is a digicam which can be used to take photographs and excessive definition video. Raspberry Pi Board has CSI (Camera Serial Interface) interface to which we can connect Pi Camera module directly. As shown in below figure 9 this Pi Camera module can connect to the Raspberry Pi's CSI port the usage of 15-pin ribbon cable.



**Fig-9**: Raspberry pi with Camera

## 7. EXPERIMENTAL RESULTS

Whenever the trees have been fired or cut 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, the data has been sent assist of Zigbee transmitter which transmits the further information to the Zigbee receiver. Accelerometer and vibration sensor helps to identify smuggling of trees as shown in figure 10 and figure 11.



**Fig-10**: Hands on Kit of Anti-Poaching System of Trees using WSN and IOT without detection
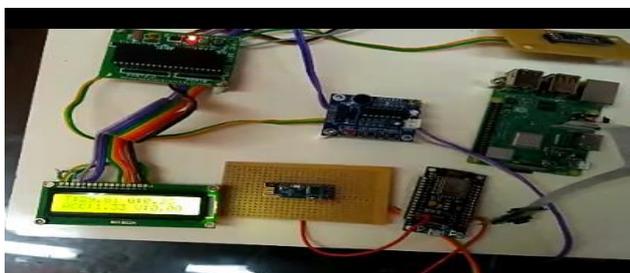


**Fig-11**: Hands on kit of Anti-Poaching System of Trees using WSN and IOT after detection

## 8. CONCLUSION

Thus, aim of our project is to protect the trees from smugglers. In existing this project work, we got exposed to many practical problems and difficulties, facing such situation and solving the problems as given us a confident and courage, which are very essential for a successful engineer. It will be no doubt that microcontroller will be a critical section of any system in industry, in the close to future and we have utilized the microcontroller for completion of this project. Once obtain we categorical our honest thanks to our guides and staff members.

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