Smart Infrastructure for Urban Mobility

Stephen F. Smith, Research Professor, Carnegie Mellon University
Director, Intelligent Coordination and Logistics Laboratory

Science AAAS

Home News Journals Topics Careers

Latest News ScienceInsider ScienceShots Sifter From the Magazine About News Quizzes

SHARE 2K 1 230

Five surprising ways AI could be a part of our lives by 2030

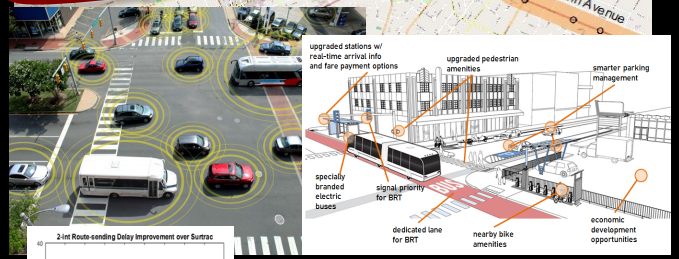
By Ben Panko | Sep. 12, 2016, 5:45 PM

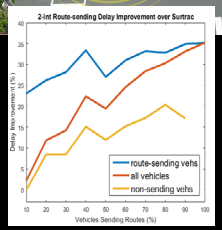
Smart traffic lights

Smart traffic lights using artificial intelligence technology to learn and adapt to traffic patterns in real time could make intersections safer and more efficient. AsianDream/iStockphoto

Many people know the frustration of waiting at red lights while no traffic is moving through the intersection. Modern traffic lights typically run on a fixed schedule, with police officers occasionally intervening during special events and emergencies. So-called smart traffic lights are already able to use cameras and road sensors to adjust their timing minute by minute to handle traffic and pedestrians faster and more safely. By collecting data and making decisions independent of human guidance, such lights harness AI to adapt to the randomness of traffic. Easing traffic congestion in this way would not simply reduce commuting stress, but it would also cut down on air pollution from idling cars. Carnegie Mellon University is **already testing smart traffic lights in Pittsburgh, Pennsylvania**, which are also being tested in Los Angeles, California, and Bellevue, Washington. By 2030, they will likely be on your corner.

