IJREAT International Journal of Research in Engineering & Advanced Technology, Volume 1, Issue 1, March, 2013
ISSN: 2320 - 8791
www.ijreat.org

Detecting Mobile Targets Using WSN Framework

S.Muthumareeswari[1], S.Kavitha[2], R.Udhaya[3], S.Aswini[4]

[1,2,2&4]**IT Department, Anna university, P.S.R. Rengasamy College of Engineering for Women, Sivakasi, Sivakasi, Tamilnadu, India**

Abstract

Wireless Sensor Networks (WSNs) are used in various applications like military applications involving event detection , target detection etc., where the monitored areas are fully accessible . The ultimate goal of WSN is to effectively sense / detect the information and distribute the collected data in the network. It provides high detection along the paths. The aim of the project is to analyze an enhanced exposure definition based on mobile target detection probability. Two problem versions are proposed by leveraging the concept of path exposure : The sensor installation cost is minimized while guaranteeing a minimum exposure and the maximization of the exposure subject to a budget on the sensors installation cost. These problems can be solved by using mixed-integer linear programming formulations. Also to tackle large size instances we develop Tabu Search heuristics that are able to provide near-optimal solutions of the same instances in short- computing time. Lastly an enhanced exposure definition based on mobile target detection probability are analysed.

Keywords: wireless sensor networks, exposure, optimization, mobile target detection

1.Introduction

The objective of the paper is to detect the mobile targets in a specified framework using the wireless sensors. An optimization framework for the problem of positioning sensors where the sensing quality depends on the distance from the sensor node. The ultimate goal of any deployed WSN is to provide the measures of the given physical processes including the time evolution of physical parameters (air temperature, light intensity, , humidity level etc).As well as the detection of specific events (intrusion, mobile target, alarms etc) . Therefore WSNs combine sensing / detecting functionalities to actually collect the measures computational functionalities to process them.

In this paper , we focus on fully accessible environments where sensors positions can be actually optimized. Intuitively The sensors should be deployed in order to fully cover the area of interest , with a density able to capture characteristics and variations of the process to be measured (*coverage*). However , sensors should also be able to setup a wireless communication backbone to exchange the collected measures ,eventually taking cooperative decisions on them (*connectivity*).

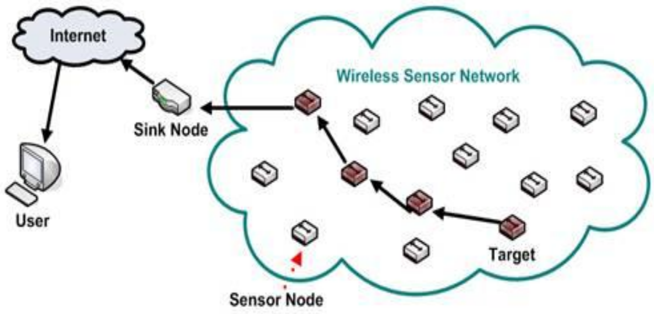


Fig 1:WSN structure

We also proposed Tabu Search Heuristics that provide near-optimal solutions in short computing time and that can be used to tackle large size instances. According to our knowledge, this is the first work that directly considers path exposure in the optimal and exact design of WSNs instead of using it as a measure of the performance of a given WSN layout.

2.Existing System

Wireless sensor networks are generally composed of small sized battery – operated devices with embedded sensing capabilities. Wireless sensor networks have emerged as effective solutions in all fields due to their cost viability and flexibility. The quality of a deployed Wireless sensor network depends on the effectiveness of sensing and detecting functionalities. The network topology regardless of the application plays a key role in determining the quality of WSN's .The existing work on this topic relies on general 0-1 coverage model based on sensing range. A common approach is to select a set of nodes satisfying some connectivity conditions and guaranteeing that each point of area is within the range of k sensors (k-coverage). Working of 0-1 coverage model is : Selects the set of nodes which satisfies connectivity conditions and ensures that each point is within the range of K Sensors. Used to monitor the large scale application measurements or to detect the localized and static target events.

Disadvantages of existing system are :

- Works with existing deployed Wireless Sensor Network
- Detects only localized and static targets.

3.Proposed System

In the proposed system, to effectively detect the targets, they design the Wireless Sensor network. In the classic coverage model, entire area must be monitored. But in the proposed, only going to monitor the targets that crosses the protection border. An optimization framework for the problem of positioning sensors where the sensing quality depends on the distance from the sensor node. The application scenario is mobile target detection and sensing quality is based on the concept of path exposure. This is the first attempt to provide a wireless sensor network planning methodology where coverage is not just based on the sensing range but its quality depends on the distance from the sensor node.

