Low-cost smart glove wirelessly translates the American Sign Language alphabet into text

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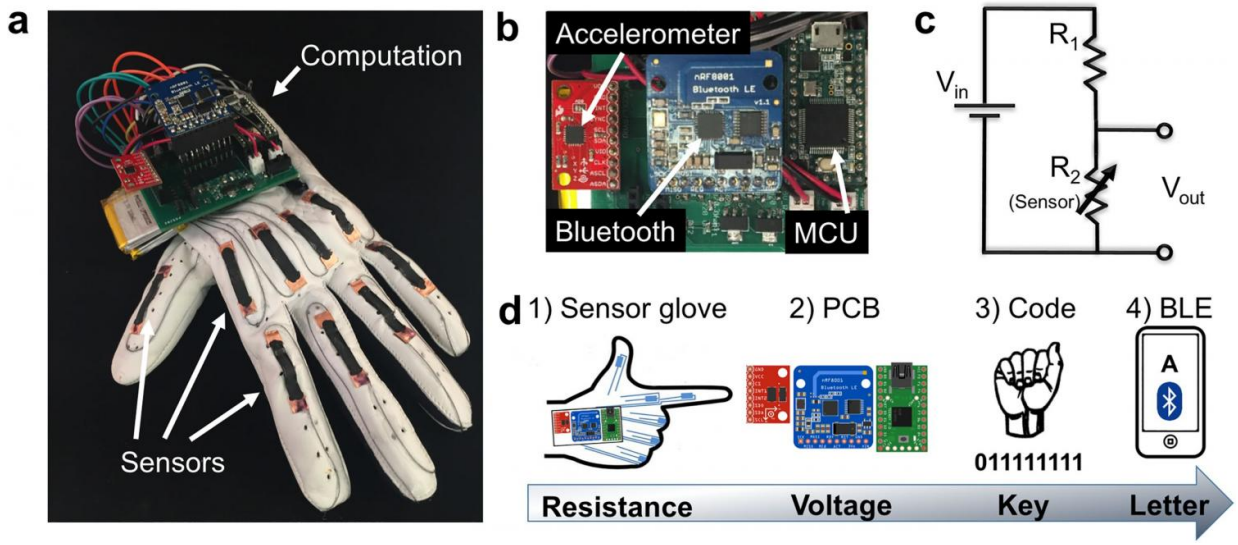

Overview of the gesture-decoding glove. Credit: Timothy O'Connor et al (2017)

A glove fitted with wearable electronics can translate the American Sign Language alphabet and then wirelessly transmit the text for display on electronic devices—all for less than $100, according to a study published July 12, 2017 in the open-access journal *PLOS ONE* by Timothy O'Connor and Darren Lipomi from University of California, San Diego, US, and colleagues.

Current methods for tracking human body positions include cameras as

well as optical systems involving infrared emitters and receivers. Both can yield good results but the former uses a lot of power, while emitters and receivers are expensive and immovable. Wearable sensor systems avoid these constraints, and gloves in particular are intuitive human-machine interfaces. Gloves that track people's gestures could provide a more seamless interface for applications from virtual reality to telesurgery as well as for covert operations such as piloting aerial drones and controlling bomb-diffusing robots.

Lipomi and colleagues built a glove that decodes the American Sign Language (ASL) alphabet and then wirelessly transmits the text to electronic devices. The glove has nine flexible strain sensors—two on each finger and one on the thumb—that detect knuckle articulation. A microprocessor computes the ASL letter for each gesture, and a Bluetooth radio transmits the text for display. The system cost less than $100 to build and has low power requirements.

The researchers found that the wearable electronic glove determined all 26 letters of the ASL alphabet accurately. Based on fatigue studies of the sensors, the system will translate ASL letters accurately after the knuckles are bent maximally 1,000 times. Moreover, the researchers found that data from the glove could also generate an accurate virtual display: when a real hand in the glove made the ASL gestures that spell "UCSD," a virtual hand mimicked them accurately. This, say the researchers, suggests new ways of using flexible, wearable electronics to interface with virtual environments. In addition, the glove can be a test system for evaluating the performance of new materials and stretchable hybrid electronics.

More information: O'Connor TF, Fach ME, Miller R, Root SE, Mercier PP, Lipomi DJ (2017) The Language of Glove: Wireless gesture decoder with low-power and stretchable hybrid electronics. *PLoS ONE* 12(7): e0179766. doi.org/10.1371/journal.pone.0179766

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