Intelligent Traffic Signals

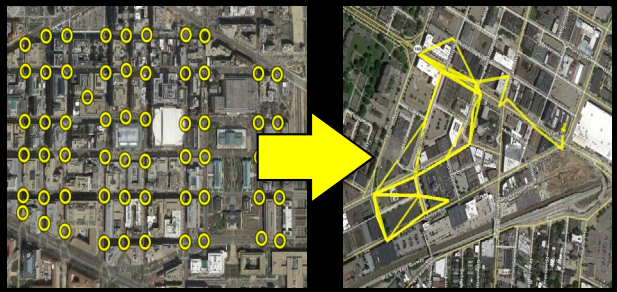




- Smart Signal Priority
- Vehicle Route Sharing

Enhanced Mobility through V2I Communication

Safe Intersection Crossing for Pedestrians with Disabilities



Real-Time Incident Detection

ACCESSIBLE TRANSPORTATION TECHNOLOGIES RESEARCH INITIATIVE

Smart Intersection Crossing

Objective: A mobile app that allows pedestrians to

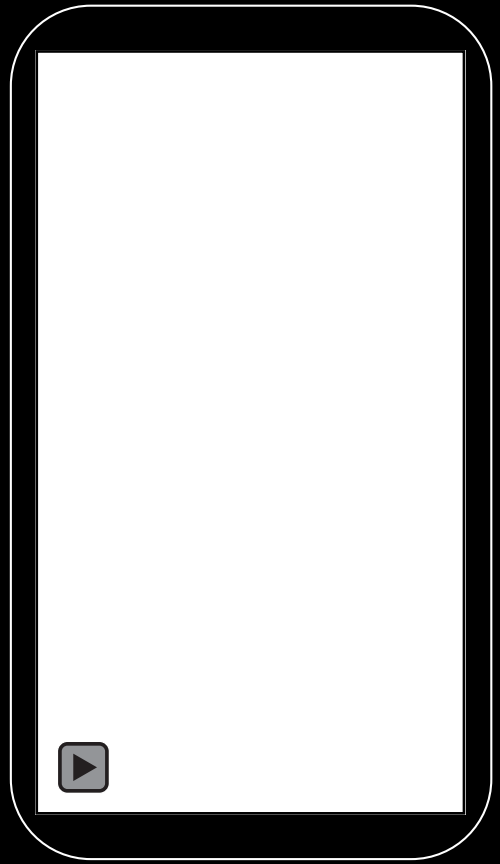
- *interact directly* with the intersection and
- *actively influence* traffic signals for safe and efficient crossing

Carnegie Mellon

The *PedPal* Mobile App

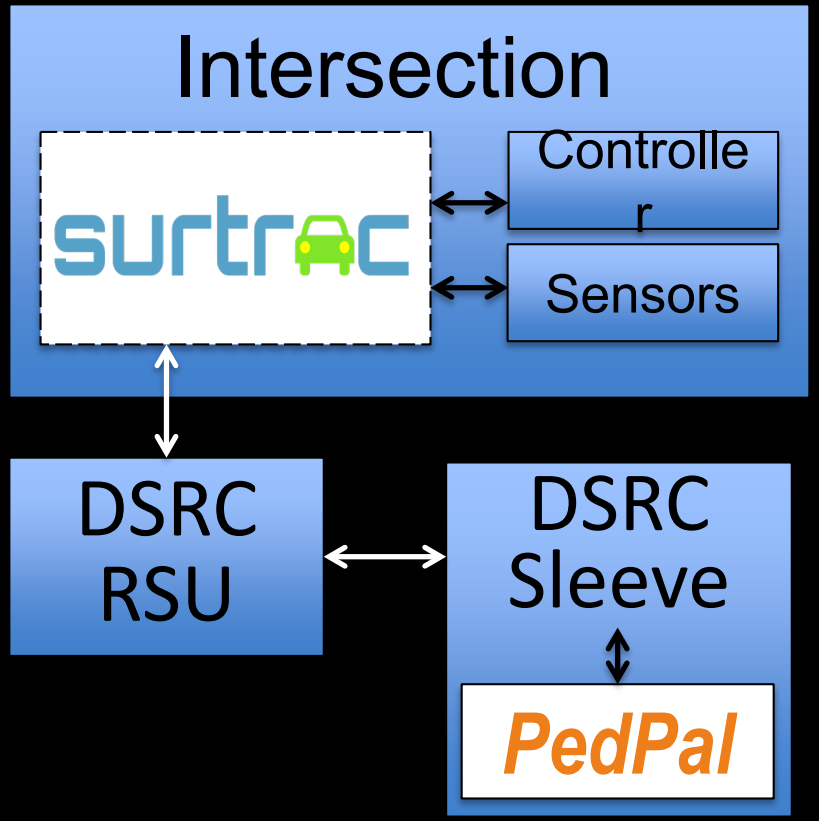
Basic Capabilities:

- Uses personalized crossing constraints to set crossing duration
- Monitors progress and extends green as needed
- Uses route information to anticipate arrival and streamline crossing
- Adjusts green to help make bus connections



Technical Approach

- Use DSRC technology to integrate pedestrian with a smart traffic signal system ( ) surtrac
  - Initial prototype couples a DSRC "sleeve" w/ iPhone
- Current prototype also provides a cellular option



Bigger Picture

- Real-time connectivity between vehicles, pedestrians, and infrastructure offers unprecedented opportunities for safer and more efficient travel
- Guaranteed latency is fundamental to safety applications, and this guarantee requires preservation of the 5.9GHz band for this purpose
  - Regardless of which “connected vehicle” technology wins out
- Uncertainty on this point is only serving to stifle innovation.