CHAPTER 7

CONCLUSION

7.1 INTRODUCTION

The works presented in this thesis tracks the dynamic boundaries. The developed algorithms reduce the communication cost between the observing sensors and the sink in a range based sensor network. The contour tracking approaches in the literature reduce the communication cost by in-network processing or by refreshing the points at regular intervals of time or by selecting the number of sample points iteratively. These refresh algorithms do not depend on the rate of change of the boundaries.

7.2 CONTRIBUTIONS OF THIS WORK

The objectives of this work was to build different algorithms to adaptively refresh the section of the boundary at the rate of its change to reduce the measurements to sink. A simulation study has been made to test the performance of the algorithms.

The objectives have been achieved in the following manner:

i The stochastic behavior of the dynamic contour is modeled.

ii The developed centralized tracking algorithm adaptively refreshes the sample points and reduces the communication cost of the observing sensors.
iii The developed distributed tracking algorithm adaptively refreshes the sample points and thereby reduces the communication cost.

iv The performance of the adaptive refresh algorithms in terms of estimation of sample points, contour points and communication cost is optimized.

Because of the above new suggestions, the contributions could be summarized as follows:

- The stochastic behavior of the dynamic boundary points is modeled as Brownian motion with drift and correlated Brownian motion.
- The communication cost is reduced by exploiting temporal correlation between the successive sensor observations.
- The communication cost is significantly reduced by exploiting spatial and temporal correlation between the sensors and successive sensor observations.
- The distributed push algorithm is more energy efficient than the centralized model with respect to routing.

The developed models permit only sufficient number of queries in the centralized system or sufficient number of pushes in the distributed system to keep the estimation error low even when the tolerance threshold is high and the confidence threshold is low. The above explained procedures contribute a set of new steps towards keeping the estimation error low. The main limitations of Brownian motion models is that they cannot be used to model discrete events. These models can be used only to model continuously varying events.
7.3 FUTURE WORK

As an extension of this research, a multivariate Brownian motion analysis can be carried out for denser deployment of sensors to exploit the temporal correlation between the sensors in a cluster.

This work, modeled the contour behavior and the model’s parameters predicted the query or the push time and estimated the sample points. Measurement of the sample points in contour tracking is stochastic in nature. Data may be skewed with mean and non constant, non-normally distributed variance. Various observations made over time is discrete by the sensors and hence as future work, a time series analysis can be made to understand the underlying structure and function for developing a mathematical model to predict and to control.