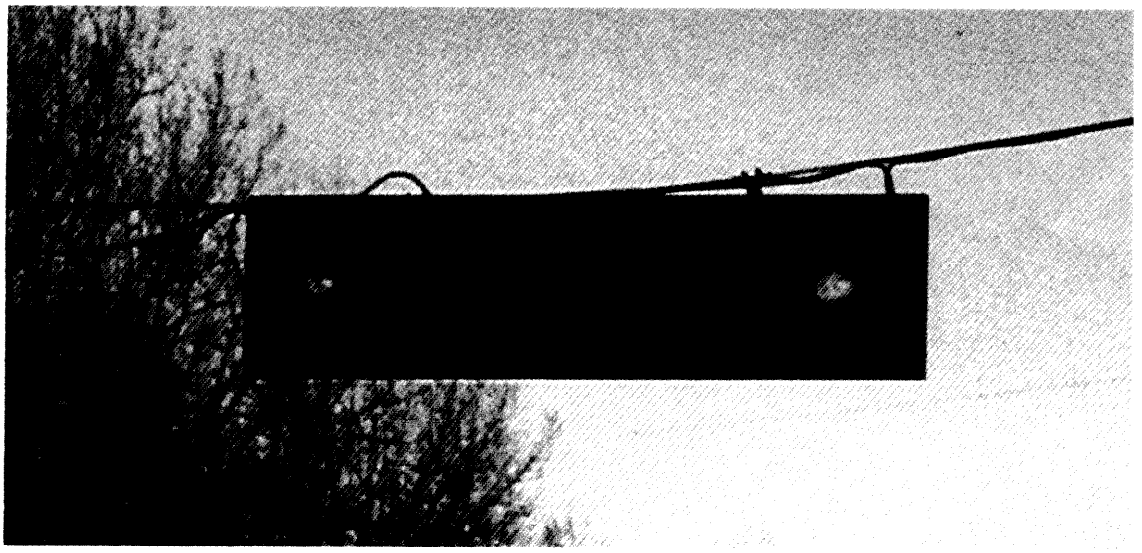
United States Department of Transportation
Federal Highway Administration
Federal Transit Administration

Technology in Rural Transportation "Simple Solution" #10

ENTER@PRISE

Wireless Pagers to Activate Warning Beacons



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

A variety of advisory road signs are accompanied by beacon lights that flash when messages are critical to travelers. The activation of the beacons to flash is either triggered according to the time of day or by manual adjustment. This simple solution enables beacons to be activated remotely using common pager services and low cost receivers on the road signs. This non-infrastructure intensive method could therefore be beneficial in rural regions.

Real-World Example - **Pager Activation of School Crossing Beacons (Oregon)**

Overall goal: To reduce the costs of installing and operating flashing beacons at schools and to provide greater flexibility and cost-effectiveness in programming the beacons for special events.

Technical approach: Flashing beacons have been installed to warn drivers that they are in a school zone where children are likely to be crossing. The original system used special timers to activate the beacons just before and after school. Any changes in school hours or special events required a special trip to the location to reprogram the clock.

To streamline this process, a pager-controlled system was designed and built. Each sign installation has a pager, and a 386-PC and paging software are used to control the pager units. Messages are sent from the PC to the pagers. These messages contain the unique ID code of the pager and a code to switch the outputs on or off. The use of unique pager codes allows the city to use one pager telephone number for a subset of the school installations covered by the system. The central PC schedule is easily modified and allows greater flexibility for handling special school events.

Current status: The system is fully operational at 14 elementary schools.

Location / geographic scope: The City of Portland, Oregon.

Agencies involved: The City of Portland Office of Transportation.

Cost information: The previous system, with individual timers and the necessary overhead cabling, cost about $2,500 per sign to install. The pager-activated system is much more cost-effective, costing around $100 per site for the pager units themselves. As the pagers do not require separate housing, this also reduces costs. The paging service costs $5 per month per number. At present five to six schools utilize one paging number. System software was created in-house.

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Have goals been achieved? Yes. The system has reduced costs and streamlined the beacon activation process.

Solution timeline: By the summer of 1997, 10 additional schools will be covered by the system. This will represent about half of the elementary schools in the city. As this is a city-initiated solution, there are no plans at present to expand the system to additional cities.

Further Description of Application

Additional technologies may include:

Alternate means of providing such a system include wireless data broadcast on AM, FM or HAR subcarriers. The costs to support this service using radio subcarrier technologies would be prohibitive as a stand-alone service. However, in cities or areas currently disseminating data over wireless radio, the additional cost to encode and deliver this service would be minimal.

Potential additional uses for this technology may include:

Remote beacons could be activated to indicate a series of unpredictable but repeating events. For example, a flashing beacon to indicate ice on a bridge could be remotely activated. Ideally, such a system would be activated by sensors on the bridge. However, as the decision to activate the beacon may be made remotely, at least under the simplest scenario, wireless technology may be needed to communicate with the beacon. The following list includes candidate applications for remotely activated beacons:

- Danger of objects in roadway / falling rocks.
- Flooding possible.
- Trucks entering roadway.
- Children at play.

Benefits of Application

	Benefits to travelers	Benefits to the community	Benefits to business / industry	Benefits to the public sector
Direct benefits	School crossing beacons are less likely to flash when not necessary enabling smoother traffic flow through these areas.	School crossing beacons are more likely to be flashing during unusual times when children are present, creating a safer environment for children.		No manual intervention is needed at the crossing signs to alter the timings.
Indirect benefits	School zones become more efficient for travelers.	Parents may feel more secure allowing children to walk to / from school or after hours school events.	Similar technologies and approaches may be used to warn vehicles of trucks entering the roadway	Improved credibility of advisory systems

Probable Implementation Process

Step One: Rural areas and small cities must first determine if such a system is needed. For those sites that use or intend to use school crossing beacons, the school system should monitor a period to determine how often the beacon activation timing would be altered if available.

Step Two: Pager or other wireless data communication services vary in cost and availability on a local basis. Some exploration would be required to determine such availability.

Step Three: Pager receivers must either be designed and manufactured or purchased by arrangement with the City of Portland.

Step Four: Beacon units must be installed and evaluated to determine that they are functional.

Potential Implementation Issues

Issues associated with the implementation of this system include allowing for future system expansion. Given the potentially high number of schools within an area that could benefit from the system, agencies should ensure that the system is configured so that it can be augmented to cover additional schools in the future with minimum disruption to the school beacons already covered by the system. In addition, the possible expansion of the system to activate other types of signs via paging should also be taken into account when specifying the system.

As this application relies on paging coverage, only those areas with existing terrestrial coverage can take advantage of this system. However, paging services via satellite are also available and offer far greater coverage.

Solution's Contribution to Broader Rural ITS Developments

This simple solution is a prime example of a site-specific, stand-alone application of technology, given that it provides a mechanism for activating beacons to emphasize various road signs. The potential contribution of this solution in the rural ITS development is described below:

Integrated Traffic Control - By drawing increased attention to various advisory or instructional traffic signs, this system aids in traffic control.

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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