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RESEARCH NEWS

Hannover Messe 2016: Safer warehouse logistics

Tactile power steering for order picking carts

Vehicles in logistics centers will be more intuitive to steer in the future, thus making work easier and safer. "Tactile" handles being developed by Fraunhofer researchers will make this possible: They employ pressure sensors to detect the direction in which a user is pushing or pulling the cart. Whenever there is a risk of a collision, the cart stops immediately.

Logistics centers are chaotic places: forklifts, industrial trucks, motorized carts, also called ants in German, convey loads from point A to point B. Workers have been using a control panel with five to ten buttons to steer such carts. Since fully loaded carts can weigh as much as 500 kilograms, improper handling can often result in serious accidents.

Using hand pressure to steer

The tactile handles being developed by researchers at the Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg will make the operation of motorized carts more intuitive in the future. "Users will steer carts merely with hand pressure," explains Prof. Klaus Richter, expert group manager at the Fraunhofer IFF. "Whereas steering used to require effort, our handle has a kind of power steering." This means that workers can get a cart moving in the right direction with very little effort. Pressure sensors integrated in the handle make this possible. Since the handles are equipped with sensors for both hands, a cart does more than just detect whether it is being pushed or pulled. Software that compares right and left hand pressure enables a cart to recognize the particular direction specified by the user as well. The researchers are presently working to ascertain how many sensors are needed to steer a cart easily – the prototype has four sensors for the time being. "We intend to minimize the components in order to keep the price down," explains Richter.

Vehicle to vehicle communication for logistics

Commands given to order picking carts by workers by hand pressure are transmitted to motors like those used for electric bikes. The motor is able to execute the commands in a few milliseconds. This would be faster than an operator could handle, though. "We are developing the system to reach top speed and then we introduce artificial delays," reveals Richter. Psychological tests with subjects will pinpoint how long delays have to

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be to maximize user safety and ease of operation. "At the moment, we are working with our colleagues from Cloud & Heat on transmitting every worker command to a cloud where the commands will be collected and coordinated," says Richter. If a cart being taken around a blind curve is at risk of colliding with another cart, both carts will be stopped automatically – just like the vision of vehicle to vehicle communication. The researchers have already attained a latency of 10 milliseconds, i.e. the signal needs only 10 milliseconds to travel from the tactile handle to the cloud and back to the motor control unit.

The researchers will be presenting their development at Hannover Messe (Halle 17, Booth C18) from April 25 to 29, 2016. Visitors will be able to test the power steering system right there, using real handles to push a virtual cart. They will also be able to vary the parameters of the order picking cart – whether these be the weight of the load or the response time with which the cart executes entered commands.

FAST Realtime research project

The tactile handle is being developed in the FAST Realtime research project, which is primarily being advanced by the mobile communications industry and is part of the 2020 Cluster Strategy. The project with total funding of € 50 million is intended to develop new human-machine interfaces. Whereas the purpose of the "Internet of Things" is to interconnect individual objects, the "Tactile Internet" is about defining interfaces to humans, which make objects more effective and more intuitive as well as safer.

Tactile Internet

Objects will be rendered smart and will communicate with each other in the "Internet of Things". This vision will be broadened in the "Tactile Internet", which will integrate humans and their behavior in real time. In other words, human-machine interfaces will be tangible and respond simultaneously, thus making them safer, more effective and more intuitive. This is why very low response times are a prerequisite for the Tactile Internet.

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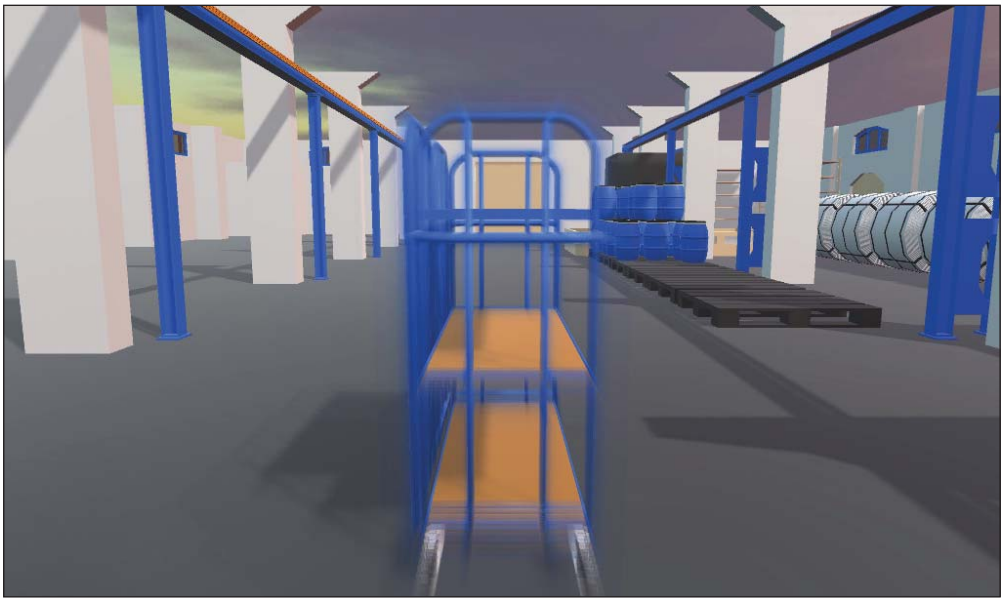
Quote from Prof. Richter:

"The stated goal of the Tactile Internet is for human-machine interfaces to be tangible. We are bringing this vision a bit closer to reality: Our handle makes it possible to steer order picking carts intuitively and with little effort."

Quote from Marius Feldmann, COO at Cloud&Heat Technologies GmbH:

"The tactile handle is an extremely interesting application of the new forms of cloud computing on which we are working. This innovative approach relies on very low-latency connections to the cloud. This can only be achieved when the cloud is moved close to users in order to reduce the point-to-point path radically."



Experimental psychology tests of typical latencies are conducted on the "tactile interaction" augmented reality simulator. © Fraunhofer IFF | Picture in color and printing quality: www.fraunhofer.de/en/press