

**WAYPOINT NAVIGATOR – A NAVIGATION SYSTEM TO  
FIND THE SHORTEST PATH FOR TRANSPORTATION**

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## **ABSTRACT**

Navigation systems are becoming standard in-vehicle equipment nowadays. The demand for in-vehicle navigation systems has been increasing through the years due to various reasons such as: Increase in traffic and Population and road network. The availability of navigation systems and related services and their integration with other Utilities is rapidly emerging worldwide and also entering to the Sri Lankan market.

In this research report, very much attention is given to the experience gained in developing digital navigable maps and in-vehicle navigation systems for Sri Lanka. Further, it is trying to identify the areas where such systems/applications can be of great benefit to organizations in government as well as private sectors in monitoring their fleets in operation.

A state-of-the-art navigation system can be divided into four components as, 1. Map database, 2. Navigation Software 3. Hardware to run the software and map storage and 4. The positioning sensors (GPS).

Unlike the other countries, the developing of a navigation system for the Sri Lankan road network is quite difficult task due to the non availability of data and details of the selected areas. Taking into consideration the limitations and shortfalls, the software was initially developed in detail only for the Colombo Municipal Council area where large scale detailed maps are available.

After given careful consideration and comparative analysis of the available software facilities, the proposed software was developed using C#.NET with .NET Framework 2.0

While database component was developed using MS Access. Dijkstra's Shortest Path Algorithm is applied in order to display the paths and the shortest path among cities. In order to obtain real time data it was applied the GPS technology to the system.

Global Positioning System (GPS) is the technology which was widely being used in defense activities initially is now widely used in Vehicle Navigation Systems from aircraft, naval vessels and road vehicles. The technology helps the users to determine the vehicle position or provides users with proper maneuver instruction in order to understand the location. There are significant limitations associated with ground factors such as buildings, canyon around cities etc. Thus correction of such deviations are necessary for the proper application of such facility for the vehicle navigation system. The other limitation encountered with the digital map layer of the road network which is near appropriate to the accurate coordinates. These factors caused in precise vehicle position location on the road network of the digital map.

In order to overcome this limitation it was attempted to apply a map matching algorithm which was very essential for the clear identification of the vehicle location. An optimal algorithm is developed through the analysis of some driving conditions (such as turning, U - turn or drive to parking lots).