

An IoT Based System to Prevent Of Illegal Cutting of Trees

SHREYA J KUMAR¹, JAYASHREE M², ABHIJEET SUMAN³, ASHWIN R⁴, ABHIJITH H V⁵
^{1,2,3,4,5}*Department of Information Science and Engineering*

*Sai Vidya Institute of Technology
Bangalore, India.*

ABSTRACT

The motive of this paper is to develop an anti-smuggling system that would be useful in the protected forest areas. Sneaking of the trees such as sandal, red sander, teak etc., is major national concern. To avoid smuggling and to spare the woodlands around the world, we have come up with an idea, for which we have proposed a system based on Internet of things which can be used to detect the illegal cutting of tree and restrict the tree smuggling.

Keywords- IOT; Sensor; Data Processing; Sensor Network.

I. INTRODUCTION

For ages we have been disturbed by illegal activities like smuggling of Precious and commercial trees such as Teakwood, Sandalwood, Sagwan etc., from the protected Forest areas. These trees are very expensive as well as have a lot of commercial demand in the world market. The trees are protected by marking them some tags manually in certain places. Logging can be cutting trees, sliding trees, nearby preparing, and stacking trees or logs onto trucks.

The fare of wood materials is begun from illicitly removing timber which is a multi-million dollar industry. Illegal logging not only leaves a mark of deforestation also making void where old trees once stood – it strips the financial livelihood of local communities. There's additionally lost and cost income that may has been created just from legitimate logging of woodlands. At the point when trees are cut without the licenses and are pirated abroad, the administrations miss out fiscally in a few ways, including lost income from assessments and obligations likewise the expenses for the endeavors to deal with the unlawful logging. Trees that are cut without paying the assessments and obligations diminishes the market cost of that timber, which additionally influences different lumberjacks to take after similar practices. This further expands misfortunes to governments and begins an endless loop in the market. Illegal logging of trees is also called as timber theft by the timber mafia. It can likewise be alluded to as the gathering, transportation, buy, or offer of timber disregarding laws. The harvesting procedure might be unlawful which incorporates utilizing degenerate approaches to access the timberlands; extraction of wood without the lawful consent; the cutting of ensured and imperiled species; or the extraction of timber than from as far as possible. Due to increase in demand for the forests products, it has brought some financial benefits to the poor people living around the forest areas. But usually, poor communities who are totally reliant on woodlands miss out of interests as the logging organizations and vagrant specialists receive a large portion of the rewards.

Clearcut logging is harvesting or silviculture method, and which is also known as clearcutting or block cutting. In the wood products industry logging organizations are alluded to as logging temporary workers, and the non-association teams alluded to as "gyppo loggers." Cutting trees with the most noteworthy esteem and leaving those with less esteem which is either ailing or deformed trees, is alluded to as high evaluating. It is additionally called selective logging.

As a preventive measure to the above problem, we have come up with a system based on Internet of things that can be utilized to keep the pirating of the trees which would thus stop the de-forestation and keep up the Environmental strength, which would tackle one of the issues of the Global Warming. Each tree unit is having an electronic unit, which comprises of various sensors, trancivers and micro Controller.

II. NEED FOR STUDY & RELATED WORK

- 1) In LUCKNOW 200 teak trees were cut and the timber was smuggled [3].
- 2) In Berhampur endangered red sandalwood trees were seized [4].
- 3) The town of Suifenhe in China is home to a timber production line that procedures in excess of 5 billion pounds of wood for every year, the majority of which originates from Russia by pirating [5].
- 4) There exist few methods based on RFID to detect the movement of trees [18].

- 5) The circumstance has gone very more regrettable as timber, worth lakhs and lakhs of rupees is in effect unlawfully sold directly under the nose of the concerned office.
- 6) The Times of India, Ahmedabad. Plan to control between state pirating of backwoods woods.
- 7) From Indonesia the greater part of the illegal wood creation is being completed in Malaysia. This is key travel nation. Prevention of Illegal logging of Trees using IOT 253. Though in Brazil, Amazon range holds 80% illicit exchanging this abuses government controls. At the center of illicit logging is across the board defilement regularly called as 'Green Gold'. [2]
- 8) Indonesian Government came to know from the examination that Korindo was doing illegal exporting of timber with the assistance of aristocrats. Joined Nation has announced it as a world biosphere save and it shapes a biggest secured territory of timberland in South East Asia. [2]

III. PROPOSED WORK

The system consisting of 3 units:

