

The hand as a joystick

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You need a mouse and a keyboard, a touch-screen or a joystick to control a computer system. In the future, a new gesture command system will make it possible to use just the fingers of a hand.

Before a new vehicle rolls off the assembly lines, it first takes shape as a [virtual model](#). In a cave – a room for the virtual representation of objects - the developers look at it from all sides, they »sit« in it, they examine and improve it. For example, are all the switches easy to reach? The developers have so far used a [joystick](#) to interact with the computer which displays the virtual car model. In the future, they will be able to do so without such an aid – their [hand](#) alone is intended to be enough to provide the computer with the respective signals.

A multi-touch interface, which h was developed by Georg Hackenberg during his Master's thesis work at the Fraunhofer Institute for Applied Information Technology FIT, made this possible. His work earned him first place in the Hugo Geiger Prizes. »We are using a camera that, instead of providing color information, provides pixel for pixel the distance of how far this point is from the camera. Basically this is achieved by means of a type of gray-scale image where the shade of gray represents the distance of the objects. The camera also provides three-dimensional information that the system evaluates with the help of special algorithms«, explains Georg Hackenberg.

Hackenberg's main work consisted in developing the corresponding algorithms. They ensure that the system is first able to recognize a hand and then able to follow its movements. The result: The 3D camera

system processes gestures down to the movements of individual fingers and processes them in real time. Up to this point in time comparable processes with finger support could only detect how hands moved in the image level – they could not solve the depth information, in other words, how far the hand is from the camera system. For this reason it was often difficult to answer with which object the hand was interacting. Is it activating the windshield wipers or is it turning on the radio? Small movements of the hand, such as gripping, have so far been hardly possible to detect in real time – or only with great amounts of computing power. That is no problem for the new system.

[Gesture](#) commands are also interesting for computer games. A gesture recognition prototype already exists. The researchers want to improve weaknesses in the algorithm now and carry out initial application studies. Hackenberg hopes that the system could be ready for series production within a year, from a technical viewpoint. In the medium term, the researchers hope to further develop it such that it can be used in mobile applications as well, which means that it will also find its way into laptops and cell phones.

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