Anti-Smuggling System for Trees in Forest using GSM Technology

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Abstract—**Our life is dependent upon trees**. **There is a long association of man and trees. Since the hoary past man and trees have been the two major creations of Nature. In his prehistoric days man turned to trees and plants to collect the things vitally necessary for his existence. Since that time man and trees have been interdependent, though man is more indebted to trees. . Amongst the variety of flora available on the planet, "Sandalwood" are one of the most costly as well as less available trees. They are useful in medical sciences and cosmetics. From the past few years, we are finding that the newspapers and news channels are frequently filled with news regarding the smuggling activities. Since they are costly, smugglers allegedly cut down many of these trees and transport them to their factories for commercial purposes. Anti-smuggling system is a measure that has been taken to stop these smuggling activities using GSM module and three type of sensors.**

Keywords: *Anti-smuggling system, GSM module, sensors.*

I. INTRODUCTION

The anti-smuggling system is a very effective system that helps in controlling smuggling activities in forests. The system consists of 2 units

1. Tree unit.

2. Power unit.

3. control unit.

A. Tree unit

The Tree unit is the primary unit for the implementation of the system. This unit consists of three sensors to protect the tree from getting Cut Down, Damage with fire, etc. The tree unit is the primary unit for the implementation of the system.

The tree unit consists of three sensors:

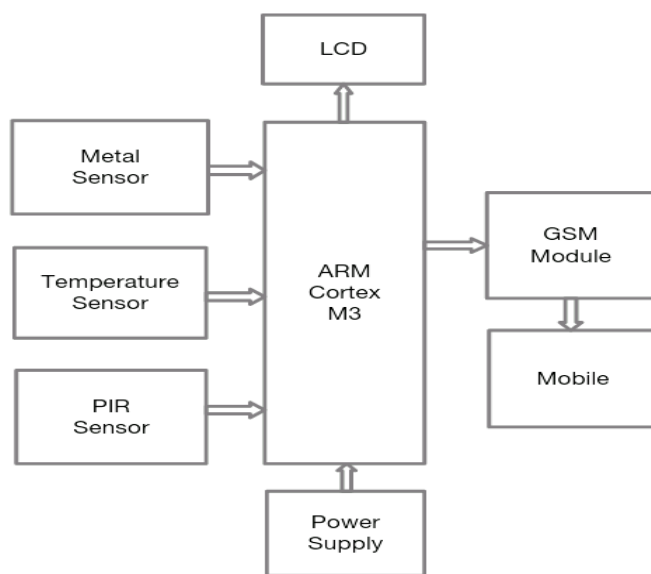1. Metal sensor

2. PIR sensor

3.Temperature sensor

Fig 1. Tree unit

This is the heart of the system where the sensors sense the movement and send message to microcontroller. The microcontroller thus sends message to the forest officials through GSM module.
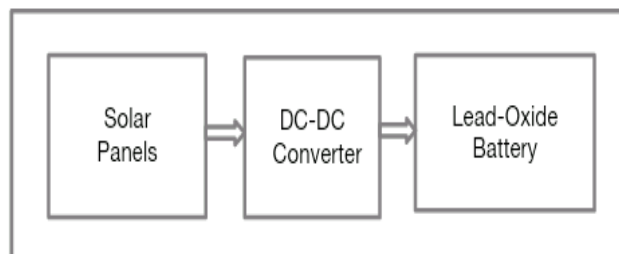
B. Power unit

