IOT Based Forest Monitoring System

Bhujbal Varsha S, Kale Sonali S., Nawale Rutuja R., More Prashant. C.

Department of Electronics and Telecommunication Engineering, H.S.B.P.V.T's College of Engineering Kashti, Maharashtra, India

ABSTRACT

Smuggling of most costly trees such as sandal wood, sagwan in forests, causes a serious hazards of forest resources and also causes significant economic damage and large devastating effect on the environment all over the world. To solve this problem we built this project Arduino platform based forest monitoring system using IoT. In this project we have built forest monitoring system using arduino board interfaced with vibration sensors through HT12E encoder. It monitor the perticular trees like sandalwood by using the sensors. This project used a controller based anti-smuggling system employing Internet Of Things (IoT) technology, which is able to detecting theft by monitoring the vibrations produced by the cutting of trees/branches using a vibration sensor. It will display message on LCD and also on computer through Thinkspeak app in forest area. This project presents a system for monitoring forest and its proximity based on Internet of things based wireless sensor network technology.So this project is used to reduce forest mischance, the intrusion lawless activities in the forest by using wireless sensor technology and avoiding manual power to the highest possible extent.

Keywords : Internet of Things, vibration sensor,HT12E,HT12D.

I. INTRODUCTION

We have developed a system which can be used to restrict the smuggling of the trees which would in turn stop the de-forestation and maintain the Environmental stability, which would help to solve one of the issues with the Global Warming and also control pollution issues.Sandal wood, sagwan etc trees are very costly as well as less available . These trees are used to make cosmetics as well as furnitures. Selling of such trees huge amount of money get involved ,for this purpose lots of tree woods are cut & theft. To restrict such smuggling and to save the forests around the world some preventive measures need to be developed. The developing of such a system can be used to aviod this smuggling. This project is developed to prevention of such trees.For that there will be two sections 1.Tree section 2. Zone section.RF module consist of transmitter and receiver unit.Each tree consist small electronic unit, which having vibration sensor,RF module and HD12E.Tree cutting will be detected by these vibration sensor.

II. LITERATURE SURVEY

1. Trees from the Neerenkimale reserve forest under the Uppinangadi forest range are reportedly being felled and supplied to the market since the last few months,in 2018.
2. According to DRI sorces smugglers hire poachers to locate and cut down the tree paying them between Rs.20 and Rs.40 per kilogram based on the market demand.So,while smugglers make lakhs out of each tonne,the poachers based in the rural parts of Chittoor, Kadapa, Nellore and Kurnool districts of AP who cut the trees are paid as little as Rs. 50,000 to 1 lakh per tonne.

3. Sandalwood trees cut and smuggled out from central jail,in 2017.
4. Sandaled trees smuggled out of Lalbagh gardens,in 2013.

III. PROPOSED WORK

Zone Section: These section monitors the forest area. RF receiver receives data from transmitter and sent these data to HT12D decoder to decode the information. The information of vibration sensor is send to the computer through Thinkspeak app by using wifi module and also message display on LCD. The location of smuggling tree and data of vibration sensor from these information, the location of tree cut be tracked and smuggling restricted.
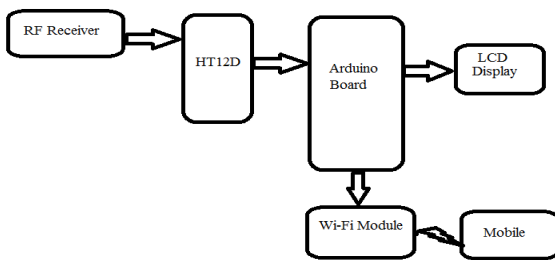

Fig.1.Block diagram of Zone section

Wi-Fi Module (ESP8266)

The ESP8266 Wi-Fi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or off loading all Wi-Fi networking functions from another application processor.[4]

Arduino Uno

The Arduino UNO is a widely used open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output pins that may be interfaced to various expansion boards and other circuits.

Specifications

Operating Voltage: 5 Volt
Input Voltage: 7 to 20 Volts
Digital I/O Pins: 14 (of which 6 provide PWM output)
Analog Input Pins: 6
DC Current per I/O Pin: 20 mA
DC Current for 3.3V Pin: 50 mA
Flash Memory: 32 KB of which 0.5 KB used by boot loader
SRAM: 2 KB
EEPROM: 1 KB
Clock Speed: 16 MHz
Length: 68.6 mm

RF Module

An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio frequency (RF) communication. For many applications the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and a receiver.