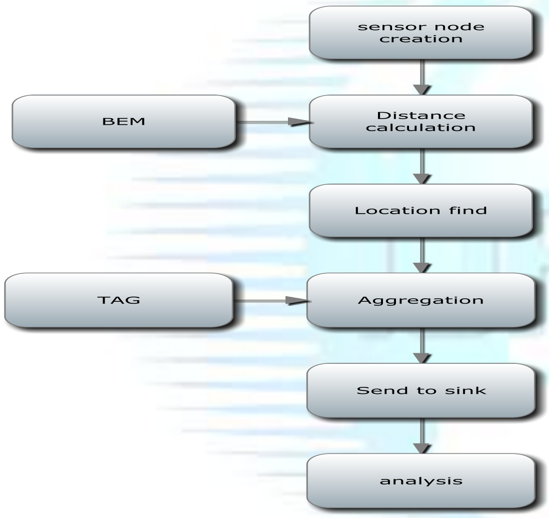


Fig.2 flow diagram for WSN architecture
[BEM -→ Boundary Elimination Method]

3.1 Framework for positioning the sensors

For mobile target detection, the concept of exposure and the two definitions (2) and (4) allow the estimation of the quality of WSNs. In this, the exposure models are used to optimize the topology of a WSN assuming that sensor positions can be selected within a discrete set of candidate sites . These locations can be defined on the basis of a preliminary analysis/ survey of the area to be protected, and they strongly depend on the specific application scenario. In many cases, sensors cannot be freely placed in the area, and possible positions depend on the availability of a support or infrastructure (e.g., points where sensors can be easily hidden, points where they cannot be damaged, etc.). When sensors can be located in continuous regions, a discrete approximation (e.g., grids) can be considered. In general, the goal of the network planning is to select a subset of CSs where to install sensors.

The exposure does not only depend on the sensors positions, but also on the path followed by the mobile target traversing the area. As in previous work [3]–[5], instead of considering all possible continuous trajectories across a given area, we assume that the paths are constrained on a grid and that they all start from (end to) some virtual points on the left (right) of the grid. The accuracy of this approximation obviously depends on the grid density.

3.2. Network Connectivity

In the network connectivity, the sensors can communicate only if they are in range. We define the communication range as the maximum distance at which a transmission from a sensor can be correctly decoded at a receiver. The sink node acts as a centralized server that collects events detected by sensors and estimates whether an intruder is present. A special node σ and its relative incoming connections are added to S and A' to represent the sink.

To guarantee connectivity among the sensors and the sink, a unit of traffic is required from each installed sensor to the sink. Connectivity can thus be imposed by adding constraints that do not modify the shortest-path sub problem and only place additional conditions on sensor installation. In general, we want to avoid overloading a sensor with communication relay traffic, thus leading it to early depletion or load congestion. For failure tolerance purposes, one or more backup paths should be selected so that the sink is reached even in case sensors fail.

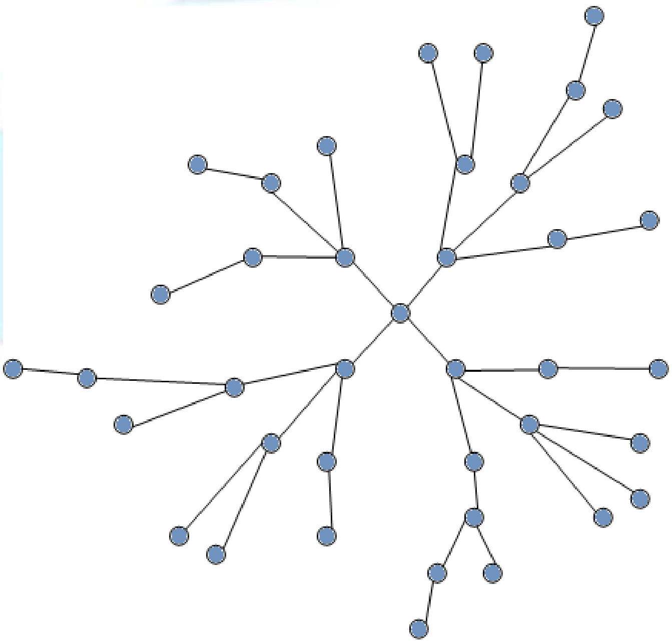


Fig 3:Network connectivity

Finally, note that the feasibility of connected, or connected, WSN designs strongly depends on the set of CSs and on the sensor communication range. If the CSs are too sparse and/or the communication range is too short, no solution exists even if there is enough capacity. In those cases, the network planner is forced to find additional possible locations for sensors or to choose sensor nodes with different technology (longer range, higher capacity, etc.)

3.3. Intrusion Detection

Given the area of interest, let denote the set of all CSs where sensors can be installed. The area is approximated by a grid on which targets can move. The grid graph *G = (V,A)* is defined as follows. The vertex set V includes one vertex for each grid intersection point and two distinguished vertices and that represent the virtual origin and, respectively, destination of any path. The arc set A includes two arcs (i , j) and (j , i) for each grid edge {i , j}, the incoming/outgoing arcs connecting to *o* the leftmost column vertices of the grid, and the rightmost column vertices to *t* , respectively. Note that CSs are not forced to lie on the grid. They can be placed in any position of the area surrounding the grid, according to the available installation sites.

4.Implementation Methodology

The implementation phase consists of the following processes. They are Object tracking, Measuring model, Algorithm Implementation, Data aggregation, Analysis.

4.1 .Object Tracking

After the wireless sensor nodes are being created the tracking operation is done. The tracking operation is done in two phases that is monitoring and reporting. These two operations are interleaved during the entire object tracking process.