Fig 2. power unit

The power unit consists of solar panel, dc-dc converter, lead oxide battery. The battery supplies voltage to the entire circuit. Solar panels, absorbs solar power during day time and stores it in the battery. At the night time, this stored battery power can be used to run the entire circuit.
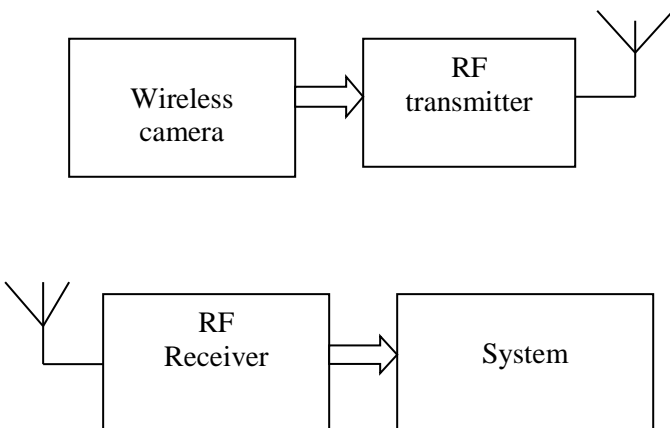
C. Control Unit

Fig 3. control unit

The control unit consists of RF trasmitter and reciever and wireless camera .wireless camer a is used to notice if there is any human movement in the forest .which will be helpful for the forest officals to sit far n monitor about what is happening in the forest .

II. SYSTEM COMPONENTS

Various components which are used to implement the anti-smuggling system are presented here. These components are readily available in the market and quite affordable.

A. Solar panel

Fig4:solar panel

For our designed system 12V solar panel is used. These panels absorb solar power and converts it into voltage and sends an input of 12V,5W to dc-dc converter.

B. ARM CORTEX M3 microcontroller

Fig 5. ARM CORTEX M3

- ARM cortex m3 is a 32bit microcontroller having high speed and high performance

- Excellent compiler target ,Reduced pin count requirements

- Efficient interrupt handling

- It is targeted towards higher performance applications.

- Power management

- Efficient debug and development support features ,Breakpoints, Watchpoints, Flash Patch support, Instruction Trace

- Designed to be fully programmed in C

C. Metal Sensor

The operation of metal sensor is based upon the principles of electromagnetic induction. Metal detectors contain one or more inductor coils that are used to interact with metallic elements. A pulsing current is applied to the coil, which then induces a magnetic field. When the magnetic field of the coil moves across metal, the field induces electric currents (called eddy currents). The eddy currents induce their own magnetic field, which generates an opposite current in the coil, which induces a signal indicating the presence of metal.
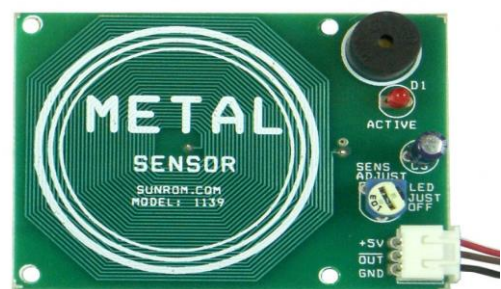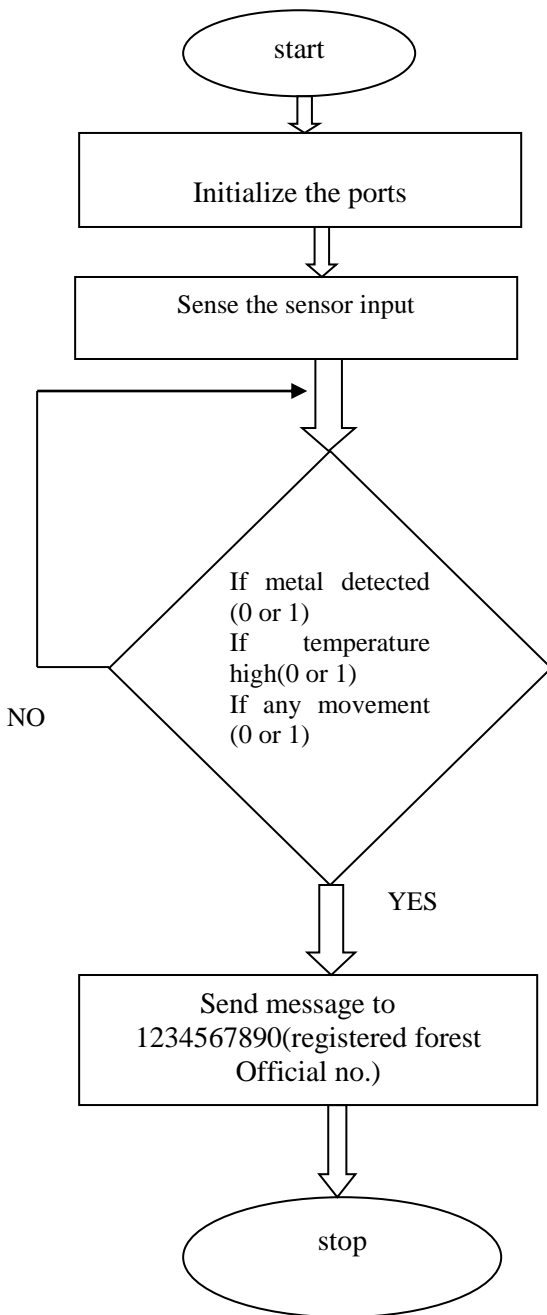

