

## Detection and classification real-time of fall events from the daily activities of human using forward scattering radar

### ABSTRACT

Detection and identification of various human activities that have concurrently performed by two individuals or more is a crucial task of elderly assisted living systems. Fall is the biggest problem which may threaten the older people's life aged 65 and above, therefore, the real-time detection of human activities and classification of fall events is required whether in their houses or in the health care institutions. This paper presents a Forward Scattering Radar as a monitoring sensor for the real-time categorizing features of falls from the non-fall activities. The spectrogram representations are utilized for analyzing motion characteristics, while, based on the short-time Fourier transform features, the support vector machine has been used for classification operations. An indoor experiment was carried out to emulate the sitting on a chair of the older and forward falling down event, where 50 trials were fulfilled by 5 adults for each activity. The analysis results indicated that the Forward Scattering Radar has a pretty good ability in detecting of the daily activities and classification of fall from the different overlapping activities. The preliminary classification results have revealed a noticeable classification performance of the fall event when the two activities, the forward falling and sitting on a chair, are happened simultaneously.

**Keyword:** Elderly fall detection; Forward scattering radar; Time-frequency domain analysis; Support vector machine; Real-time classification