

Title	独居高齢者の自立性を向上させるスマートスピーカーを利用した見守りシステムの提案
Author(s)	王, 晶
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# **A Proposal of A Monitoring System Using Smart Speaker to Improve Autonomy of The Elderly Who Live Alone**

WANG Jing

School of Knowledge Science,  
Japan Advanced Institute of Science and Technology  
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**Keywords:** the elderly who live alone; caregivers; families; independence; life rhythm; status check; abnormalities; smart speaker; monitoring system; voice call.

In recent years, the increasing population of the elderly has become a severe problem in Japan. To assist the elderly to have a better life and help the families or caregivers to keep on getting the information from the elderly, a lot of monitoring systems have been studied. But a lot of tasks are still remained. To finish the tasks, this study is purposed to propose another monitoring system using smart speaker, especially for the elderly who live alone.

The proposed system consist of two parts. The first one is to gather the conversation when the elderly is talking to the smart speaker. The second one is to gather the response from the elderly to the voice call from the smart speaker. The voice call is aimed to help the elderly who live alone to keep their daily routine and notice them the important things that they are easy to forget, such as taking medicine and so on. By these two kind of data we can get to know what the elder usually does in their daily life and analyze to know their daily routine. After that, we can get to know once they do anything not usual (eg. Sleep late) and take a measure in time. Also, the voice call from the smart speaker can keep or improve the elderlies' independence by keeping them in a routine.

To prove that, in this study, 4 elderlies who live alone (among whom 2 are using visit

nursing service and the other 2 are not) are asked to help to do the experiment. Several companies have developed their own smart speaker based on their different competency, in this study, Amazon Echo is selected to do the experiment for its variety of product lines and the widest range of skills. During the experiment, the elderlies are asked to use the Amazon Echo for around 1 month, and their daily life about sleep and diet are incurred to set up the voice call from smart speaker. The conversation happened between the elderly and smart speaker are all recorded on a cloud. After the experiment, their caregivers or their families are interviewed to evaluate the data collected during the experiment. The valuation is about what kind of information is included in the log (or no information), and whether the information is effective or not.

Except for one of the participants in the experiment didn't use the Amazon Echo because he didn't want to "follow the order" from the machine, the other 3 participants used the Amazon Echo in their daily life. By analyzing their data remained in the cloud, their life rhythm can be known and informed to their caregivers or their families. After understanding the elderlies' life rhythm, it is easy to detect the abnormalities in their life. For example, if they had dinner at around 19 o'clock, although they usually finish their dinner at around 18 o'clock, it can be assumed as that something happened during the day (although it doesn't have to be bad things). From the previous data, caregivers can check what happened during the day, and if they can't get the information from the previous data they can call the elderly.

To confirm the amount and degree of effective data, caregivers and families are asked to evaluate each data by interview. The majority of the data are evaluated as effective and among them a large amount of data is evaluated as very effective since a lot of them cannot be detected by the physical sensor only. Using these data, caregivers can make a reference when they make the future care plan for the elderly. And for the families, by knowing more information about the elderly they obtain more prompt to get a touch to the elderly. Not only when they find something abnormal happened, but also when they get to know the details of the elderlies' daily life. Such as if they find out that the elderly went to participant the year-end party, they would like to call the elderly and ask about some more details about the party.

From the interview of the elderly, it is known that the elderly will pay attention to the voice call from smart speaker and try to follow the schedule of the voice call. And also, the smart speaker can urge them to obey their life rhythm, sometimes when they are trying to omit or

simplified their diet. This shows that it is possible for this proposed system can keep or even improve the elderly's independence by keeping them in their life rhythm.

But there are still a lot of difficulties remained to develop an ideal proposal monitoring system. For example, the voice of the Amazon Echo is accepted differently by different participants. Or the voice call can surprise the elderly since it doesn't have a cushion for the elderly before the voice call start.

Although there are still a lot of difficulties need to be gotten over, the result of the experiment showed that the monitoring system using smart speaker has a big possibility for the assistance to the elderly who live alone in the future.