

A REVIEW ON RECENT AVAILABLE POSITIONING TECHNOLOGIES AND ITS ADVANCEMENT

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ABSTRACT This paper reviews and compares the available positioning technology for location based application such as the Intelligent Transport System (ITS) and personal vehicle positioning. With the rapid growing trend of worldwide vehicle ownership, issues such as traffic congestion, environmental pollution, energy consumption and road accident cases are increasing. Intelligent Transportation System (ITS) which depends on location and positioning has been identified as one of the advocated key to resolve the issues. Global Positioning System (GPS) is one of the most promising ubiquitous positioning technologies accepted worldwide for ITS application. It is discerned that GPS alone in ITS application is not adequate since GPS faced Non-Line-of-Sight (NLOS) and multipath effect. New technology integrated is needed to overcome the drawback of the current system for continuous positioning; particularly important for ITS application to be fully functional. This is the significant motivation for tremendous research works had been carried out to improve the performance of positioning. In this paper, advantages and disadvantages of the recent available positioning technologies being used in the implementation of ITS such as satellite-based positioning, network-based positioning and location integration of several positioning technologies is found to be able to improve accuracy, reliability, availability and applicability of the ITS.

ABSTRAK *Kertas kerja ini membandingkan teknologi penentuan lokasi untuk aplikasi berasaskan lokasi seperti Intelligent Transportation System (ITS) serta penentuan lokasi bagi kenderaan persendirian. Dengan trend peningkatan kenderaan yang meningkat di seluruh dunia, isu-isu seperti kesesakan lalu lintas, pencemaran alam sekitar, penggunaan tenaga dan kes-kes kemalangan jalan raya semakin serius. Intelligent Transportation System (ITS) yang bergantung kepada maklumat lokasi dan penentuan lokasi telah dikenal pasti sebagai salah satu kaedah yang dapat membantu menyelesaikan isu-isu tersebut. Global Positioning System (GPS) adalah salah satu daripada teknologi penentuan lokasi yang diterimakai di seluruh dunia bagi aplikasi ITS. Namun begitu, teknologi GPS sahaja adalah tidak memadai kerana masalah Non-Line-of-Sight (NLOS) dan kesan berbilang arah (multipath). Bagi mengatasi kelemahan sistem GPS dan untuk membolehkan ITS berfungsi sepenuhnya, penentuan lokasi yang berterusan adalah penting tanpa masalah NLOS dan kesan berbilang arah. Masalah ini telah menjadi satu motivasi kepada penyelidikan bagi menambahbaik prestasi sistem penentuan lokasi. Kebaikan dan keburukan teknologi baru penentuan lokasi yang ada digunakan dalam pelaksanaan ITS seperti penentuan lokasi berasaskan satelit, penentuan lokasi berasaskan rangkaian dan Integrasi lokasi beberapa teknologi kedudukan didapati dapat meningkatkan ketepatan, kebolehpercayaan, ketersediaan dan kebolehgunaan aplikasi ITS.*

(Keywords: Positioning technologies, GPS, NLOS, multipath effect, integration)

INTRODUCTION

Increase in the use of private vehicles is a common phenomenon in developed and developing countries. The number of vehicles in the world is increasing from year to year [1]. The increase of average annual percentage of registration from 1960 to 2010 is only 2.3% [2], the guesstimate number of vehicle is around 12 million. The increase of number of vehicle around the world triggers concern and interest in road safety, ease of mobility and environment impacts.

The direct impact can be seen through the increase of road accidents with high fatality rate. The alongside effect of road accidents generally associated with health service burden and claims as well as expenditure on repairing services on the crash damages and initiate liability to the national economy [3].

On the other hands, the increasing number of vehicles with lack of infrastructure development causes traffic congestion [4] and brings great challenges to transportation mobility and sustainability, causing a waste of time and fuel [5]. The increasing of fuel