A magnetic pen for smartphones adds another level of conveniences

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Utilizing existing features on smartphones, the MagPen provides users with a compatible and simple input tool regardless of the type of phones they are using

Daejeon, Republic of Korea, July 24, 2013 – A doctoral candidate at the Korea Advanced Institute of Science and Technology (KAIST) developed a magnetically driven pen interface that works both on and around mobile devices. This interface, called the MagPen, can be used for any type of smartphones and tablet computers so long as they have magnetometers embedded in.

Advised by Professor Kwang-yun Wohn of the Graduate School of Culture Technology (GSCT) at KAIST, Sungjae Hwang, a Ph.D. student, created the MagPen in collaboration with Myung-Wook Ahn, a master's student at the GSCT of KAIST, and Andrea Bianchi, a professor at Sungkyunkwan University.

Almost all mobile devices today provide location-based services, and magnetometers are incorporated in the integrated circuits of smartphones or tablet PCs, functioning as compasses. Taking advantage of built-in magnetometers, Hwang's team came up with a technology that enabled an input tool for mobile devices such as a capacitive stylus pen to interact more sensitively and effectively with the devices' touch screen. Text and command entered by a stylus pen are expressed better on the screen of mobile devices than those done by human fingers.

The MagPen utilizes magnetometers equipped with smartphones, thus there is no need to build an additional sensing panel for a touchscreen as well as circuits, communication modules, or batteries for the pen. With an application installed on smartphones, it senses and analyzes the magnetic field produced by a permanent magnet embedded in a standard capacitive stylus pen.

Sungjae Hwang said, "Our technology is eco-friendly and very affordable because we are able to improve the expressiveness of the stylus pen without requiring additional hardware beyond those already installed on the current mobile devices. The technology allows smartphone users to enjoy added convenience while no wastes generated."

The MagPen detects the direction at which a stylus pen is pointing; selects colors by dragging the pen across smartphone bezel; identifies pens with different magnetic properties; recognizes pen-spinning gestures; and estimates the finger pressure applied to the pen.

Notably, with its spinning motion, the MagPen expands the scope of input gestures recognized by a stylus pen beyond its existing vocabularies of gestures and techniques such as titling, hovering, and varying pressures. The tip of the pen switches from a pointer to an eraser and vice versa when spinning. Or, it can choose the thickness of the lines drawn on a screen by spinning.

"It's quite remarkable to see that the MagPen can understand spinning motion. It's like the pen changes its living environment from two dimensions to three dimensions. This is the most creative characteristic of our technology," added Sungjae Hwang.

Hwang's initial research result was first presented at the International Conference on Intelligent User Interfaces organized by the Association for Computing Machinery and held on March 19-22 in Santa Monica, the US.

In the next month of August, the research team will present a paper on the MagPen technology, entitled "MagPen: Magnetically Driven Pen Interaction On and Around Conventional Smartphones" and receive an Honorable Mention Award at the 15th International Conference on Human-Computer Interaction with Mobile Devices and Services (MobileHCI 2013) to be held in Germany.

In addition to the MagPen, Hwang and his team are conducting other projects to develop different types of magnetic gadgets (collectively called "MagGetz") that include the Magnetic Marionette, a magnetic cover for a smartphone, which offers augmented interactions with the phone, as well as magnetic widgets such as buttons and toggle interface.

Hwang has filed ten patents for the MagGetz technology.

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