Fig3: Metal sensor

D. Temperature Sensor

Fig4: LM 35

- The LM35 can be connected easily .It can be stuck or established to a surface and its temperature will be within around the range of $0.01°C$ of the surface temperature.
- This presumes that the ambient air temperature is just about the same as the surface temperature; if the air temperature were much higher or lower than the surface temperature, the actual temperature of the LM35 die would be at an intermediate temperature between the surface temperature and the air temperature.

F. Passive Infrared Sensor

Fig5:PIR sensor

- PIR – Passive Infrared Sensor
- It senses 180degree movement for 20meter area .
- It is used to detect whether a human has moved in or out of the sensor's range.
- When the sensor is idle, both slot delete the same amount of IR ambient amount radiated from the room or wall or outdoors. When a warm body like human or animal passes

by, it first intercepts one-half of the PIR Sensor which causes a positive differential change between the two halves.

III. METHODOLOGY

Fig1 shows the block diagram .which consists of metal sensor, temperature sensor, PIR sensor, ARM CORTEX M3 microcontroller, LCD display, power supply, GSM module and mobile phone. Whenever there is any movement is the forest or if the tree is being cut or in case of forest fire the sensor sense and send message to the microcontroller. The message from microcontroller is displayed on LCD display which just for demo purpose. The message from microcontroller is sent to the forest official through GSM module. The mobile no. of the forest official who is in charge gets registered in the GSM module. Therefore that person gets a message.

The metal sensor will placed at each tree but temperature sensor and PIR sensor will be placed at just one tree. The metal sensor will send information to the microcontroller through RF transmitter and receiver. The temperature sensor used is LM 35 which will send information to microcontroller if environmental temperature is above 35degree.

The PIR sensor covers 180degree coverage therefore is there is any movement nearby it sends message. The wireless camera will be fixed at the tree unit .therefore continuous monitoring of forest area is done. We are using camera in order to notice whether it is animal movement or if any human movement and therefore action can take place.

IV. Flow chart

Fig 6: Practically implemented Anti-smuggling system

VI. RESULTS

The sensors are the main source of input to the microcontroller. Based on the three sensors' input, microcontroller sends three different messages respectively.

Fig. 8 shows the messages that have been received by the forest official's registered mobile number. The first message "SOMEONE ROAMING INSIDE THE FOREST" is the message that indicates that there is some human being or animal nearby the trees. This is an output obtained due to the detection of the PIR sensor.

The second message "TEMPERATURE HIGH" indicates that surrounding temperature of the trees has risen above 35 degrees' Celsius. This is an output obtained due to detection of the temperature sensor.

The third message "SOMEONE CUTTING THE TREE" indicates that a tree is in the process of being cut down. This output is obtained when any metal (in the form of a tool) comes in contact with a tree, the metal sensor for that particular tree detects and notifies the forest officials.

