TREE MONITORING SYSTEM

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Abstract: Smuggling of costly and important trees like Sagwan, Sandalwood causes hazardous threat to the forest and major economy damage. Also it has harmful effect on environment. The intention of this project is to keep eye on the trees like sandelwood and sagwan. It is achieved using sensors like vibration sensors and tilt sensors. Renewable source of solar energy is also used. This project makes use of microcontroller based wireless sensor system technology, so it detects the theft by monitoring the status of vibration levels produced by the trees which are being cut down.

Keywords:—Vibration Sensor, Tilt Sensor, HT12E and HT12D, RF Module, PIC Microcontroller, GSM Module

1. INTRODUCTION:

THE smuggling of costly trees like Sagwan and Sandalwood is serious problem to the farmers as well as to environment. We know that these tree are very expensive and farming of these trees can give nice amount of money. Forests are useful in reducing global warming but due to deforestation the area of forest is reducing. Civilization is also the reason for deforestation. Beacause of these reasons a serious threat of global warming is rising rapidly.To restrict the smuggling we can develop a project. The project is related to prevention of trees. People should understand importance of trees. Tree gives oxygen by absorbing CO2, therefore their protection is important. It can be used for agroforestry. That means it can be used in agriculture as well as forests. It is very useful for monitoring the trees. A small electronic unit which consist of RF module and sensors will be equipped on every tree. We will mount it on trunk of each tree which will detect theft and automatically initiate and send alarm signals through wireless medium. This system operates on rechargeable batteries so it is a low power design and less maintenance required To avoid frequent manual change of batteries the solar energy harvesting system is used to recharge the node's of batteries.

2. GOALS AND OBJECTIVES:

- To stop smuggling.
- To protect the costly trees like sandalwood, sagwan,etc.
- To reduce human efforts.
- To detect whether the tree is collapsed or not.

3. METHODOLOGY:

➢ Block Diagram:

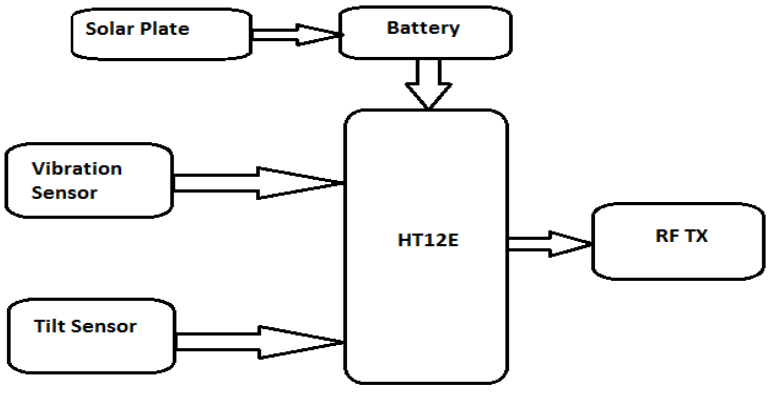


Fig. Block Diagram of Transmitter

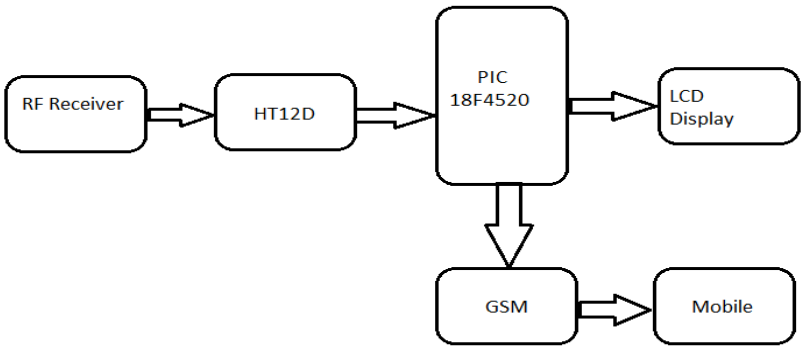


Fig . Block Diagram of Receiver

4. WORKING OF PROJECT:

In this project we are using an electronic circuit, which will contain vibration sensors. It is connected to the tree. In normal times, the tree will have very less vibrations. These vibrations are in specific limit because these are generated naturally.

But when these vibrations are produced during cutting of the tree, these are very high level vibrations. The vibration sensor will sense these vibrations and will compare those with vibrations at normal time. If these vibrations are different from normal vibrations, it will sense that situation as fault situation.

And will give a signal to the processing circuit. It will detect the fault, and will play a sound buzzer or give an alert message to the owner of the tree.

