Florida Department of Transportation Research

Development of Automated Testing Tools for Traffic Control Signals and Devices (NTCIP and Security), Phase 2
BDV30-977-05

The metal cabinets that house traffic signal controllers are a common sight at most intersections in Florida. Traffic engineers use them to time signal changes and facilitate the flow of traffic through an intersection. At the core of this device is the actuated signal controller (ASC), commonly known as a traffic signal controller, which takes in a variety of information and adjusts the timing of traffic signals. Prior to use, traffic controllers must be tested to verify that they are working as designed and as programmed. However, many different companies manufacture traffic controllers, and testing them requires an individualized protocol for each manufacturer, which makes testing them complex and time-consuming. Fortunately, standards for traffic controllers have recently been developed as part of the National Transportation Communications for Intelligent Transportation System Protocol (NTCIP) which allowed the development of a test tool that could automatically test any traffic controller, regardless of their proprietary protocol, as long as the controller conforms to the NTCIP.

The NTCIP was initiated in the early 1990s, and it has grown in parallel with the development and implementation of intelligent traffic systems (ITS) devices. As these devices have become more common and more connected to central control and data collection, more standards have been needed, and the NTCIP has responded accordingly.

In this project, Florida State University researchers worked with Florida Department of Transportation (FDOT) personnel to develop an automated testing tool that would be able to test any traffic controller that conforms to NTCIP. In previous projects (BDK83-977-08 and BDK83-977-20), the researchers laid the groundwork for development of this testing system.

The system developed by the researchers runs on a standard laptop computer and comprises 20 NTCIP-based automated testing scripts covering all functions of a standard traffic signal controller. A console program that allows the user to execute the testing scripts was developed as well as a user's manual. The system was tested with traffic controllers from five manufacturers. Training sessions for FDOT personnel were also conducted.

Above: The unobtrusive traffic control box at the left of this image integrates timing schedules, crossing request buttons, and in-road sensors to improve the efficiency and safety of intersections.

A traffic controller is basically a microcomputer that is typically connected to a computer network, and like any computer, it is vulnerable to computer viruses or hacking. These security issues are a significant concern. As part of a broader effort to identify possible security issues within the traffic control system and provide solutions, the researchers also conducted an extensive literature search and developed a set of guidelines detailing best practices for the security of traffic control systems. These guidelines are included in the user's manual.

This project takes advantage of advances made in the area of transportation device standardization and will increase the efficiency of traffic controller testing along with the overall security of the traffic control system.

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For more information, visit http://www.dot.state.fl.us/research-center