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Target Tracking and Mobile Sensor Navigation in Wireless Sensor Network Using Ant Colony Optimization

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Abstract: **The Now a days Tracking mobile target is an big problem in wireless sensor network. This work is about the diculties involved to track the target which emits the signal using the mobile sensor based on reception of signal. As the mobile target plan is unknown, time of arrival (TOA) measurements from the mobile sensor network is used by the mobile sensor controller. Mobile sensor controller collect TOA is obtained from both the mobile target and mobile sensor to direct mobile sensor to follow the target and also to estimate location. To estimate the location we used min max approach. System also proposes Ant colony optimization (ACO) to estimate location eciently and for managing sensor mobility aiming at improving the tracking of a single target. This enlightens the approximation of the position of the nodes to guess the location of the nodes. Once the entity is managed, mobile sensor nodes concentrate in that entity and the location of the mobile sensor and target jointly to improve the tracking accuracy. Systems provide a sequential algorithm and a joint weighted localization algorithm before controlling the mobile sensor movement to follow the target. For the navigation of mobile sensors improves eciency, the cubic law is applied. Target tracking can be seen as a sequential location estimation problem. Char- acteristically, the target is a signal emitter whose transmissions are received by a num- ber of distributed sensors for estimating the location. Main drawback of existing system is delay in time of arrival (TOA) measurement. To overcome the time delay and to improve the shortest path of the target, system proposes Ant Colony Optimization (ACO) approach to estimate tracking the location of target.**

Keywords: **Ant Colony Optimization, Target Tracking, Mobile Sensor Navigation, Min-Max Approach, Time of Arrival.**

I. INTRODUCTION

The Wireless sensor networks (WSN) consist of large numbers of sensor nodes. Sensor networks are of different types sensor nodes such as magnetic, thermal, radar which are used for monitor variety condition. Sensor networks is heterogeneous system consist number of detection stations. Target tracking detects target and location of the object area. The predict area is different from the individual area. In modern years, wireless sensor networks have found rapidly growing applications in areas such as environmental monitoring, automated data collection and surveillance. Usually, target tracking involves two steps. At first, it needs to estimate or predict target positions from noisy sensor data measurements. Then, it needs to control mobile sensor tracker to follow or capture the moving target. As a result the problem of mobile target positioning in a sensor network consists of stationary sensors and a mobile sensor. The aim is to estimate the target position and to control the mobile sensor for tracking the moving target.

II. LITERATURE SURVEY

The Particle filtering has also been applied with RSS measurement model under correlated noise to achieve high accuracy [1]. For target tracking, Kalman filter was proposed in [2], where a geometric-assisted predictive location tracking algorithm can be effective even without sufficient signal sources. In addition to the use of stationary sensors, several other works focused on mobility management and control of sensors for better target tracking and location estimation. Zou and Chakrabarty [3] studied a distributed mobility management scheme for target tracking, where sensor node movement decisions were made by considering the tradeoff among target tracking quality improvement, energy consumption, loss of connectivity, and coverage. In [4], a continuous nonlinear periodically time-varying algorithm was proposed for adaptively estimating target positions and for navigating the mobile sensor in a trajectory that encircles the target. Furthermore, Xu et al. [5] have shown that direct TOA localization offers some performance gain over TDOA localization. Since the mobile sensor navigation control depends on the estimated location results, more accurate localization algorithm from TOA measurements leads to better navigation control.

Main drawback of existing system is delay in time of arrival (TOA) measurement. Here each anchor sensor node records and sends, to the data fusion sensor, its TOA measurement of target signal and mobile sensor signal.

III. IMPLEMENTATION AND RESULT

The proposed system intends to better solution to existing problem of delay for tracking target. Input to the system is an text file. We first create a wireless sensor network by importing system.graphics.drawing namespace. Then we make a connection to the receiver and by sending text file from sender to receiver we find the time of arrival between two nodes. Further we apply semi-definite programing to calculate fitness function for target tracking. To overcome the drawback of existing system i.e Min-Max Approximation we apply Ant Colony Optimization algorithm and finally we present difference of time variation in graphical form.