1. Tree unit
2. Sink Node unit
3. Server unit

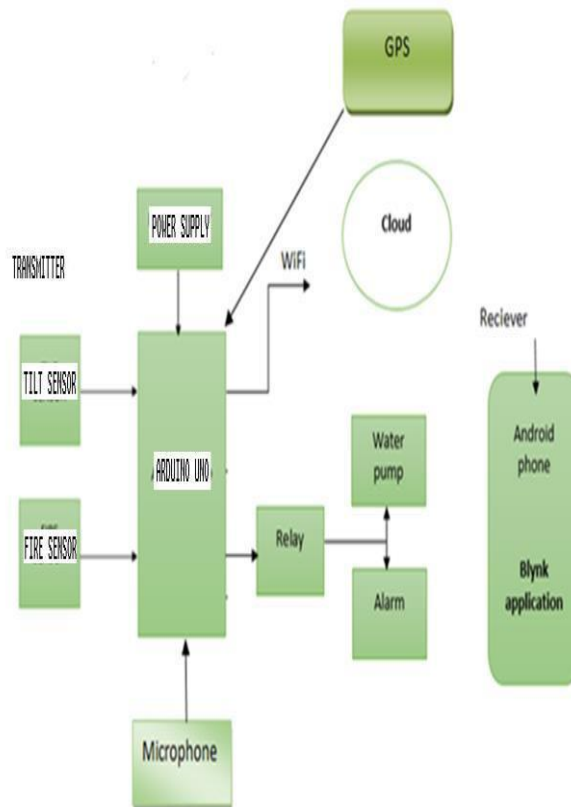


Fig1: System Architecture

The tree unit consists of tilt sensor, sound sensor and temperature sensor. Tilt sensor helps in detecting the tree bending angle and notifies fall detected in the blynk application in an android phone.

Temperature sensor will detect the temperature around the tree, whenever there is an unusual rise in temperature due to forest fire or due to rupture of a cutting tool used against the tree.

Sound sensor will detect the usual sound around the area, like the continuous sound produced by chainsaw while cutting the tree disturbs the environment causing the sound sensor to give the notification.

The main idea presented in the paper is to design a portable wireless sensor node that will be a part of a Wireless Sensor Network.

The suggested system will consist of two modules one involving sensors, controller module which will be at tree location and another one is the Android phone.

We have used an open source blynk application which will continuously receive sensed data. This is an IOT based project where we upload sensed data continuously to blynk server.

Using the open source application we can turn on the water pump in case of forest fire and we can turn on alarm other devices in smuggling case. Here we have given the user the authority to manually switch on the water pump and the buzzer present at tree spot. This system could be monitored from any location and control also track the changes.

In the tree unit a microcontroller which is the heart of the venture, situated inside and controls operations of the framework. Tree cutting will be detected by accelerometer sensor, bending of tree will be detected by flex sensor and in case of fire it will be detected by temperature sensor.

The Sink node acts as an interface between forest tree network and the internet. It gathers the information from various tree units and forwards the information to server using wify module.

The server receives the data from sink node through internet. It stores the data in the blynk database. All the information is sent through wify module to mobile application. With the help of GSM modem authorized person will get the SMS on our registered mobile phone which contains information regarding temperature of the tree and movement of the trees by accelerometer sensor and even a voice alert over an android application. By this information we are able to alert and control the illegal logging of trees.

Fig 2 shows the working of proposed system.

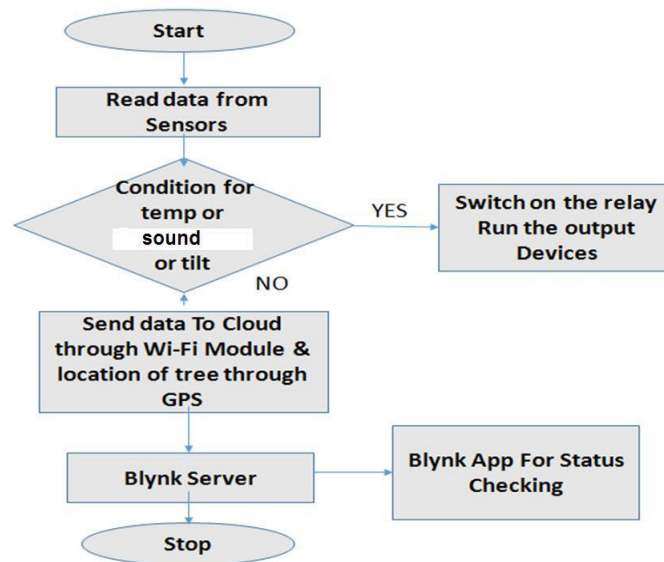


Fig 2: Flow diagram

Information is sent through wify and gps to mobile application. With the help of blynk application authorized person will get the data values on an registered mobile phone which contains information regarding temperature of the tree and movement of the trees by accelerometer sensor and even a voice alert over an android application. By this information we are able to alert and control the illegal logging of trees.

IV. EXPERIMENT RESULT

The test bed is created using Arduino microcontroller, sound sensor, tilt sensor and temperature sensor and these modules are assembled. The tree unit is fixed to the model. An open source server, the blynk server is used. Android application is created using eclipse. Figure 2 shows the data gathered by the server.



