Threat Alarm for Protection Of Forest Trees Against Poaching Implementing IOT

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Abstract: Smuggling/theft of trees in forests, acts a serious trouble to forest capital, causes significant economic damage and eventually has quite a shocking effect on the environment over the all creation. Smuggling of trees has run to increased risk of Natural Resource getting smothered. Animals are losing their Natural Environment, thus resulting total imbalance in Nature. Proposed work on a micro-controller based anti-poaching system provide work on Wireless Sensor Networks(WSNs) technology, which is accomplished of sensing theft by monitoring the signal produced by the cutting of trees using a 3 axis accelerometer. A low power MSP430 micro-controller is used along with RF modules. WSN is widely cast-off technology in monitoring and controlling for the remote applications. The system architecture and the hardware designs are designated in detail.

Keywords: WSNs, 3 axis accelerometer, MSP 430 Microcontroller, RF module CC2500.

I. INTRODUCTION

In topical years, Poaching of treasured tress which are mostly has been hugely increased due to man's self-regarding wishes over-the-top include Sandalwood, Teak wood, Pine and Rosewood. Trees have been much difficult to protet various creativity carry out ideas were implemented by different bodies, and in specific Govt. of India, to allay this problem. This holds enlistment of anti -poacher for deployment and training complete forest. Strict penalty for find guilty criminals and providing superior incentives for anti-poaching were as directed for destroying the risk.

However, there is many of the actions have remained largely ineffective. There is hopeful solution for the prevention of forest tress is –"the implementation of Wireless Sensor Networks (WSNs)" which is a robust, effective and practicable technology for monitoring and controlling. WSN is a most developing technology, widely used in many applications which can be involved monitoring and controlling. In forest, It is already deployed for fire detection, rearing/ poaching of wild animals .It is facilitates preservation and easy conduction; they exclude the use of lavish things like cables and decrease the cost.

In this abstract, the presented design for a portable wireless sensor node which is the part of a Wireless Sensor Networks. It will be attached on trunk of each tree, accomplished to identifying theft and also repeatedly start and send signals to Central Base Station. The system method is for a low power proposal, so it can be a greater life. The system is a low power design, and it is more successfully work with rechargeable batteries which can charge active by natural solar system. A solar panel taken in the system to use for recharging node's batteries .It can avoid regular manual change batteries.

In a network, the cluster of a nodes is around 5-10 trees. This can be formed a cluster with a master node having extra properties and to communicate with central base station. The location of central base station is at the entrance of the jungle/farm which will communicate with node through RF network. The designed network will follow Star topology.

There are several features of wireless networks technology as protocol routing, power management, network structure and hierarchical networks. The extract highlights the analog sensors IEEE standard 1451 and how sensors can be used for several applications and the generic procedure to desire system for them . A system-architecture for locale monitoring and controlling is to design by considering design requirements like hardware of the nodes, sensor network and abilities to access and manage remote data. It provides detailed about using wireless sensor networks to real-world monitoring.

In this paper proposed system is discussed in sections as follows: Section II contains the existing system, section III explains proposed design for the node and architecture describes each block used for node development. Section IV the result of proposed system is concluded.

II. EXITING SYSTEMS

WSNs have been developing research areas in recent documented for detecting and environments over long dated of time. The wide spread applications of WSNs are environment and locale monitoring, home/industrial monitoring and controlling like product quality, food processing and military application. Our necessary requirement to protect and maintain forest and environment application manually is very difficult.

- One of the traditional methods for protection of forest trees is building tall walls for the entire area with solar and electrical fencing. But as the area increases the wall length and cost required building it increases proportionally. This technique proves insufficient for in-business watchers.
- There is another method by using software controlled devices to notice any breakage in continuities of any parameter. For example, by sensing heat of human body. This technique is more suitable for conservation of Trees in farms

no other Animals are likely to enter other than Human beings and also where the area to be considered for preservation area is small as possible. However, this method is inadequate for poaching control in Wild forest as the forests are marked with presence of creatures other than Human-being.

- To control against poaching there is another method hiring Security personal for monitoring the entire area for suspicious Activity. This method is exiting to control poaching. But there is physical limitations in Human it is hard to monitor the entire area continuously, this method is failure for the larger area thus the hiring of guards proves unreliable and inadequate.
- For the larger area installation of CCTV cameras proves very costly and is hard to implement due to limitation of power supply in deep forest areas.
- By using RF-ID is latest trend for conservation of trees. It is to tag an RF-ID to trees just like tagging an Animal for knowing. However, this technology doesn't give Real Time Information while the activity is happening. Activity is detected only when the Tree leaves its Initial position.

