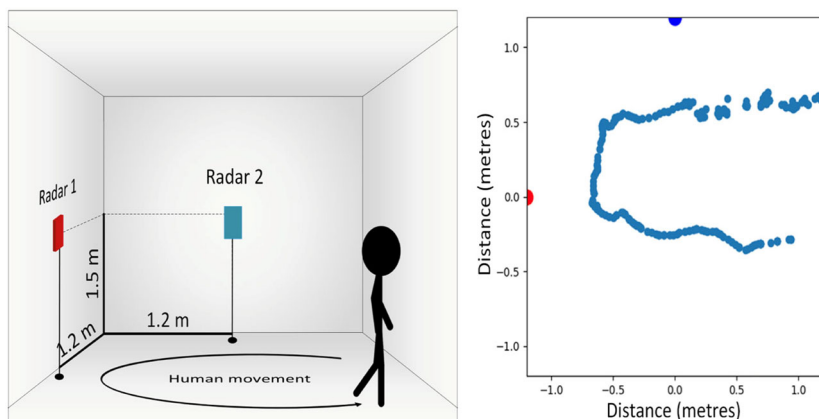# Non-intrusive Human Activity Recognition

BRISTOL INNOVATIONS

A millimetre-wave (mmWave) radar system for human detection that overcomes intrusion and privacy concerns associated with cameras



## Problem

Human activity recognition (HAR) is used for monitoring people in environments such as care homes, hospitals, workplaces, and lifts. Many HAR systems have been proposed, incorporating recent developments in sensor technologies and machine learning techniques. However, such systems most often rely on cameras, sensors, and wearable devices, or a mixture thereof, to analyse human behaviour. Whilst these methods achieve outstanding performance in gesture and posture recognition, the use of cameras raises privacy concerns and requires good lighting conditions.

## Solution

Researchers from the University of Bristol have developed an HAR system using multiple millimetre-wave (mmWave) radars located in different positions, in order to detect multiple objects simultaneously, and increase the data output of monitored objects to increase the accuracy and reduce false alarms. Not only are these mmWave sensors less intrusive, but they can detect speed, postures (standing, sitting, lying and so on), movement direction, and proximity in a far broader range of light conditions than the current state-of-the-art camera systems.

*Relevant publication*:
H Cui, N Dahnoun (2021). High Precision Human Detection and Tracking Using Millimeter-Wave Radars, *IEEE Aerospace and Electronic Systems*, 36(1): 22-32

## Key Benefits

- Less intrusive than current camera systems

- Low cost, high accuracy

- Operates in real-time

- Operates in any light condition, including at night, and in vapour, fog, steam, and smoke

## Applications

- Geriatric population monitoring, including heart rate detection

- Human activity monitoring in low light or smoky environments

## IP Status
Patent pending: WO2022130350

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