

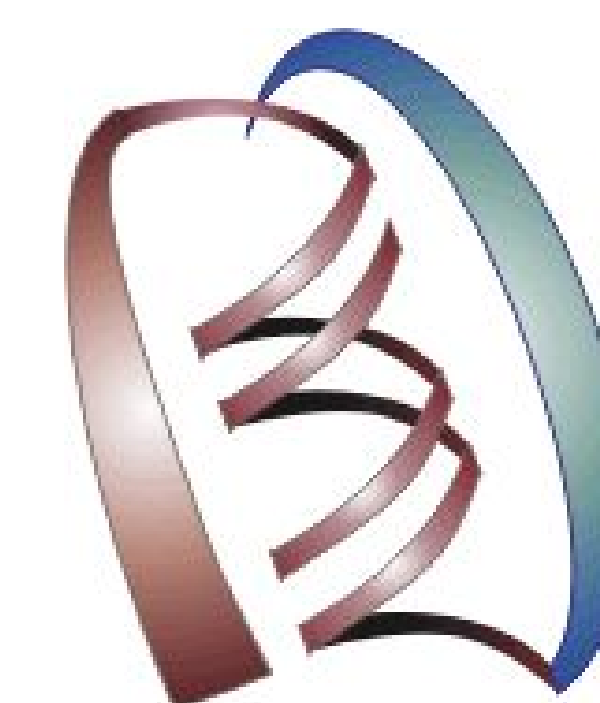


MedBot-Home: Automatic Medication Dispensing System

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Motivation

- Medication organization and administration has become a growing issue in the United States for older adults (65 and older)
- ~30% of hospital admission of older adults are drug related
 - >11% due to medication noncompliance
 - 17% related to adverse drug reactions
- Noncompliance includes forgetting to take medications or improper administration of the drug – both behaviors that may be present in either healthy or ill elderly individual

Current devices:

- Have a limited web interface that prevents elderly adults from documenting their given medication
- Require presorting medication
- Frequent monitoring of device



Fig 1. TabSafe with refilling cartridge

Market Analysis

Of the 46.2 million older adults in the United States...

40% - 75% do not comply with their medications.

18% feel comfortable using a new device on their own.

77% feel comfortable using a new device with guidance.

Target Market

4 - 15 million older adults

How the device works

Goal: Increase patient independence, increase compliance, and better follow-through on taking prescribed medications

Solution:

- A device that sorts and administers medications to the patient at the appropriate time in an easily accessible location, such as the kitchen
- MedBot-Home achieves this through a web application and home device