4.2. Measuring Model

The measuring model analysis the tracking operation. The measuring model only has the control of the detection of the node where it is going in order to track the object.

4.3. Algorithm Implementation

The proposed model implements the probability base model to track the object. Efficient local search is used to find the likely object configuration, the complex observation model is summarized by local Gaussian (Laplace) approximation and the Kalman filter (KF) is used. The probability of the object to be tracked is measured by the probability density function.

4.4 Data Aggregation

Data is aggregated based upon the determined position of the object. Data aggregation is a very necessary criteria as from here only all the data are collected and sent to the sink or base station. Sink then transfers the data to the destination from where the object is finally tracked with the help of gathered information.

4.5. Analysis

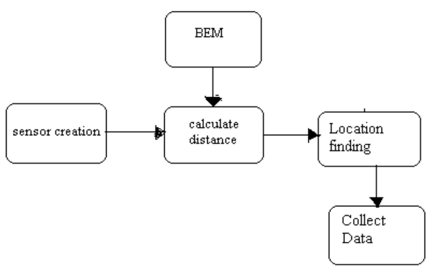
The following parameters are analyzed in our proposed model :

- ✓ Latency
- ✓ Throughput
- ✓ Packet delivery ratio

The block diagram (fig1.2) includes all the different phases used in the paper. It is the overall processes to be done with the paper. This block diagram consists of the following : BEM, sensor creation, calculate distance, location finding, collect data. [BEM -→ Boundary Elimination Method]

The **boundary element method** (**BEM**) is a numerical computational method of solving linear partial differential equations which have been formulated as integral equations (i.e. in *boundary integral* form). It can be applied in many areas of engineering and science including fluid mechanics, acoustics, electromagnetics, and fracture mechanics.

Fig .4 Block diagram detecting targets



5. Modules specification

In this paper, for designing the sensors and for further implementation we used certain modules. They are :

- Formation of Network
- Path Selection
- Location Detection
- Route Maintenance
- Performance Analysis

5.1 . Formation of Network

Network formation models describe the interaction between a collection of nodes that wish to form a graph. Such models have been introduced and studied in the economics literature.

5.2.Path Selection

We select the best communication path for achieving the highest signal-to-noise ratio at the cluster head. Then, we estimate the target position using the Tabu search algorithm. The best communication path is designed to reduce the communication cost, which leads to a significant reduction of energy consumption and an accurate target tracking.

5.3 Location Detection

Location detection plays a key role in this paper. Because it is important to place the sensors in a correct spot which can provide three dimensional building visualization along with real-time monitoring of hot spots, structural failures, or interference sources.

5.4 Route Maintenance

In this paper several routing protocols have been proposed for a dynamically changing topology. In a WSN, a route may suddenly become broken because only one host roams away. Even if a route remains connected, it may become worse due to host mobility or a better route newly being formed in the system. So maintaining the route for data transmission is essential and is done using dynamic source routing protocol.

5 .5 Performance Analysis

Performance analysis is the last module in this paper. For this three phases should be analysed. They are latency, throughput, packet delivery ratio. After implementing all the above modules these three phases should be analysed.

6. Conclusion

The integration of prototypes and the test bed implementations with Route updating is deemed essential to validate findings and refine models and systems. It is demonstrated by the studies carried out in the past for other wireless technologies. The simulation results have shown that the energy routing protocol is to save energy respectively. As well as reducing the time delay respectively.

The objective of this system is detecting multiple targets. It is similar to Blind Source Separation Problem (BSS). Our mobile target detection is based on BSS – Source number estimation. We proposed distributed source estimation algorithm. It has two levels: First local source number estimation is performed then it combines the local estimations and generate a global decision based on Bayes theorem. Advantages are it avoids large amount of long distance data transmissions, reduces network traffic, conserves Energy.

7.References

[1] IEEE/ACM TRANSACTIONS ON NETWORKING, VOL. 20, NO. 3, JUNE 2012 , Design of Wireless Sensor Networks for Mobile Target Detection , Edoardo Amaldi, Antonio Capone, *Senior Member, IEEE*, Matteo Cesana, *Member, IEEE*, and Ilario Filippini, *Member, IEEE*

[2] C. F. Huang and Y. C. Tseng, "The coverage problem in a wireless sensor network,"*Mobile Netw. Appl.*, vol. 10, no. 4, pp. 519–528, Aug. 2005.

[3] T. Clouqueur, V. Phipatanasuphorn, P. Ramanathan, and K. K. Saluja, "Sensor deployment strategy for target detection," in *Proc. ACM Int. Workshop Wireless Sensor Netw. Appl.*, 2002, pp. 42–48.

[4] Y. Zou and K. Chakrabarty, "Sensor deployment and target localization in distributed sensor networks," *Trans. Embed. Comput. Syst.*, vol. 3, no. 1, pp. 61–91, 2004.

[5] V. Phipatanasuphorn and P. Ramanathan, "Vulnerability of sensor networks to unauthorized traversal and monitoring," *IEEE Trans. Comput.*, vol. 53, no. 3, pp. 364–369, Mar. 2004.