Tacit hand device steers blind to safety (w/ video)

September 15 2011, by Nancy Owano

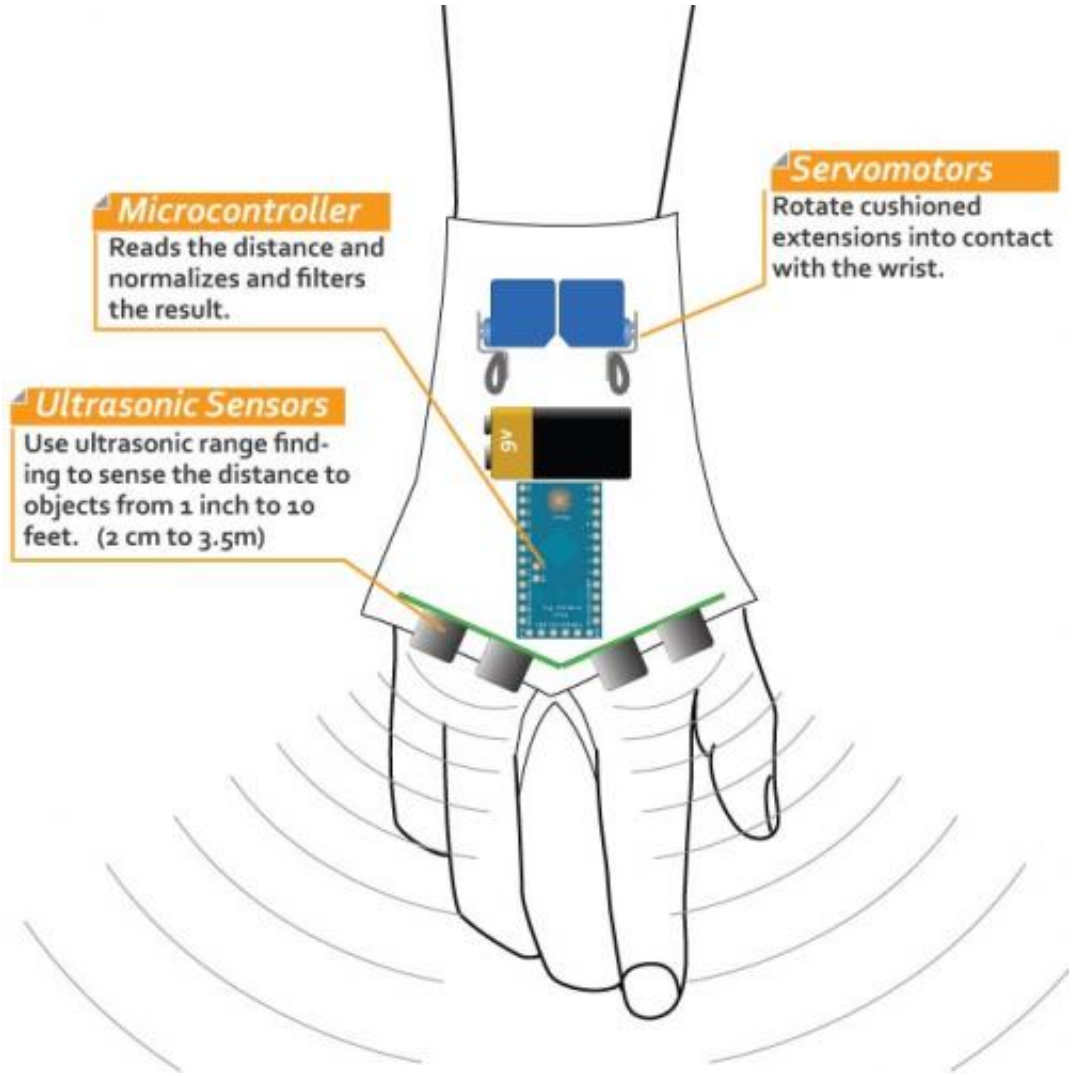
(PhysOrg.com) -- A hand device called the Tacit can help the blind and visually impaired move around safely in complex environments. Wrist-mounted, the device uses ultrasonic sensors mounted above the knuckles that can pick up the distance of objects from one inch to 10 feet away and then translate that distance to pressure on the wrist--the closer the object, the more pressure on the wrist. Pressure is applied on the right or left side of the wrist to help the user determine where the obstacle is

located.

The device can be strapped on to either hand and one-size-fits-most. The device shows a fast response time, in fractions of a second. A blind or visually impaired person can sense what is in the immediate area with a sweep of the hand. The inventor, Steve Hoefer, chose the word Tacit to describe the haptic-feedback invention, he wrote, because "it just seemed like an appropriate name that's a lot shorter (though less descriptive) than 'Hand-Mounted Haptic Feedback Sonar Obstacle Avoidance Assistance Device'."

As interesting as the device is, what has attracted much buzz is the fact that the device, more formally called The Tacit Project, is under a Creative Commons License, and the project has been dedicated as a DIY idea for others to build. Hoefer's site, Grathio Labs, has posted source code, a list of parts, and detailed diagrams, with an invitation to make the device. "I am active in the Open Source software and hardware and encourage community innovation and creativity," he says on his site. He is using the Creative Commons BY-NC-SA license, which he explains as a "Don't be a jerk" license. "In short: Make it, learn from it, teach it, improve it, modify it. Just share what you do, give credit, and don't sell any without contacting me first."

As such, Hoefer is straightforward about where the device, which is a prototype, is of merit and where it needs improvements. "It's not perfect but it works and it can be better." It could easily be made about half the size, he said; another challenge is the fabric he chose, neoprene. He chose neoprene because it is a solid, durable, shock-absorbent base for electronics, but neoprene is not easy to sew. "It likes to drop stitches like crazy on a sewing machine."



As for device accuracy, Hoefer says that lasers would have provided the most accuracy, but would be too costly, in his opinion. The cost of materials for Hoefer's prototype is $65. "For now ultrasonics work best at this price."

The hand device follows an earlier idea by Hoefer for a headband with ultrasonic sensors and vibration motors around the circumference of a headband; the motors vibrated faster when close to

an obstacle. The headband had two flaws which led Hoefer to try something different. The most dangerous obstacles, such as furniture that the blind person can trip over, are not at head level. Also, said Hoefer, "vibrating motors stuck on your skull will drive you insane quickly."

The Tacit device's learning curve is measured in seconds, according to Hoefer. He said everyone who has worn it figured it out immediately.