Audio based home monitoring system for the elderly

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The pending retirement of the baby boom generation will severely tax the elderly care support system. In particular, there will be a lack of qualified personnel to provide home care and also insufficient space in elderly care facilities. One way to ease this burden is to ensure that elderly individuals feel comfortable and confident living independently at home until later in life, with minimal personal assistance. This work pursues a technological solution to address these topic by developing an audio-based automatic home monitoring system. The essence of this observation system is that it can employ audio sensors to passively observe an elderly person who is still living independently and raise an alarm if an event occurs that requires attention (e.g., change in day and night rhythm, a fire starts, etc.). Thus, the proposed system can help lessen the amount of time a human caregiver will need to spend monitoring an individual.

Current technology allows making cheap, wireless and compact audio capturing nodes. So many nodes can be placed inconspicuous in the living area of the elderly. In comparison to a one channel system a multiple channel system can obtain a signal with better quality and spatial information about its origin.

The overall goal of this work can be split up in a set of subgoals being a) obtaining relevant acoustic information using a Wireless Acoustic Sensor Network (WASN), b) locating sound sources using the WASN signals, c) improving the signal quality (by multichannel processing), d) clustering of sounds e) detecting abnormal sound sequences. Different to what is typically seen in the literature this research is focusing on system integration (combine state-of-the-art algorithms into a working entity) and practical issues concerning this system (including lock synchronization, building up the wireless network, choice of microphones and error handling). Moreover, design choices will be based on experiments conducted on real-life data.

Keywords: *Home monitoring, Wireless Acoustic Sensor Network, Abnormality detection.*