



DEVICE RADAR:
Visilion shows the current position of devices and objects

LOCATION IS EVERYTHING!

Medical devices and accessories can be located in hospitals using real-time positioning. A visit to the Charité Hospital in Berlin.

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**FOUND IN
A HEARTBEAT:**

A defibrillator can also be located at the touch of a button

They are annoying timewasters in everyday life: the things that go missing just at the wrong moment. Your key has suddenly disappeared or you can no longer remember which level of the parking garage you parked your car on. Smartphones play a locating role here and can tell their owner where they are currently located with the help of another phone – thanks to the loud “here-I-am signal.” In the central emergency department of the Charité Hospital on the Benjamin Frank-

lin Campus (CBF), however, this would be completely out of place, because signal tones in medical technology mainly draw attention to clinically relevant conditions of patients and devices. Instead, a real-time locating system (RTLS) shows the positions visually on a map. Positioning is possible in real time, and the system has been in use for testing purposes on the CBF for the past year.

Dräger has entered into a partnership with Sony to provide RTLS in hos-

pitals. The electronics company has an extensive range of components and solutions in its Visilion system, which is also used in the logistics sector (in trucks, for example) and has been adapted for the specific needs of hospitals. The Charité, Germany’s biggest university hospital, trialed the technology under real conditions. Visilion blends inconspicuously into the emergency specialists’ time-critical processes, which are often unclear to the non-expert’s eye. Touch screens —▶



RESOURCEFUL: Dr. Bernd A. Leidl, chief consultant in the central emergency department, appreciates the fact that the technology cuts the time spent searching for equipment



TRACKING: The locating system automatically shows where even mobile medical technology is situated

are mounted on the wall in four different places. “Here you can see the devices as a photo,” says Birgit Liehr, nursing manager in the central emergency department on the Benjamin Franklin Campus. The tiles represent monitoring and ventilation equipment as well as syringe pumps. Non-technical equipment can also be seen, such as patient beds. Even these, says Birgit Liehr, have the astonishing ability to “go missing,” despite their size – and end up in every nook and cranny of the emergency department. Liehr taps on the photo of a bed. A floor plan of the emergency department appears,

consisting of several dozen rooms and corridors. Around 30 blue and some gray circles light up in various places. Each one represents a bed of the selected type and each of them has been given its own number. “The blue circles show the current location, while the gray ones show its most recent position.” This is the case, for instance, when a patient is transferred to another ward in the hospital in order to be admitted as an inpatient.

SEARCHING AND FINDING

Visilion follows a different principle to positioning by means of GPS, whose sat-

ellite signals cannot always be reliably picked up indoors. While GPS signals are evaluated by the sought device itself – it uses the signals to calculate its own position and transmits this via mobile radio communication or Wi-Fi as soon as it is sought – Visilion works precisely the other way around. Little transmitters are attached to each object that needs to be tracked. These “tags” are transponders with a distinct address. The “observers” – the radio components that wirelessly scan the tags – are located at fixed points within the building. The data-flow between the tags and observers is



CONTACT: The "observer" that connects to devices and objects is as small as a phone charger

EAR THERMOMETER OR PATIENT BED: VISILION TRACKS ANYTHING THAT HAS BEEN TAGGED

evaluated in the cloud. Algorithms work out the position of the tagged objects and display them in real time on a virtual map – on the ward’s computer screens, but also on mobile devices such as smartphones and tablets. “The smallest objects we have tagged to date are an ear thermometer and a set of keys,” says Dr. Bernd A. Leidel, chief consultant of the emergency department. “We require the set of keys for transfers by elevator when taking patients from the emergency room to places such as the operating room, the cardiac catheter lab, or the intensive care unit.” These are two

objects that can easily be mislaid on a daily basis. In actual fact, every object has the potential to waste the team’s time searching for it. “It helps a great deal when you can immediately see which room a certain device is in,” says Leidel. Patients quickly move from one ward to the next, while the technology along the treatment path remains behind. It would take a perfect photographic memory to remember the hundreds of daily usage situations, like when syringe pumps travel with patients to the intensive care unit and thus change departments, as Birgit Liehr explains: “People work with the

same devices there and we must remember to take ours back.”

The setup of the Visilion system is relatively simple (see p. 37). It can bring both clinicians and decision makers in hospitals a whole host of advantages. It is a matter of perspective which of these particularly stand out. Dr. Leidel primarily sees the time factor: “When you use an ECG machine in an emergency room, for example, you generally only need it for a few minutes.” The dynamic nature of the situation often makes it impossible to immediately clear everything away. “In large buildings like this one, people would



EMERGENCY DEPARTMENT: The reality is occasionally unclear. A locating system can create order and cut costs

AN OVERVIEW OF THE UTILIZATION RATE OF DEVICES IS ALSO POSSIBLE

return the machine to a certain place where it can be found again,” says the emergency doctor. But this isn’t always possible straight away due to the high number of emergency cases. As a result, a scattered landscape of equipment forms over the course of the day, leading to frequent searches. The strategy of mounting four of the touch screens at conveniently chosen locations has also proved successful, “because even mobile devices such as tablets can occasionally go missing.”

