# Design and Development of Wireless Sensor Node for Anti-Poaching Of Valuable Trees

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*Abstract: -* **Sensor for the forest department using For many days we are reading in the newspapers about smuggling of trees like sandalwood, 'sag wan' etc. In many states of India, like the jungles of Karnataka and Tamilnadu notorious smuggler "virrappan" did the smuggling of such trees in the past years. In order to overcome this smuggling of trees we use wireless sensor network (WSN) technology which is a modernistic addition in the field of radio network. In this case we use MEMS technology to monitor these kinds of peculiar trees and also use of vibration renewable energy source of solar energy. Here we can also save the forests and wild animals from forest fire.**
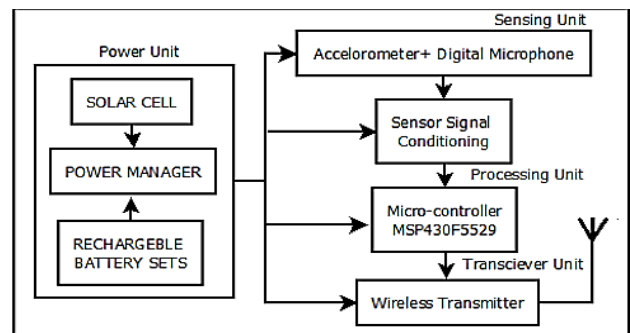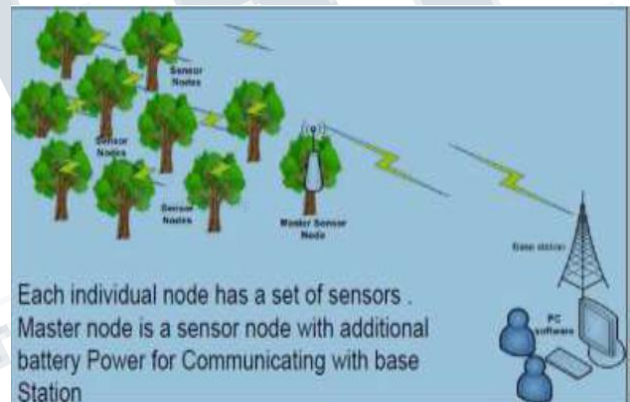
*Keywords-* **WSN,MEMS accelerometer.**

## I. INTRODUCTION

Our project is related to prevention of trees, wildlife from smuggling and forest fire. Our life will be totally dependent on oxygen which is provided by trees .Protection of trees is our responsibility so that, the project is implemented on, "WSN based forest tree protection system". The main idea presented in this paper is to design a wireless sensor node which is a part of wireless sensor network. It will be mounted on trunk of each tree, capable of detecting theft as well as automatically initiate and send alarm signals if any to remote terminal through wireless media. In a network, a cluster of 15-20 tree nodes can be formed with a master node having additional resources and intelligence to communicate with base station. The base station will be located at the entrance of the jungle or farm.

## II. EXISTING SYSTEM

The smuggling of economically significant kinds of trees in forested areas such as Sandalwood, Teakwood, Pine and Rosewood has been tremendously increased. There have been several initiatives undertaken by different stakeholders and in particularly by the Government of India, in order to solve these problems. The system has two nodes referred as Master node & Slave nodes. Master Node: Receives the messages from all the sensor nodes and forward it to Base station Base Station: Receives the messages from more than one master node and logs the messages to the server.



Each individual node has a set of sensors . Master node is a sensor node with additional battery Power for Communicating with base Station



## III. LITERATURE SURVEY

O.Younis, S. Fahmy.: HEED: A Hybrid, Energy-Efficient, Distributed Clustering Approach For Ad Hoc Sensor Networks, In: IEEE Transactions on Mobile Computing 3 (4), pp. 366–379 (2004). In this paper, Heterogeneous - Hybrid Energy Efficient Distributed

Protocol (H-HEED) for Wireless Sensor Network has been proposed to prolong the network lifetime. This paper proposes the impact of heterogeneity in terms of node energy in wireless sensor networks have been mentioned. Finally the simulation result demonstrates that H-HEED achieves longer lifetime and more effective data packets in comparison with the HEED protocol.

