Design Competition
2nd Monthly Update Meeting

Wednesday, November 30, 2016 | 7-9 PM
Booker Conference Suite, Room 2512
Announcements/Reminders

- Letter of Intent - due **Thursday, December 15**!
  - Submit [here](#).

- Next Senior Meet & Greet, **Friday, January 13** - Mark your calendars!
  - Senior Citizen contact info - cannot be provided outside of structured events!
  - Contact Zvinka if you need help identifying other means to connect with seniors: [zzlatar@ucsd.edu](mailto:zzlatar@ucsd.edu)
Hardware Primer for Design Competition

November 30th 2016
ATmega328P-Xplained Mini
Arduino Compatible!

The ATmega328P Xplained Mini board is fully Arduino compatible.

The board’s layout supports the Arduino R1 Shield and can be used directly in the Arduino IDE.

Also includes the mEDBG on-board debugger!
Arduino Zero
Arduino Compatible!

Arduino with ARM Cortex-M0+
- Directly Arduino IDE compatible
- Use with Arduino R1 shield form factor
- Exact same hardware configuration as (aforementioned) WINC1500-XSTK kit:
  - SAMD21 ARM Cortex-M0+
  - Built in EDBG debugger
  - One USB serial/programming port
  - One USB port for your design

You essentially get 2x Arduino Zero boards in one kit. The WINC1500-XSTK and the Arduino Zero board.

This means you have 2x ARM Cortex-M0+ processors with built in C/C++ debugging capabilities to play with!
Mikroelectronika “Click” board form factor.
Lots of functionalities to choose from!

Key Features
- Compact, credit card-sized footprint offers flexibility during the prototyping phase
- On-board PIC16F18855 MCU supports a wide range of applications
- MikroBus Expansion Header with over 180 off-the-shelf options for adding functionality to your design
- Integrated drag-and-drop programmer with USB interface—no drivers required
- Analog potentiometer and push-button switches for user input
- Integrates seamlessly with MPLAB Xpress Cloud-Based IDE and MPLAB Code Configurator for the quickest development cycle

Get Started Now
Getting started has never been easier. Simply point your favorite web browser to http://MPLABXpress.microchip.com, plug in your MPLAB Xpress Evaluation Board and begin building your next award-winning design.
WINC1500-XSTK
C/C++. Good for wireless connectivity!

**SAMD21 Xplained Pro board:**
- Atmel SAMD21 ARM Cortex-M0+
- Three Wing Board Connectors
- Built in debugger

**ATWINC1500 Xplained Pro Board:**
- Atmel WINC1500 Wi-Fi module
- Communicates via I2C with SAMD21 Xpro board

**Wing Board Connector:**
- Allows for connection of Wing Board modules
- 16-pins available per connector

**IO1 Xplained Pro Board:**
- SD Card reader
- Temperature Sensor
- Light Sensor
What your team is getting?

Training Workshop, early January 2017 (6th or 9th)!
→ Covering Arduino and advance debugging topics
→ Distribute hardware to all design teams
→ Stay tuned for announcement from Nikki
→ Register by December 15th!

Primary Contact
→ Y.C. Wang (yuchung.wang@microchip.com)

Professional design kit, one set per registered team!
→ ATmega328P-Xplained Mini → Arduino Zero
→ WINC1500-XSTK → JTAGICE3 Debugger
→ MPLAB Xpress Board

You get multiple Arduino compatible boards, WiFi Connectivity, Cloud support (PubNub), low-power small form factor prototyping, development in Arduino, C/C++ and professional debug capability!
Keys n Knobs

2nd Monthly Update Meeting
November 30 Design Competition
2016-2017

Melissa Ngu
Aman Gupta
Kellie Liu
Christie Marquez
Keyue Xia
Ellen Yang
Enrique Zavala
Background

What do we already know/assume about senior citizens?
Interactions with Senior Citizens

