The utilization of IOT technology in the study of communication between people with dementia and their caregivers

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Background Deteriorating communication ability of people with dementia is reported as a major cause of care burden. Caregivers' avoidance or inappropriate communication with dementia people reinforce agitation, anxiety and social isolation of dementia people and worsen their psychological and behavioral symptoms (Paquay et al., 2007; Williams et al., 2009). Notwithstanding the importance of sympathetic and effective communication based on Person-centered care, a desirable communication model has not been established (Levy-Storms, 2008). Thus, it is demanded to collect and examine the communication between dementia people and their caregivers in the natural setting and be feedbacked to caregivers to enhance their communication attitude and skill. **Purpose** 1. Seek for the possibility of using IOT technology in the study of communication between dementia people and caregivers. 2. Evaluate the vocal communication by caregivers within the Person-Centered Care framework. **Methodology** 1. An Arduino-based device was made to record and transmit the dialogue into the server. For human voice-sensor recording and real-time transmission was programmed with ftp type. 2. The small size of the devices were hung around the necks of two dementia people living in the nursing home with permission of their families. The informed consent of caregivers working in the nursing home were also acquired. Recording was done through 2~3 hours a day in the morning in the living room. The recording was prohibited in the private places of dementia people. The audio was transcribed into text scripts with help of Naver voice recognition program and manual transcription in part. Then, the text was quantitatively and qualitatively analyzed within the 5 principles of PCC theoretical frameworks: warmth, inclusion, attachment, identity, and occupation. **Results** 1. The device was manufactured for the purpose of data collection and transmission. 2, Data shows there was a great shortage of communication between two parties as caregivers in the nursing home rarely talked to dementia people. In the cases of talking to them, the theme was task-oriented and concerned only physical caring, feeding, bathing and diaper change. 3. By qualitative analysis under the Person-Centered Care framework, caregivers showed warmth, attachment, and recognition. However, some caregivers withheld the demand of dementia people, making fun of them and treating them with a patronizing attitude. There were other Personhood-depreciating communication patterns; intimidation, invalidation, and objectification. **Discussion** 1. Technological approaches are sometimes useful in the studies of understanding and analyzing the demands and needs of dementia people. Arduino-based network voice recorders are cheap and easy to manufacture, which can be widely used for training caregivers. This study shows the possibility of cheap and easy technology to relieve the burden of caring and increase the quality of lives of dementia people. 2. This study reveals non-PCC communication in the nursing home which desperately needs improvement. Caregiver's attitude and skills on communication with dementia people should be educated and coached based on Person-Centered care.
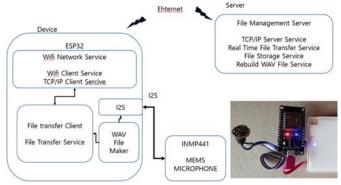
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The system consists of a server and a device which has a MEMS Microphone INP441 and a microcontroller unit. Voice is transferred to Micro controller unit ESP32 using I2S communication protocol. ESP32 Microcontrollers have a WI-FI function to configure its own wav file transfer client service. Wav files are made from the receiver of MEMS Microphone and transferred to the server(left). The voice data was analyzed quantitively using Gold wave program(upper).