



# TomolD: Room Scale RFID Tomography for Indoor Localization

TECHNOLOGY NUMBER: 2022-297



## OVERVIEW

A real-time, multi-user tomographic localization system known as TomolD

- Uses low-level communication channel parameters to create probability heatmaps of user's locations
- Provides accurate location capabilities for stationary or moving users

## BACKGROUND

Device-free localization methods allow users to benefit from location-aware services without the need to carry a transponder. However, conventional radio sensing and imaging approaches using active wireless nodes require wired power or continual battery maintenance, limiting deployability. Attempts have therefore been made to use technologies such as Wi-Fi, Bluetooth, or ambient signals to locate an individual in a specific geographic setting. The goal would be to analyze variations and patterns in the signals received to accurately estimate a user's location to provide personalized recommendations, contextual notifications, or optimized navigation. So, an need exists for alternative approaches that enable flexible and scalable deployment of radio sensing and imaging technologies.

## INNOVATION

Researchers have discovered a real-time, multi-user ultra-high frequency (UHF) radiofrequency identification (RFID) tomographic localization system. The technology, known as TomolD, uses low-level communication channel parameters such as received signal strength indicator (RSSI), radiofrequency phase (RF), and Read Rate to create probability heatmaps of user's locations. The heatmaps are transferred to a custom-designed signal processing and machine learning pipeline to robustly locate users. Study results show that TomolD provides accurate location with an average mean error of 17 cm for a stationary user and 19 cm when they are walking and

## Technology ID

2022-297

## Category

Hardware

Engineering & Physical Sciences  
Semiconductors, MEMS, and  
Electronics

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moving. The device also demonstrates multi-user tracking with an average mean error of 40 cm and 72 cm with two and three users. Ultimately, TomoID enables a scalable, easily deployable, and minimally intrusive method for locating uninstrumented users in indoor environments.