Routing algorithms in traffic networks are essential parts of route guidance systems, route choice behavior models and traffic prediction models. Although it was commonly recognized that traffic prediction is associated with large uncertainty, little attention was given in the past to assess and estimate stochastic dependencies of link travel times. Reason for that is not nonexistence of such correlations, but rather due to the complexity of the problem.

The objective of these studies is to evaluate current routing algorithms, which ignore stochastic dependencies; also, to check if consideration of such dependencies significantly complicates routing algorithms. The research is valuable for design and evaluation of transportation strategies intended to improve the mobility and reliability of the transportation networks.

My role in the research project will be to assist He Huang, a PhD candidate of Transportation Engineering in quantifying the stochastic dependencies among link travel times. First, I will carry out an extensive literature review to get acquainted with state-of-the-art research on traffic network dependency and data analysis methodologies that can be used for the purpose of our project. I will explore existing traffic databases: RTIC (University of Massachusetts Amherst) and PeMS (University of California at Berkeley) among others. After the data are extracted, I will aggregate it into peak, off-peak and mid-day periods, with respect to workdays and weekend. Visual inspections and statistical analyses will be performed to investigate the existence and the extent of spatial and temporal correlations between links of a roadway. Conditional probability distributions will be derived for upstream (downstream) link travel times given upstream (downstream) link travel times. In addition, I will assess whether there are significant differences among the conditional distributions by time-of-day and roadway type.