Meet & Greet with UCSD Retirees

- Met and interviewed three different seniors

Meet & Greet with La Costa Glen Community

- Met eight different seniors
Follow Up

Conducted to clarify and build upon interview responses from senior citizens

- After evaluating their responses as a team, we emailed the seniors.
- For input that was not immediately recalled by seniors, they were asked to participate in a diary study.
- We will analyze the outcomes of these diary studies and further distilled our HCWs.
Mobility

- How can we help those in wheelchairs maintain mobility?
- How can we help those in wheelchairs improve mobility?
- How can we help those in wheelchairs get around their homes if they live more easily?
- How can we improve their mobility?
- How can we help those in wheelchairs improve their mobility?
- How can we help those in wheelchairs maintain their mobility?

Health And Meds

- How can we improve senior citizens' health?
- How can we help senior citizens stay healthy?
- How can we help senior citizens with exercise and physical health?
- How can we make it easier for senior citizens to take their medicines even when away from home?
- How can we help senior citizens remember to take their pills regularly and consistently?
Project Ideas
Impact

- A product that can make taking medication an enjoyable experience at an affordable cost
- A product that can help senior citizens pick up small objects from the ground without forcing them to bend.
- A portable, glow-in-the-dark product that can help senior citizens with diminished vision and motor skills open doors.
Thank you!
Team SevenZeroThree

Alexander Khoury - EE
Craig Ives - EE
Connor Devaney - COGS
Timothy Han - EE
Vincent Tang - EE
Tyler Richard - EE
Eric Waters - EE
Ben the Bassist - PHYS
Carmel Fiscko - EE
Interactions with Senior Citizens

- Attended Meet & Greet at La Costa Glen
  - Met nine different seniors
- Feedback from senior relatives
Problems Observed

- Falling
- Medication Reminders/Distribution
- Reaching high shelves
- Bad posture with walkers

http://www.learnnottofall.com/content/fall-facts/why-seniors-fall.jsp
Project Idea - Shuffle/Fall Detection

- Sensor in the shoe designed to detect shuffling and falling
  - Additional sensor may be required for detecting falling
- Warns user of walking patterns that could potentially lead to falls or trips
  - Establishes a baseline of the seniors walking patterns, and detects deviations from that.
  - Possibly incorporates machine learning
- Sends request for help when a fall is detected
- Sensor is paired with a notification device
  - Open to suggestions!
- Detailed data analysis available to professionals/relatives if requested
  - Record data in background
Impact

- Reduced falling incidents as a result of shuffling
- Help seniors learn to avoid unsafe walking (shuffling)
  - Improves gait over time
  - Possibly useful to researchers as well
- Help seniors be more comfortable with the benefits of wearable technology
  - Sensors are integrated as an attachment onto their daily outfit, such that they don’t have to think about using our technology.
Smart Guardian

Team Members: Ammar Babikir, Joshua Hernandez, Vicky Guan, Naveen Kashyap, Michael Tran, Brian Lazaro Wuerstle, Blake Morris

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Problems Observed

1. Difficulty in communicating what injuries are to medical/health professionals

2. Current medical devices do not give detailed “injury reports”

3. Many medical devices today → Seniors do not want to wear them because they look big, bulky, unattractive and makes them feel self-conscious
Interactions with Senior Citizens

Meet & Greet with UCSD Retirees

Met 5 different seniors

Meet & Greet with La Costa Glen Community

Met eight different seniors

Meet & Greet with Casa De Manana Retirement Home In La Jolla, CA

Separate interview times have been set up with each of these seniors.
Project Idea

- Lightweight, automated, wearable device that automatically reports injury due to impact.

