Overview of UWM Smart Transportation Research Activities

Civil and Environmental Engineering Department
University of Wisconsin-Milwaukee

Presenter: Troy Liu, Professor
Director, Center for Urban Transportation Studies
liu28@uwm.edu
UWM CUTS
Infrastructure & Innovative Design

Continuous Flow Intersection

Double Wide Intersection

Single Point Urban Interchange

Large Roundabouts
Vehicular Speed Guidance and Smart Traffic Lights

On-board/smartphone-based bus speed guidance
Passenger Flow Sensing

Wifi-probe based metro station passenger flow monitoring and management
WIFI Probe
Smart Parking Simulator

- Parking space
- Entrance
- Ramp
- Aisle
- Sensor
- VMS/CMS
- Indicator

Cloud based Parking Infrastructure Simulation Lab
Intelligent Transportation Systems

- Online TMP Decision-Support Tool and Simulator
- Work Zone Tracking Tool
- Traffic Analysis Tool
- Online Integrated Corridor Management Systems
- Multimodal Special-Event Traffic Management Systems
- Freeway Work Zone Analysis Tool
Work Zone Tracking Tool

- Track all work zone activity
- Track and coordinate lane closures
- Identify lane closure conflicts
- Facilitate the sharing of lane closure information
Traffic Analysis Tool

- Analyze cumulative traffic impacts of multiple projects citywide
- Access the impacts based on various changes in project schedule, traffic operations and mitigation strategies
- Alert the DOT potential situations with excessive delays
Work Zone Hotspots

<table>
<thead>
<tr>
<th>Hotspot Level</th>
<th>Color</th>
<th>Existing Condition</th>
<th>Work Zone Condition(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>Green</td>
<td>LOS A thru D</td>
<td>LOS E or F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>LOS E or F</td>
<td>Delay increases by 5 to 24 seconds</td>
</tr>
<tr>
<td>Moderate</td>
<td>Yellow</td>
<td>LOS A thru D</td>
<td>LOS E or F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delay increases by 25+ seconds</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>Red</td>
<td>LOS A thru D</td>
<td>LOS E or F</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Delay increases by 50+ seconds</td>
<td></td>
</tr>
</tbody>
</table>
Big data analytics and urban computing
Crash Mapping Automation Tool (C-MAT)
Software as a Service
Web Graphical User Interface

User/Customer
Submit input forms and data files
Rich results

Developer/Researcher
Submit *.py program and a solid example

Visualization
Optimization
Crowdsourcing Products

Cloud computing and AI
A Cloud-based programmable and portable platform for engineering tools, collaboration, data analytics

Tools ("virtual apps") are 100% reusable, portable and compatible with multiple platforms and devices for data collection and analytics
Serve the Wisconsin state

- I-894 full freeway closure traffic study
- I-94 full freeway closure traffic study
- I-94 travel time study using BlueTooth data
- BlueTooth detection for evaluating rural work zone delay and diversion
- Heavy vehicle performance under forced flow conditions
- I-94 East-West corridor traffic diversion study
- Traffic simulators
- SE Wisconsin freeway incident response time model
- intelliRoute
Training Future Transportation Workforce

- 31 graduate student, 14 PhD students

**Student Awards:**
- Midwestern ITE Traffic Bowl Winner
- International ITE Student Award (Daniel Fambro Award)
- ICEM Student Fellowship
- Wisconsin ITE Student Paper Award
- Transport Chicago Best Paper Prize
- Best Paper Prize in the National Rural ITS Student Paper Competition
- UWM CEAS poster competition 2nd Place Prize
- Martin Bruening Paper Award
- Chancellor Award
- Dean’s Fellowship
- UWM Research in Excellence Award and Dissertation Award
Wisconsin Mobility as a Service (WMaaS) Platform

Mobility-as-a-Service (MaaS) describes a shift away from personally-owned modes of transportation and towards mobility solutions that are consumed as a service. A comprehensive system with diverse travel choices.
Our model does not work in practice because it is true; rather we hold our model to be true because it works in practice.