Prius problems put spotlight on car electronics

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Toyota Prius are lined up for sale at a Toyota dealership in Springfield, Ill., Thursday, Feb. 4, 2010. (AP Photo/Seth Perlman)

(AP) -- Your most expensive piece of electronics probably is not your flat panel TV or your computer. More likely, it's your car, which can pack 50 microprocessors to control everything from the fuel mix to the rearview mirrors.

The recalls and other technical problems besetting Toyota in the last few weeks highlight the risks of relying on electronics instead of the mechanical rods and cables that controlled vehicles for most of the 20th century.

Such advancements bring many benefits, but the worry is that the car is a computer on wheels that could freeze up and potentially crash. No less a

computer celebrity than Apple Inc. co-founder Steve Wozniak has said his Toyota Prius sometimes accelerates on its own.

For many years, a car's gas and brake pedals were connected directly to the throttle and the brake assembly. Now computers and electronic sensors govern many of those functions, as well as a vehicle's exhaust system, its inside temperature and a host of other operations.

Those design changes were reviewed this week when the National Highway Traffic Safety Administration began looking into 124 reports from consumers that their Toyota Priuses momentarily lost braking ability while traveling over uneven roads, potholes or bumps. Four of the reports involve crashes.

The Prius problem is part of a broader issue for Toyota: Accelerators in its non-hybrid cars can get trapped under floor mats or become stuck on their own and fail to return to the idle position. Toyota has recalled eight top-selling models, involving 2.3 million cars in the U.S. alone.

The wider problems appear to be conventional mechanical issues, but Transportation Secretary Ray LaHood said his department would undertake a broad review of whether automobile engines could be disrupted by electromagnetic interference caused by power lines or other sources.

In the Prius, in addition to traditional hydraulic brakes, the car has an electronically operated braking system to recover some of the energy lost as the car slows. Some of that energy is sent to the battery that powers the Prius' electric motor. The hybrid design saves fuel and reduces emissions, but it increases the complexity of the car and the number of potential failures.

One explanation Toyota has offered for the Prius problems is that there's

a time lag when the Prius switches between its gas engine and the electric motor. The car would then be delayed in switching between the traditional hydraulic brakes and the electronic braking system.

However, even if there's a momentary lapse of the brakes, they will work if the driver keeps pushing the pedal, the company has said.

On Thursday, Toyota instead pointed toward the antilock braking system. Antilock brakes engage and disengage many times per second to prevent skidding. The company said that it changed settings on the assembly line to prevent "inconsistent brake feel during slow and steady application of brakes on rough or slick road surfaces." It has not recalled cars to make the same change.

The first computer-controlled antilock braking system for cars was introduced in 1971. Yet the technology's complexities can still trip up manufacturers: 39,000 trucks and tractors and 6,000 school buses were recalled in 2000 to fix problems with the software on brakes made by Bendix Corp.

Today's cars are far safer and more reliable than those manufactured without electronic controls, said Bruce Belzowski, assistant research scientist at the University of Michigan Transportation Research Institute. At the same time, he said, the added complexity demands much more testing in different conditions.

In 2005, Toyota announced a recall of 160,000 Priuses following reports that brake lights lit up for no reason and gasoline engines shut down of their own accord. The culprit was the software controlling critical car functions.

Software also appears to be to blame at Ford Motor Co., which said Thursday it plans to fix 17,600 Mercury Milan and Ford Fusion gas-

electric hybrids because of a glitch that can give drivers the impression the brakes have failed.

The automaker says the problem occurs in transition between two braking systems and at no time are drivers without brakes. Ford spokesman Said Deep says the company will ask owners to bring their vehicles in for a software fix that changes the pedal feel.

Jake Fisher, senior automotive engineer for Consumer Reports magazine, criticized another electronic feature of some Toyotas and Lexuses: the push-button ignition.

To turn the engine off in an emergency, such as when the accelerator is stuck, Toyota and Lexus drivers must hold the button for three seconds - much like a computer can be rebooted by pushing the power button for a while. Drivers of other makes such as Cadillac, Nissan and Infiniti can shut off the engines by pushing the start button more than once. A driver in an emergency may not think to hold the button, but likely would push it several times, Fisher said.

An easier way to turn off the engine may have prevented an accident with a runaway Lexus last summer that killed four people. The gas pedal got stuck under a floormat. (It's not known why the driver did not shift into neutral to slow the car.)

Dennis Virag, president of the Automotive Consulting Group, said Toyota has erred in not adopting a brake override system for all its cars - one that shuts off the fuel supply to the engine if the brakes are engaged and the accelerator is down.

Most other manufacturers have such systems, which can save lives even when the gas pedal is working as intended because there have been many cases of confused drivers stepping on both the brake and the gas at the

same time.

Of course, the override makes for yet another layer of electronics between the driver and the car - and another way that vehicles are getting more complex even as they get safer.