- Fashionable, stylish, attractive
Impact

A product that is all encompassing to better monitor physical injuries occurring within the geriatric community. On top of the obvious implications on senior citizens’ safety and sense of security, having access to this data would allow for a more human centered approach when designing spaces for the elderly. We would become more aware of their specific physical needs and therefore more able to address them.
Thank you!
Team Little Einsteins

Tori, Ming, Woen, Adrienne, Jack, Yuka
Interactions with Seniors - Senior Citizen Meet & Greet (10/28)

- 5 seniors interviewed
- Casual, Q&A interviewing in groups of students to one senior
- Summary of Interviews
  - Aging well and independent
  - Seniors are very involved in the community
  - Excited about technology and very willing to be involved with the teams
  - Have some physical limitations (depth perception, hearing), but does not oppress their independence
Interactions with Seniors - Brookdale Senior Living

- 6 seniors interviewed
- Interviewed some in groups and some individually
- Topics of our interview questions
  - Experience living at Brookdale
  - Worries, concerns, reservations
  - Hobbies, interests
  - Involvement in community, contacts with family
- Observations
  - Many had difficulty hearing and carrying conversations
  - Caretakers were constantly attending to their needs and pushing them around
  - Many events throughout the day but difficult to keep them engaged
  - Many of them liked having stuffed animals, dolls, or cats by their sides
## Main Problems Observed

<table>
<thead>
<tr>
<th>Lack of companionship</th>
<th>Assisted care</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seniors need a companion or some stimulation from their environment</td>
<td>Caretakers need to know when they are needed</td>
<td>Seniors need a way to move around on their own</td>
</tr>
</tbody>
</table>
Project Idea - Companionship, Environmental Stimulation

To address issues of loneliness, boredom, and overall mental health

Proposed solutions:

- Communal pets
- AI/Responsive stuffed animal
- Make friends with people who might live near them (caretakers, peers)
Project Idea - Assisting caretakers

To improve the life of seniors in retirement homes by assisting the caretakers.

Proposed solutions:

● Color coded display/lights/siren on wheelchair that alerts caretakers
● Guide dog that can alert caretakers
● Robot that understands when elderly is facing problem, can remotely alert caretaker
Project Idea - Mobility

To address problems of mobility and lack of independence.

Proposed solutions:

- Wheelchair that can change vertical height
- Controller for wheelchair (with added features?)
- Beeping cane that judges height/depth
Impact: Companionship, Environmental Stimulations

- Seniors need a companion or some stimulation from their environment because it’s good for their mental health
  - With companionship and environmental stimulation, seniors receive the necessary mental stimulation
  - Our solutions seek to increase the amount of interaction of elderlies with animate objects (pets and responsive animals) and increase the frequency of interacting with other human beings.
  - More interaction, more environmental stimulations!
Impact: Assisting caretakers

- Caretakers need to know when they are needed
  - Because seniors are more prone to injuries, it is necessary for them to be able to contact help as soon as possible or for the caretaker to be notified right away so that the problem can be addressed right away
  - Our solutions try to address the lack of effective communication between the elderly and his/her caretakers in such critical situations
  - Life saving notification systems
Impact: Mobility

- Seniors need a way to move around on their own
  - Mobility gives people a sense of independency because the elderly want to be able to do things by themselves (i.e. walking, driving, etc.)
  - However, many obstacles are present for elderly to be capable of moving around at their will (i.e. constraints of a wheelchair, physical strength)
  - Our solutions seek to apply technologies to assist the elders or provide them safe methods that enable them to be more mobile
Thank You!
Team Boba

Jimmy Quach, Weley Lin, Wilson Tran, Anne Le
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Interactions with Senior Citizens

- Three seniors from Casa De La Manana
- Grandparents/Parents
- Senior Care Takers (Family, Friends, Staff)

Questions We Asked
Problems Observed

- Lack of physical activities
- Boredom
- Want to see family
- Physical/mental health
- Desire for independence
Project Idea
Impact

Improving physical activity has a positive correlation on mental activity regardless of age. Our goal is to make seniors healthier, happier, and hearty.

