

Smart Mobile Operation: OSU Transportation Hub (SMOOTH) Project Description

We start with the premise that in a Smart City, *all individuals should have access to multiple choices of transportation*. In the U.S., the first mile (access to transportation choice) and the last mile (from transportation station to final destination) can be the weakest links in smart mobility. Most people in the US do not live or work close to a transportation stop (bus, train, metro); we consider this the first mile problem. How do you reach (for example) the bus stop to initiate mobility in a smart city? Transportation stops are usually not close to the last point of interest, like a shopping area, grocery store, a pharmacy or work; we consider this the last mile problem. How do you reach your final destination after you get off the bus? While walking may be a solution for some, it is not a viable option for everybody (elderly, handicapped, etc...). Note, for instance, that the elderly are expected to become 20% of the entire US population within the next 25 years. The proposed solution to these issues is the use of a network of “on demand automated vehicles.” These vehicles could be shuttles, smaller automated platforms or small automated cars. Smartphone applications will be developed to enable passengers to schedule and track on-demand vehicles using their smartphones.

The proposed approach will be demonstrated using the OSU Transportation Hub, which will handle two use case scenarios: a closed circuit of automated shuttle driving within the main campus, and transportation between two selected stops within the outer campus. The first use case scenario is automated on-demand shuttle based mobility in shopping areas. The second use case scenario is automated shuttles for the first or the last mile of transport. The automated shuttles will have Vehicle-to-Vehicle (V2V) communication modems. It will be possible to demand several shuttles as connected vehicles depending on passenger load. The shuttles and other automated vehicles will be equipped with vulnerable road user detection technology, enabling them to function in pedestrian zones of campus.

The key benefit of this demonstration will be its forming a stepping stone towards solving an important mobility problem in the City of Columbus. Passengers will have a more complete mobility choice from their initial to final destinations and will be less affected by the cold weather conditions during winter. The demonstration will have a beneficial effect on the economy of the city of Columbus and the U.S., as it will help create new projects and more jobs on high technology software and hardware development. The project will also have a positive impact on improving the quality of life of the citizens of Columbus through more complete and comfortable mobility choices. The project will lead to less usage of cars in future pilot areas and will result in a reduction of driver related accidents, traffic jams and high emissions.

Although the first phase of the project will be on the OSU Campus, the City of Columbus will also benefit as the proposed GCTC project moves to pilot studies in Columbus in later phases.

The Mid-Ohio Regional Planning Commission (MORPC) will develop the Columbus area metropolitan transportation plan. MORPC will consider integration of the SMOOTH project into the transportation plans of Columbus and MidOhio. The Ohio State University is a very large campus with multiple local bus lines, bus stops, roads and pedestrian walkways. The Control and Intelligent Transportation Research (CITR) Group at Ohio State/CAR has many years of demonstrated expertise in Intelligent Transportation Systems, including automated driving and connected vehicles. Ohio State/CAR will implement the technical part of the project and will collaborate with the Ohio State Campus Transportation and Traffic Management (TTM). There will be a Hub at the CAR-West Annex, which is where CITR is located, where data will be collected, scheduling and allocation will be done, and all vehicles of SMOOTH will be tracked.

The contacts for the project are Prof. Umit Ozguner (ozguner.1@osu.edu) and Prof. Bilin Aksun Guvenc (aksunguvenc.1@osu.edu), who will coordinate the technical developments at Ohio State, and Paul Carlson (PCCarlson@Columbus.gov), who will provide the interface with municipal organizations. Partners of the project at the present time are the Center for Automotive Research (CAR), Ohio State University; the City of Columbus, the Mid Ohio Regional Planning Commission (MORPC); and Team ARIBO. Other partners are expected to join the SMOOTH Project, including CAR2GO.

Preliminary Timeline

December 2014 - SMOOTH Kickoff

December 2014 - March 2015 – Contact funding/support sources

Jan 15, 2015 - Prepare SMOOTH GCTC EAGER Grant Application and Submit to NSF

Jan 2015 – Initiate work on one platform

March 2015 – Finalize platform(s)

May 2015: Pilot tests (Hub software)

June 2015 – MyColumbus functionality and Demonstration #1

June 2016 – Demonstration #2