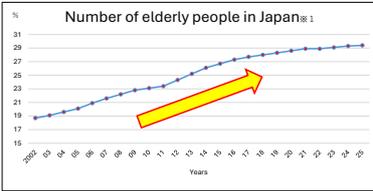# Let's Save the Elderly with Programming!
— Digital Innovation for a Better Aging Society —

Okayama Gakugeikan High School
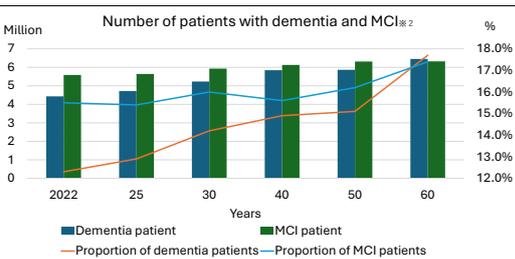
Introduction

• The Current State of Aging in Japan

Number of elderly people in Japan[1]

Looking at the graph, the proportion of elderly people in Japan is increasing. This year, the proportion of elderly people has risen to 29.4%.

• Current Situation of Patients with Dementia and MCI

Number of patients with dementia and MCI[2]

Despite the increase in the elderly population, the proportion of patients with dementia and MCI is also rising.

• Current Situation of Medication Accidents[3]

According to the Consumer Affairs Agency, a total of 318 reports have been received to date regarding accidental ingestion by people aged 65 and older. Many of these cases involve not only "forgetting to take medicine" but also accidentally putting things like medicine blister packs, dentures or fillings, and cleaning agents or bleach into their mouths.

• Solution?

If we create a medication management system using a microcontroller, could it reduce accidents caused by taking medicine

Objection

Eliminating deaths of elderly people with dementia due to forgetting to take their medication

Research1
medication management system

• Creating a program

When the program starts, it notifies the elderly with lights and sounds that it is time to take their medication. Once they notice and press the button, the lights and sounds stop, and the motor activates to open the box. The program can be configured to play any type of music, allowing you to use either music they dislike to quickly catch their attention or music they enjoy as a pleasant reminder—both approaches are effective. By preparing the medication in the box beforehand, we believed it would help prevent the accidental ingestion of anything other than the intended medicine.
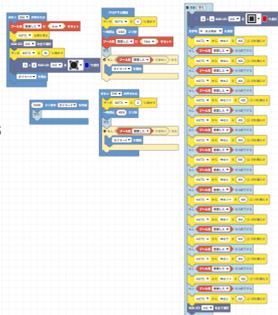
Research2
Development of a Medication Management System Equipped with a Microcontroller

I 3D-printed a motor mount to make a commercial pillbox open automatically when the program starts.

Draft of the motor mount
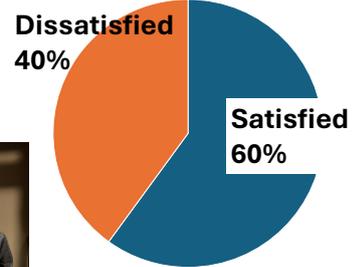

Commercially available pill boxes

Demonstration Experiment

Details

- 10 elderly people with dementia
- One person for one week
- I had them use it and answer a survey.

Result
User Reviews

Dissatisfied 40%

Satisfied 60%

Feedback

Good points	Bad point
It was nice because I could make it my favorite music.	It was a bit inconvenient because I could only put one type of medicine in the box.
The light made it easy to see.	The button for opening it is a little small.
It's easy because you just have to press a button, even when you're busy.	It was inconvenient that I couldn't carry the box.
It reminds me to take my medication, so I don't forget anymore.	It was inconvenient because I couldn't use it when I wasn't at home.

Conclusion and Future Research

• Conclusion

I think the overall evaluation from the elderly was good. However, during the experiment, we only had one box, so it took a lot of time, and it couldn't be used by multiple people at the same time, which made me realize the limitations of commercially available box. Other challenges that were raised included making the box portable and allowing it to hold more than one type of medicine.
So, we decided to make the boxes from scratch using a 3D printer ourselves because, in terms of helping more elderly people, it is more reasonable and productive to create them ourselves.

Layout of a box made with a 3D printer

• Future Research

By making this box, we were able to increase the types of medicine that can be placed in it. In the future, we want to have people with dementia try the boxes made with a 3D printer, make them portable for practical use, and continue researching them.

References
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※2 Ministry of Health, Labour and Welfare, Future projections of the number and prevalence of elderly people with dementia and mild cognitive impairment (MCI), https://www.mhlw.go.jp/content/001279920.pdf?utm_source=chatgpt.com, the 4th of December 2025
※3 MedDevice Regulatory Affairs Portal, Regarding the 81st Report of the Medical Accident Information Collection Project, https://blog.rso.or.jp/ 医療事故情報収集等事業第81回報告書について/, the 4th of December 2025