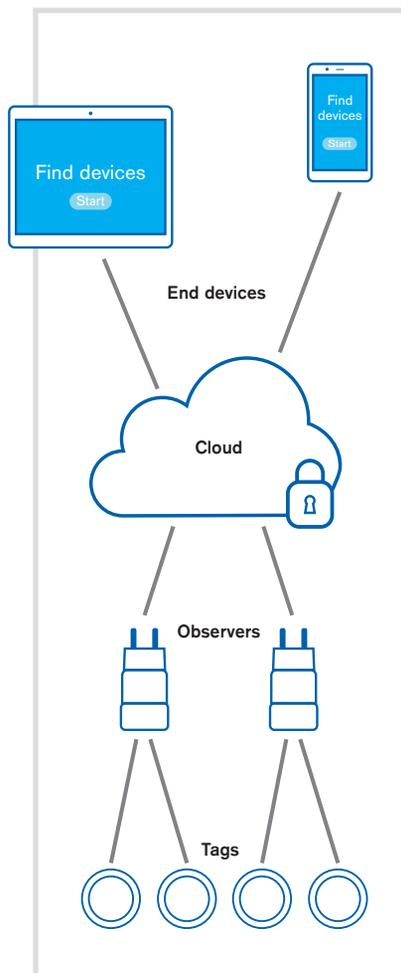
The installation on the Benjamin Franklin Campus is a pilot project. As

a leading hospital specializing in maximum care, the Charité – along with Dräger – is gaining practical experience in an everyday hospital setting. This should also benefit others. Today, for instance, Marie-Christin Blume, global system product manager for RTLS in the IT/S business unit, and Jannes von Zech, global product manager for Visilion in the German region, are visiting the central emergency department. They are supervising the project and want to find out where it can be optimized and which other application areas are viable in the

future. “Our domestic market in Germany is ideal for tailoring this solution to customer requirements,” says Marie-Christin Blume. In the future, Dräger should also serve as a one-stop shop for medical technology that reveals its location at any given time. “The key here is our closeness to the customer,” says von Zech.

This same closeness also makes it possible to get people’s different perspectives of Visilion, whether medical staff, site engineers, procurement employees, or administrative staff. After all, besides being able to determine the location of

HOW DEVICE LOCATION WORKS:



equipment in real time, it is also possible to get an overview of the utilization rate in order to optimize the inventory and efficiently distribute it throughout the building. “So far, the detection range ends at the boundaries of our ward,” says Dr. Leidel. “When a device leaves the area, we at least know its last position. Sometimes you have to play Sherlock Holmes to find out exactly where it has ended up.” If the entire hospital were equipped with observers, this detective work would no longer be necessary. With Visilion it is even possible to create a virtual fence around departments or an entire hospital. This “geofencing” can increase convenience as well as security. Valuable medical equipment is constantly being stolen from hospitals by criminals all over the world. If the electronic fence is in place, an alarm sounds as soon as the tagged technology crosses this invisible threshold.

STRESS IS REDUCED

For nursing manager Birgit Liehr, who has been in the job for 48 years, 38 of which have been spent in emergency medicine, the new locating technology is an invention whose benefits confirm what she already knows thanks to her experience: “Throughout the world, there is always productive chaos in certain clinical areas.” Flexibility and the ability to act according to the situation always take precedence in an emergency department, which is why people here want to spend as little time as possible clearing equipment away or searching for it. Visilion is designed to help in precisely this area. Initial studies show that the system can cut the time spent searching by up to two-thirds – time that benefits the patients and also reduces costs and stress. ◀

Where exactly am I? This is a common question that not only tourists ask themselves while gazing at the map. It helps to look at the smartphone here: one of the satellite positioning systems like GPS immediately knows the answer and marks the location as a spot on a virtual map. It is calculated from the time it takes the different signals to arrive from at least three satellites. Satellite signals do not always penetrate enclosed spaces. Anyone who wants to determine their own location – and that of objects – in buildings needs a different technology, such as the Visilion locating system. The backbone here is not provided by satellites, but rather mini radio devices, so-called observers, positioned at strategically important points. These work with an energy-efficient form of the Bluetooth short-range radio, which will be familiar to people in their homes in the form of wireless keyboards, for example. Then there is the Bluetooth Low Energy (BLE) version, which uses a tenth of the transmitting power, not only saving energy, but also providing additional safety in settings sensitive to electromagnetic

interference, such as hospitals. Where professional Wi-Fi access points don't already offer BLE, the network for Visilion can also be set up, expanded, and optimized using Wi-Fi-based observers in plug sockets. The second Visilion components are the little modules known as tags, which are fitted to the devices that need to be located. Both components communicate in an encrypted manner via BLE. The tags respond when requested to do so by the observer. Several observers positioned in various locations simultaneously receive the signals and evaluate their strength. Generally speaking, the smaller the distance between the tag and observer, the stronger the signals. Algorithms use the various signal strengths to calculate the position of the tag with an accuracy of two to three meters. This is achieved by adapting the entire system to the physical conditions. The results of the measurements are available via the cloud on logged-in end devices (such as smartphones or tablets). The data can also be evaluated in many different ways in order to optimize the use of resources, for instance.



If you have any questions about the system or would like further information, simply scan the QR code – and send us an e-mail.