HT12E & HT12D

HT12E is a 212 series encoder IC (Integrated Circuit) for remote control applications. It is commonly used for radio frequency (RF) applications. By using the paired HT12E encoder and HT12D decoder we can easily transmit and receive 12 bits of parallel data serially. HT12E simply converts 12 bit parallel data in to serial output which can be transmitted through a RF transmitter. These 12 bit parallel data is divided in to 8 address bits and 4 data bits. By using these address pins we can provide 8 bit security code for data transmission and multiple receivers may be addressed using the same transmitter.

Specifications

18-pin DIP
Operating Voltage : 2.4V ~ 12V
Low Power and High Noise Immunity
Low Standby Current : 0.1uA (typ.) at VDD=5V
Data code has positive polarity
Easy Interface with and RF or an Infrared
transmission medium
Secure and robust protocol
Ideal for remote control and security applications
Compatible with the HT12D decoder IC
Minimal External Components

Tree Section : This section monitored the forest mishap like illegal smuggling of the valuable trees.The vibration sensor sense the vibration in the trees. The RF transmitter transmit the signal to RF receiver at the zone section and prevents smuggling of valuable trees. Thus the smuggling of trees can be monitored at the zone section and also concerned forest authority can be informed through IoT.
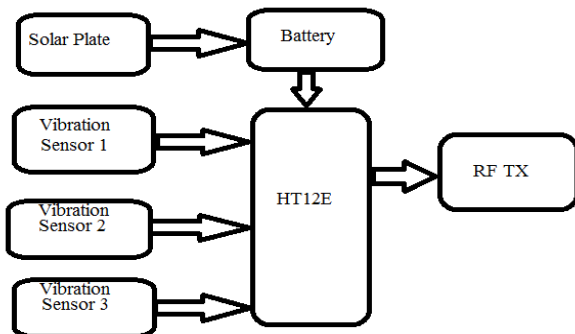

Fig 2: Block diagram of Tree section

Vibration sensor

Vibration sensors are sensors for measuring, displaying, and analyzing linear velocity, displacement and proximity, or acceleration. Vibration — however subtle and unnoticed by human senses — is a telltale sign of machine condition. Abnormal vibration indicative of problems with an industrial machine can be detected early and repaired before the event of machine failure; because such a failure is potentially costly in terms of time, cost, and productivity, vibration measurement allows industrial plants to increase efficiency and save money. Therefore, vibration analysis is used as a tool to determine equipment condition as well as the specific location and type of problems. The severity of machine vibration is standardized by the International Standards Organization (ISO) in the ISO 10816 publication. The standard describes acceptable vibration levels for four different classes of machines. This data, as laid out in the chart below, proves useful as a reference point when analyzing vibration measurements.

Specifications

Operating Voltage: 12VDC (red V + shield V-)
Sensitivity: Greater than or equal 0.2g
Frequency Range: 0.5HZ ~ 20HZ
Operating Temperature Range: -10 ~ 50

ADVANTAGES
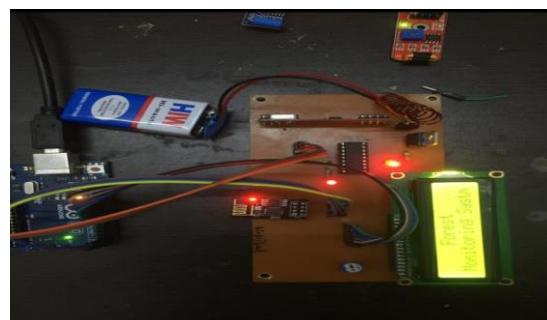
It provides security for costly trees.

It helps for avoid deforestation.

For reducing global warming.
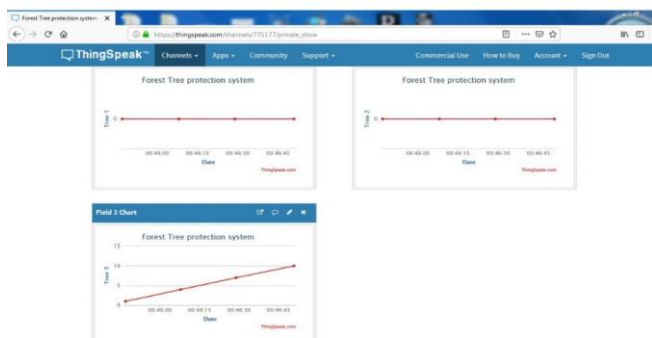
APPLICATIONS

Used in forest area to restrict the smuggling of costly trees.

RESULTS

Result of forest monitoring system using IoT

Hardware implementation of forest monitoring system using IoT

The graph shown by thinkspeak to particular user

IV. CONCLUSION

This project is able to avoid smuggling of trees in forest where human being is not capable to provide security. This project is used to protect costly trees in forest.It also control the global warming and pollution of these area where it is used.So this system is benificial for such applications.

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