Rural Intelligent Transportation Systems (ITS) Toolkit

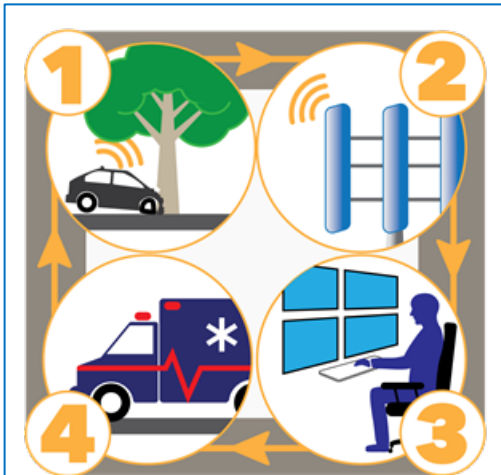## Automatic Crash Notification System

ES 4

Photo: Courtesy of Neil Hetherington, WTI

Description: An automatic crash notification system (previously called a mayday system) notifies a response center of a vehicle breakdown or crash. Typically, these systems consist of a Global Positioning System (GPS) receiver and a cellular phone for voice/data communication that are installed in a vehicle. An automatic crash notification system may be activated by a driver or automatically activated in case of a crash. These systems transmit the vehicle's location and allow for communication between a driver and a service center. The service center may contact emergency services or tow truck services depending on the driver's needs. These systems can transmit other crash information, including vehicle speed, direction of impact, and air bag deployment.

Smartphone applications (see #ES2) are being developed to provide low cost automatic crash notification systems to drivers. These applications use a smartphone accelerometer and GPS to monitor the smartphone owner's driving and automatically detect a collision. If a collision occurs, these applications notify emergency contacts provided by the driver.

Rural Transportation Critical Needs	Issues Addressed	Strategies Achieved
☐ Crash Countermeasures	☑ Emergency service notification time	☑ Road User
☑ Emergency Services	☑ Emergency service response time	☐ Road
☐ Operations & Maintenance	☑ Communications between multi-jurisdictional/multi-agency emergency service personnel	☑ Vehicle
☐ Rural Transit & Mobility		☐ Safety Culture
☐ Surface Transportation & Weather		☑ Engineering
☐ Tourism & Travel Information		☑ Emergency Response
☐ Traffic Management		☐ Enforcement
		☑ Education

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Applicability	Partnerships	Key Components
•Automatic crash notification systems are a low cost way to improve driver safety. Automatic crash notification systems are particularly important in rural areas where response times are longer and there are typically fewer travelers who may contact emergency services after seeing an incident. It also helps to address situations where a vehicle may not be seen after a crash.	•Applications benefit from collaboration among numerous agencies, which may include: •Departments of Transportation (Local, State, Federal) •Vehicle Manufacturers •Law Enforcement •Emergency Services •Local Hospitals	•Microcontroller •GPS receiver •Cellular transceiver •Data modem •Service subscription

Examples of Implementation

- **SOSMART Smartphone Application**

SOSMART uses a smartphone accelerometer and GPS to monitor driving and detect a collision. If a collision is detected, this application will automatically notify a driver's pre-selected emergency contacts.

- **Minnesota Department of Transportation, Mayday Plus**

The Mayday Plus project developed a system that could automatically initiate a call with emergency services in case of a crash. The system transmitted vehicle location to a dispatcher and allowed the driver to speak with emergency services dispatchers. This system was tested in 11 counties throughout Minnesota.

- **Idaho Transportation Department, Condition Acquisition Reporting System (CARS)-Mayday**

CARS-Mayday allows vehicles equipped with On-Star to directly contact the Idaho State Communications Center. If a vehicle crash is detected, basic information is transmitted to the Communications Center. The Communications Center can dispatch appropriate emergency services and provide the local hospital with important crash information before the patient arrives based on the probability of injury, which is determined by the vehicle speed and direction of force information from the On-Star system.

- **Erie County, New York**

A field test of automatic collision notification systems in Erie County, New York found that these systems reduced average incident notification times from three minutes to less than one minute.

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Implementation Considerations (Pro)	Implementation Considerations (Con)
• Systems reduce response times. • Provide quick identification of vehicle location. • Improve communications to emergency services.	• Gaps in cellular service will cause communications issues. • Public may fear invasion of privacy.

Opportunities for Future Expansion

- Currently these systems are installed in specific makes and models of vehicles. As more drivers become aware of the benefits, these systems will become more readily available to the public. In the future, more options for smartphone crash detection applications may provide low cost crash notifications for drivers.
- In the future, automatic crash notification systems could potentially communicate vehicle-to-vehicle (V2V) with nearby emergency vehicles if a crash is detected. These systems could also use V2V to communicate to nearby cars that there is a crash up ahead so that approaching drivers could slow down.

Additional Resources

- *Safer Car*, found here: http://www.safercar.gov/Vehicle-Shoppers/Safety-Technology/acn
- *The Potential Impact of Rural Mayday Systems on Vehicular Crash Facilities,* found here: http://www.sciencedirect.com/science/article/pii/S0001457598000839
- *Predicted Effect of Automatic Crash Notification on Traffic Mortality,* found here: http://www.sciencedirect.com/science/article/pii/S0001457501000483
- *Characteristics of Crashes that Increase the Risk of Serious Injuries*, found here: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3217552/
- *ITS and Transportation Safety: EMS System Data Integration to Improve Traffic Crash Emergency Response and Treatment,* found here: http://www.trb.org/Main/Blurbs/156874.aspx
- *Advanced Automatic Crash Notification: The Future of Motor Vehicle Crash Response*, found here: http://www.emsworld.com/article/12200889/advanced-automatic-crash-notification-the-future-of-motor-vehicle-crash-response
- *CARS-Mayday: Improving Crash Response Times in Rural Areas,* found here: http://nationalruralitsconference.org/downloads/11documents/Abstracts/F1abstracts_Davies.pdf

Useful Tip

For vehicle owners, hardware costs to add an automatic collision notification system to a vehicle are low, and subscription fees can be chosen based on individual needs to save on subscription costs.

Cost Range

(Cost/financial information, where noted, is based on 2016 dollars (unless otherwise specified). Cost/financial information is estimated, and will vary based on size and scope of project, number of units, etc. In general, capital costs include initial purchase costs of hardware, software, and other required equipment. Maintenance and operations costs include staff time to operate, monitor and maintain systems; data collection; system upgrades; evaluation; etc.)

Capital Costs: The total capital cost for this tool is low (less than $50,000). The cost of an automatic crash notification sensor and processor that will automatically send a text message to an emergency call center with vehicle location information is estimated at $1,609[1]. The cost of an aftermarket automatic crash notification system is estimated at $419[2]. The cost to download a crash notification smartphone application is free, but a user will need to have cellular service in order for these applications to work.

Operations Costs: The operations and maintenance costs for this tool are low (less than $50,000). The monthly subscription service fees for automatic crash notification systems are estimated at $35 per month.

National Center for Rural Road Safety

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