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Forest Anti-Smuggling Monitoring System in Real Time

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ABSTRACT: The goal of this project is to come up with a way to stop people from sneaking things into Protected Forest areas. There has been a lot of worry about the theft and illegal moving of valuable trees like sandalwood, teak, sagwan, and others. It's also theft from Forest plants and animals. As worried people, our goal is to stop this kind of crime by using the newest technologies. Putting sensors in trees makes them smart. These sensors form a Sensor Network that talks to each other using GSM. The design system has three sensors: a flexsensor (to find out how steep a tree is when it's being cut down), a flamesensor (to find forest fires), and an infraredsensor (to effectively spot illegal logging).Having information about the trees ahead of time keeps them safe from theft and other damage.

KEYWORDS : IR sensor, flex sensor, flame sensor, Raspberry Pi, GPS, and GSM

I. INTRODUCTION

Poaching isn't just a problem in India; it's also a problem in China, Australia, and some African countries. On the world market, Red Sanders costs INR 10 crore per ton, while Indian sandalwood costs 12000 to 13000 INR per kg. The Indian rosewood tree is becoming less common each year. To try to keep it from going extinct, the Indian government is trying to limit the sale of sandalwood. According to the government, the most that a single person can buy is 3.8 kg. As long as the tree is already under government control, it can't be cut down on private or temple land until it is thirty years old.Sandalwood smuggling has caused problems with law and order, the economy, and social life in areas that near India.The main goal of this project is to come up with a way to stop people from smuggling sandalwood trees.

We are making a method that can be used to stop this kind of crime. It will have a Raspberry Pi, a Flex Sensor, a flame sensor, and an infrared sensor. Each tree will have its own small electronics unit. Flex sensors will pick up on tree cutting, a flame sensor will pick up on a forest fire, and an infrared sensor will pick up on someone breaking in close to a tree.A small embedded system unit with a Raspberry Pi, sensors, GSM, and GPS should be in each tree. If these parts are present, they will use a GSM module to let Forest Officials know how the tree is doing right now.
EXISTING SOLUTIONS

Wireless Communication in this system used ZigBee Module which is very slow and has lesser range than GSM Module .In this method tree smuggled are identified by using flex sensor which wil communicate or transfered to forest officials using Zigbee Module but this module covers a small range and slow transfer.There is no availability of sensing forest fire which is present in our proposed idea.By adding additional feature we added infrared sensor which is used to detect illegal logging and GPS which is used to provide exact location of smuggling happened in huge forest area.There is no practical implication of existing idea.

SYSTEM ARCHITECHTURE

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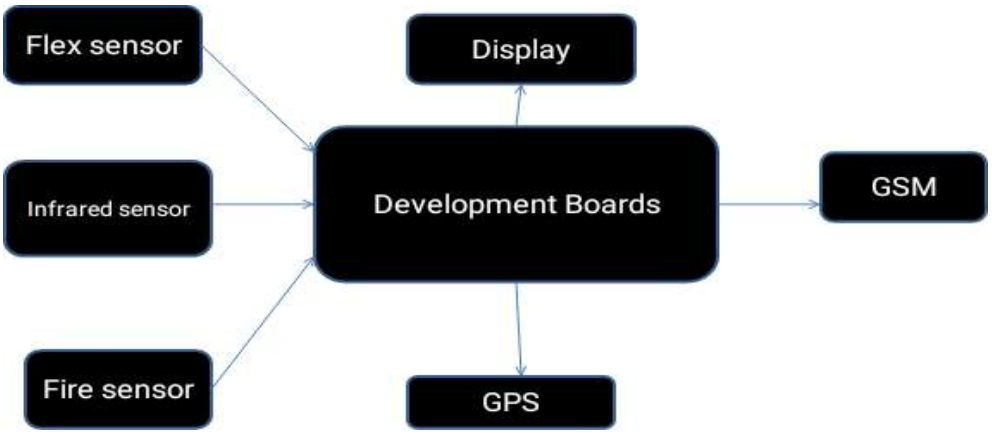


Flex Sensor:

A simple flex sensor 4.5" in length. As the sensor is flexed, the resistance across the sensor increases . The resistance of the flex sensor changes when the metal pads are on the outside of the bend. Usually the sensor is stuck to the tree and resistance of the sensor element is varied by bending or cutting of tree. It's often called flexible potentiometer.

