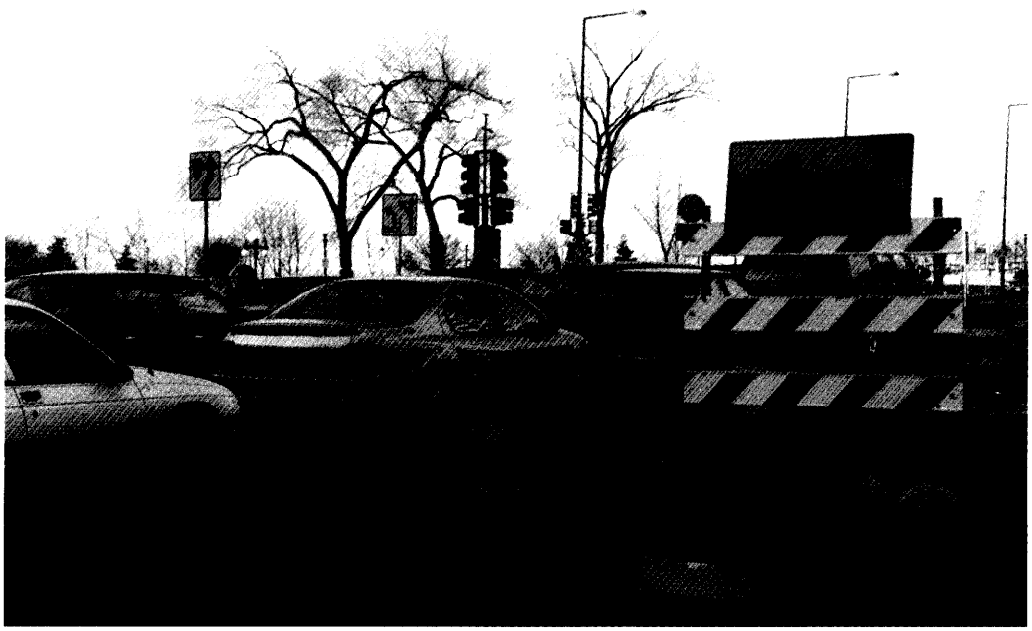
United States Department of Transportation
Federal Highway Administration
Federal Transit Administration

# Technology in Rural Transportation "Simple Solution" #4

E N T E R@P R I S E

## Low Cost Vehicle Detection



### Introduction

This application was identified as a promising rural Intelligent Transportation Systems (ITS) solution under a project sponsored by the Federal Highway Administration (FHWA) and the ENTERPRISE program. This summary describes the solution as well as opportunities for expansion into the broader context of rural ITS.

### Technology Overview

Vehicle detection to determine traffic volumes or lane occupancy is essential for timing traffic signals, planning roadway expansions and predicting traffic impacts, even on low volume roads or rural areas. Traditional loop detectors require permanent installation and are expensive. This simple solution uses less expensive audio technology to detect the presence of vehicles.

***Real-World Example* - Smartsonic Sensor for Traffic Applications**

**Overall goal:** To develop a low-cost alternative to loop detectors for monitoring traffic flow and lane occupancy.

**Technical approach:** The Smartsonic Sensor measures the acoustic energy radiated by passing vehicles to determine the lane occupancy and vehicle count. The acoustic detector can also determine vehicle speeds, types and, when used as part of a network, link travel times.

**Current status:** Development of the sensor has been completed, and it is now commercially available.

**Location / geographic scope:** The system is currently in use in Arizona, Texas, Virginia and Massachusetts and can be used where there is a pole, bridge or overpass on which to mount it.

**Agencies involved:** AT&T developed the sensor in conjunction with the Virginia Tech Center for Transportation Research, sponsored by the FHWA. The system has since been sold to International Road Dynamics Inc. (IRD) for commercial production.

**Cost information:** One lane equipment cost: $1500. One lane installation cost: $500. Four lane equipment cost: $6000. Four lane installation cost: $1000.

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**Have goals been achieved?** Yes.