Fig. 6shows the main circuit consisting of (from left) the temperature sensor, GSM module, ARM cortex M3 microcontroller, metal sensor, PIR sensor, RF transmitter, RF receiver, DC-DC converter and LCD. Fig.8 shows the three different messages sent to the registered mobile number of the forest officials.
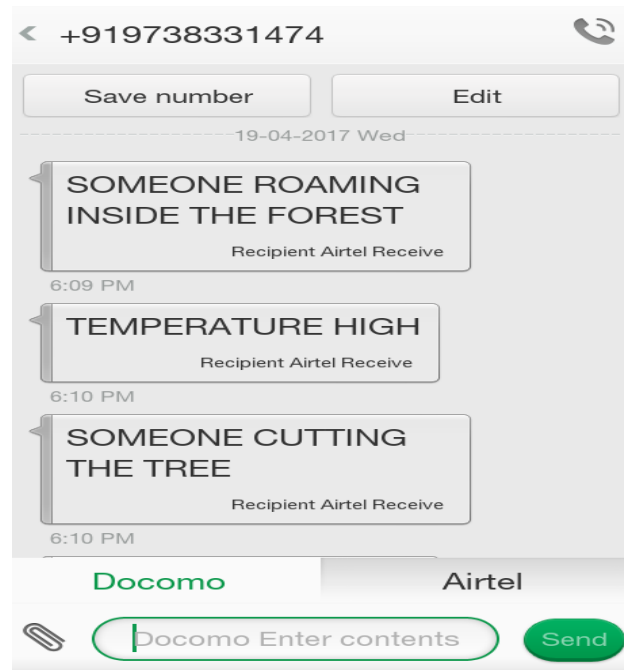
Fig 7:flowchart of the process

Fig8: The LCD displaying the message - " SOMEONE ROAMING INSIDE THE FOREST"

V. ADVANTAGES

By using this system, manual power is reduced to a great extent. This is because, the forest officials can supervise via the control room, without the need of going to each and every area of the forest checking for the illegal activities and thereby, saves their time. Global warming is also reduced to a great extent. The habitat of birds is preserved. This system is reliable since it works under all environmental conditions and the components do not get worn out.

VII. CONCLUSION

Thus, this effective and reliable system helps in controlling and stopping the smuggling activities. Apart from the main objective, the system also helps in reducing the global warming to a great extent. The natural habitat of the animals is preserved indirectly. The trees can also be protected from forest fire by using this system. This in turn helps in reducing deforestation. Thereby, the ecological balance is maintained.

References

[1] http://timesofindia.indiatimes.com/city/lucknow/200-teak-treescut-

TImber- smuggled/articleshow/16804707.cms

[2] http://ibnlive.in.com/news/endangered-red-sandalwood-seizedfrom-

smugglers-in- berhampur/480595-3-234.html.

[3] http://esl.fis.edu/learners/support/sci/text/stolenforest.html.

[4] Yichang, China; Guangyu He ; Junli Wan ―Research on Zigbee

wireless communication technology Wei Wang‖ In Electr.Eng. &

Renewable Energy Sch., China Three Gorges University.

[5] Chonggang Wang, Tao Jiang, Qian Zhang ―ZigBee® Network

Protocols and Applications‖

[6] ZigBee specification version 2006, ZigBee document 064112,

2006.

[7] ZigBee Alliance, ZigBee Specification. Version 1.0 ZigBee

Document 053474r06.

[8] Jiang, Y., Cao, J., & Du, Y. ―Unmanned air vehicle landing based

on Zigbee and vision guidance‖ WCICA 2006, 2, 10310 - 10314.

[9] *Muhammad Ali Mazidi, RolnD.Mckenley, "The 8051 Microcontroller and embedded system using assembly & C‖*

[10] HuaQian ―API: GSM/GPRS Modem User Interface‖ The University of Texas at Dallas University of Texas at Dallas, 2007.