- Vibration Sensor:

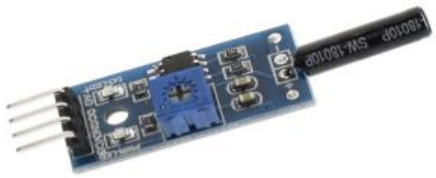


Fig. Vibration Sensor

It is used for detect the vibrations. It has digital as well as analog output. Inbuilt comparator IC LM393 is used to compare vibrations with a threshold value.

Pin description:

- VCC: 3-5V DC
- GND: min/ground
- DO: digital output (sensitivity can be controlled with the potentiometer)
- AO: analog output

- Tilt Sensor:

Fig. Tilt Sensor

Tilt Sensor are used to sense the tilt angle or movement. It is implemented by using mercury or rolling ball technology for measuring tilt angle. This module consists of a signal amplifier, tilt sensor and has three pin header.

- Encoder:

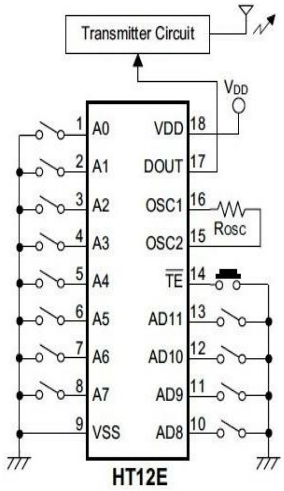


Fig. HT12E Encoder IC

It is an 4096 series encoder IC. It has 18 pins in which eight pins are used for addressing and four pins are used for data. This encoder IC is mainly used in applications like RF and infrared circuit interfacing. The chosen pair of encoder/decoder should have same number of addresses and data format. Encoder IC HT12E has transmission enable pin which is normally active low. The programmed data or address are transmitted simultaneously with header bits using RF transmission medium when a trigger signal is received by TE.

- Decoder:

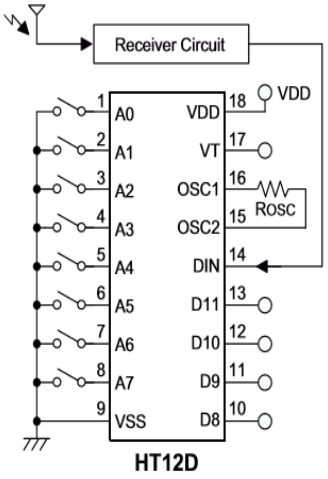


Fig. HT12D Decoder IC

It is an 4096 series decoder IC. It convert serial data into parallel. It decodes the serial data and address obtained from a RF receiver into parallel data and gives it to the output data pins.The input data coming from RF receiver is compared with the local addresses. It iscompared three times continuously. If unmatched or no errors are found then the input data code is decoded. High signal at VT pin shows a successful transmission.

- RF Module:

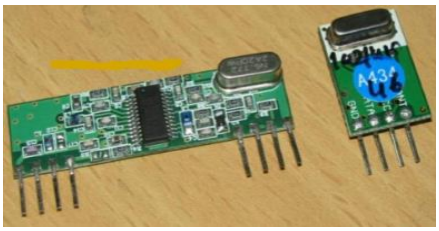


Fig. RF transmitter and receiver

The frequency range for RF module varies between 30 kHz 300 GHz. RF module used in this project operates on frequency of 433 MHz. Generally 100 m of range can be achieved by this module without obstacles.

- GSM Module:

Fig. GSM

This GSM module has a SIM800AGSMchip and RS232 interface while enables easy connection with the computer or laptop using the USB to Serial connect or to the microcontroller using the RS232 to TTL converter. SIM 800A-GSM/GPRS model that works on frequencies GSM850 MHz, EGSM900MHZ, DCS 1800 MHz and PCS 1900 MHz.

5. FLOWCHART:

Given flowchart shows the flowchart of tree section where the encoded data is transmitted. Whenever a thief starts to cut the tree then vibration gets generated in the trunk and branches of the tree. This vibration is sensed by the vibration sensor and gives output to the comparator IC. The comparator compares sensor output with a reference voltage. The output of the comparator is given to data pin of the encoder to encode the data and this encoded data is transmitted by RF transmitter.

