Smartphone App Steers Drivers Toward Safety

University of Minnesota

Alec Gorjestani, M.Sc., showed an early interest in transportation innovation — as a teenager, he built a go-cart from a lawnmower engine. Years later, he's moved beyond backyard DIY projects. Gorjestani's problem-solving skills and engineering aptitude are now channeled into his work as a research fellow at University of Minnesota's Intelligent Transportation Systems Institute. He's developing ways to keep the road safer, and that includes DriveScribe, a smartphone app commercialized by Minneapolis-based Drive Power LLC.

A Dark Road

Although distracted driving existed long before the dawn of mobile phones, the devices have certainly exacerbated the problem. That's underscored by some startling figures from the U.S Department of Transportation. When fatal car crashes involved distracted driving, at least 13 percent of the accident reports cited mobile phones as the source of distraction. Those statistics are bleaker for newer drivers: When teenage drivers caused fatal crashes, 19 percent were

distracted by mobile phones.

It's a problem that carries a growing sense of urgency, particularly with the widespread use of smartphones — devices that allow users to easily check email, Web surf and text. In the United States, more than half of all mobile subscribers own smartphones, and that number continues to rise. According to Nielsen Research, two-thirds of new mobile phone purchases in the U.S are smartphones.

A Different Approach to Helping Drivers

Those crash statistics make most people fearful. But while DriveScribe's inventors want to reduce distracted driving, they don't rely on fear as the motivator. "We want to positively reinforce good driving behavior," says Will England, founder of Drive Power.

That's the idea behind the DriveScribe app, which consumers can download for free to their iPhones and Android phones. It blocks calls, text and email access — but more importantly, DriveScribe acts as a personal driving coach. It gives feedback to drivers who brake suddenly or run stop signs, and warns them to slow down if they exceed the speed limit. And it doesn't just point out room for improvement. DriveScribe also helps drivers avoid potential problems — it will alert drivers to a sharp curve in the road up ahead. Information about driving behavior is stored online, so parents can log in to a website to review their teen's progress.

DriveScribe also provides a reward system for teen drivers. For example, a parent can choose to sponsor a teen driver for $5 or $10 a month, and through good driving behavior, the teen can earn back that money in the form of gift certificates for Amazon and other retailers.

At the Starting Line

The basic idea behind the app came from a research project that began around 2004, at the University of Minnesota's Intelligent Transportation Systems Institute, with initial funding from the U.S. Department of Transportation. The intent was to develop in-vehicle technology that could detect unsafe driving in teens, like speeding. No phones were involved initially. "It was basically a big computer, with a map on it and GPS," says Gorjestani.

Around 2008, as cell phone usage increased, so did concern about calls and texting that led to distracted driving. At the same time, phone technology was becoming more sophisticated — and that included the quality of accelerometers and GPS in phones. Says Gorjestani: "We thought, instead of the cell phone being a bad influence on driving, why not try to make it a good influence?" From 2009 to 2011, he led the technical research phase on the project, and helped design a smartphone-based system.

The technology worked for the smartphone-based system. But would drivers actually use it? To find out, Gorjestani and his team of mechanical engineering researchers (including Arvind Menon, M.Sc.; Eddie Arpin, M.Sc.; Craig Shankwitz, Ph.D.; Janet Creaser, M.Sc.; Michael Manser, Ph.D.; and Max Donath, Ph.D.) enlisted the help of cognitive psychologists within the Intelligent Transportation Systems Institute. They surveyed about 30 pairs of teens and parents to obtain their perspective on the smartphone-based technology. As expected, the parents overwhelmingly supported the technology's ability to improve driving habits. The teen response was unexpected: For example, 93 percent of teens indicated that it would help them obey speed limits. "We were surprised at the high acceptance rate," says Gorjestani. "We thought there would be more resistance from teens saying, 'I don't need this, this isn't helpful' — but that wasn't the case."

In 2011, when Gorjestani and his team had finished their research to build the technology, Andrew Morrow and his technology transfer office (TTO) colleagues began looking for a business partner, but couldn't find one that was a good

fit. "We decided it would be best as a startup company," says Morrow, technology marketing manager at University of Minnesota's Office of Technology Commercialization. "That way, it will get the attention it needs to grow and will likely be acquired by a larger company."

Several entrepreneurs expressed interest, but one stood out: Will England, now CEO of Drive Power. "Licensees for UMN technologies always have a requirement to produce a business plan, and the plan Will produced appeared to have the most promise," says Morrow.

In December 2011, the University of Minnesota licensed the technology to Drive Power LLC. England praised the TTO's ability as "dealmakers." "It's a very diligent group," says England. "They put the right people in the room to kickstart it."

Gorjestani, who also serves as Drive Power's vice president of technology, noted the TTO did extensive work to identify the technology's potential — conducting a market search for similar technologies, determining who the competitors were. "They even did some financial analysis," says Gorjestani. "They played a critical role in finding someone who was willing to take a chance and take this to market."