1. ACO Algorithm:

Initialization:

a) Set initial parameters that are system: variable, states, function, input, output, trajectory, output trajectory.

b) Set initial pheromone trails value.

c) Each ant is individually placed on initial state with empty memory. While termination conditions not meet do

a). Construct Ant Solution: Each ant constructs a path by successively applying the transition function the probability of moving from state to state depend on: as the attractiveness of the move, and the trail level of the move.

b) Apply Local Search

c) Best Tour check:

If there is an improvement, update it.

d) Update Trails:

1. Evaporate a fixed proportion of the pheromone on each road.

2. For each ant perform the \ant-cycle" pheromone update.

3. Reinforce the best tour with a set number of \elitist ants" performing the \ant cycle".

e). Create a new population by applying the following operation, based on pheromone trails. The operations are applied to individual(s) selected from the population with a probability based on fitness.

1. Darwinian Reproduction

2. Structure-Preserving Crossover

3. Structure-Preserving Mutation

End While

2. Results:

Steps are carried out during implementation of Target tracking and mobile sensor navigation using Ant Colony Optimization are as follows:-

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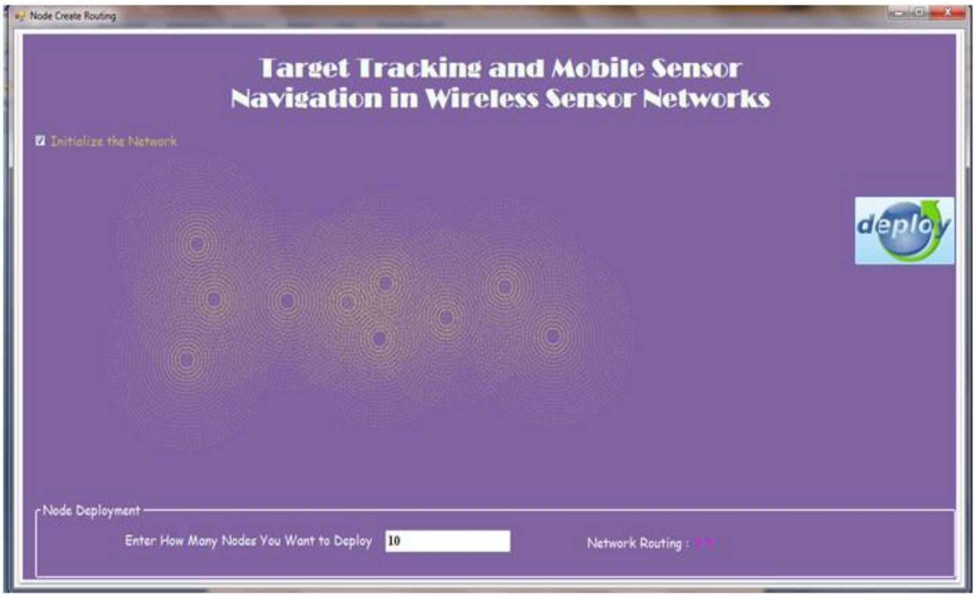
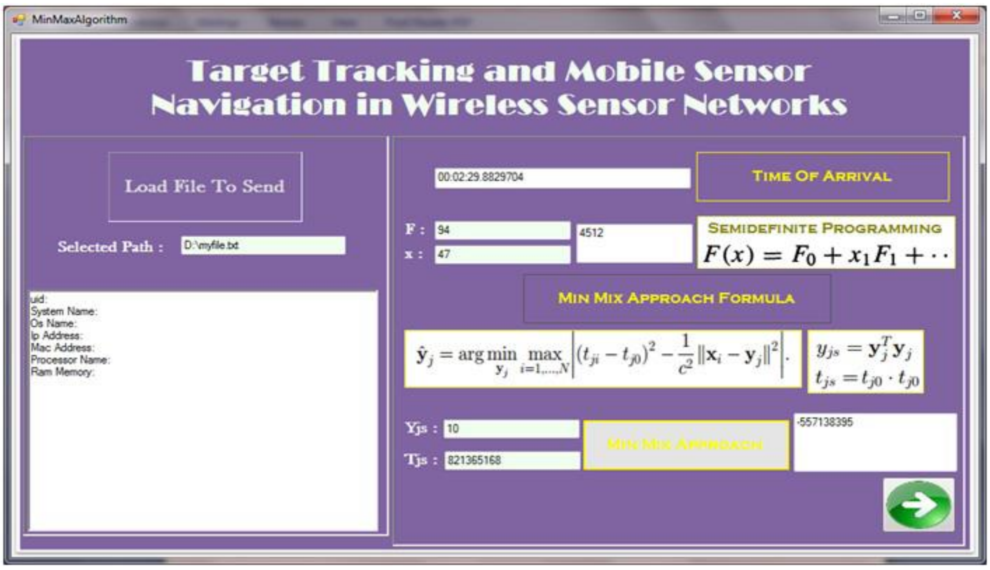
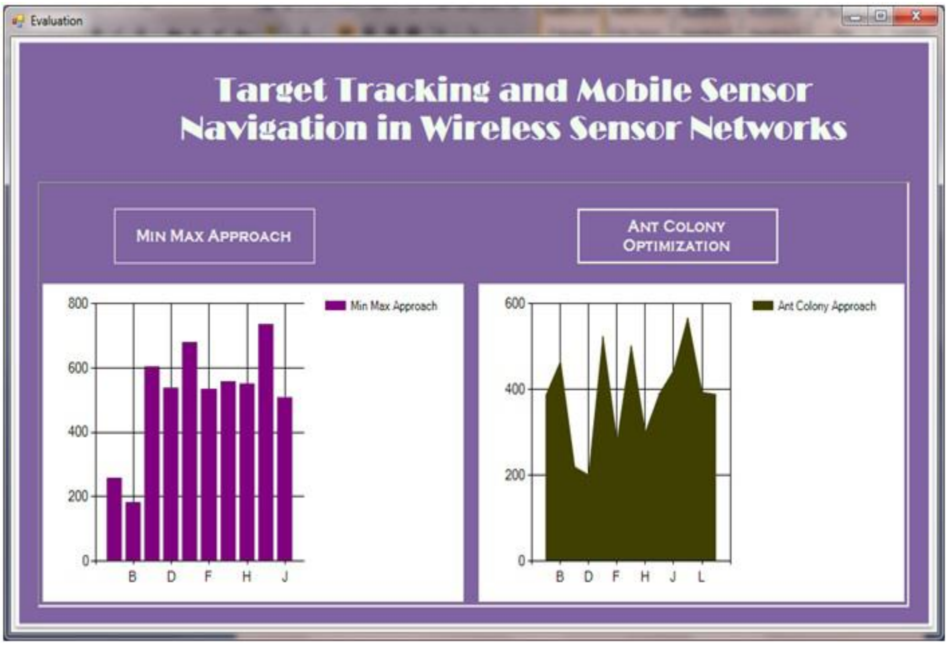


Above figure shows network initialization, in that we create a sensor network





Evaluation Result shown in above diagram.

IV. CONCLUSION

A System Proposes Ant colony optimization (ACO) to estimate location efficiently and for managing sensor mobility aiming at improving the tracking of a single target. Proposed system also overcomes the drawback of existing system that is time delay. The Network simulation results show the performance analysis of the mobile sensor nodes compared with coverage range, time delay, remaining energy respectively. Hence a sequential algorithm and a joint weighted localization algorithm are used before controlling the mobile sensor movement to follow the target. In support of the identification of mobile sensors, the cubic law is applied to improve efficiency. Simulation results illustrate successful tracking and navigation performance for the proposed algorithms under different trajectories and noises.

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