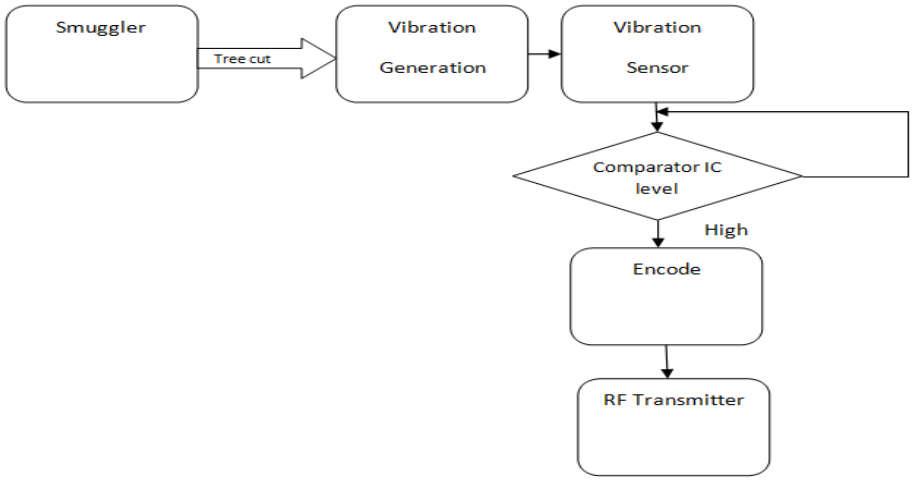


Fig. Flowchart of tree section

The flowchart shown below is the control section. The encoded data which is transmitted by RF transmitter is successively received by RF receiver. And encoded data properly decoded by decoder. The decoded data is given to the PIC controller and message send on owners mobile with the help of GSM.

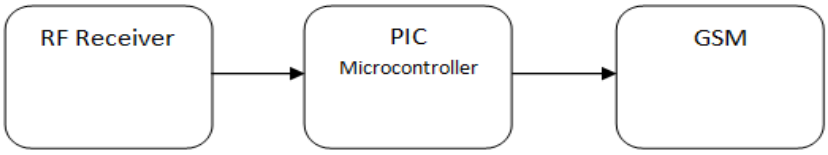
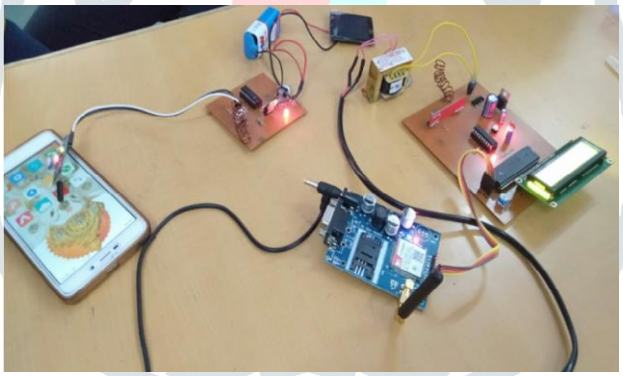


Fig. Flowchart of Control Section

6. **OUTPUT RESULT:**



7. CONCLUSION:

In this project we conclude that user using this system can avoid their economical losses due to smuggling of expensive trees. It is compact in size and cheaper cost. The areas where humans cannot provide security this system can be implemented. This system is implemented in farms of sandalwood, sagwaan and also in forest. Because the CCTV are not used in this system, cost of implementation is less. This project helps biological system by preventing the cutting of trees and protect animals life.

8. REFERENCE:

[1] Muruganantham k., Mythili T., thilagavati S., Prabhakaran R. (2017, March 26),“ WSN Based forest tree protection system ”, South Asian Journal of Engineering and Tecnology, 44-50. 2005.
[2] V.Narasimma, Anand, Anandhakumar, Krishnan, (2018,March 17), “ Design of a WSN node for forest trees against poaching ”International Conference on Advancements in Engginearing, Technology and Science.ISBN,384-397
[3] Wang Yun Toh, Yen Kheng Tan,(2014),“ low-power body sensor node with RF energy harvester”,IEEE-802.15.4,3503-3510
[4] Qadeer A Khan, Sarvesh J Bang.“Energy Harvesting for Self Powered Wearable Health Monitoring System”,2013.
[5] R.DHAYABARANI, R.K.CHANDRALEKHA, D.GOWTHAMI, K.GOWTHAMI2 , S.JEYADURGA. ELECTRONICS AND COMMUNICATION ENGINEERING, VSB ENGINEERING,”ANTI-SMUGGLING FOR TREES IN FOREST WITH SOLAR POWER GENERATION”.
[6] Mr.V.NARASIMMHANAsst.Prof1, Anand .M, Anandha kumar. C, Krishnan. Department of ECE, Sri Sai ram Institute of Technology, WEST TAMBARAM , Chennai (India),” DESIGN OF A WSN NODE FOR FOREST TREES AGAINST POACHING”.
[7] Mr. Rohan Solarpurkar , Prof.Suvarna L. Kattimani , Mr.Shekar Badachi ,Mr.Akshay Malaga4, Mr.Sarfaraz Makandar , Department of CSE, BLDEA’s college of engineering and technology, Vijayapur, Karnataka,” Real Time Forest Anti-Smuggling Monitoring System based on IOT using GSM”.
[8] Azlan Awang1, Muhamad Haidar Suhaimi2 Electrical and Electronic Engineering University Technology PETRONAS Bandar Seri Iskandar, 31750 Tronoh, Perak Darul Ridzuan, “A Forest Monitoring System Using Wireless Sensor Networks”.