

## RESEARCH NEWS

August 2018 || Page 1 | 3

### Indoor positioning

#### **USB flash drives for precise positioning and navigation inside buildings**

**We rely on GPS signals to guide us to our destination as fast as possible while we are driving, sightseeing or hiking. It is hard to imagine everyday life without satellite-based positioning. However, alternative solutions are necessary for places that lack a direct line of sight to GPS satellites. Fraunhofer researchers have developed a system for navigating in buildings that can be put into operation in a matter of minutes. Their technology will demonstrate how GPS works as part of the special exhibition "Time" at the phaeno Science Center in Wolfsburg, Germany.**

Although they look like ordinary USB flash drives, they facilitate the positioning and navigation of robots, vehicles and objects inside buildings: RTLSflares. Developed by researchers at the Advanced System Technology Branch AST of the Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB, RTLSflares are a solution for indoor positioning. They are especially suitable for the geolocation of mobile robots and automatic guided vehicles in logistics. In addition, specialists in disaster areas can use RTLSflares to coordinate first responders.

#### **Simple operation, high precision**

Measuring approximately 58x25x10 mm, an RTLSflare contains a microcontroller, a radio-frequency identification (RFID) chip, an inertial measurement unit, a USB interface and positioning software. Four flares can be placed in stationary positions to set up a wireless ad hoc network. A fifth flare can be used to geolocate a moving object inside a building – in real time and with centimeter precision. This solution has an operational range of 100 meters. When a flare transmits ultra wideband (UWB) signals, the propagation time of the signals transmitted can be measured in order to determine an object's position along the X, Y and Z axes. "We can use UWB signals to determine the position of a mobile unit within mere centimeters. We do this by measuring the differences in propagation time of a signal transmitted to various stationary units," says Norbert Fränzel, researcher at Fraunhofer IOSB-AST. "It is, however, necessary to know the exact location of the stationary units. This makes it possible to determine the relative position of the mobile unit." To this end, the team of researchers developed a method by which the stationary units automatically calibrate themselves. As a result, each RTLSflare can essentially configure itself. These innovative units thus lend themselves to a diverse range of existing applications. What's more, these cost-effective

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RTLSflares can be operated using off-the-shelf power banks or USB power hubs. “In the context of human-machine cooperation, companies could conceivably provide employees and heavy-duty robots alike with RTLSflares,” adds Fränzel.

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**RESEARCH NEWS**

August 2018 || Page 2 | 3

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For industrial demo applications, Fraunhofer IOSB-AST offers an evaluation kit that comprises five RTLSflares, instructions for use and drivers. Interested parties can try out a set for several weeks free of charge.

In addition, visitors to the special exhibition “Time” at the phaeno Science Center in Wolfsburg can see the RTLSflares in action: this positioning solution will be used to illustrate the GPS operating principle. The exhibition is open through February 3, 2019.



RTLSflare as a USB stick.

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The exhibition piece at the phaeno Wolfsburg Science Center is based on the RTLSflares technology of the Fraunhofer IOSB-AST. © Matthias Leitzke | Picture in color and printing quality: [www.fraunhofer.de/en/press](http://www.fraunhofer.de/en/press)



## RESEARCH NEWS

August 2018 || Page 3 | 3

Exhibition piece at phaeno Science Center in Wolfsburg: a Fraunhofer IOSB-AST positioning solution illustrates the GPS operating principle. © Matthias Leitzke | Picture in color and printing quality: [www.fraunhofer.de/en/press](http://www.fraunhofer.de/en/press)

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