Source 1

Source 2
“If you can’t do it, ADAPT IT”

Thanks for watching!
Team Members: Danny Lim, David Chang, Jarnin Fang, Justin Chou, Tarun Pasumarthi
Problems Observed

- Body health problems
- Mental health problems
- Falling
- Medicine organization
- Mixing medication
- Infectious diseases
- Use of cane/wheelchair
- Vision problems
- Lack of technology use
- Reducing hand-eye coordination
- Loneliness
- Retirement home inconvenience
- Travel/transportation
- Scams (Phone, TV, Internet)
- Fire & burns
- Airway Obstruction

And much more..
Regret
Nostalgia
Loneliness
2 Interactions with Senior Citizens

- Meet & Greet with La Costa Glenn Community
  ➢ Met several different seniors

- UCSD Shiley-Marcos Alzheimer’s Disease Research Center
  ➢ Weekly support group for Early-Stage Alzheimer’s patients

- Volunteering at Emeritus Senior Living
  ➢ Recreational activities with senior residents
  ➢ Interacting with seniors at memory care unit
Project Idea

App/website that allows seniors to record private and permanent voice or video messages for their friends and family
This product allows a senior citizen to easily leave a permanent legacy behind for their loved ones.
Thank You!
Team Magicians

Team Members: Junru Ren, Jiali Xie, Xingshen Zhang, Qixin Ding, Ruijia Cheng, Xiangyu Zhao, Jiani Huang, Shuangli Zhou, Yifei Zhang

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Interactions with Senior Citizens

Meet & Greet with UCSD Retirees

- Mr. Charles, Mrs. Russakoff, Susan

Meet & Greet with La Costa Glen Community

- Met nine different seniors

Plans for future interaction

- In-person separated interview for specific scenarios
- Diary study
Problems Observed

1. Problem in depth perception e.g. hard to detect how deep a staircase is
2. Need reminders for taking medicine, when & which
3. Problems when bend to pick up things
4. Uncomfortable body posture when using walker
5. Problem in deciding whether today is good for driving or not
6. Problem in standing up from chair/sofa/bed
7. Using and learning new technology
Project Idea

(Wearable) device that can sense depth of staircases etc. and provide feedback to the user about the depth information
Impact

A product that help senior citizens to live a safer and more self-supporting life
Thank you!
Project Purple

Team Members: Leanne Go, Michelle Phan, Maria Zavala, Christina Huynh, Jennifer Chan, Kelli Iwamoto

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Problems Observed

1. Memory
   - Being lost
   - Confusion
   - Everyday activities become a struggle

2. Transportation
   - Do not trust themselves, and do not trust others (Uber or Lyft)

3. Loneliness
Interactions with Senior Citizens

Meet & Greet with UCSD Retirees
- Met three different seniors

Taking care of residents with alzheimer's and dementia
- Certified nurse assistant

Interactions with our own grandparents
Project Idea

A purple, wearable device geared towards people diagnosed with Alzheimer's

Reminders for:
- Going to the bathroom
- Taking medication
- Eating
- Family members

Location and medical history storage (when lost and alone)
Impact

It will allow those with Alzheimer’s to maintain a semi independent lifestyle and allow ease of mind for their loved ones.
Thank you!
Senior Solutions

Team Members: Jason Barr, Eric Richards, Mingqi Shen, Yuluo Du, Jan Eric De Castro

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Problems Observed

1. Falling (esp. in the bathroom)
2. Reaching
3. Hearing
4. Forgetfulness
5. Transportation
6. Communication and schedule planning
Interactions with Senior Citizens

Meet & Greet with UCSD Retirees

- Met four different seniors

Meet & Greet with La Costa Glen Community

- Met six different seniors

Separate interview times have been set up with each of these seniors and at additional retirement communities around La Jolla.
Process

1. Wrote problems we observed on sticky notes
2. Grouped problems into common themes
3. Formed questions and identified “how can we...” statements based on problems observed
4. Selected questions that we thought to be most common/pertinent
5. Attempted to get more details in follow-up interviews
Project Idea

How can we prevent seniors from falling in the bathroom?