Kemal Akkaya, Mohamed Younis, "A Survey On Routing Protocols For Wireless Sensor Networks ", Ad Hoc Networks 3, pp. 325-349 (2005). This paper surveys recent routing protocols for sensor networks and presents a classification for the various approaches pursued. Data-centric, hierarchical and location-based are three main classifications that are examined in this paper. Network flow and QoS modeling are also discussed.

Fikret Sivrikaya and B¨ulent Yener wrote a paper about "Time Synchronization in Sensor Networks: A Survey". This paper reviews the time synchronization problem and the need for synchronization in sensor networks, then presents in detail the basic synchronization methods explicitly designed and proposed for sensor networks.

Bara'a A.Attea and Enan A.Khalil "A New Evolutionary Based Routing Protocol For Clustered Heterogeneous Wireless Sensor Networks" volume 12, Issue 7, July 2012. This paper propose the undesirable behavior of the EA when dealing with clustered routing problem in WSN by formulating a new fitness function that incorporates two clustering aspects, viz. cohesion and separation error.

## IV. PROPOSED SYSTEM

### Microcontroller (PIC 16F877A)
Microcontroller PIC16F877A is one of the PIC Small scale Family microcontrollers which is well known as of now, begin from amateur until all experts. Since it is simple utilizing PIC16F877A and utilize Streak memory innovation so that can be compose eradicate until the point that thousand times. The prevalence this RISC Microcontroller contrasted over and other microcontroller 8-bit particularly at a speed of and his code pressure. PIC16F877A have 40 stick by 33 way of I/O PIC16F877A splendidly fits numerous utilizations, from car enterprises and controlling home apparatuses to modern instruments, remote sensors, electrical entryway locks and wellbeing gadgets. It is perfect for brilliant cards and also for battery provided gadgets due to its low utilization. EEPROM memory makes it less demanding to apply microcontrollers to gadgets where lasting capacity of different parameters is required (codes for

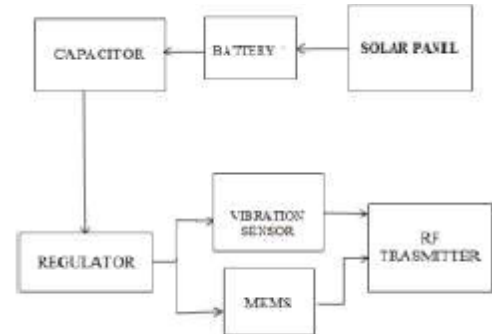transmitters, engine speed, collector frequencies, and so on.).
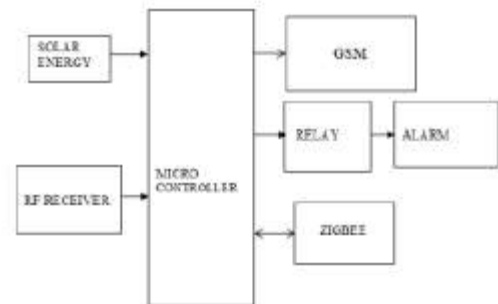