The Mobile Ad Hoc Networks (MANETs), various routing protocols have been explored in this extract also review two standard MANET protocols, i.e., Ad Hoc On Demand Distance Vector (AODV) protocol and Destination Sequenced Distance Vector (DSDV) protocol. DSDV is designed by Bhagwat and Perkins. The DSDV protocol was build on the classical Bellman-Ford Routing Algorithm with developments such as making it loop- free. [5]. AODV is a widely accepted on-demand protocol in ad hoc networks proposed by C. E. Perkins and E. M. Royer. The combination of both DSR and DSDV protocol is Ad hoc On-demand Distance Vector (AODV). DSR surveys the Route Discovery of on-demand mechanism and maintenance, DSDV from and above the use of hop-by-hop routing, sequence numbers and periodic [5].

III. PROPOSED METHODOLOGY

A. Overveiw of Proposed System

The key idea in Figure 1, to design of wireless sensor node is the part of the WSNs. The wireless sensor node will be mounted on each tree which is able of identifying theft then automatically start and send signals if any to the nearest node or to the Central Base Station or to the node.

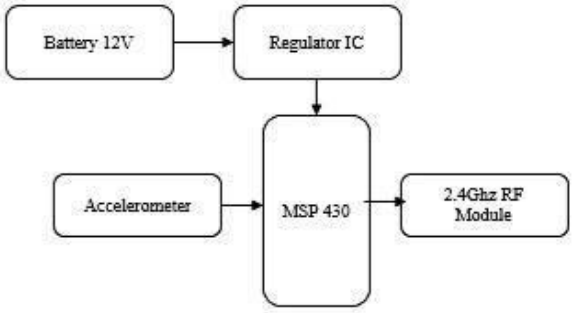

Fig. 1.Block diagram of node

There is four components in the sensor node are as a sensing unit (3 axis accelerometer), a controlling-processing unit (MSP430 micro-controller), a Trans receiver unit (CC2500) and a power unit. Entire sensor and component were wisely chosen to have a least power consumption profile and have common input supply voltage range of 1.8-3.3V.

1. Sensing module- The ADXL-335 is a 3-axis, low power, accelerometer. It has selectable measurement range of ±3g minimum .This ADXL335 is interfaced to micro-controller through I2C/SPI. It has an ultra-low power consumption of - 350 µA in active mode and 0.1 µA in standby mode at 2.5 V (typical).

Fig. 2. ADXL 335 Model

Parameter to be used by sensor node: -

Accelerometer data in digital form
Analog data from Thermistor
Node address assign through switch.
External RTC for Date & Time.
Serial Data transmitted through UART to Zigbee module.

2. Processing Unit- (MSP430) it is developed by TI family- ultra low-power micro controller. It is having different sets of peripherals for various applications. The architecture design for extensive low power modes, so that it is optimized to get extended battery life for portable measurement applications.

In Active Mode–230 µA/MHz at 1 MHz, Flash Program Execution, RAM Program Execution (Typical).
In Standby Mode– 0.5 µA.
In Off Mode (RAM Retention) - 0.1 µA

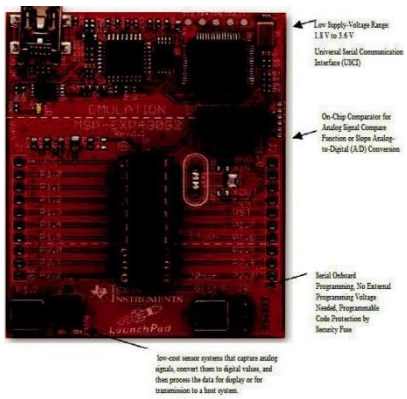

Fig. 3. MSP430G2553 Model

3. RF Module – Digi-key is used for Communication module, which is build in IEEE 802.15.4 standard. It activates at 2.4 GHz (freely available ISM band in India), on condition that a maximum range of 30m. 250 Kbps its RF data rate, 900 MHz is the range of higher power consumption,

Fig. 4. RF Module

In terms of much higher data rate and also smaller compact antenna is the advantage. Low power, least complex to use and low cost. The other one advantages of RF module is interfaced via UART.