> *The app officially launched in June, but significant work was needed to optimize technology for wider distribution. Using Gorjestani's technology as an initial platform, the company spent about six months refining the phone app and also building the Web portal to let users view information about driving performance.*

Many Routes to Road Safety

The app could also bring drivers' education into the 21st century. "Drivers' ed is very outdated, and everyone knows that," says England. Instead of studying book-based driving information, a teen driver's homework could entail taking a drive and reviewing their performance afterward.

> *But DriveScribe's potential extends beyond teen drivers. As England observes: "From a safety perspective, everyone needs a little help as a driver."*

For example, it can collect information on driving habits to allow drivers to qualify for lower insurance rates. "Insurance companies want to give safe drivers the ability to put up their hand and say, 'Hey, I'm a safe driver — I deserve a discount,'" says England. Some car insurance companies are starting to do this already, but with hardware devices that connect to a car's dashboard. As a phone app, DriveScribe has an advantage. "It's infinitely cheaper and easier to distribute than a hardware device," says England, who notes that insurance companies have expressed interest in the app.

For companies that want to create a driver safety culture, DriveScribe is also well-suited for commercial fleets. Earlier this year, Drive Power launched a pilot project with Saudi Aramco, a Saudi Arabia oil company that will use the app to monitor the driving performance of some of its workers.

Morrow says his own driving has improved, and he's discovered a side-benefit: His three young daughters find the app entertaining. They like hearing it tell their dad what to do. "They can hear it coaching me, and they all laugh," he says. "It's now become an engaging part of every family car ride."

Thanks to the app, England made a discovery about his driving too: "I learned I speed a lot, to be perfectly honest." He speeds less now. "Everyone knows they shouldn't be doing these behaviors, like speeding or not coming to a full stop at a stop sign," he says. "Just to have that little reminder, either in the moment or afterwards, is very beneficial."

Avoiding Other Hazards

For nearly 20 years, Gorjestani has pondered ways to steer drivers' behavior in the right direction. "He has a strong, genuine desire to combat this problem of unsafe driving," says England. That's true, but he arrived at transportation research via a detour. Initially, Gorjestani intended to work in robotics. He reconsidered that choice in the early '90s, when funding for robotics research began to dwindle. At the same time, he saw growing funds to address transportation challenges. "I decided to go with the flow and get into transportation," says Gorjestani. "But as I did so, I grew to really love it."

One reason, he says, is the way it brings positive changes to people's lives. Gorjestani observes that, for the foreseeable future, two behaviors will persist: People will continue to drive, and they will continue to make mistakes. An overarching goal of the university's Intelligent Transportation Systems Institute, where Gorjestani works, is to help people do a better job driving. "It has always tried to go for research projects that fulfill that goal," says Gorjestani.

Case in point: Snowplowing in Alaska, where snowfall is measured in feet, not inches. That can quickly make roads invisible to drivers. To address that, Gorjestani and colleagues (led by Craig Shankwitz, Ph.D.) used a type of technology called a heads-up display. This transparent display projects information without blocking the user's view — miliitary and commercial pilots have relied on heads-up displays for decades. For the snowplows, a curved acrylic plate is mounted in front of the driver's field of vision, reflecting a computer-generated display that marks the road's boundaries. That allows drivers to look through the windshield and "see" the road hidden beneath more than a foot of snow. Several Alaska plows currently have this technology, and soon it will be added to some snowplows in Minnesota.

Gorjestani has also helped design a system for safer bus rides. In Minnesota's Twin Cities area, buses are allowed to use the shoulders on freeways during traffic congestion. But that's a challenge, because the shoulders are narrower than a regular lane — and buses are wide vehicles. To keep buses where they belong, he and his team created a lane-assist system that gives bus drivers useful feedback. "We vibrate the seat to the right side or left, depending on where they're deviating from the lane," says Gorjestani. The steering wheel provides feedback too: "If they start to deviate to the right, there will be some torque feedback, nudging them back into the lane."

Paving the Way for Future Drivers

When it comes to nudging drivers toward better habits, DriveScribe could play a vital role. The technology is miles away from the stereotypical phone app. "There's a purpose to the product," says England. "It just gives you that extra boost to continue to press forward through the times that inevitably are somewhat challenging."

The idea is not just to help new drivers, but also people who might not realize they need it. "Everyone thinks they're a better driver than they are," says Gorjestani. His desire to encourage safer driving has a personal twist too, considering his young children will earn their drivers' licenses in the next five years or so. He knows the allure of smartphones isn't going to diminish during that time.

"Cell phones are only going to become more ubiquitous, more powerful, and more feature-packed," says Gorjestani. That translates into a distraction that's hard to resist. "People have tried legislating the problem, but the reality is, it's difficult to police," says Gorjestani. It's a problem that's going to be around for a while, and he hopes to solve it with solutions like DriveScribe.

"As an engineer, you can choose to work on a lot of things," says Gorjestani. "I'd like to do good in this world, even if it's just a little bit. And that's one of the reasons I want to stay in research and products that help people."

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