UTC Project Information	
Project Title	Application of Augmented Reality and Tangible Interfaces to Minimize Work zone Effects on Mobility through Participatory Planning
University	Oregon State University
Principal Investigator	Joseph Louis
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Funding Source(s) and Amounts Provided (by each agency or organization)	University of Washington PacTrans $35,000 Oregon State University $35,000
Total Project Cost	$70,000
Agency ID or Contract Number	69A3551747110
Start and End Dates	September 1, 2018-August 31, 2020
Brief Description of Research Project	This research proposes the development of a novel interactive visualization system that encourages multiple stakeholders to simultaneously interact with traffic simulations. The application is specifically aimed towards stakeholders to determine the optimum work-zone configuration to minimize their adverse effects on commuter mobility. This research will provide the foundation upon which further exploration can be conducted into the use of novel visualization methods to handle the voluminous data generated by transportation systems. To the PI's knowledge, this implementation of the AR Sandbox would be a first for traffic data visualization, and could potentially pave the way for further application of the interface to other transportation engineering problems that are dependent on spatial attributes and existing terrain such as highway alignment design, determination of no-passing zones, etc. The PI anticipates that this interface will prove to be an engaging platform for use in in educational settings to cater to kinesthetic and visual learning styles. The PI expects the publication of at least one conference and journal paper resulting from this study that describes the use of novel participatory systems for work-zone planning.

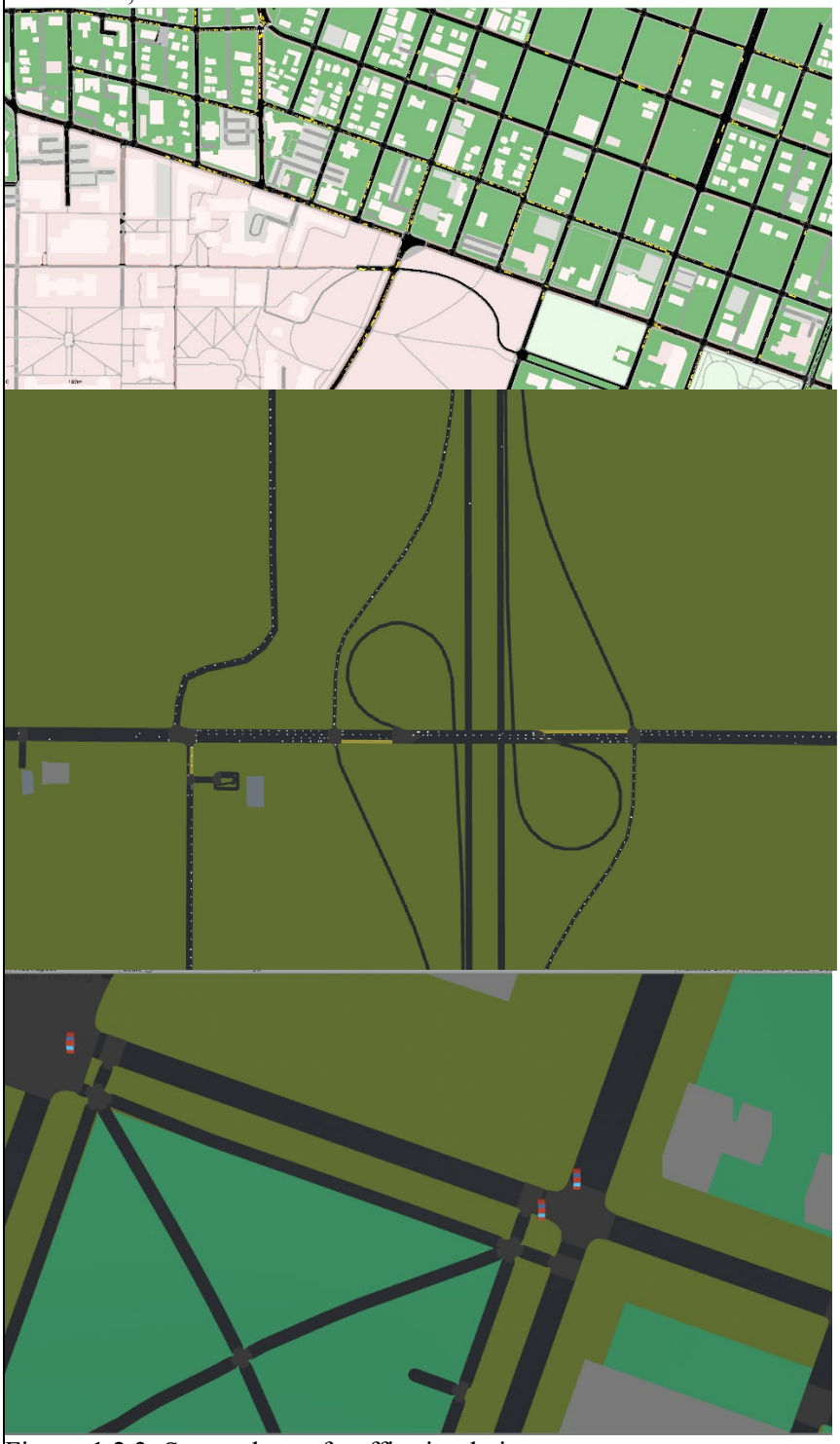
Describe Implementation of Research Outcomes (or why not implemented) Place Any Photos Here	The research outcomes were implemented as a software application for the AR sandbox that shows a traffic simulation in an urban environment wherein the user can define the traffic volumes for different types of vehicles. Furthermore, AR marker-based interaction was implemented to enable the user to interact with the traffic simulation in a tangible manner. The following images show screenshots of the simulation, the AR-based interaction, and the simulation run on the sandbox.  Figures1,2,3: Screenshots of traffic simulation

Figure 4: Marker-based AR for interacting with the simulation

Figure 5: Multiple users viewing and interacting with the simulation on the sandbox.

Impacts/Benefits of Implementation (actual, or anticipated)	This research resulted in a novel means of visualizing and interacting with traffic simulations. Specifically, the developed application allows for multiple users to huddle around a traffic simulation and interact simultaneously with the underlying system. The application develop focused on studying the impact of lane closures for work zones on traffic, and this is expected to benefit traffic planners and schedulers who may be able to utilize such a tool for mitigating delays caused by planned lane closures.
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