Rainer Ihra (left) and Dr. Attila Römer at the Sensor+Test, Nuremberg (Germany)

Another Breakthrough the Wall with Sensors

DISTANCE SENSOR TECHNOLOGY – A new system from Metirionic measures through walls and detects objects or people very accurately via standard circuits. Dr. Attila Römer, CEO and founder, and Sales Manager Rainer Ihra explain the capabilities and possibilities of the technology.

Dr. Römer, please tell us about the history of Metirionic and why the company was founded.
Römer: It all started at a time when sensor networks were really big and we were thinking what use is the information from a sensor in a wireless network if you don't know where the reading is coming from. Especially when you're talking about very large networks. More and more the question arose where the measured value comes from.

In addition, a sensor is subject to maintenance at some point and after replacement it does not end up in the same place as before. An industrial hall with many valves or pressure sensors then easily becomes unclear and it is difficult to locate the individual units.

Our company name is composed as follows: Metiri comes from Latin and means „measurement" and on IC means „on the circuit" in English, so in its entirety „measurement on the circuit". So our name says it all.

Are there any milestones on the way to the Mars 2.0 highlight that you will be presenting at Sensor+Test?
Römer: We wanted to develop a measurement method that was not yet available at the time of our founding, and that worked with standard circuits as far as possible. The idea was to develop a proprietary system based on the solutions of the time, such as Wireless Hart or Zigbee, in order to locate firefighters in the area of operation, for example, or to remotely control robots.

After that, the idea was to achieve greater market penetration with an existing standard. That's why we decided to use Bluetooth, because this radio technology was already very widespread. That's why we became a member of the Bluetooth SIG and are represented in several committees for what is now called channel sounding, because it is about the representation of sounds.

What we are showing is a kind of preview of what will be possible in channel sounding in the future. We are able to measure distances with standard circuits. And we can do this with a level of accuracy that has never been seen before. Existing solutions such as field strength devices from the Corona app, on the other hand, only provide estimates.

What makes us particularly happy is that Metirionic has turned ten years old. It's great that we are currently successful on the market and have set our sights firmly on shaking up the market with new ideas over the next ten years. Channel sounding is slowly coming into the standard, you can do point-to-point measurements and think ahead in the direction of passive radar. There will be a lot of new things from us in the future.

To this end, can you please explain how your new measuring solution works?
Ihra: The basis is the 2.4 GHz frequency, with its great advantage is to be able to measure through walls and work throughout a building. That's why it's so well suited for firefighter use, by networking individual firefighters. Infrared sensors can't track them through a wall, though, but we can. Even in an earthquake zone or avalanches, we can locate any Bluetooth-enabled mobile device. This will soon be possible on all

operating systems, such as iPhone, Android or with smart watches.

Römer: The buzzword for the measuring method is secondary radar, but usually only primary radar is known, as it is used in the military. There, the reflection of emitted signals from objects is measured, which quickly leads to inaccuracies. In the secondary variant, however, there is a counter station. So you know exactly who is responding, and the distance can be determined much more precisely because the sensor node is known exactly. And I can also transmit sensor data on humidity, temperature or various gases via the existing data channel.

Ihra: Many suppliers sell a large number of sensors for one customer and then, when servicing is required, the operator no longer knows where his devices are located in large industrial plants. With our solution, operators can see exactly where the sensors are located.

Römer: The same applies to actuators in heating systems, which can be regulated quickly and easily throughout the building with our solution. This means that no installer has to climb up any ladders and search for the actuators to make an adjustment. Layoutplans are often no longer correct, but with a tablet and our solution, the operator gets an up-to-date representation of located actuators at any time.

Is this also the principle that is so strongly applied in intralogistics?

Römer: Absolutely. Because warehouse operators always need to know where a particular good is located. Conventional methods use satellites or anchors that serve as a reference for measurement. These are needed, but our Bluetooth circuits are very power efficient, cost less and are very effective. You could equip each pallet with one of our tags, and so with each sensor brought in, new reference points are created and a mesh network is formed. The wireless nodes can communicate with each other and measure distances. The more objects there are in the warehouse, the more precise the location determination becomes. A kind of swarm with a common intelligence is formed. One member can tell which others are around them. This is an essential difference to classical radio methods such as UWB, where the aim is to measure as many reference points as possible at the same time.

