

## A way to hear the electric car coming down the road

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"Close your eyes," engineering graduate student Bryan Bai called out from his Prius at the far end of the Tresidder parking lot, before the car began moving forward. A Toyota Prius runs silently on electric power until its speed exceeds 25 mph, at which point the gas engine kicks in. Unseen and unheard, Bai could be driving the vehicular version of Jaws, only without the suspenseful background music. That's a hazard for pedestrians, especially blind people.

But then a low noise came from Bai's direction. It wasn't a car engine and was a bit closer to a muted jet engine, with some static and white noise thrown in. The noise grew louder and louder, indicating that whatever it was, it was getting closer. The noise stopped, and Bai grinned in the driver's seat of the Prius, now parked in front of his collaborator, MD/PhD student Everett Meyer. This is one Prius that can't sneak up on passersby.

Meyer and Bai met during last year's Summer Institute for Entrepreneurship program at the Graduate School of Business and began working on a speaker system to make hybrid vehicles audible, especially those that can run in fully electric mode like the Toyota Prius, Camry and Highlander. On their own time, juggling their coursework, they eventually set up a company called Enhanced Vehicle Acoustics and developed a prototype of the system.

"The inspiration is the coolness factor," Meyer said. "The idea that there's a problem out there and you can do something about it."

The problem is that hybrid vehicles running on electric motors are moving so quietly that pedestrians, especially blind people, can't hear them. Last month federal lawmakers introduced a bill called the Pedestrian Safety Enhancement Act of 2008. If the bill passes, the Department of Transportation will do a study to establish minimum sound levels for all hybrid vehicles, whether they're idling, speeding down the freeway or slowly making their way through parking lots and residential streets. Prius owners are debating the bill they call the "Bell the Hybrid Act" in online chat forums across the nation.

Meyer said they expect some resistance to their product. "We got a lot of voices saying, 'This is a bad idea. You're making a lot of noise.' We don't believe that. We believe this is something that has to happen."

"In business school they taught us that a good idea is one that never reaches consensus," Bai said.

Now they have a company called Enhanced Vehicle Acoustics and a plan to market their products. "People who drive Priuses are generally pretty conscientious and aware, so it seems like a good beginning market," Meyer said. As more electric cars come along, he said, the speaker system may interest both drivers and manufacturers.

Their PANDA system, Meyer said, is about 5 decibels quieter than a regular combustion engine from the front and 10 to 20 decibels quieter from the back. They're working on a commercial version of PANDA they hope to have ready by early June. (PANDA stands for "Pedestrian Awareness Noise-emitting Device and Application.")

The sound comes from small speakers the size of one's palm installed in the front wheel wells and under the back bumper, said Meyer. They can handle all weather conditions and a wide temperature range, he added.

The noise isn't audible from inside the car, Bai said, unless you roll down a window. He opened the car door and pointed to the wired blue box in front of the gear shifter that generates the sound. "This gives us a chance to shape the soundscape," Meyer said. Their business plan is at the moment is, "If you build it, they will come."

This summer Meyer and Bai are taking their prototype on the road to the national convention of the National Federation of the Blind in Dallas, the Plug-In Exposition in San Jose and NoiseCon in Dearborn, Mich. The Prius, they said, won't be coming with them. Instead, they hope to use a vehicle borrowed or volunteered on site.

In October, they demonstrated the PANDA speaker system at a convention of the California chapter of the National Federation of the Blind. Driving by a group of blind people, Meyer and Bai played two different sounds on the car's speakers. One sound mimicked diesel engine noise, the other a diesel accompanied by higher-pitched pinging.

"Universally, the blind people didn't like the pinging noise," Meyer recalled. "They thought it was distracting even though they could hear it better."

Source: Stanford University

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