Flame Sensor:

A flame detector is sensor to detect and respond to presence of flame or fire. It can detect infrared light with a wavelength ranging from 700nm to 1000nm.The far infrared flame probe converts the light detected in the form of infrared light into current changes. Sensitivity is adjusted through on board variable resistor with detection angle of 60 degree.It is placed to tree unit which is used to detection of forest fire.

Infrared sensor:

It's an electronic sensor that measures infrared radiation from objects in its field of view.An IR sensor consist of an IR Led and an IR photodiode together they are called opto coupler. When the IR transmits emits radiation , it reaches the object and some of the radiation reflects back to the IR receiver. It is use to detect a motion near our object and send a signal to raspberry pi which will trigger the buzzer

Raspberry pi:

Raspberry pi is a single board computer . It act as a processor which is used to collect information from sensor unit ,when sensor satisfying their threshold condition it will send an information to forest officials which contain exact location of tree.

GPS

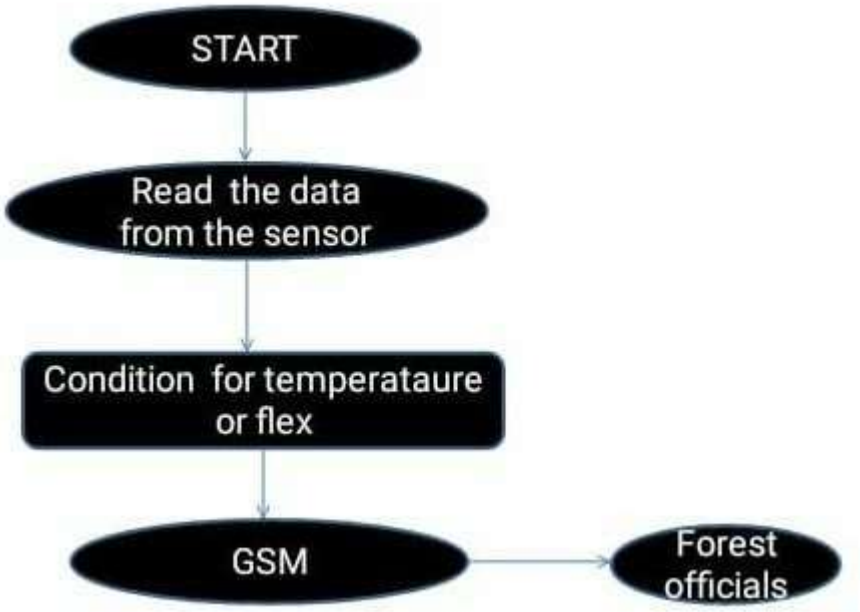
The Global Positioning System (GPS), originally Navstar GPS is a satellite-based radionavigatioin system owned by the united states government and operated by the United States Air Force.It is a Global Navigation Satellite System that provides geolocation and time information to a GPS receiver anywhere on or near the Earth Where there is an unobstructed line of sight to four or more GPS satellites .Obstacles such as mountains and buildings block the relatively weak GPS signals.

GSM

It is a standard developed by the European Telecommunications standards institute(ETSI) to describe the protocols for second-generation(2G) digital cellular networks used by mobile devices such as mobile devices such as mobile phones and mobile tablets. 2G networks developed as a replacement for first generation analogcellkular networks, and the GSM standard originally described a digital, circuit-switched network optimized for full duplex voice telephony. GSM is a trademark owned

by the GS|M Association. It may also refer to the most common voice used.

