

Deployment of Stochastic State Estimation System and Intelligent Transportation Platform on Southern Ring Road Expressway Corridor in Bangkok

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Abstract

This presentation describes the deployment of Intelligent Transportation System (ITS) platform on one of the major expressway corridors in Bangkok Thailand. Four components of ITS platform are implemented in this project including: (i) traffic state estimation/prediction, (ii) travel time estimation/prediction, (iii) automatic incident detection, and (iv) traffic information system. The project involved the design, installation, and testing of around fifty traffic sensors (which is an industrial microwave-type sensor) along the 40 -kilometres expressway corridor. The data collection and filtering module was then developed to provide the input data to the state-estimation module. To estimate the traffic state between a pair of sensor (and along the whole corridor), the Stochastic Cell Transmission Model (SCTM) was implemented as the main algorithm for the state-estimation. The short-term prediction module for the traffic state was also introduced. Apart from the traffic data collected directly from the traffic sensors deployed, other sources of data include GPS data from probe taxis and RFID data from the toll collection system. The travel time estimation/prediction system fused the three data sources to provide the estimated instantaneous travel time along the expressway corridor. The third module is the automatic incident detection system which relies on the detections from three algorithms: Dynamic Time Warping, California algorithm, and McMaster algorithm. For the detection under the free-flow traffic condition, the system utilized the trajectory data obtained from the traffic sensor to detect any stationary vehicle inside the detection zone. The last component of the system is the traffic information system which disseminates the data and traffic condition via three main channels: win-app system, web-app system, and mobile-app system.