

'Smart' Cars Are Learning to Avoid Collisions

*Systems Under Development
Flag Trouble, Alert Drivers
And Even Take Control*

By Al Karr

Debra Bezzina was driving on Interstate 96 in Michigan last month when she reached for a pack of gum in her pocket.

Suddenly, an urgent voice said, "Not, Not, Not," alerting her that the car was drifting to the right, starting to cross the solid white line by the side of the road.

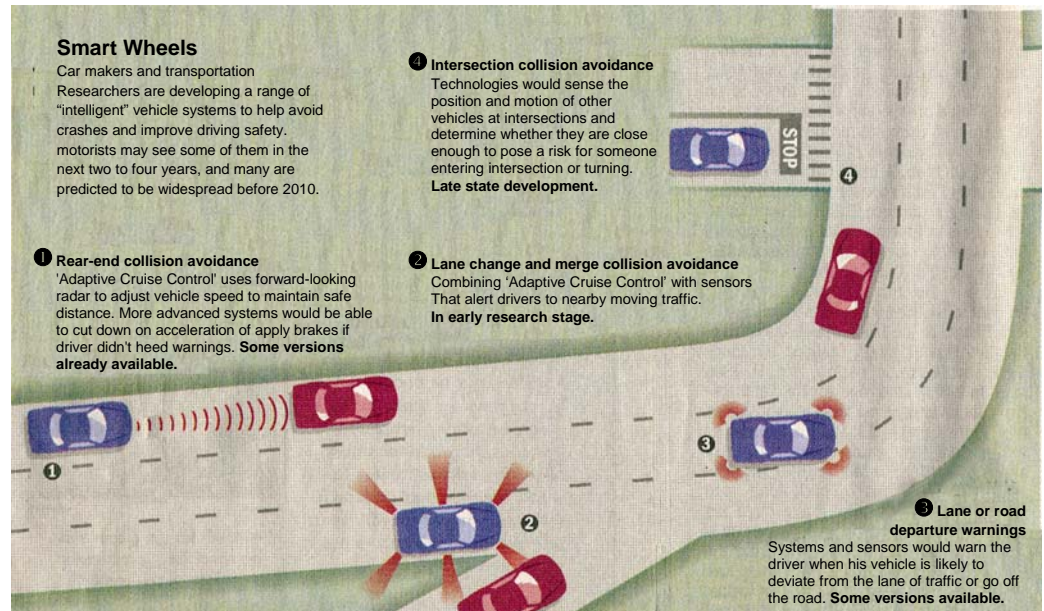
It wasn't a back-seat driver. Ms. Bezzina, a field-test program manager for auto-parts maker Visteon Corp., has been driving an experimental Nissan Altima equipped with a warning system that alerts drivers to road departure and lane shifting.

"Who knows? I might have drifted all the way out of the lane without realizing it," except for that warning signal, she says.

The test system (part of the USDOT sponsored RDCW program) signals other potentially dangerous situations as well. On another day, as Ms. Bezzina circled the Nissan off the Southfield Freeway onto I-96, at a speed judged by the system to be too high for the cloverleaf curve, an icon flashed on the dashboard, and the seat vibrated in front, behind her knees.

Visteon has partnered with AssistWare Technology to develop these experimental vehicles which utilize and are based on Assistware's SafeTRAC Lane Departure Warning System

These warnings are part of a growing number of savvy systems being developed by auto makers and researchers at universities and



Sources: U.S. DOT; Visteon; GM; Universities of Minnesota and California, Virginia Tech

The Wall Street Journal

transportation authorities. The federal Department of Transportation has supported such efforts under its Intelligent Vehicle Initiative, with the aim of helping - or even forcing -- motorists to make better on-the-road decisions and thereby avoid crashes.

Some crash-avoidance systems are already available on certain luxury cars. The Cadillac DeVille, for instance, has military-style night-vision aids. Certain models of Lexus, Mercedes-Benz, Infiniti and Jaguar have "adaptive cruise control" that controls acceleration and braking to maintain, say, a two-second gap between your vehicle and the one ahead of you.

But beyond that, a wide range of "smart" systems are being developed. Motorists may see some of them in the next two to four years, and many will be in widespread use before 2010, predicts the Intelligent Transportation Society of America, an association of industry and academics.

Products under development include systems that, in theory at least, would prompt motorists to slow down sooner or stop before

entering dangerous intersections, while others would provide warnings for inadvertent lane change or road departure. Still others would alert a driver that his or her vehicle is closing the gap with the car ahead too fast, and then, if the driver doesn't respond, move to reduce the accelerator pressure and apply the brakes in time to avoid a crash.