4. Power unit - Li-poly battery will be used. These are Light weighted and slim, constructed on the new Polymer Lithium Ion chemistry, output voltage is 3.7V and cut-off voltage is 2.7V.

B. Proposed Architecture

Figure 5 displays the architecture of proposed system. Sensor nodes: Sensor Node will have input as data of Accelerometer.

Base Station: Receives the message from Sensor nodes. There can be one or many Base Stations required for proper coverage of the specific area.

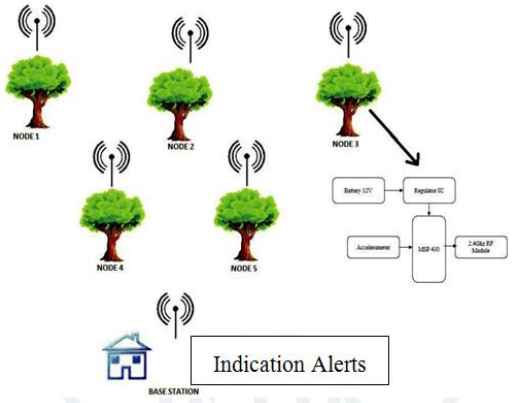

Fig. 5. Proposed Architecture

MANET is a network which has a wireless quality like as laptop computers, PDAs and smart phones. They have wireless ability to perform dynamically form of a temporary network without using network structure such as wireless sensor node connected to a wired network. For example, ant is like a mobile agent establishes their helpfulness for solving some combinational optimization difficulties also such as the anti-poaching watchers. Ants connect with each other through an indirect method called stigmergy. Each ant places some a chemical material in its location so that is delivers by further more ants to categorize it as having been at a given location. This feature has often been repeated in ant is similar to mobile agent algorithms.

Every time the ants transfer food from the source to the destination, they deposit some pheromone so that ants can follow. When the ants deposit pheromone quicker it disappears, the pheromone starts to gather. The more ants follow a particular path, the more the pheromone line is gathered. The ants may take the longer path and also the shorter path. However, the shortest path will collect greater pheromone density and it will attract more the same ants. It works on a positive feedback. Therefore, even though the ants discover the shortest route later than largest one, shortest route easily directs.

C. Work-Flow

The work-flow design of projected system is exposed in the Figure 6. First initialize IO pins of controller like ADC and UART serial port. Here the MSP430 model is used as a controller because an advanced feature is available like Low Supply-Voltage, Universal Serial Interface and Ultra-Low Power Consumption. On the further side continuously displays the recent status of cutting trees from all nodes on LCD screen. If discover the particular node where the tree is cut, the information and address of that node is immediately send to the nearest node and provides the acknowledgment to the sender node also. If the acknowledgment is effectively acknowledged from that node then the address packet is send to the base station. Created on this packet information base station is easily discover the shortest route by using ANT- AODV algorithm and store the data.

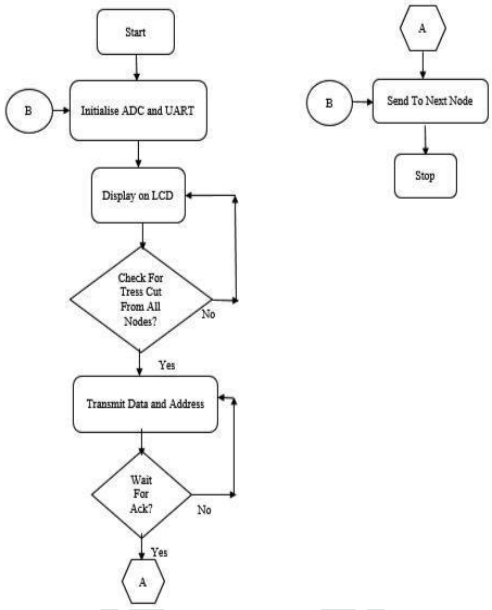

Fig. 6. Work-Flow

IV. CONCLUSION

The author extend a least cost and least power based WSN node to identify theft/smuggling contributing to the safety of important & costly species of tree. So other sensor implementation and work on various critical aspects of system has to be ended in future. This article has described the strategy and execution of a WSN for preventing trees and wildlife. Forest fires have multi-dimensional destructive properties in community, financial and environmental matters.

The future effort is implementation of Multi-node network and incorporation of microphone, motion detector sensor & temperature sensor to make systems more effective to acquire data such animals or humans interference, fire detection etc. So author concluded that WSN is very influential and appropriate tool to be practical in this application.

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