別紙２

Results report

１．Title of Research and Development: Teleassistance for Seniors with Dementia – A Novel Concept for Safety

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４．Results of Research and Development:

We designed a tele-assistive system for the elderly with mild dementia so that they can walk outdoor safely by support of remote caregivers through the Internet. In order to realize the system, we focused on three elements as research topics; 1) development of a navigation system for elderly walking, 2) development of a health management system based on biomedical signals, and 3) development of a remote assistive system. These developments have been done through user studies.

1) Development of a navigation system for elderly walking

- Navigation display system with LASER light onto real surfaces

  We have implemented visual information display systems with LASER light onto surfaces by using walking aids or pendant typed wearable devices (Fig. A1, A2). We confirmed that it is not practical under the strong sunlight and it has a possibility to be dangerous due to the elderly behavior with LASER. As a result, we moved on the different method that is the development of smart MEGANE (“Megane” is the Japanese name of glasses).

- Smart Megane with LED lights for navigating the elderly

  We put LEDs on edges of glasses and designed the lighting patterns (Fig. A3). In addition, we re-implement the glasses to reduce the weight (Fig. A4). Through user studies with young and elderly participants, we confirmed that it has possibility to be a navigation system for walking out although there is a necessity of redesigning some lighting patterns. Our system could show that it is one of the methods to support the elderly to walk out safely.

2) Development of a health management system based on biomedical signals

- Sensor vest: wearable biomedical signal sensor

  It is easy to recording electrocardiograms with sensor vest, while conventional electrocardiographs require to attach several electrodes onto the subject bodies. We investigated the qualities of sensing signals from sensor vests, and validated the quality was enough good in standing and lying position (Fig. B). Also, we confirmed that the quality of signal will be declined in walking.

3) Development of a remote assistive system

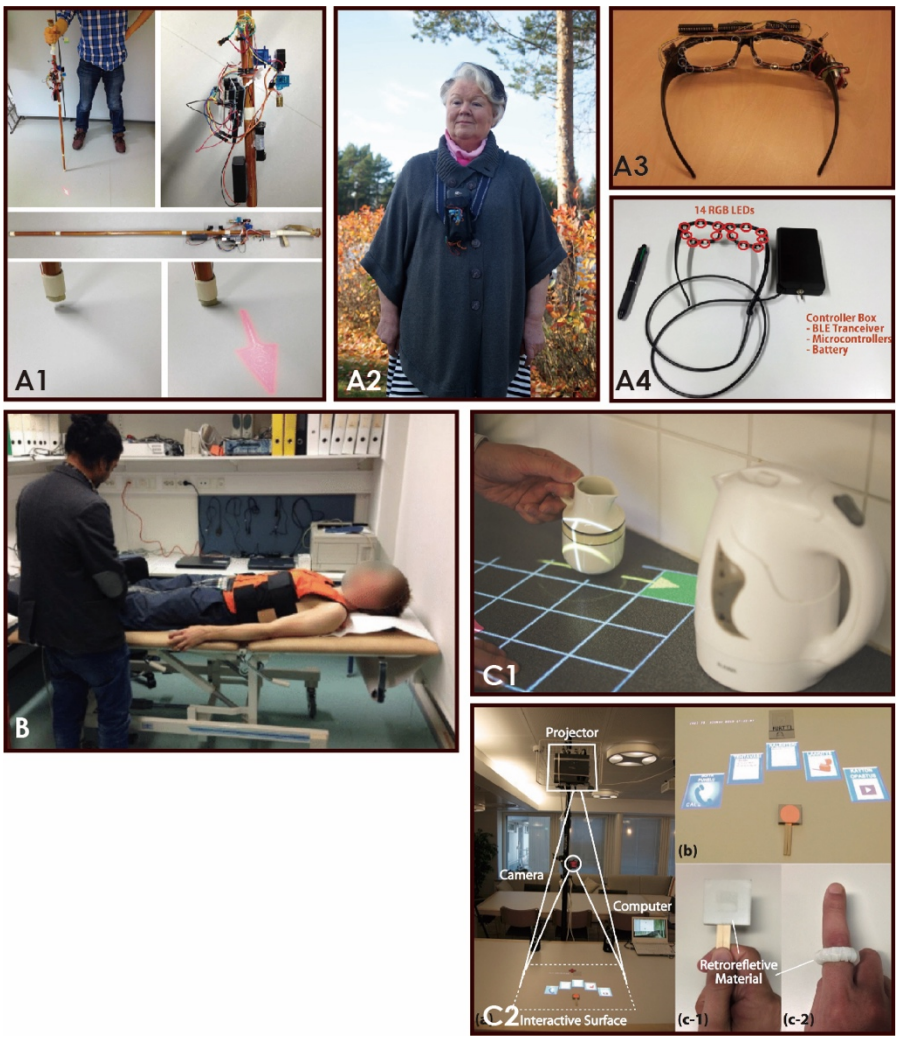
- Projection visual information displays

  We can show visual information onto active spaces of the elderly by using a projector. In this view point, we have developed projection systems for kitchen activity as one of the elderly working location. We have implemented a projection system that displays assistive information from the remote caregivers, and a projection system that provides input interfaces for the elderly to use (Fig. C1, C2).

- Promoting communication with the remote assistance

  We focused on increasing communication which might have possibility to reduce the symptoms of dementia. As our target situation, there is a main task and we were trying to make the elderly speak out by giving

additional information. Then, we tried to find a suitable trigger as additional information, words, through user studies. We implemented an experimental system with several types of words, then conducted user studies with young and elderly participants. As a result, we confirmed that the participants tend to speak out more when showing question form than memorial information.



Our system. A1: Cane-type navigation system, A2: Pendant-type navigation system, A3: Smart Megane (first prototype), A4: Smart Megane (light model), B: Sensor vest, C1: Projection remote assistive system, C2: Projection visual input interface.

In addition to the research and development such as above, research exchange was located important activity in this program. Therefore, we have exchanged some students and researchers every year positively. Also, we collaborate with each researcher and publish/make presentations at some international conferences. We believe we achieved the purpose for research exchange enough. In addition, we could expand our network to connect to other researchers through international conferences.