Detachable suction cup handle that is strong enough to support seniors’ weight but easy enough to detach from surfaces.
Impact

Eliminate falls in the bathroom and save lives.
Thank you!
KiWi Team Members:
Geeta Asuri, Maya Azarova,
Michelle Hernandez, Gulmira Mustapaeva,
Kien Nguyen, Devon Stanfield

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Problems Observed

1. Hearing challenges
   a. Background noise is extremely distracting
   b. To converse comfortably seniors need proximity and for the speaker to be facing them

2. Memory
   a. Harder to remember new facts, especially unfamiliar names
   b. Need reminders for scheduled tasks, appointments, medication

3. Motivation to stay curious and keep learning
   a. Have to find and create new ways of exercising the brain
   b. Many people play games like words with friends, bridge etc. Some learn new skills using DVD or audio courses

4. Dexterity, range of motion
   a. Typing especially on smaller devices like phones
   b. Holding a hair dryer up, brushing hair: both need to raise the arm high
Problems Observed continued...

5. Mobility
   a. Challenging to get up from a seated position, e.g. from a seat or out of a car
   b. Sitting for a long time like for a long car ride can cause uncomfortable muscle spasms
   c. Seniors give up playing sports like tennis, golf and skiing due to muscle tears or joint pain

6. Walking
   a. Shuffling when tired; not good as it can increase probability of falls
   b. Need to scan ahead and mentally plan the path
   c. Tendency to overestimate the ability to walk a certain distance; need to rest on the way

7. Falling
   a. Many seniors spoke about this as a concern and welcomed ideas about preventing falls
   b. Universally accept that effort to maintain and improve strength and balance is important
Interactions with Senior Citizens

Meet & Greet with UCSD Retirees | October 28
● Met 2 seniors

Meet & Greet with La Costa Glen Community | Nov 12
● Met 7 seniors, obtained contact information for 4 others

Discussion after Thanksgiving meal | Nov 24
● Reconnected with 3 seniors who are also family members and excited to be part of this competition, planning further meetings and discussions with them

Discussion & Lunch at UCSD Faculty Club | Nov 28
● Discussed our top ideas with 5 seniors. Received suggestion to get feedback from physical therapists who work with seniors
Upcoming Interactions with Senior Citizens

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La Costa Glen | Dec 10
- Provide updates to at least 5 seniors on product ideas already discussed with them.
- Get further feedback on our product functionality.
- Observe their daily routine tasks onsite and participate in their activities for the day.

Discussion & Lunch at UCSD Faculty Club | Dec 13
- In process of arranging another meeting with seniors.

Ongoing communication with all seniors via email
Project Idea 1

A multipurpose cane and/or walker.

- Sense and warn about changes in elevation ahead: uneven pavement, poorly marked step, rug with edge folded over etc.
- Integrated source of light for poorly lit areas with on/off switch
- Self-standing
- Detection of falls and/or poor gait to alert a caregiver that help is needed
Impact

The multipurpose cane will improve mobility for seniors by addressing the challenges they face while walking

1. Gives a higher sense of comfort and safety while walking
2. Increases their independence while walking without supervision or assistance.
3. Enhances safety at night due to integrated LED lighting
4. Provides higher mobility and engagement with the community and friends
Project Idea 2 & Impact

Up-n-go: a device to assist seniors to stand up from a seated position and sit down on a sofa, chair & etc.

- Rotatable, portable, easy to fold up and carry around
- Customizable with different sizes, finishes, and designs

This device addresses a challenge that many seniors face multiple times a day

1. Improves quality of life
2. Increases mobility and ability
3. Enhances ability to function independently
Thank you!
Older & Wiser

Team Members: Breanna Leahey, Alaina Bujtor
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Problems Observed

1. Lack of Motivation
2. Not enough Exercise
3. Health Problems
4. Lonely
Interactions with Senior Citizens

- Spoke to grandparents (4)
- Spoke to senior at work (1)
- Plans for interviewing seniors at the Vi La Jolla
Project Idea

Activity monitor!

