Riding a motorcycle is an amazingly freeing experience. The strong connection the rider has to the road is largely thanks to the relatively minimal barriers between themselves and their surroundings. But the trade-off, especially when compared to cars, is usually in creature comforts and high-tech gadgetry.

Premium motorcycles are now gaining automotive wizardry such as traction control and active suspensions, but bikes are still challenged to give the rider the same sort of information on tap that a driver can have. Part of the challenge is the flexibility of a car cabin versus a small gauge cluster on a motorcycle, but innovators are now looking at ways to make helmets do more than just protect your head. Such a helmet is one of the many research projects Intel's New Devices Group (NDG) is working on.

Moyerman with the Intel Edison chip that interfaces between the smartphone and motorcycle's CAN bus.

Stephanie Moyerman, a 29-year-old Philadelphia native with a Ph.D. in astrophysics and cosmology from the University of California, San Diego, often commutes to and from Intel's Chandler, Arizona, campus on her Kawasaki Ninja 300. One of her many ideas is to better connect the rider to the machine via technology.

Upgrading the brain bucket

Currently on the market are bolt-on upgrades to motorcycle helmets such as Bluetooth headsets that connect to smartphones for navigation, music and voice communication, but they operate as independent units from the vehicle. The smartphone or GPS does not have any connection to the bike. New helmets in development right now, such as the Skully AR-1, which bills itself as “the world's smartest motorcycle helmet,” add an impressive array of features such as a heads-up display and rearview camera, but do not pull any data from the bike.

A two-person team comprised of Moyerman and Santa Clara, California-based software engineer Xiaochao Yang worked with BMW to develop both software and Intel Edison-based hardware that is able to read data from the motorcycle's computer systems and transfers it to an Android smartphone. From there, the rider is able to interact with the intelligent unit by speech and using the trigger phrase, “Hello Jarvis” that’s not unlike Apple's “Hey Siri” or Google's “OK Google.” In fact, the custom Android app uses Google’s speech API.

Rider to bike communication
What makes the Intel/BMW prototype special is that riders can talk directly to the bike while still accessing the Internet. “If you need directions, say ‘take me home’ and it’ll queue up directions and give them over audio. But if there isn’t enough gas, then it will redirect you to a gas station first because it can read the bike’s remaining fuel range,” explains Moyerman. “It will also do smart navigation, so if a blind turn is approaching, it’ll give you warning to slow down.”

The system will also make safety checks easier, says Moyerman. “You can ask for bike status, so all the things that you’re supposed to check, but never do – like your tire pressure and oil level – you can just ask it. You can just say ‘status’ and it’ll do a full systems check for you.”

Edison’s wireless capabilities can extend to interface with other Wi-Fi devices, such as action cameras so the user can command recording with just his or her voice.

Making sense of the CAN bus

Putting together a system like that is much more complicated than plug and play. Every vehicle maker has its own data language, which means that there’s no universal standard to interpret the data. The team at Intel worked with BMW’s Bay Area group to translate a R1200GS adventure motorcycle’s own language from the CAN bus (controller area network) to Edison, which then sends it to the smartphone via Bluetooth.

“The CAN bus data is all in bike code, and you can see all these bytes fly by like watching the Matrix,” said Moyerman. “And you’re hacking it all apart and putting it back together.”

Reading the CAN bus’ code wasn’t the only foreign language challenge. “BMW sent us a 111-page CAN bus document, and it was entirely in German,” Moyerman said, laughing. “So we had a fun time trying to figure it all out.”

For worldwide markets

One would assume that a system that works with the $16,000 BMW R1200GS would only be targeted to those with deep pockets, but currently this is strictly a research endeavor rather than product development. Moyerman says there’s been some interest to apply the technology to places where two-wheeled transportation is even more common than the car: “For example, in emerging markets where it may be incredibly dangerous to ride your motorcycle or moped, like through the streets of Calcutta, finding your way around, getting gas, etc.” She claims that the Edison system would cost just a fraction of what others do, especially those with heads-up displays such as the Skully AR-1.

Safety first

“Safety is one of the big ones,” says Moyerman on the next area of focus. “You could put range sensors so that the phone can alert you if there’s someone in your blind spot. Things like that in cramped spaces are incredibly cool.”

The concept of saving lives while pursuing a passion for motorcycling is reflected in Moyerman’s personal life. When her
Connected motorcycle helmet project got approved, she was in between motorcycles at the time and sought to remedy that with a new model – but there were voices of concern.

“My wife is a surgeon, and she was very opposed to people riding motorcycles because she’s seen the result of accidents,” said Moyerman. “When this project got picked up, I hadn’t had a bike in two years, so I wanted to buy a bike to get riding again. My wife wanted me to take the safety course so my skills would be refreshed.

“I convinced her to take the safety class with me, and she loved it and is now deciding what motorcycle she wants to buy.”

So, why motorcycles? After all, at least in North America, the car is far more common than the motorcycle, so why develop something for a niche market? Moyerman said that the team is exploring the application of the same technology to cars, but the answer to why bikes one is related to practicality: “Cars are lot more complicated, and for me, all the information in the car is already accessible. I can see the dashboard right underneath where I'm looking, but on my motorcycle, I actually hate looking down... Plus I think motorcycles are cooler.”

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