Fig 2: Data in the data base

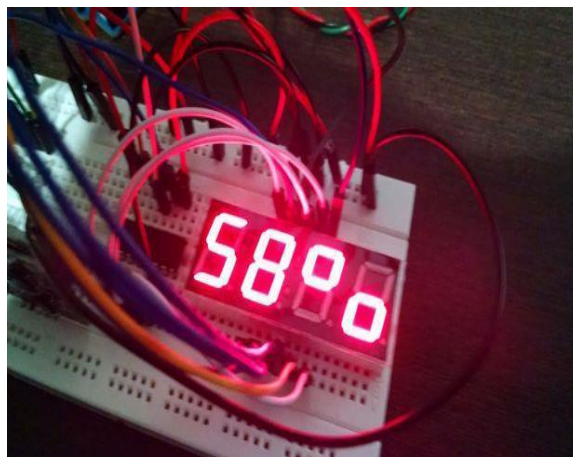


Fig 3: Various alert message displayed on LCD

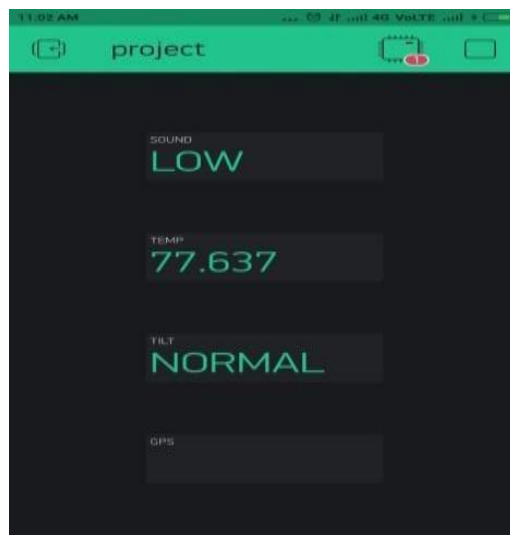


Fig 4: Alert Received on mobile pone through the app

Different cases like tree may fall due to natural events like rain or through fire are also considered. If someone is trying to cut the tree using weapons, someone may try to fire the tree base.

V. CONCLUSION

Preventing smuggling of trees is a major challenge. This idea also helps the government or the authorized concerned person to know where the Smuggling is happening with the help of GPS and how it is happening like cutting of tree, by fire or because of the high temperature around the surroundings of the forest. It not only prevents from smuggling but also from natural calamity like forest fire.

REFERENCE

- [1] Yichang, China;Guangyu He Junli Wan, "Research on Zigbee wireless communication technology" Wei Wang In Electr.Eng. & Renewable Energy Sch., China Three Gorges University.
- [2] http://medlibrary.org/medwiki/Illegal_logging
- [3] <http://timesofindia.indiatimes.com/city/lucknow/200-teaktrees-cut-timber-smuggled/articleshow/16804707.cms>
- [4] <http://ibnlive.in.com/news/endangered-red-sandalwood-seized-from-smugglers-in-berhampur/480595-3-234.html>
- [5] <http://esl.fis.edu/learners/support/sci/text/stolenforest.htm>
- [6] <http://esl.fis.edu/learners/support/sci/text/stolenforest.htm>. Muhammad Ali Mazidi, RolnD.Mckenley, "The 8051 Microcontroller and embedded system using assembly & C. Chonggang Wang, Tao Jiang, Qian Zhang—ZigBee Network Protocols and Applications.
- [7] ZigBee Alliance, ZigBee Specification. Version 1.0ZigBee Document 053474r06.
- [8] Anil Kulkarni, Ajay Khandare, MandarMalve, "Wireless Sensor Network (WSN) for protection high cost trees in remote jungles from fire and poaching", International Seminar on Sandalwood: Current Trends and Future Prospects, pp. 68-73, Feb 2014.
- [9] Digital Output MEMS Accelerometer-ADXL345 Analog Devices, 2009.
- [10] SrideviVeerasingam, SaurabhKarodi, SapnaShukla, "Design of Wireless Sensor Network node on Zigbee for Temperature Monitoring", 2009 International Conference on Advances in Computing Control and Telecommunication Technologies IEEE Journals, 2009.
- [11] Problem analysis and proposed solutions on illegal logging in WWF southern Russia report pg. no. 18, [www.illegallogging.info/sites/default/files/uploads/WWF Southern Russia report](http://www.illegallogging.info/sites/default/files/uploads/WWF_Southern_Russia_report.pdf).
- [12] The Peruvian Environmental Law Society (2003) Case Study on the Development and Implementation of Guidelines for the Control of Illegal Logging with a view to Sustainable Forest Management in Peru [http](http://www.eolss.net/sample_chapters/c10/e5-03-02.pdf).
- [13] www.eolss.net/sample_chapters/c10/e5-03-02.pdf
- [14] www.theshillingtimes.com/2014/07/10/timber-smugglers-attack-forest-staff.
- [15] www.postronindia.in/datasheet/DS_P5006.pdf
- [16] blogwsj.com/indiarealtime/2013/12/30/Australia/Smuggles-sandalwood-to-feed-indian-demand.
- [17] C. Srinivasan and H. Ranganathan on RFID sensor network based automation system for monitoring and tracking of sandalwood trees.
- [18] http://medlibrary.org/medwiki/Illegal_logging
- [19] WWF Latvia (2003) <rev>The features of illegal logging and related trade in Baltic Sea region; WWF International (2002) The Timber Footprint of the G8.
- [20] Annual report 2003 from the Commission to the Council and the European Parliament on the EC Development Policy and the implementation of External Assistance in 2002.