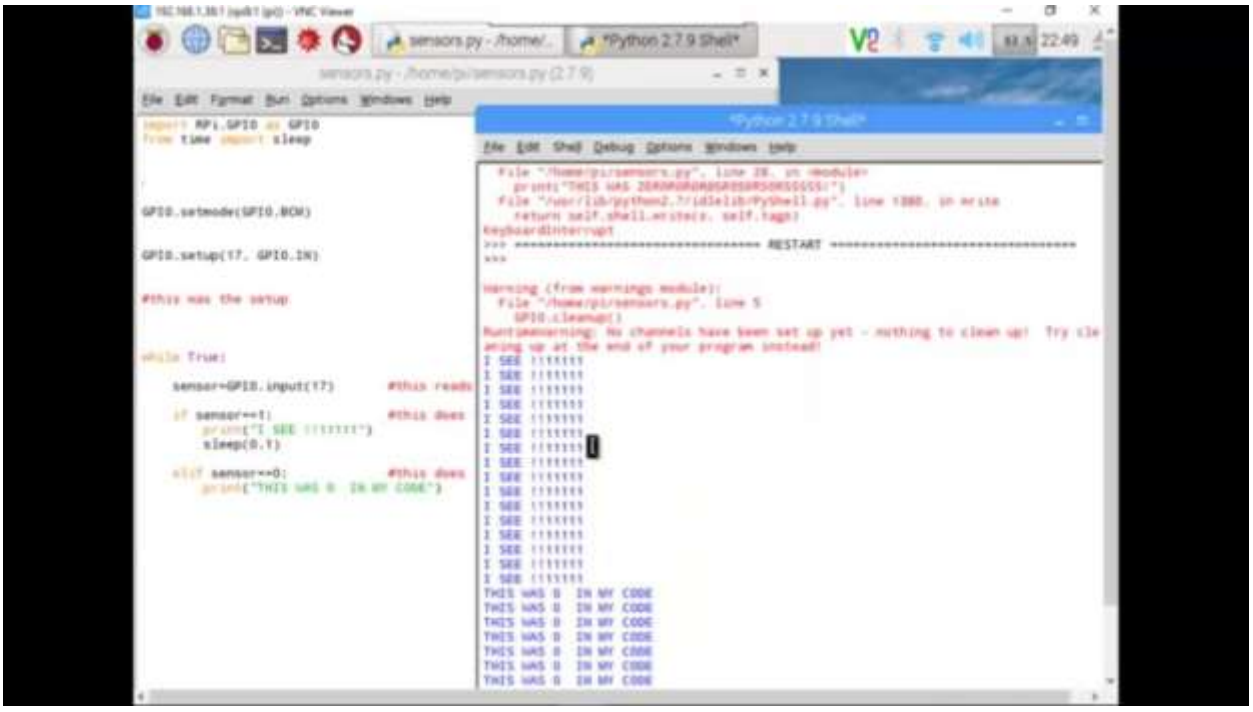
IV .SYSTEM DESIGN



When the data readed from flex sensor, flame sensor, infrared sensor satisfy the given condition or threshold valve it will trigger the buzzer,and sends information to forest officials which provide an information such as tree name ,location and perfect location of tree. If forest fire occurs in forest it will send the information to forest officials.

VI . EXPERIMENTAL RESULTS

A . ILLEGAL DETECTION RESULTS



If there is an illegal logging into forest for cutting of trees can be detected by this sensor by which a person who entering into a forest for smuggling of trees can be identified

B . FLAME SENSOR RESULTS

If forest fire occurs it will trigger the buzzer, and send information to forest officials through GSM which would help the forest officers to make necessary action for suppressing the forest fire by fire suppression methods

VII . CONCLUSION

The paper suggests protection of valuable trees from smuggling using Raspberry pi, GSM and various sensors. Smuggling can be easily prevented by continuous monitoring of the valuable trees in the forest automatically. The main goal of the system is to enhance forest management efficiency and decrease trees illegal logging cases. Flexsensor and Infrared sensor gives robust monitoring of the tree being cutting down. and immediate alert is given to forest officials. So that they can take immediate actions. Thus from implementation of this system smuggling can be prevented and eco system is maintain balanced by preventing deforestation.

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