Ihra: Forklifts can also be tracked in this way, as can the goods they deposit somewhere in the warehouse. This creates an additional reference point. With our solution, the deployed sensors can be converted into infras-
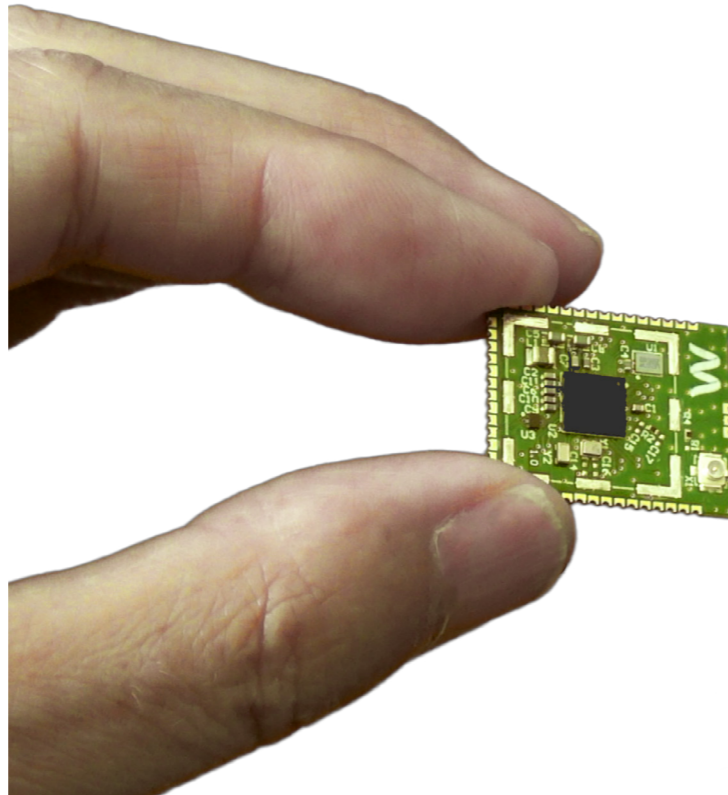
The Mars 2.0 has a very small form factor

tructure devices so that they no longer just produce data, but also measure the distances to each other.

An interesting field of application is robotics and your solution should also be able to become active here...

Römer: As a company, we make our technology available. We develop it and offer the technology to our customers. The end products belong to our customers with the Metirionic solution they have integrated. Among other things, one of them builds industrial remote controls and there the emergency stop switch must work safely. In the past, the cable limited the range for each robot; today, in the wireless era, one hand-held device is sufficient for several robots. However, the operator must always be able to reach the emergency stop button in time if a fault occurs that can also cause injury to workers. In this case, our technology determines the distance and gives an alarm when the maximum distance is exceeded. We support our customers in complying with all industry standards and certifications, which cover all safety-relevant parameters and ensure robust operation without interference from other radio systems. The quality must be the same as when using a cable. And we can provide this in full, even with redundant systems.

Ihra: Our system can be monitored very well and can document all data movements via a built-in data log-

Locating people after earthquakes or avalanches is a core application of the new system

ger. In this way, the correct handling of the remote control can be proven in the event of an accident. Römer: Another advantage of the channel sounding method is the multiple use of channels in order to measure enough sounds and to ensure the quality of the results with high probability even despite occurring interferences and to evaluate the measurement as valid. On the other hand, it can also be concluded that there is not enough confidence in the measurement and that a repetition is necessary. We can thus provide our customers with quasi condition monitoring.

What would you describe as the USP of your solution?

Römer: We fit the entire technology into an extremely small form factor, with all the necessary components such as button cell, electronics and radio antenna. We want to show our customers how small we can make such a solution for precise distance measurement and what it can do. The variety of applications is only limited by the end customer's imagination. Thanks to the tiny chip, it can be easily integrated everywhere. One example is the rescue of buried victims by an avalanche, because it also fits into a smartwatch that you carry with you in the mountains. Previous Bluetooth-based positioning systems only emit a single tone, which has to be laboriously localized using an antenna system and triangulation. In the future, this can certainly be solved better and more accurately, and perhaps our technology will soon be the mandatory standard in this case. We are ready to work on this.

Ihra: Another application idea is for manual workers to tag their tools with a tiny little tag so they know when they leave a job site to have all their tools in the cart. This way, they can make sure not to lose the expensive items. Another application idea is for manual workers to tag their tools with a tiny little tag so they know when they leave a job site to have all their tools in the cart. This way, they can make sure not to lose the expensive items.

Author: *The interview was conducted by* **Michael Kleine**

Images: *Cover image Michael Kleine, others Metirionic*

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Technical-Background

Video Showcase

Video Technology