1. Schedule medications in website and track symptoms/reactions to medication



2. Load up to 6 medications into device by pouring into specified pill container

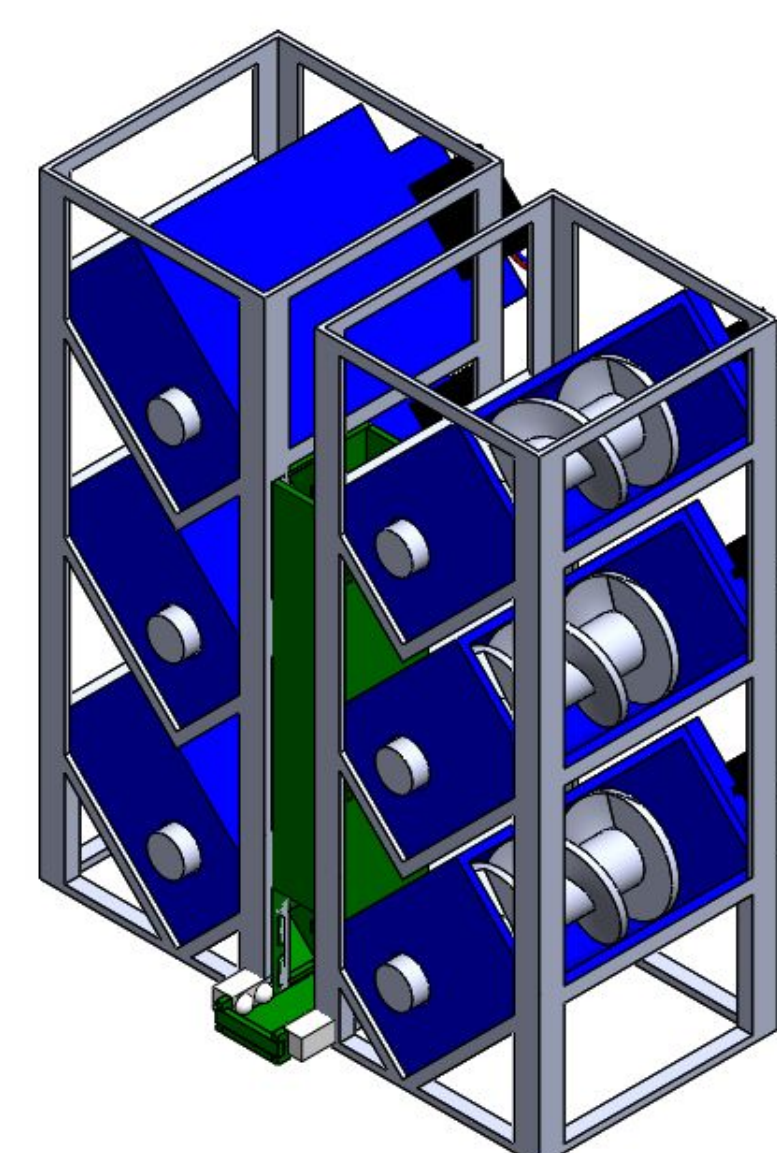


Figure 2: Medication dispensing system for several medication types

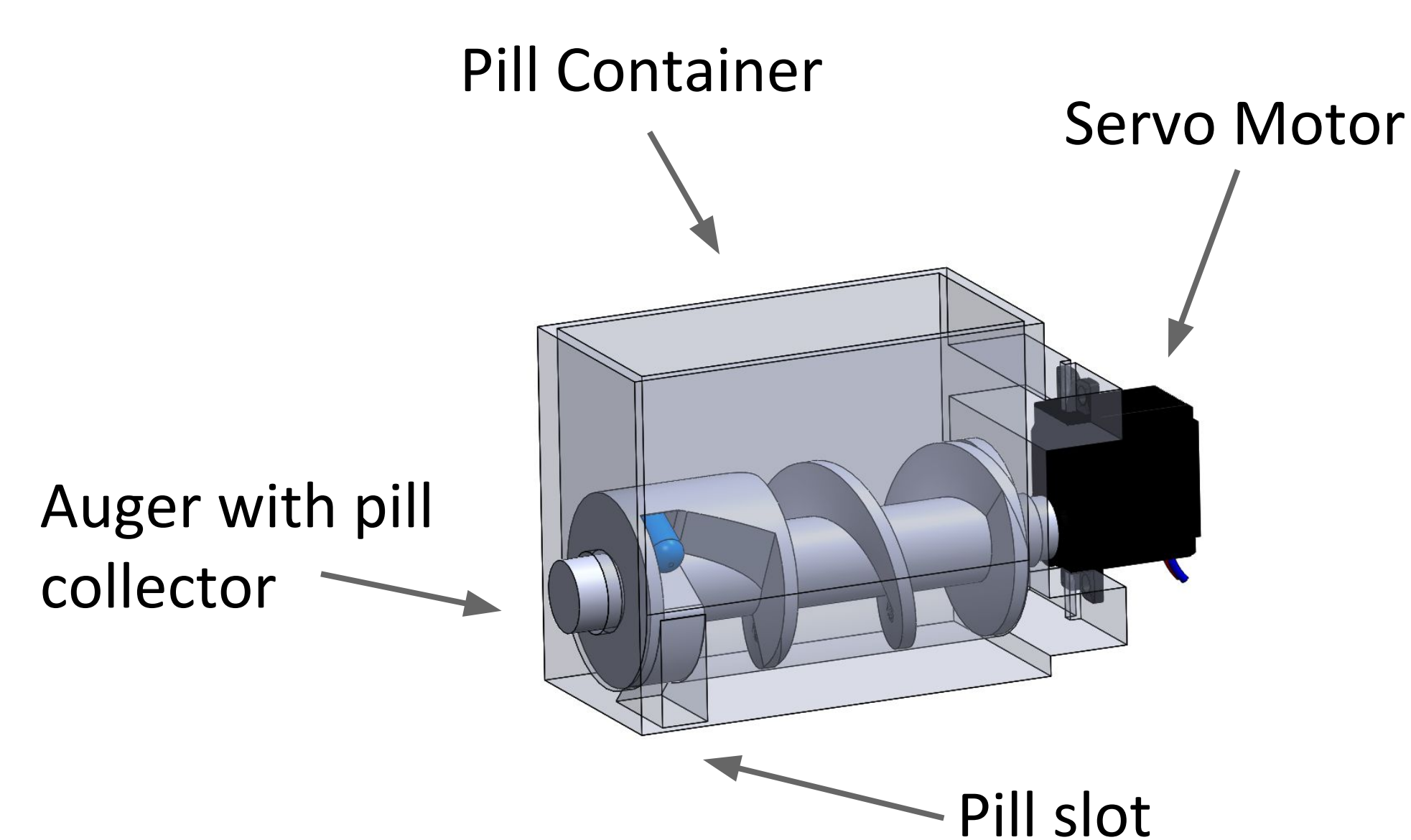


Figure 3: Dispensing mechanism for single medication type

3. At scheduled time, system alerts the patient, specified servo motor is activated, and auger is rotated
4. A pill falls into auger pill slot and falls down pill chute
5. An IR break beam reads that pill has dispensed and servo motor turns off

