CHAPTER 6

CONCLUSION AND FUTURE WORK

6.1 CONCLUSION

The current WSNs are assumed to be designed for specific applications, having strongly coupled data communication protocols. Considering that WSNs can be potentially useful for a wide range of application domains and that the sensor network infrastructure is expensive, there is a strong trend towards designing commercial scale WSNs as being composed of heterogeneous sensor devices and assisting a large range of applications for different groups of users. Architectures for future sensor systems will have to be able to serve different applications and adapt to different post-deployment query patterns. Networks from different providers will have to be individually programmed and yet be able to interoperate efficiently. To achieve this, service oriented architecture was proposed as a programming model for heterogeneous wireless sensor networks.

The basic service oriented architecture suffices to implement simple interactions between a consumer and a provider. If the implementation of a service needs the invocation of other services, it is a necessary to combine the functionality of several services. In this case, need for composite service arises. Current SOWSN provides service composition solutions with the help human expert. As non-technicians, end-users should have the ability to create new service which can meet their own demands. Current service
oriented wireless sensor network architectures are inherently unable to support this requirement. To achieve this, the problem comprises four phases.

**i) Automatic service graph generation:** An input/output dependency based automated service graph generation method for the purpose of dynamic service composition is proposed. The sequence set is generated based on the analysis of input/output dependency. Simulation results show that the proposed algorithm is better in terms of success ratio and execution time. The result also shows that the proposed algorithm is able to achieve around 15% improvement in the success ratio.

**ii) Global QoS-aware service selection:** The QoS based service selection problem for composite services determines how to select one service for each involving task from its corresponding candidate service group, so that the overall QoS of the constructed composite service can be maximized while the constraints set by users are satisfied. To better facilitate the service selection process, the registry has both functional as well as non-functional information such as QoS information. The mathematical model is established for service selection. The results show that the service selection algorithm using convex hull optimizes several objectives simultaneously. The results prove that the optimality of QASS algorithm is improved from 5 percentage to 10 percentage.

**iii) Service sharing and routing:** Since sensor nodes have limited energy capacity, it is important to minimize the energy consumption of sensor nodes to prolong the lifetime of a sensor network. This leads to design a light weight but effective scheme to support multiple requests that are arriving at the base station. The proposed service sharing algorithm merges similar concurrent requests, and rewrites the new request in terms of existing requests. The results show that the service sharing algorithms achieves 5-15% of reduction in the service request injection. Then the query routing algorithm routes the
query based on the service requested. Experimental results indicate that the proposed solution eliminates redundancies among similar requests efficiently and routes the request with minimum latency, resulting in lower energy consumption and increased network lifetime.

6.2 FUTURE WORK

SOWSNs would be able to dynamically adapt to any load of queries independently from the applications issuing those queries. It is foreseen that service-oriented architectures as a highly viable candidate to support the requirements of tomorrow's wireless sensor networks. This research has implemented automatic QoS-aware energy efficient service composition solution for service oriented wireless sensor networks. This work can be extended along the following directions.

- In case of mobility, service propagation is a problem because there is no proper self configuration mechanism for the mobile node. Mobility related service discovery issues needs to be focused upon.

- Currently service matching is performed by a simple name and type comparison. However it would be possible to do a complex semantics based service matchmaking techniques to improve the discovery process.

- Reliable service selection considering the dynamic changes of QoS is highly targeted because conducting QoS prediction dynamically should have fault tolerance ability and failure recovery ability.
• ESQR can be extended to support new features like QoS-aware query routing (where the route for a query is determined based on the QoS required by the query), and more efficient distributed task scheduling.

• Furthermore the proposed method can be implemented in a sensor network testbed, and evaluate the advantages of proposed approach in a realistic sensor application.