

CHAPTER 8 CONCLUSION

8.1 INTRODUCTION

In this final chapter we will talk about the achievement of designing and development of a cost-effective vehicle tracking solution for small and medium-sized enterprises (SMEs). This will discuss about the achievement of initial objectives of the project. This part will also illustrate issues encountered through out this exercise, limitations with the current system. It will discuss about extensions to future work that can be carried out to improve this system up to a fully comprehensive commercial quality product.

8.2 ACHEIVEMENT OF OBJECTIVE

The main objective of this undertaking was to develop a cost-effective solution for vehicle movement tracking. That primary objective was met with the development of this vehicle tracking software. This was achieved with the support of location based system (LBS) which uses GSM digital cellular network infrastructure.

The customer organization is pretty satisfied with the final version of the vehicle tracking software. The almost all of their functional requirements were met by this vehicle tracking system. The other non-functional requirements such as usability requirements, reliability requirements, performance requirements, supportability requirements and user interface designs were accomplished as well.

8.3 ISSUES ENCOUNTERED

It was rather difficult to render the correct map into the vehicle tracking application. Initially it was tried to develop the vehicle tracking application having a map with JPEG file format. But so many limitations were encountered with that integration. Zoom in/out was not working properly with that one since the clarity of the JPEG raster map. It was also very hard to align *World Geographical System 1984* (WGS84) coordinates to that raster map correctly. Through the literature survey, it was able to find out that, the best way to implement a vehicle tracking application with vector maps which are not reluctant to that sort of operations. Moving from raster maps to vector maps was one of the turning points in the development.

Accuracy of the system is poor when it moves out of Colombo city limits. This issue can be overcome gradually when the GSM digital cellular coverage is widened by the operator.

8.4 EXTENSIONS FOR FUTURE WORK

A couple of possible improvements have been identified with the current setup that would significantly enhance the performance and effectiveness of this vehicle tracking system. The accuracy of the system could be an arguable factor with this current implementation. One possible solution to this problem is to increase the coverage area with several base stations (BTSs) by the operator.

The current vehicle tracking software and graphical user interface configuration do not allow a user to remotely login into the system and monitor or track the vehicles. However, more extensive automated vehicle tracking software could be developed for the system to further customize it for a specific customer's need. For example, software could be developed to have a web based interface where users of the system can login into the Internet and get access to the vehicle tracking system. Then it is basically web based and users need not to be there at the monitoring station all the time. As a further extension of this it can develop a wireless application protocol (WAP) enabling interface to access this vehicle tracking system via third generation mobile (3G) phones and pocket PCs such as IPAQ devices. This software can also be integrated with Satellite GPS as future development if necessary fund is available. It would not be very hard to deal with due to the modular nature of the system's object-oriented software design.

8.5 CONCLUSION

The main objective of this thesis was to design and construct a cost-effective system to track position or movements of vehicles using a Network based positioning system. It can say the primary objective was achieved by 100%. In conclusion of this thesis, it can be assured that the main objective of this project for Masters Degree, being the gain of knowledge in relevant area of vehicle movement tracking, gain theoretical and practical knowledge, concluding in the design and development of a working system for the intended customer organization was successful.

Track and plot the vehicle's ground location on a base map was also a primary task of this project. This objective is also quite successful with the final vehicle movement tracking system. All of the original design goals were met or surpassed and some novel extensions were included. The whole system was assembled so that it can be extended for any number of new applications and different platforms with minimal additional software changes, seeing as this was developed using Java.

For the demonstration purpose with this pilot project, the system performs movement tracking for only two tracking vehicles simultaneously in Colombo region. But the system was designed and developed in such a way that, it can track any number of vehicles simultaneously at anywhere when the GSM coverage is existent. The tracking system performs successfully and further work would be required to implement it as a commercial quality and commodity product. Miniaturization of the car unit would be needed for commercial level implementation.

Overall, the development of the vehicle tracking system was a success. All design goals were met and all the primary objectives were achieved. Some extra features were also introduced and included to the system to convince its flexibility and enhancement. Advanced improvements could be made such as greatly enhanced communications media such as satellite GPS, enhanced in-car sensors or miniaturization of the in-car systems.