

# Conclusion & Further work

### 8.1 Introduction

The conclusion chapter discusses the overall achievements of the project after the conclusion of the development work and the documentation. The first part is to present the conclusion of the project by giving the overall view after analyzing the achievements gained from the project. Then, the author will identify the problems encountered and future enhancements of the project.

### 8.2 Conclusion

The dissertation comes to an end with this chapter and signals the completion of the "An Evolutionary Approach to Locate Urban Public Services". Therefore, the next step is to analyse the achievements of each of the objectives of the project.

The first objective is to do a detailed study on basic concepts of locating urban public services. The Second objective of the project was to analyze the current approaches to locate urban public services to find out the issues behind them. Both of these objectives in combination had been tested under the theme "Problem" under Test Results in Chapter 7. As per the results obtained therein, 74.2% of participant affirmation had been received. Thus the conclusion will be that the first two objectives have been excellently carried out.

The third objective of the project which is to make a comparison between various techniques of structural programming and Artificial Intelligence (AI) techniques were achieved during the course work of the project. This objective is reflected in the category "Technology" in the Test Results of Chapter 7. Here, the affirmation percentage of 52.8% reflects that this objective had been achieved in a satisfactory manner.

The fourth objective was to build a hypothesis to solve the problem using the selected technology. This was achieved by proposing a multi agent based solution to the problem of maintaining dependencies and complex interactions between public service agents when locating these public services in the city environment. A percentage of 64% of participants

have been affirmative here. This shows that this objective had been achieved in a very good manner.

Then the author achieved the fifth objective of the project by designing the proposed solution as a top level architecture diagram. Here the affirmation received according to Test Results in Chapter 7 was 52.5%. This reflects that this objective related to the Design had been carried out in a satisfactory manner.

Thereafter, the author has implemented the models that were identified during the design using java and the agent framework. This implementation objective had obtained 46.7% affirmation by the participants. Hence this objective had been achieved in a fair manner.

The seventh objective of the project was to test the system for valid and invalid parameters. This was through the prototype evaluation and the results got from these tests were compared with each other. The prototype, problem and the solution were evaluated after gathering user feedbacks through questionnaires (Appendix C). The question number 5, 6, 7 in evaluation questionnaire (Appendix C) covered the problem, question numbers 8,9 covered the technology, question numbers 10,11 covered the proposed solution, question numbers 12,13 covered the design and question numbers in 14,15 covered the implementation area.

Finally, the project was documented by completing the final objective that needs to be achieved.

### **8.3 Problems Encountered**

Most of the parameter values of the public service agents are not real time data that are collected from the environment. Therefore, the program has to set some default values for the type and environment of the agents. The agent's location is a relative measurement of the real time data. Because of this, the compatibility of the prototype to the real-time data is not known by the author. Therefore the prototype needs to be tested with the real time inputs from the environment.

One of the problems encountered was the difficulty in displaying each and every interaction between public service agents graphically to the end user. Even though, there is

a possibility of using time delays for each agent, sometimes these delays may result to exceptions in the system.

#### **8.4 Further Improvements**

One of the future enhancements would be to improve the prototype to provide more features to the user to locate urban public services effectively. At the moment, the prototype is able to output a suitable location for the public service build inside the city. Therefore, in future, the prototype needs to be enhanced to provide the user to locate public services in different environments such as cities situated in flat lands, cities that are covered with terrains, cities that have more water resources than the land area, etc. The prototype developed so far needs to be amend to move from one city environment to another and more number of agents will be included to the system to handle different aspects of the city environment.

The prototype may need to be integrated further to use real time data during the processing of the agents to make the system more realistic to the user. Here the system can be improved as a Knowledge base. The knowledge and experience of Civil Engineers, Architects and Urban Planners can be fed to the system via the agent data. Then the system will become close to the real city situation.

Urban public services locating system can be integrated in order to provide a printable version of the final output at the end of the system. This may provide the user to use system output do design urban models for the real time analysis of the city environment.

#### **8.5 Summary**

The conclusion chapter had discussed the overall achievements of the project after the conclusion of the development work and the documentation. At first, the conclusion part of the chapter gave an overall view about the achievements gained from the project. Then, the problems encountered and future enhancements of the project were explained.