

TARGET TRACKING AND MOBILE SENSOR NAVIGATION IN WIRELESS SENSOR NETWORK: A REVIEW

Reddi Malu

Computer Engineering, Dr. D. Y. Patil COE Savitribai Phule Pune University, India

Abstract :- Now a days Tracking moving target is an big problem in wireless sensor network. This study how to locate the moving target and mobile sensor with the help of emitting signals using mobile sensor navigation. Suppose moving target is unknown, at that time wireless sensor network use mobile sensor controller to utilize the measurement in terms of arrival time (AT) of mobile target signals. Before directing mobile sensor to follow the target, mobile sensor controller acquires the arrival time (AT) measurement information from both mobile target and mobile sensor for capturing location of target. This paper proposes min-max approximation approach to locate location of target for tracking and apply cubic function for mobile sensor navigation. To improve accuracy of tracking target locate the location of both mobile sensor and target together. This paper define weighted tracking algorithm to grow system performance.

Keywords: mobile sensor navigation, weighted tracking, AT, mobile communication, target tracking, noise.

I. INTRODUCTION

Now a days number of applications are developed that are based on mobility in wireless sensor network such as applications are generally used in military, environmental monitoring, civilian fields. For tracking moving target first of all we must identify and locate the location of target[2]. Sensor network are mostly used in tracking mobile target in network. Practically different number of application based on mobile target tracking such as wildlife monitoring, robot navigation.

In wireless sensor network we use two different approaches to find the location of target such as[3]

1. Range based method
2. Range-free method

The main difference between these two method is that in range based method we calculate distance by measuring signals Arrival Time (AT), Difference of Arrival Time (DAT), RSS. And in range-free method we use special protocols. In range-free method we use distance vector to determine location of target in WSN. Basically this method is used for fixed target or stationary target which uses multi-hop information. To determine location of target in WSN we use range based method which uses local information only.

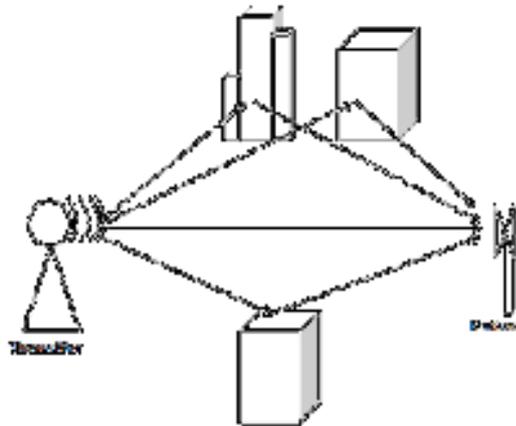


Fig1: signal transmission route from the transmitter to receiver.

Navigation is used for finding location of moving target and safety route to destination. In navigation procedure we must to follow two steps such as:

1. To find the location of target by using positioning system such as Loran-C or GPS.
2. Determine the route of moving target to reach destination.

Main goal of this paper is to locate the location of target and apply control over the mobile sensor tracker for tracking moving target.

II. BACKGROUND

There are number of target positioning approaches based on various measurement models such as arrival time (AT), received signal strength (RSS), difference in arrival time (DIAT), angle of arrival (AOA), and combination of these all[5].

For tracking a target, Kalman filter was stated that where graphical-collaborated anticipated location tracking algorithm can be sufficient even we don't have active signal sources. Li et al checked use of continued kalman filter in AT measurement model for tracking target, to obtain more correctness experimentally kalman filter use RSS measurement model. Number of organization are focused on portability management rather than static sensor to obtain better target tracking and location judgment. Zou and Chakrabarty proposed a distributed portability management technique for tracking a target, where sensor node movement is based on energy consumption, loss of connectivity etc.

Here we consider the problem of tracking target and mobile sensor navigation together which are depend on AT measurement model. By using this model I introduce min -max approximation technique to capturing location of target for tracking which can be sufficient and effectively solved by using semi definite programming (SDP)[3]. And apply cubic function for mobile sensor navigation. To improve accuracy we capture target location and mobile sensor together. Signals navigation systems are based on some parameters such as:

1. Accuracy
2. Availability
3. Capacity
4. Continuity

By using these parameters we find the performance of signal navigation system. Now a days GPS technology is used overall in world and users are access updated position information constantly as long as GPS working properly

A Target Tracking

There are different approaches to find location coordination of target such as:

- Angle of arrival (AOA)
- Arrival Time (AT)
- Difference of arrival time (DAT)
- Received signal strength (RSS)