"In the next few years, you will see a lot more technologies coming into vehicles which are geared toward preventing crashes," says Joseph Kianthra, associate administrator for vehicle safety research for the National Highway Traffic Safety Administration.

The IVI program, which received \$28 million in funding for fiscal 2003, is directed at the most common types of crashes: rear-end, intersection, road-departure, lane-change and merger collisions that are responsible for the majority of highway fatalities. In 2002, there were more than six million car crashes in the U.S., resulting in 42,815 deaths, 2.9 million injuries, and \$230 billion in costs, according to NHTSA.

It is uncertain how effective these new systems will be because considerable development and field testing remains to be done. There is also the question of how motorists will react: Will they welcome the new assistance, be distracted by it, resent the "interference," or cede too much control? Researchers also want to know how drivers will respond to each specific warning device, and where to draw the line on the driver's authority versus the car's.

General Motors Corp. heads a group that has conducted a 10-month field test that involved 80 drivers and 10 Buick Le Sabres, combining two technologies for avoiding rear-end crashes: "adaptive cruise control" and forward-collision warnings and control. The system uses audio and heads-up displays on the windshield, to warn drivers who are bearing down on a slowed or stopped vehicle ahead, advising them to brake or swerve. If the driver doesn't respond, the system itself would cut down on acceleration and apply the brakes.

Massachusetts Institute of Technology's Age-Lab focuses on

THE WALL STREET JOURNAL

Originally printed TUESDAY, MARCH 2, 2004

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UMTRI / Shekinah Errington

Visteon and AssistWare Technology teamed with the University of Michigan Transportation Research Institute to develop a next-generation safety system dubbed Road Departure Crash Warning (RDCW). The system has been deployed on a fleet of vehicles (shown above) and is being road-tested by drivers as part of an ongoing U.S. Department of Transportation study.

technology to aid older drivers, but the systems under development also could improve safety for drivers of any age. One would display warnings on the windshield, showing the vehicle's speed, how much it is above what would be considered safe, and a suggestion to start braking. But, in a further step toward science fiction, dashboard monitors might also record the driver's heart rate, blood pressure or other stress

factors, which could affect safe driving.

Of course, there is a danger of overloading the driver with too much information, which could itself cause an accident, says Joseph Coughlin, the Age-Lab director. "We tend to be so optimistic about the technology and know so little about the human element," Mr. Coughlin says. So far, "we're getting lots and lots of data to the driver, but not a

drop of knowledge about what to do with it," he adds.

Researchers ask where to draw the line on the driver's authority versus the car's.

Many "intelligent transportation" experts believe that such problems can be overcome, contributing to a safer driving environment. Cautious drivers probably won't notice the systems, because they won't function if drivers are acting prudently, adds NHTSA's Dr. Kianianthra, though he says that more aggressive drivers might see the systems as a "nuisance."

The University of Minnesota's Intelligent Transportation Systems Institute is aiming to reduce crashes at rural intersections that don't have any traffic signals, those junctions where low-speed traffic on rural "collector" roads enters a highway carrying high-speed, high-volume traffic.

This spring, the Minnesota DOT plans to demonstrate a crash warning system at such an intersection along a four-lane divided expressway in the southern part of the state. The system will use radar detectors

along the highway to measure gaps in traffic and then flash roadside warning signs to drivers on the collector road, indicating whether it is safe to get onto the highway. If funds are available, some such systems could begin in 2005, says Max Donath, the ITS Institute's director.

The Virginia Tech Transportation Institute is working on two similar systems. One uses roadway technology to flash a stop signal when a vehicle's speed and distance show that it will soon run a red light or stop sign. The other would signal a device in the vehicle to produce a noise and flash a stop-sign icon on the dashboard to warn the driver of the imminent hazard.

When put into operation, all these systems are going to produce "a sea change in the way we drive," says Neil Shuster, president of the ITSA.

This article originally appeared in the March 2, 2004 issue of the Wall Street Journal. It has been edited to add additional information and for minor corrections.

About AssistWare:

AssistWare Technology, Inc., is a spin-off of Carnegie Mellon University's Robotics Institute. Founded in October, 1995, AssistWare introduced SafeTRAC in 1999 making it the first commercially available lane departure and drowsy driver warning system.

Today, AssistWare's customer base includes automotive OEMs and end-users, commercial trucks manufacturers, and private truck fleets worldwide.

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