

Implementation of an Algorithm for Ride-Sharing in an Autonomous Mobility-on-Demand System

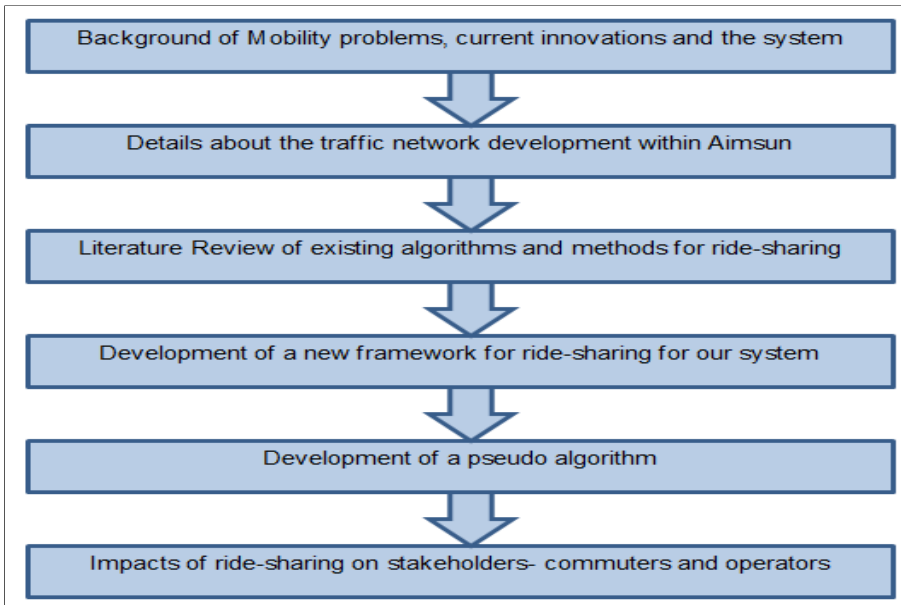
Master's Thesis of Supraja Hariharan

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Disposition of the Master's Thesis(Own source)

The ride-sharing framework

The system is visualized to be a dynamic ride-sharing system.

The components of the system being:

Framework: Framework is the mechanism by which updates are done in the system. A rolling horizon kind of framework is visualized. The network is viewed as a grid which has its own time-distance matrix for each of the cells. The path of the journey can be traced as a corridor going through a series of such partitions.

Searching & Matching phase: A series of constraints like the seat availability constraint, detour constraint and distance constraint will be checked to identify the most appropriate car to satisfy a certain request and the most appropriate ride request to match with.

Execution of rides: A cost function approach will be adopted to identify the best possible route and the way to execute the ride requests.

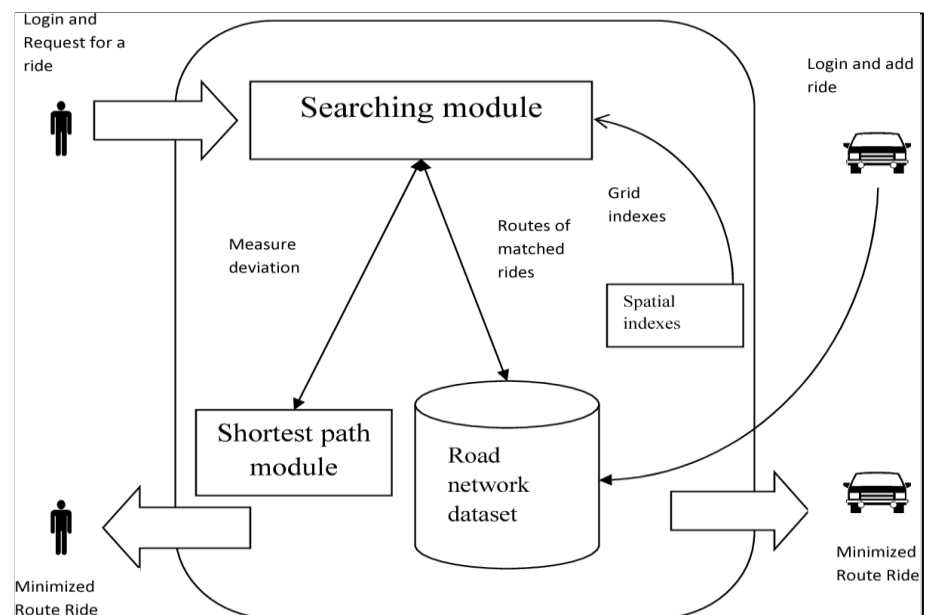
Objective:

The prime objective of this Master Thesis is to develop a framework for the fleet management concept of ride-sharing for an autonomous Mobility-On-Demand public transport system.

Research approach and deliverables:

A literature review based approach was adopted to develop this framework. Previous algorithms and approaches available for ride-sharing were studied. A combination of these algorithms was then taken up to develop this framework for ride-sharing. The gaps in the framework with regards to the system were then filled by suitably adding relevant constraints.

Complete traffic networks for the three townships (Punggol, Tengah and JID) was developed within the traffic simulation software Aimsun. These networks are now readily available for testing of the algorithm.



Stages in a ride-share system (Source: Samia Arshad et al., 2015)

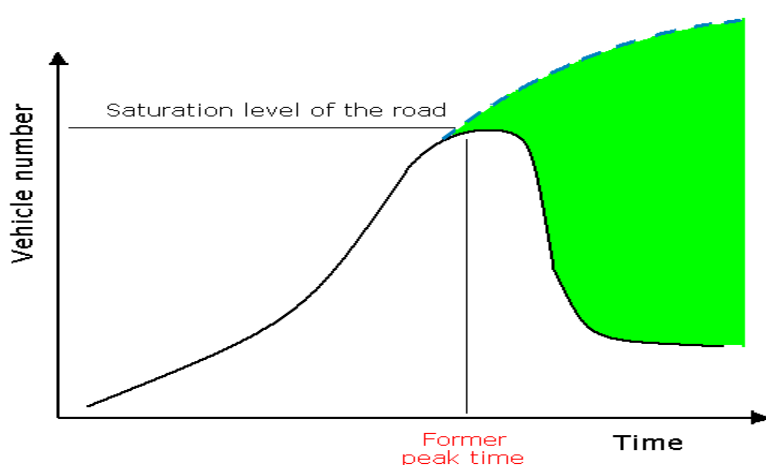
Impacts of ride-sharing on the stakeholders

The impacts of ride-sharing can be studied in multiple levels.

This Master thesis will study the manner and extent to which ride-sharing will impact technical aspects like capacity utilization, fleet size etc.

The impacts of ride-sharing on social and economic aspects like comfort, safety, security, travel costs etc. have also been addressed.

This thesis will also address how ride-sharing impacts various stakeholders like operators, car manufacturers and their decisions.



Extra capacity by ridesharing

(Source: www.move-forward.com)