

Radar system can recognize and track people and objects in room

March 21 2023, by Niklas Goll



The polyurethane ceiling unit equipped with four radar modules. Credit: Fraunhofer-Gesellschaft

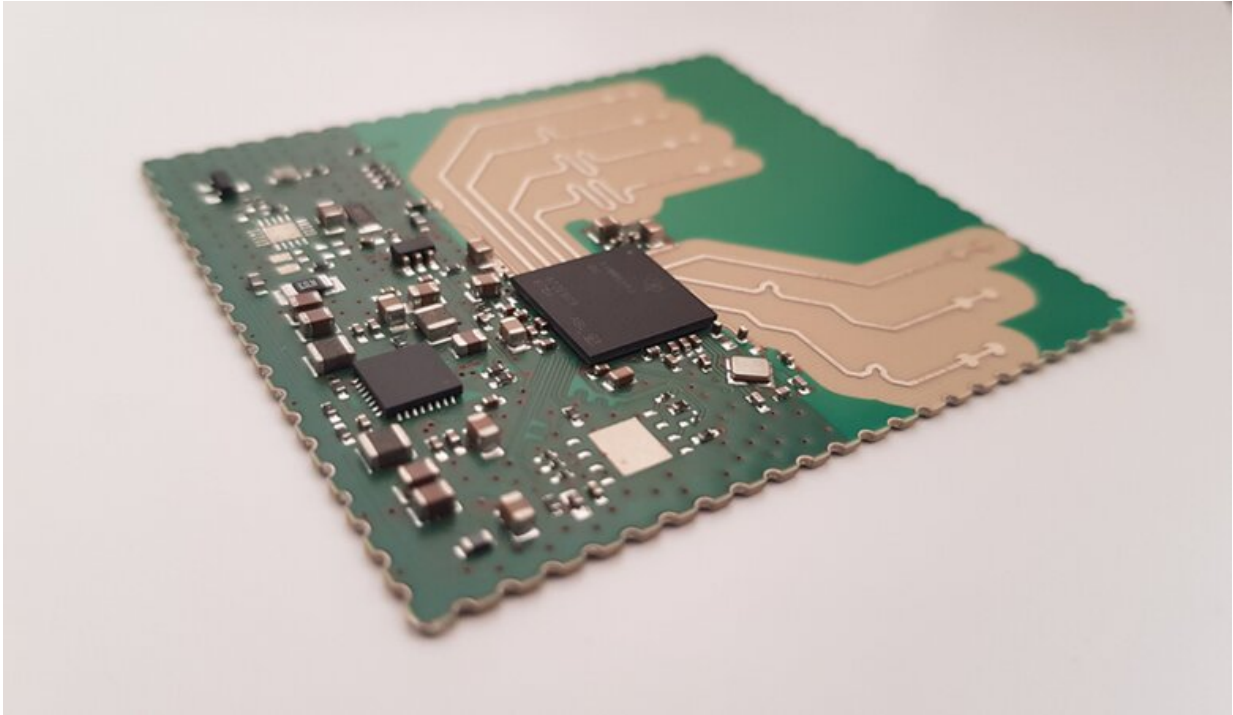
Recognizing when senior citizens are at risk in the home or helping them find misplaced objects they presumed lost: The technology developed in the successful OMNICONNECT project can help people lead independent lives for longer. The researchers of Fraunhofer IZM have integrated a miniature radar system into an LED ceiling light that can

track and recognize movement patterns and locate people or objects in a room.

Four radar modules are combined to ensure full 360° coverage. AI algorithms work through the collected data to identify whether a person in that range has suffered a fall, with the [radar system](#) being able to track more than 30 people in spaces of up to 1600 square feet with an angular resolution of 12°. And for added object detection capabilities, passive transponders were developed to work with the radar system.

Supported by the Ministry of Education and Research, the OMNICONNECT project has brought together researchers from the Fraunhofer Institute for Reliability and Microintegration IZM with partners from Berlin and Oldenburg.

Their mission: To develop a miniature radar system that can detect [medical emergencies](#) or other situations that require a caregiver's intervention, while respecting the privacy of the users. By contrast to cameras or CCTV systems that record images, the system only tracks patterns of movement. It is integrated into a ceiling light, making it easy to install, unobtrusive, and easy to accept for the people living with it.



MIMO radar module. Credit: Fraunhofer-Gesellschaft

The system works with AI-supported radar modules and passive transponders that can be placed on different objects, thus for the first time enabling the tracking of movement and location with a single radar system. The transponders work as frequency-specific [radar](#) targets, with each resonating at a known frequency. This turns them into uniquely identifiable beacons that the system can scan for and whose precise location can be calculated by checking the time needed for the signal to bounce back.

The data is processed on site by a field-programmable gate array or FPGA, a tiny computing system with integrated processor. It shares the object and motion data with an AI-based system that can recognize movements and patterns, developed by the computer science researchers

at the OFFIS Institute of the University of Oldenburg. To control the app and identify specific options, a special app interface was built by HFC Human-Factors-Consult GmbH.

The demonstration unit designed and constructed at Fraunhofer IZM has undergone live trials and proven its ability to detect an object's position with an accuracy of five centimeters in a ten-meter range. The demonstrator is currently being used by the project partners in several possible use cases. The data it collects can be used to produce certain [movement patterns](#) of typical behaviors and, with enough meaningful data available, feed into possible assisted living applications or be used to recognize certain incidents. The position data could be used to check whether the detected person is feeling well or whether a medical or care intervention is indicated.

Provided by Fraunhofer-Gesellschaft

Citation: Radar system can recognize and track people and objects in room (2023, March 21) retrieved 9 April 2024 from <https://techxplore.com/news/2023-03-radar-track-people-room.html>

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