*Fig 4.1 Tree Section*



*Fig 4.2 Zone Section*

## HARDWARE ASPECT:

Sensing Module: Record portrays ADXL362 in detail. The ADXL362 is a ultralow control, 3-hub MEMS accelerometer that devours under 2μA at a 100 Hz yield information rate and 270 nA when in a movement actuated wake-up mode. Not at all like accelerometers that use powerduty cycling to achieve low power usage, the ADXL362 does not alias input motions by under examining; it tests the full transmission limit of the sensor at all information rates.
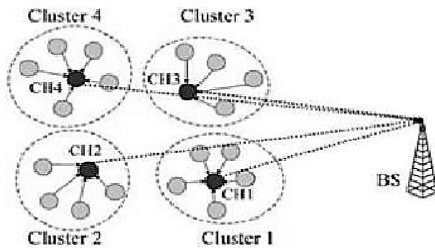
Processing Unit: MSP430F5528 - Record portrays microcontroller in detail. The gadget includes an effective 16-bit RISC CPU, 16-bit registers, and steady generators that add to most extreme code effectiveness. The carefully controlled oscillator (DCO) permits wake-up from low-control modes to dynamic mode in 3.5s (ordinary).

RF Module: Report depicts RF Module CC2500 in detail .The CC2500 is a minimal effort 2.4 GHz handset intended for low-control remote applications. The circuit Is expected for the 2400-2483.5 M Hz ISM (Mechanical, Logical and Medicinal) and SRD (Short Range Gadget) recurrence band.

Rechargeable Battery: A 1.2V/3000 mAh Rechargeable Battery will be utilized to control a Remote Sensor Hub.

Solar Panel: A 3V/150 mAh Sun oriented Board can be utilized to Charge Batteries.

**Routing Protocol scenario**



Above diagram shows a Multi-Level Hierarchical Protocol. This Protocol includes a node configured as Master and all other nodes as Slaves. The Master has the Task to co-ordinate all the nodes present in a cluster. The placement of Masters should be such that each Master will have access to other adjacent Master Nodes. The sensors send their sensed data periodically and react to any sudden change in the value of the sensed attribute by reporting the corresponding values to their Masters.

## V. RESULTS AND DISCUSSION

The web page called anti poaching dash board which displays The output by using the internet. It takes the input as area and provides status of that particular area. The output contents are Area name, total tree ID's, Tree ID's which are fallen and Tree ID's which are alive. Also the dash board contains the refresh button. If someone try to cut the trees the sensor sense the vibrations while produce cutting of trees the sensed data will be send to the base station trough WI-FI .the owner or security in charge of that particular area will receive the call for the registered mobile number which gives the information about the area , particular tree ID and also gives the caution message to owner or security in charge.
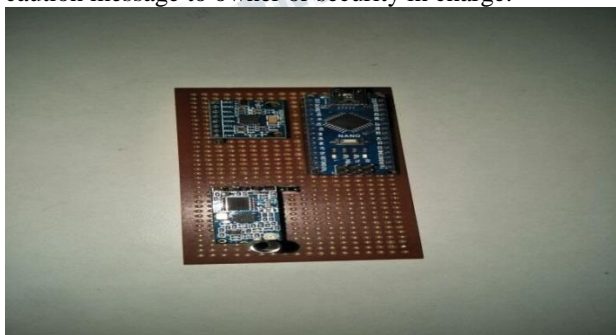


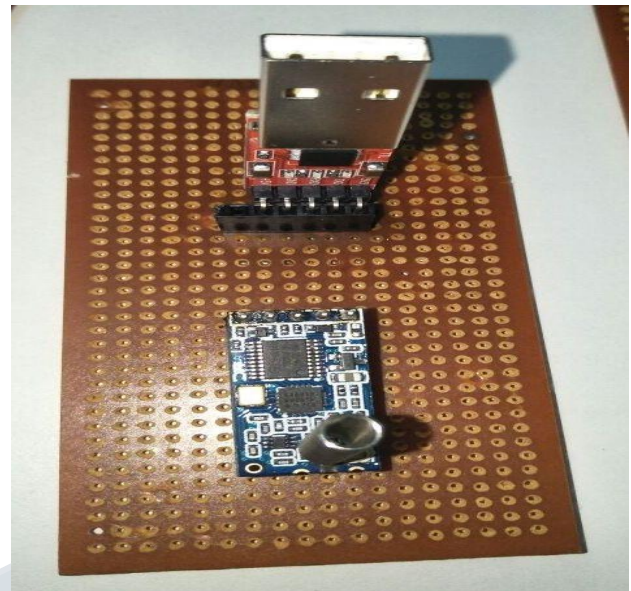*Fig 5.1 Tilt senor connected to board placed in trunk of tree*



