Hassan Charara

Software Applications Developer IV

YEARS OF QUALIFYING EXPERIENCE: 32

Education

- M.S., Computer Science, Texas A&M University-Commerce, TX, 1985.
- B.A., Business Administration, Lebanese University-Beirut, Lebanon, 1982.

Professional Activities

- Institute of Transportation Engineers.

Background and Qualifications

Mr. Charara's specialty is in Software Engineering. He has more than 30 years of experience in the software design, development, field implementation, and evaluation of Connected Vehicle applications, Traffic Signal Monitoring and Analysis applications, ITS, system integration, and traffic sensor testing and evaluation.

Mr. Charara is currently working on the Traffic Optimization for Signalized Corridors (TOSCo) project. Mr. Charara's role includes the the generation and broadcast of SAE J2735 standard Signal Phase and Timings (SPaT) and MapData (MAP) messages from the infrastructure to connected vehicles in the FM-1960 deployment corridor in Houston, TX. He is also working on the configuration and deployment of 14 Dedicated Short-Range Communications (DSRC) Road-Side-Units (RSUs) at 14 intersections in the FM-1960 corridor. Mr. Charara is also working on a demonstration project for North Texas Tollway Authority (NTTA) to demonstrate wrong way driver detection and mitigation in a connected vehicle environment. A Smartmicro radar sensor is being used to detect wrong-way driving vehicles that feeds its per-vehicle detection information into a road-side unit (RSU) made by Nordsys. The Nordsys RSU generates a Basic Safety Message (BSM) for the wrong-way driving vehicle that is broadcast via the RSU to other vehicles and at the same time forwards the BSM to another road-side application that generates a Road-Side Alert (RSA) message which is broadcast to connected vehicles via the RSU. The RSA message is also forwarded to NTTA central system.

Since joining TTI, Mr. Charara has worked on several projects in the areas of connected vehicle technology, Traffic Signal Operations, ITS, and Traffic Sensor Technology. Projects he worked on include:

- Connected Vehicle Wrong-way Driving (WWD) Detection and Mitigation Demonstration, TxDOT
- Rail Crossing Violation Warning Application and Infrastructure Connection, USDOT
- Improving Safety and Efficiency of Signalized Intersections during Inclement Weather, TxDOT
- Traffic Safety Improvements at Low Water Crossings project for TxDOT
- New Approaches for Testing Connected Highway and Vehicle Systems, USDOT
- Traffic Signal Controller Logic Enhancements to Support V2I Safety, USDOT
- Signal Phase and Timing (SpaT) and Related Messages for IntelliDrive [Connected Vehicles] Applications, USDOT
- Prototype Development and Small-Scale Demonstration of SPD-HARM with Q-WARN using Connected Vehicle and Infrastructure Sensor Data, Federal Highway Administration, USDOT
- Integrated Vehicle-to-Infrastructure Prototype (IVP) Project, USDOT
- I-35 Corridor Reconstruction - Corridor Advance Traveler Information System (TxDOT)
- Fully Adaptive Detection-Control System (D-CS) for Isolated Intersections, TxDOT
- Evaluation of Innovative Methods to Reduce Stops to Trucks.
- Evaluation of the Existing Technologies for Vehicle Detection and Establishment of Communication Data Requirements.
- Real-time, Multi-modal Traffic Adaptive Diamond Interchange Control (Smart Diamond)
- Urban Highway Traffic Operations Project. (Ramp Metering)

Recent Work Experience

Dates	Position(s)	Organization
2015 - Present	Software Applications Developer IV	Texas A&M Transportation Institute
2004 - 2015	Research Scientist	Texas A&M Transportation Institute
1999 - 2004	Associate Research Scientist	Texas A&M Transportation Institute
1993 - 1999	Assistant Research Scientist	Texas A&M Transportation Institute
1990-1993	Research Assistant	Texas A&M Transportation Institute

Relevant Project Level Experience

Key Researcher, Signal Phase and Timing (SPaT) and Related Messages for V2I, FHWA-USDOT. This project, a cooperative effort between Battelle and TTI, defined and demonstrated the interfaces and messages to provide traffic signal phase and timing (SPaT) information, and other related data, to mobile devices in a connected vehicle environment. The project consisted of two major phases: the systems design and development, and then a prototype demonstration. Work performed included the development of ConOps; system requirements, and ultimately the development of the system interfaces. Mr. Charara developed a prototype system to demonstrate the resulting interfaces designed in the project at the Tuner-Fairbank Highway Research Center (TFHRC) using signal controllers from two different vendors and representing the two major controller architectures in use today: the NEMA TS-2 and the 2070 architectures.

Key Researcher- I-35 Corridor Traveler Information (Texas Department of Transportation). TTI designed, deployed and implemented an advanced Construction Traveler Information System for the $2 billion reconstruction of Interstate 35 in Central Texas. Mr. Charara developed a system to determine travel time in real-time from Bluetooth sensors deployed in the corridor and interface with TxDOT's Lonestar ATMS system to display travel time messages on Portable Changeable Message Signs (PCMS) via C2C standard in the corridor.

Key Researcher, Prototype Development and Small-Scale Demonstration of SPD-HARM with Q-WARN, FHWA-USDOT. The purpose of the Intelligent Network Flow Optimization (INFLO) project was to develop and test in a small-scale demonstration for USDOT, the algorithms included in the INFLO bundle of Dynamic Mobility Applications (DMAs). These algorithms included the Queue Warning (Q-WARN) and Dynamic Speed Harmonization (SPD-HARM) applications to detect queues and congestion on freeways using both infrastructure and Connected Vehicle data. The INFLO project required fusing of data from traditional detectors, used by DOTs to monitor freeway operations, with Basic Safety Message (BSM) data from connected vehicles. The purpose of using connected vehicle data was to detect congestion faster, refine the location of queues on a congested freeway, and generate queue alerts and speed harmonization recommendations broadcast to drivers in connected vehicles via DSRC or the cellular network.

Key Researcher, New Approaches for Testing Connected Highway and Vehicle Systems, FHWA-USDOT. In this project, the TTI team developed a platform for FHWA to test, validate and verify connected vehicle concepts, applications, and technologies in a controlled environment that replicates actual field deployments. Mr. Charara developed the interfaces to integrate and share data between the various modules in the environment. The platform was deployed and tested at TFHRC for USDOT.

Key Researcher, Integrated Vehicle-to-Infrastructure Prototype (IVP) project, FHWA-USDOT. In this project, a cooperative effort between Battelle and TTI, the objective for developing the IVP platform was to facilitate the generation and broadcast of SAE J2735 standard messages including SPaT, MAP, SRM, SSM, TIM, and RTCM. The IVP prototype was also to enable the reception of V2I messages like BSM and sharing the messages with infrastructure applications. Mr. Charara's role was to help develop and test the SPaT, MAP, SRM, and SSM messages together with the Battelle team members.

Key Researcher, Connected Vehicle Wrong-Way Driving (WWD) Detection and Mitigation Demonstration, TxDOT. This project was a cooperative effort between TTI and Southwest Research Institute (SwRI). The objective of this project was to demonstrate the ability to detect wrong-way driving vehicles using a traditional WWD system from TAPCO and using connected vehicle technology. Mr. Charara's role was to help in system installation, configuration, integration, and testing.