



This blog hosts weekly news about the Texas A&M University Sketch Recognition Lab. SRL is directed by Dr. Tracy Hammond, an associate professor in the Computer Science and Engineering Department. More information about the lab can be found at <http://srl.tamu.edu>

Friday, March 6, 2015

Dr. Tracy Hammond's GeoTrooper on Daily Planet

The first time that a person goes anywhere, it can be disorienting. Think about a family going on vacation to a new, foreign country - all the streets are different, all the landmarks are unfamiliar, and their hotel is somewhere in the middle of the unknown jumble of language and landscapes.

Ultimately, this is the issue which Dr. Hammond, the director of the Sketch Recognition Lab, and her team at Texas A&M University solved with GeoTrooper – only it's intended for a much more imperative situation.

To a soldier, the feeling of being a stranger in a strange land can start on day one, as soon as they set foot on the ground. When they are sent in via nighttime airdrop, for example, soldiers parachute from the sky and into a new country or location – one in which they likely know almost nothing about. When they land, they find themselves in an entirely new atmosphere - sometimes, they even land behind enemy lines. From there, they must quickly make their way to a rendezvous point.

However, it is in those moments of much needed directional guidance that problems arise.

While the time between a soldier landing and his or her arrival at the rendezvous point should only be about 15 minutes, in reality, it can take over two hours. That's dangerous when soldiers land on a battlefield or behind enemy lines.

Consider the family vacation situation, again. Now, however, the family is not only in an entirely new place, but is also in the middle of the wilderness, in the dark. Their hotel is in the middle of a city a few miles away and all they have to guide them is an address. That is, by no means, a good place to be.

When Dr. Hammond was approached by the commander of the 18th Airborne Corp in Texas, she was recruited to create an efficient and effective way to guide soldiers to their destination.

"What they wanted was a simple beacon-in-phone solution so that the phone could point to where ever they were going," she explained to Daily Planet. "The problem with carrying a cell phone around is that even if they look at it for a second, they ended up staring at that point, rather than trying to concentrate on what's going on around them."

So, unlike a lost family, soldiers do not have the luxury of time or safety needed to look up a location on a phone or GPS mapping system. Taking focus away from the situation around a soldier greatly inhibits his or her ability to perceive what is happening in nearby areas. Furthermore, a soldier cannot carry and easily look at a screen when they need both hands to safely carry a weapon that may need to be used at any time.

Thus, creation of GeoTrooper - a vest that guides its wearer via touch instead of sight or sound – came about to solve these issues. This hands-free solution consists of vibration modules (think Immersion's TouchSense technology) and a Bluetooth connection.

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(Still image of GeoTrooper from Daily Planet video, listed below)

On the back of each shoulder and in the small of a person's back are small boxes (modules) that vibrate in a tapping fashion to indicate which way a soldier should turn.

To make GeoTrooper, Dr. Hammond and her team first had to experiment with how people respond to touch.

"We made sure to invent signals that were completely obvious," she commented. "We didn't actually know what those signals were when we first started. When we put a vibration on the right shoulder, does that push me forward, or does that pull me back?"

After testing the signals, it was discovered that a vibration-tap to the right shoulder would be automatically interpreted as a sign to turn right, as a tap on the left would cause a person to turn left (whichever shoulder the vibration-tap is on is the one that drops back).

Another guidance signal also made an appearance in experimentation.

"Interestingly, when we tapped both shoulders behind them," Dr. Hammond detailed. "They said it was a really strong pull that made them feel like they were being pulled backwards and that they needed to do a U-turn."

Thus, simultaneous vibrations to both shoulders indicated to the wearer that they need to turn around. These nonverbal cues allow the wearer to be guided to a set target destination.

That location is identified using Bluetooth technology. At each camp or rendezvous point, a transmitter is placed. This beacon is decoded by built in receivers in the vest and acts as a GPS target. With the tapping system in place and the Bluetooth signal picked up by GeoTrooper, soldiers can easily transverse the new lands they find themselves in without being distracted by sounds or sights or letting down their defenses to hold a GPS.

"We took that high in the sky vision and we were able to take two hours and reduce it down to about 10 minutes," Dr. Hammond stated. "And on the battle field, that's a big deal."

Understandably, this technology was quickly picked up by the military for field use.

However, Dr. Hammond also discovered a recreational and fun application for GeoTrooper - a wearable GPS system for motorcyclists.



(Dr. Hammond demonstrating how GeoTrooper can be used by motorcyclists)

"What other scenario does a user need their hands and their eyes and their ears completely," She commented with a smile. "My right hand is on the gas and the break and my left hand is on the clutch, so I can't take my hands off the bike. I should not be looking at my phone while driving. And it helps to hear where the cars are behind you."

In this scenario, the vest acts with Google Maps to connect with the same vibrational commands. In addition, a vibration in the small of a user's back just means that the vest and GPS are still working. Though GeoTrooper, users can punch their destination into their phone, put it in their pocket, and get there using the safe, hands-free guiding system.

This technology allows for not only soldiers, but lost families on vacation and cyclists to safely get to their desired location, too.

"When you've arrived at your destination, you know that because it basically gives you a little party on your back," Dr. Hammond explained. "All the sensors vibrate at once in a little rhythmic pattern to let you know that you've arrived."



(Dr. Hammond during the Discover Channel video shoot.)

Discovery Channel Canada hosted a five minute special on Daily Planet. Dr. Hammond was asked about the experience of being interviewed by the Discovery Channel crew. "It was a full day affair, starting at 8am until the last bit of sun went away. The BCS Marathon was going on and the camera men had to be strategic to not include runners in the morning shots. The motorcycle shots took about 30 takes with me circling around my block over and over, with the video camera attached the bike or with someone hanging out of a sunroof in a car in front of or behind me. The neighbors started to wander over excited by the ruckus we were causing. It was a really fun day."

(The original video content can be found here: <http://www.discovery.ca/Video?vid=531190> Please note - You may need to refresh if it states that you need to be in Canada. You have to watch two commercials first. The title of the video is Daily Planet: Geo Trooper. The product created by Dr. Tracy Hammond is the GeoTrooper)

Posted by [Hannah Conrad](#) at 4:03 PM



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