Using all these approaches built an geometric structure having number of lines and angle using these we can calculate location of target.

a. Angle of Arrival (AOA)

This AOA method is network based method which used to measure the amount of time taken by signal to visit different nodes. In AOA method correct location of every AOA element is known absolutely by using antenna. Every element is small and able to acquiring separate signal. Throw strength of signal and Arrival time, easy to calculate line of vision route from transmitter to receiver. Similarly we calculate the line of vision for other receiver that access same antenna at other location. The point at which these two line of vision are intersect represent the transmission node.

b. Arrival Time (AT) and Difference of Arrival Time (DAT) method

Arrival time and Difference of arrival time are depending on propagation time of signal that are transfer from transmitter to receiver. By using arrival time method propagation time and distance between transmitter and receiver is calculated. Arrival time is a amount of time require to receive signal from transmitter to receiver. Difference of arrival time is a difference between arrival times of two or more signals generated from transmitter to receiver.

c. Received signal strength (RSS)

Received signal strength (RSS) method is used to locate the location of target. By measuring the energy of received signal we can easily calculate the distance between two modes.

B. Mobile sensor Navigation

From last few years navigation system is used all over the world and accept commonly commit at spiritual observation such as finding the route from transmitter to receiver. Now a days navigation is used in moving robot that travel from point x to point y. Navigation is stated as “It is the way of determining and continue a direction to destination location” here destination location does not refer as final destination of moving device.

During navigation moving device face to number of challenging question such as

1. where I am?
2. Where to go?
3. How to go?

That is not necessary to give answer of all question for navigate over a region. Additional to find a path between source and destination target, it is necessary to use navigation tool such as difficulty avoidance and search algorithm. These all desire in the form of sensory input that basically transfer to moving vector to drive the moving device towards its destination location.

C. Navigation Autonomy

Navigation strategy is divided into two categories such as:

1. Regional Navigation Strategy
2. Route-Finding Navigation Strategy

These navigation strategies are useful for achieve destination location. Regional strategy use sensor input and knowledge of region to facilitate moving device to reach destination. Route-Finding strategy requires sequential monitoring of several battleground to reach destination.

Regional navigation include four actions such as

- Searching
- Direction-Following
- Aiming
- Guidance

These action form a hierarchy like structure in order to increase the complexity. It is consider that moving device has to capability to perform one of the action, it has capability to perform all actions which as precede in the hierarchy.

a. Searching

It is first regional navigation action, it has a ability to recognize the destination. Here moving device move randomly and by chance it will find the destination for example search operation.

b. Direction-Following

Some times moving device does not know the destination that can be determine by following path that may be magnetic field or compass point.

c. Aiming

In direction following action moving device follow the path to achieve destination location, but in aiming action first decide the destination and find the distance between source and destination and move towards destination.

d. Guidance

Here destination is not visible to moving device and at that time it must to guide related to combination of sensor input and known relationship between current location, destination location.

Route-Finding Navigation Strategy include three actions such as

- Recognition-triggered Response
- Topological
- Survey Navigation

e. Recognition-triggered Response

Suppose X and Y are two source and destination location respectively, want to connect these two location. In this action regional strategy is used to connect these two locations X and Y. This strategy is selected based on X location or Y location and known route from X and Y. Same regional strategy is used for navigation from source X to destination Y.

f. Topological

Topological action overcomes the limitation of recognition-triggered response action. For example suppose there are two rooms having route from one room to another room is blocked with door. At such situation by recognition-triggered response action moving device stop at door, but by topological action it use alternative route to move from one room to another.

g. Survey Navigation

Above two route-finding strategy are limited to know path from source to destination location, but in survey navigation it takes all known information about destination location.

III. ADVANTAGES AND DISADVANTAGES

A. Advantages

1. Easy to calculate Arrival time (AT) of signal.
2. No need of prior knowledge that is when transmission of signal is started.
3. By using AT measurement data we easily capture the source location.
4. Control of mobile sensor navigation is based on captured location, more accurate localization algorithm.

B. Disadvantage

Here most common disadvantage is that the mobile target is unknown.

IV. CONCLUSION

Here we study the moving target tracking problem by using mobile sensor navigation in wireless sensor network (WSN). With unknown mobile target and mobile sensor location, here first of all we need to capture location of both mobile sensor and mobile target. By using arrival time (AT) measurement data we easily

capture the source location. Here we study the different target tracking method and navigation strategies for determine location of target and path to follow.

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