A little fold-up joystick brings haptics to portable devices

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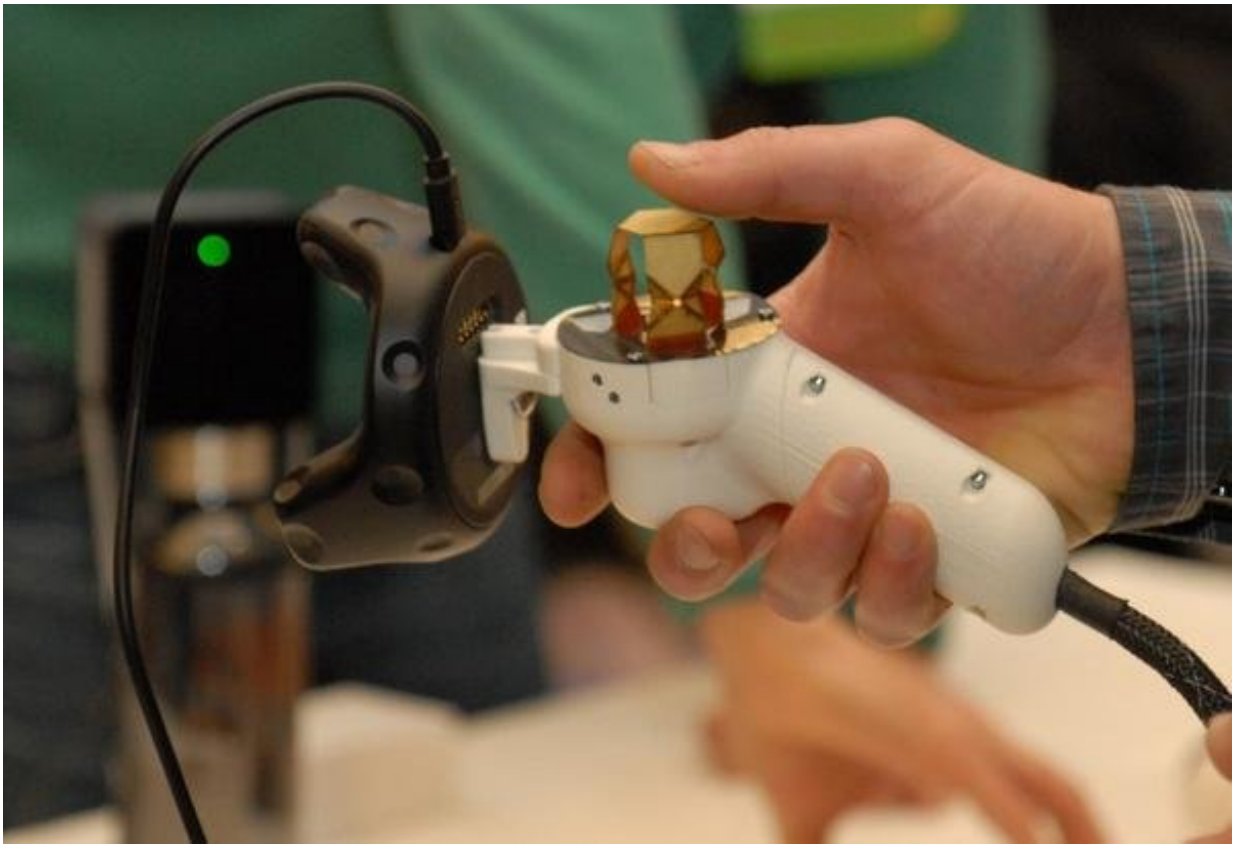

Credit: Ecole Polytechnique Federale de Lausanne

The tactile joystick developed by startup Foldaway Haptics brings the sense of touch to mobile devices, drones and, in a smaller version, to virtual reality controls. This pocket-sized device, which can be unfolded

in an instant, is about to hit the market. Next week it will be showcased at the Hannover Messe, the world's largest trade fair for industrial technology.

The tactile joystick developed by EPFL spin-off Foldaway Haptics is not much larger than a credit card and can be set up and put away in the blink of an eye. This low-power device plugs directly into a computer or mobile phone to add another dimension to the applications they run. The force feedback lets users feel the texture, stiffness and shape of virtual objects. This little robot joystick, which clearly punches above its weight, has already been presented at a number of specialized trade shows. From 23 to 27 April, visitors at the Hannover Messe – the leading industrial technology trade show in the world – will be able to give it a try.

Haptic-feedback systems, which are used mainly for gaming, hit the market a few years ago but had until recently disappointed users. They were just not very realistic in the way they simulated a collision by vibrating or imitated acceleration by increasing the feeling of resistance. "Systems offering more refined tactile force feedback have come out recently," says Marco Salerno, the cofounder of Foldaway Haptics. "But they are bulky, hard to carry around and very expensive." His company's foldable joystick offers a very similar experience to that of the newer systems but is easy to stow in a laptop bag or even in your pocket.

With the help of a small magnet, this ultralight device opens up into a joystick with an upward flick of the wrist. It goes from flat – less than two millimeters thick – to three dimensions in a fraction of a second. It is stable and solid thanks to its origami-like folding mechanism and the composite materials used to make it. When closed, it is so flat that you may wonder where the sensors and motors are. It took several years of research in the Reconfigurable Robotics Laboratory for the researchers to overcome a number of technical challenges.

The little robot's leading feature is the way it is manufactured, through a combination of thin layers of various materials already cut into the shape required for the folding mechanism to work. Because assembly is automated, it will be easy to mass-produce. "The fact that no manual action is required keeps manufacturing costs relatively low," says Stefano Mintchev, the other cofounder of the startup, which received funding from NCCR Robotics to develop its technology.

Foldaway Touch, a haptic button for virtual reality joysticks

The layer-by-layer manufacturing process means that the system can be configured in different sizes and shapes. The company used the same model to develop a retractable device that can be placed on VR joysticks. It's called Foldaway Touch and lets users handle a virtual object and feel its shape and texture with their thumb. The company won the Best Demonstration Award for the Foldaway Touch at the IEEE Haptics Symposium in March 2018.

Provided by Ecole Polytechnique Federale de Lausanne