

Research at a Glance

Technical Brief



Real-Time Signal Performance Measurement Phase II: Data and Functionality Enhancement, Large Scale Deployment, Connected and Autonomous Vehicles Integration

Traffic signal performance measurement and visualization provide insights as operational tools to help traffic management centers get more benefits from infrastructure investment. ATSPM system uses high-resolution (0.1 sec) data to support the data-driven decision-making process and allows consistent and dynamic monitoring of signal-controlled intersection.

Principal Investigators

Peter J. Jin, Ph.D.

Associate Professor

(848) 445-8563

peter.j.jin@rutgers.edu

Thomas M. Brennan, Jr.

Ph.D., P.E.,

Professor,

(609) 771-2798

brennant@tcnj.edu

Mohammad Jalayer, Ph.D.

Assistant Professor,

Rowan University,

(856) 256-5397

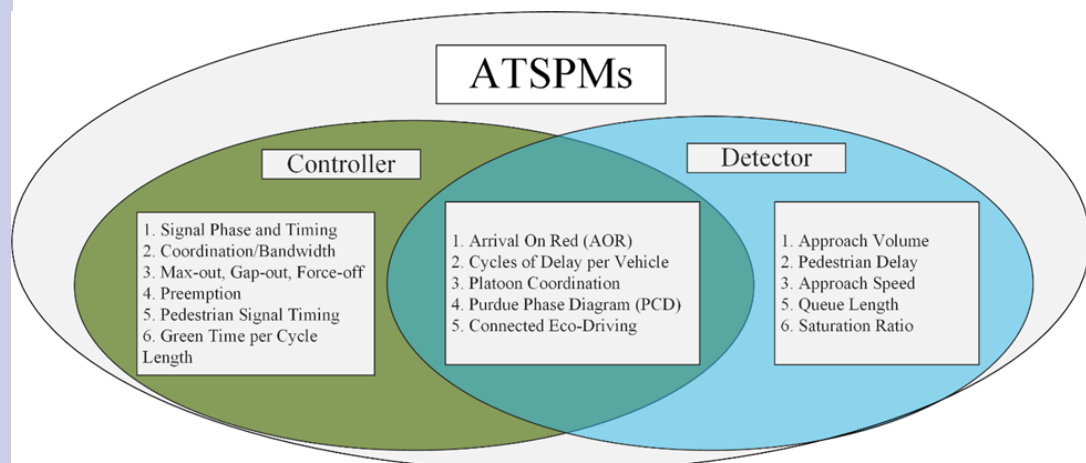
jalayer@rowan.edu

Research Problem Statement

This project developed the ATSPMs system considering existing implementation options according to agency capabilities and resources. The research team specifically designed the system based on Adaptive Signal Control Technology (ASCT) and ATSPM open-source software to develop an economically justifiable ATSPMs for arterial traffic management in New Jersey. During phase two, the team utilizes multiple sources to show additional performance metrics.

Research Objectives

The primary objective of the second phase of this project is to develop and deploy a significantly enhanced version of the original toolbox, NJDOT ATSPM 2.0, along with a pilot study on the integration of adaptive signal controllers with CAV technologies. NJDOT arterial management operators can then use the ATSPM platform to generate key performance metrics and conduct system analysis for NJDOT's ATSC corridors.



Research Project Manager

Priscilla U. Ukpah

NJDOT Research Bureau

609-963-2238

Priscilla.Ukpah@dot.nj.gov

Kelly McVeigh,

NJDOT Mobility Engineering,

856-414-8482

kelly.mcveigh@dot.nj.gov

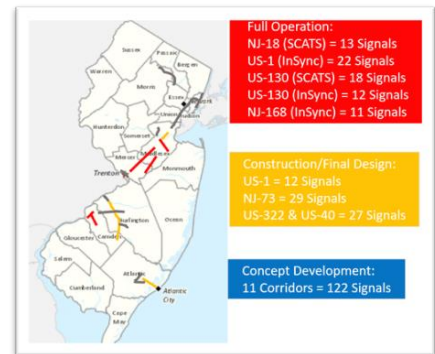
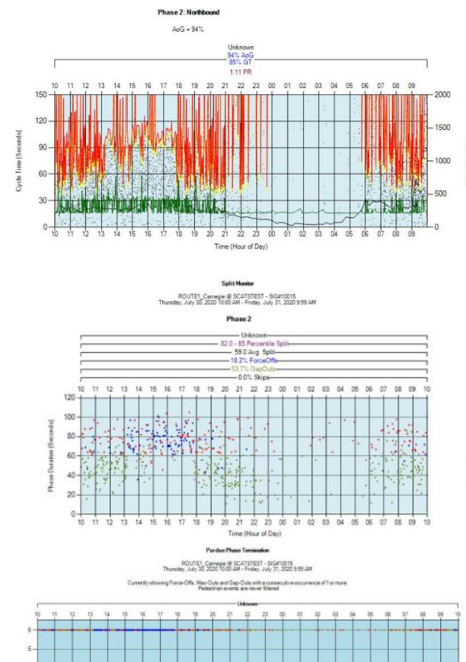
Methodology

In second phase, the research team explores how to utilize multi-source data and equipment to establish additional Signal Performance Measures (SPMs). The team will also conduct pilot testing on the integration of Connected and Automated Vehicle (CAV), Roadside Units (RSU), On Board Unit (OBU) with the existing and planned NJDOT adaptive signal control systems.

- NJDOT ATSPM 2.0 provides extended arterial performance metrics for large-scale arterial signal system management. The testing scale will extend to all existing ASCT signal controlled corridors such as NJ-18, US1, US-130, NJ168.
- NJDOT ATSPMs 2.0 provides NJDOT with more performance metrics for arterial traffic signals with the improved integration with SCATS's APIs and sensors data.
- In collaboration with NJCTII (New Jersey Connected Technology Integration and Implementation) initiative, the team also conducted lab testing and field testing of the integration of CV (Connected Vehicle) RSU and OBU with NJDOT signal controllers.

Results

NJDOT ATSPM 2.0 will allow the NJDOT to be able to conduct comprehensive assessment and monitoring of their arterial corridors and further accelerate the process of identifying, assessing, and addressing signal control and maintenance problems. Current available performance metrics include PCDs (Purdue Phase Diagram), Phase Termination, Pedestrian Delay, etc. The developed toolbox has been tested on two important New Jersey Corridors.



This brief draft summarizes FHWA-NJ-2016-14, "Real-Time Signal Performance Measurement Phase II", produced through the New Jersey Department of Transportation Bureau of Research, 1035 Parkway Avenue, P.O. Box 600, Ewing, NJ 08625 in cooperation with the U.S. Department of Transportation Federal Highway Administration.