

Public Abstract

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Title:INTELLIGENT FALL DETECTION SYSTEM FOR ELDERCARE

Fall among elders is a main reason to cause accidental death among the population over the age 65 in United States. The death rate caused by fall is rising dramatically over the last decade. The fast response and corresponding medical intervention could improve the outcome on the patient significantly. Studies show that 90 percent of adults above 65 prefer to stay in their residence as they age. The fall detection methods have been brought into scene by implemented on different fall monitoring devices including both of wearable and non-wearable sensors in many researches.

Due to the advantages in privacy protection and non-invasive, independent of light comparing to other sensors, I design the fall detection system based on Doppler radar sensor. In this dissertation, I explore different Doppler radar sensor configurations and positioning in both of the lab and real senior home environment, signal processing and machine learning algorithms for fall detection.

Firstly, I design the fall detection system based on the data collected with three different configurations: two floor radars configuration, one ceiling and one wall radars configuration, one ceiling and one floor radars configuration in lab. The performance of the sensor positioning and features is evaluated with different classifiers. After the system moves to the real senior home, an actual retired community, I investigate the system by evaluating the detection variances and difference caused by training dataset due to the variable subjects and environment settings.

Moreover, I adjust the automatic fall detection system for the actual retired community apartment. I examine different features. I also improve the fall detection performance with both pre-screener and features selection for the senior home data. I fuse the radar fall detection system with motion sensors. I develop a standalone fall detection system and generate a result to display on a designed webpage.

These results of the proposed methods are quite promising. This system could help nursing staff better understand information of the health status as it relates to falling for senior residents. In this way, seniors can be more healthy and safer in their independent living.