Overview of 2014 Summer REU Project #5

Ramp Metering Control for Mitigating Freeway Congestion

Area Coordinator and Faculty Mentor:
Dr. Heng Wei, P.E., Associate Professor
Dr. Mingminglu., Associate Professor

Graduate Mentors:
Karteek Kumar Allam, MS student
Goal and Objectives

- **Goal:** To guide the students to obtain a hands-on experience in transportation research and gain a high-level understanding in addressing the freeway congestion problem.

- **Objectives:**
  - Identify application conditions of ramp metering system and gain a better understanding of what ramp management strategy entails and the benefits and limitation of it;
  - Help to students in data collection using GPS devices and using microscopic traffic simulation software (VISSIM) to test the effect of traffic control measures;
  - Help the students learn to run the simulation model in VISSIM to evaluate the ramp metering system in terms of operation and find the difference between various scenarios considered.
Activities and Tasks

- The students will be given a preliminary training on the basics of ramp metering, analysis methods, and development of research framework.
- GPS travel data collection and other data acquisition, and relevant data analysis will be conducted under the supervision of the graduate mentors.
- Post Processing the collected data. (GPS and Video Data) and simultaneously submitting bi-weekly reports.
- The students will be building a ramp metering system at the case study site in the VISSIM environment and run the simulation model to evaluate the ramp metering system.
- The students will compile the results of the various scenarios considered and suggest a suitable strategy for the problem identified.
Project Outline

Study Site

I-275
US-42

On ramp

I-275

On ramp
Data collection and Analysis

- Collect GPS travel data (i.e. speed, travel time, distance, etc.) and post-process the Video Data to calibrate the simulation model in VISSIM.
- Simulate real-world system works and replicate the actual site conditions to provide the user a better understanding.
- Output evaluation of ramp metering system and suggest a suitable strategy.
Field Trip to TMC

Field trip will be scheduled on Wednesday, July 16th to provide an authentic environment for the teachers to perceive the real-world traffic operation and management.

**TMC** - Statewide Traffic Management Center (Ohio Department of Transportation Center Office, Columbus, Ohio).

TMC operates traffic management and traveler information systems on Ohio’s interstates, freeways, expressways and state highways. The mission is to increase transportation safety, reduce congestion, and increase efficiency.
Timeline

• **Week 1-2**: Training on basics of ramp metering, analysis methods, and development of research framework. Giving a prior knowledge about VISSIM.

• **Week 3**: Data collection, acquisition and analysis.

• **Week 4**: Post-Processing the data

• **Week 5-6**: Building a ramp metering system and run the simulation model in VISSIM

• **Week 7**: Preparation of final presentation, final report, and summary
Resources

• Computer Lab
• GA’s assistance:
  • Karteek Kumar Allam
    allamkr@mail.uc.edu
    917-664-6011
• Field trip (TMC in Columbus, Ohio)
• Discussions with faculty and GAs