**Solution timeline:** The sensor is commercially available from International Road Dynamics Inc.

**Further Description of Application**

***Additional technologies may include:***

Other vehicle detector technologies include loops, closed-circuit television, infra-red, and the magnometer. All can be utilized to determine vehicle presence, but the appropriate technology depends on the desired application.

***Potential additional uses for this technology may include:***

Other uses for this type of system could include the detection of incidents. The detectors would need to be connected to some central processing facility, such as a traffic management center. Algorithms could potentially be created to detect when the vehicle speeds or link travel times reported by a network of sensors appear to be unusual for a particular location and time of day. Some verification system is likely to be required.

Some research has been undertaken into using acoustic readings from vehicles passing a sensor to identify varying road and weather conditions, although this research is in the preliminary stages and has met with variable success to date.

**Benefits of Application**

| | Benefits to travelers / the community | Benefits to business / industry | Benefits to the public sector |
|---|---|---|---|
| Direct benefits | Less delay for travelers during implementation as opposed to loop detector installation | Less delay for business travelers and commercial vehicle drivers during implementation as opposed to loop detector installation | Wireless technologies often require less and easier maintenance.<br><br>Traffic lanes would not need to be shut down to provide any maintenance.<br><br>Not infrastructure intensive. |
| Indirect benefits | | | Safer to implement for installation crews.<br><br>Reliable traffic counts allow for more precise traffic signal adjustment. |

***Step One:*** Identify key sites for implementation. The selection criteria can include high volume locations or areas along a corridor that require additional traffic analyses.

***Step Two:*** Conduct comparisons to select the best vendor and product for the application.

***Step Three:*** Determine adequate mounting structures for the equipment. Some products mounted on standard light poles actually make the structure sway with high winds, as the product functions as a "kite", making the pole unfit to handle the extra weight.

***Step Four:*** Evaluate the deployed system to determine whether system goals are being met.

**Potential Implementation Issues**

As this system relies on acoustic information to detect traffic, there may be locations, such as busy intersections or in the vicinity of airports, where the system is unsuitable due to interference from other sources of noise.

As the sensors require mounting on a pole, bridge, or overpass there may be additional locations where this application is unsuitable.

**Solution's Contribution to Broader Rural ITS Developments**

Monitoring traffic speeds, volumes, etc., is a critical part of any transportation management system. As traffic may need to be monitored at many sites at different times by a single agency, this low-cost, easy to install and remove monitoring system has great potential. This alternative method for vehicle detection provide options for

data collection and may be useful in assisting the following developments:

*Traffic Control* - This solution can serve to collect the information needed to control the traffic system.

*Incident Management* - This solution can provide a means for detecting incidents or other unplanned events that affect the flow of traffic.

*Roadway Management* - This solution can be utilized at locations undergoing construction or maintenance, or any site where traffic needs to be monitored.

**The Technology in Rural Transportation: "Simple Solutions" Project**

This project was performed within the ENTERPRISE pooled-fund study program, and aimed to identify and describe proven, cost-effective, "low-tech" solutions for rural transportation-related problems or needs. "Simple solutions" studied within the project focussed on practical applications of technologies, which could serve as precursors to future applications of more advanced systems, or intelligent transportation systems (ITS).

More than fifty solutions were initially identified and documented. Of these, fourteen solutions were documented and analyzed in detail. The transportation technology applications were also categorized according to the seven Critical Program Areas (CPAs) defined within the U.S. Department of Transportation's Advanced Rural Transportation Systems Program. It is hoped to utilize the information gathered within this study to perform outreach to local level transportation professionals to introduce them to ITS and its potential benefits.

**For More Information:** A full report on this study is available from the FHWA R&T Report Center, telephone no. 301-577-0818. **Title:** Technology in Rural Transportation: "Simple Solutions." **Publication No.:** FHWA- RD-97-108. This research was conducted by Castle Rock Consultants, Eagan, Minnesota. For more information, contact Paul Pisano of FHWA, HSR-30, 703-285-2498. For more information about ENTERPRISE, contact Bill Legg, Washington State DOT, 206-543-3332.

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