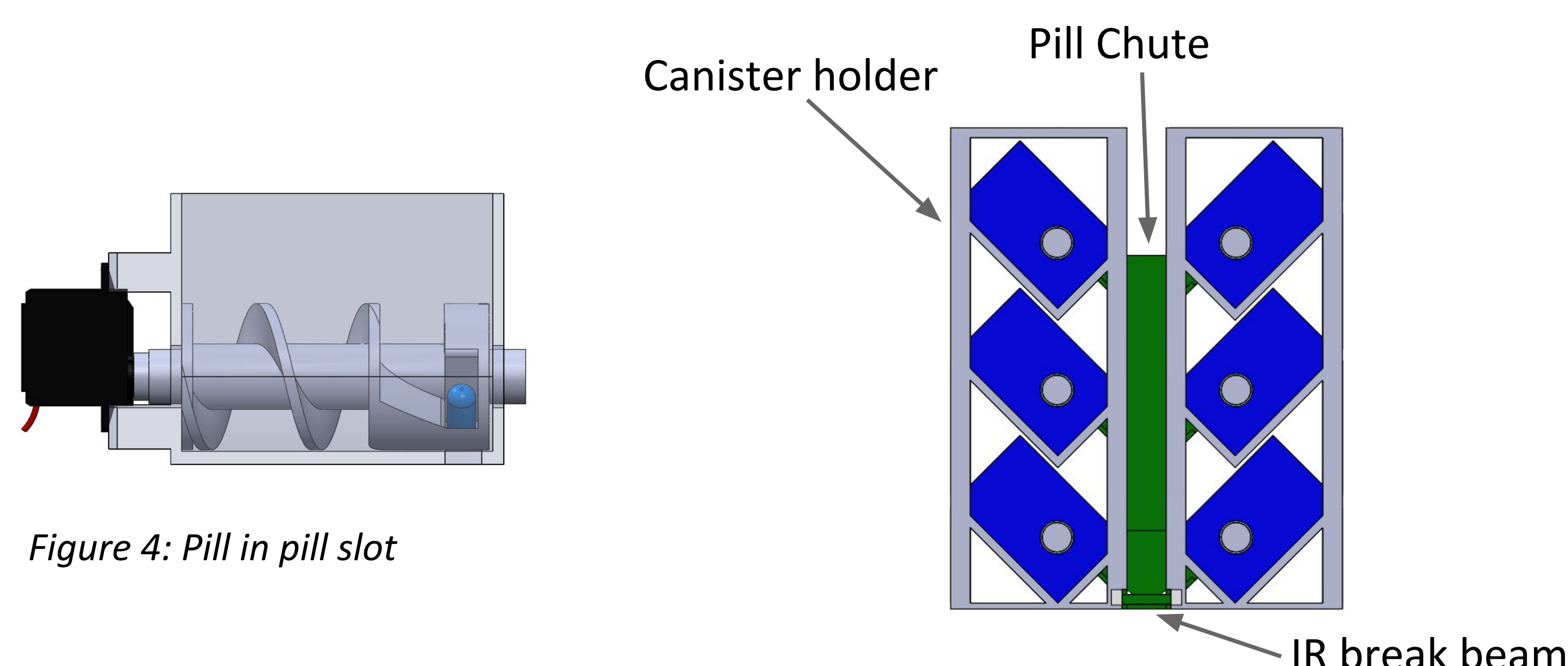


Figure 4: Pill in pill slot

Description of Design

Software design:

- Raspberry Pi 3 used to connect website backend to on-board scheduler
- Scheduler selects motor to turn on at predetermined time, allowing the pill to be dispensed
- Requires external power source

Website design:

- Offers patients or caretakers ability to edit or add new medications and track symptoms or reactions to medications
- Information stored in a database that can be accessed by the Raspberry Pi 3

Hardware design:

- User inputs up to six medication types and dispensing system works to dispense the desired number of pills and the desired pill types at treatment time

Reimbursement

Unit Name	Unit Price (\$)	Required Quantity	Total Cost (\$)
Raspberry Pi 3	35	1	35
Adafruit 16-Channel 12-bit PWM/Servo Drive - I2C Interface - PCA9685	14.95	1	14.95
Continuous Rotation Servo - FeeTech FS5103R	11.95	6	70.71
IR Break Beam Sensor - 5mm LEDs	6.50	1	6.50
3-D Printing Costs	~50.00	1	50.00

Cost per unit is \$177.16

References

- [1] An aging nation: the older population in the United States.
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- [3] Selected long-term care statistics.
- [4]Yap, Angela Frances, Thirumoorthy Thiru, Kwan, Yu Heng. Medication adherence in the elderly. *Journal of Clinical Gerontology and Geriatrics, Volume 7, pages 64-67.*

Acknowledgments

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