*Fig 5.2 Board  connected to user's computer*



*Fig 5.3 Anti-poaching Dash Board*

## VI. CONCLUSION

This paper presented a low-cost and low power WSN node to detect theft/smuggling, contributing to the protection of valuable trees. This is laboratory prototype consisting of few nodes, so Protocol testing with larger number of nodes will be included in the future. The future work also includes making of single PCB for complete Wireless Node. Now, the cc500 transreceiver is mounted externally and also we can use cameras in order to survivalence the forest.

## REFERENCES

[1]. Jennifer Yick, Biswanath Mukherjee, Dipak Ghosal, Wireless Sensor Network Survey [J].

[2]. M. Tubaishat, S. Madria, Sensor Network An Overview [J]. IEEE Potentials, May 07, 2003

[3]. Lu De Yang Bachelor of Science in Electrical Engineering implementation of a wireless sensor network with ez430-rf2500 development tools and msp430fg4618/f2013 experimenter boards from texas instruments, Jilin University, China, 2009 August 2011.

[4]. Awang, A., &Suhaimi, M. H. (2007). RIMBAMONc A Forest Monitoring System Using Wireless Sensor Networks. Proceedings of IEEE International Conference on Intelligent and Advanced Systems (ICIAS), ISBN 978-1-4244-1355-3, pp. 1101-1106, Kuala Lumpur, November 2007.

[5]. Lozano, C., & Rodriguez, O. (2010). Design of Forest Fire Early Detection System Using Wireless Sensor Networks. The Online Journal on Electronics and Electrical Engineering (OJEEE), Vol. 3, No. 2, Reference Number W10-0097.

[6]. F.G. Nakamura, F.P. Quintao, G.C. Menezes, and G.R. Mateus. An Optimal Node Scheduling for flat Wireless Sensor Networks. In Proceedings of the IEEE International Conference on Networking (ICN05), volume 3420, pages 475-483, 2005.

[7]. Kovacs, Z. G., Marosy, G. E., & Horvath, G. (2010). Case Study of a Simple, Low Power WSN Implementation for Forest Monitoring. Proceedings of 12th Biennial Baltic Electronics Conference (BEC), ISBN 978-1-4244-7356-4, pp. 161-164, Tallinn, October 2010.

[8].www.evihnadscientist.com/2008/simple-solar-circuits/

[9]. Sridevi Veerasingam, Saurabh KarodiSapna Shukla, "Design of Wireless Senor Networks node on Zigbee for Temperature Monitoring", 2009 International Conference on Advances in Computing-Control and Telecommunication Technologies, iEEE Journals 978-0-7695-3915-

[10]. Muhsin Atto and Chris Guy, "A CROSS LAYER PROTOCOL BASED ON MAC AND ROUTING PROTOCOLS HEALTHCARE APPLICATION USING WIRELESS SENSOR NETWORKS", International Journal of Advanced Smart Sensor Network Systems (IJASSN), Vol 4, No. 1/2, April 2014

[11].dowload.cnet.com/Tera-TennI3000-20432_4-75766675.html

[12]. Shio Kumar Singh, M P Singh, and D K Singh ," Routing Protocols in Wireless Sensor Networks-A Survey", International Journal of Computer Science & Engineering Survey (UCSES) Vol. I, No.2, November 2010, DOl: I0.5121/ijcses.201 0.120663

[13]. Lulu Liang, Deyun Gao, Hongke Zhang, and Oliver W. W. Yang, Senior Member, IEEE, "Efficient Event Detecting Protocol in Event Driven Wireless Sensor Networks, Rochester, NY, USA, iEEE SENSORS JOURN(lL, VOL. 12, NOt 6, JUNE 2012