- Can be easily attached to walkers & canes
- Tracks steps & heart rate
- Allows user to set exercise goals
- Simple LED interface to track progress
Impact

- Will encourage seniors to be more active
- Seniors can set daily goals for motivation
- Studies have shown that exercise can help in preventing chronic diseases
- Exercise releases endorphins that improve mood
Thank you!
Team HKN

Team Members: Christian Koguchi, Michelle Rodriguez, Lucas Tindall, Chenghao Gong, Richard Wan, Jeanette Nguyen, Sam Sunarjo, Paul Yoon, Joshua Ma

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The Aging Population

1. Senior Citizens
2. Baby Boomers
Problems Observed

1. Falling
   a. Injuries - Prevention/Mitigation/Recovery
   b. Slipping in Showers

2. Mobility & Walking
   a. Terrain
   b. Coordination
   c. Depth Perception

3. Hearing / Vision
   a. Worsens with Age

4. Memory
   a. Forgetting/Lost items
Interactions with Senior Citizens

Meet & Greet with La Costa Glen Community

- Active
- Independent
Solutions and Constraints

1. Facilitate Everyday Lifestyle
2. Simple and Small
3. Non-invasive
Project Idea

- Lose/Forget-Proof Devices
- Intelligent bed
- Magic Mirror
- exoskeleton/walking aid
Thank you!
ECE Design Project

Team Members: Wesley Chaffin, Michael Khorram, Lauren Lim, Nathan Danandeh

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Interactions with Senior Citizens

Meet & Greet with La Costa Glen Community
● Spoke with six different seniors
● Sent follow-up emails with more specific questions
● Individual interviews to be determined after Christmas break

General Interview Procedure
1. Daily Life
2. Needs and Problems
3. Comfort Level with Technology
Daily Life

Plentiful recreational activities provided by La Costa Glen Community
- Fitness Programs (yoga, stretches, running, walking, tennis, golf)
- Club Activities (art, bridge, board games)

Areas outside of LCG (rides provided via buses)
- Grocery store
- Casino

Other Activities: walking dog, reading newspaper, watching movies, traveling
Needs & Problems

Mobility
- Carrying heavy things, picking things up from floor
- Balance, falling, getting up (causing bruises and other injuries)
- Ineffective walkers, insufficient transportation options

Memory
- Name and face recognition
- Misplacing personal belongings

Motivation
- Not enough encouragement/discipline to be active
Comfort Level with Technology

Smartphones
● Commonly owned by LCG seniors
● Mainly used for basic functions (call, text, email, pictures)

Phone Apps
● Most seniors familiar with few other apps (stocks, weather, facebook)
● Few seniors familiar with more advanced apps (weight & movement tracker, news, subway routes, dropbox, language translations)
Concerns Regarding Target Audience

La Costa Glen

- Top Senior Care Community
- Includes multitude of activities, services, programs, events
- Provides menus for every meal
- Gives transportation to areas outside of community
Project Ideas

- Social fitness tracker
  - Encourages seniors to be motivated and interact with one another
- Personal belonging tracker
  - Help find missing items like jackets and purses with blinking lights and a buzzer
  - Tied to smartphone app
Impact

Enriching seniors’ lives by providing easy to use methods of solving commonly faced problems.
Team Hydra

Design Competition

- Astha Mehta, Shagun Gupta

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Problems Observed

Falling, Shoulder, Remembering food/medicines/where they kept things

Hearing and conversation, Reaching for things that are high up or low, Technology

Mobility, Vision, Getting in and out of cars, Companionship, Door knobs, Arthritis, Getting up from tables, Knees, Tremors
Interactions with Seniors

Meet & Greet with UCSD Retirees

• Interacted with 5 of the senior citizens in attendance with plans of individual meeting with all.

Meet & Greet with La Costa Glen Community

• Interacted with 8 of the senior citizens in attendance with plans of individual meeting with all.

Interactions with Seniors in daily life

• General observations in the bus or at events

Talked over phone with senior citizens in the family

• Plans to utilize the winter break for general observance and more in depth interaction with both family members and members of the senior citizen club in New Delhi, India.
PROJECT IDEA

A smart shoe clip on that prevents falling by restoring balance.
IMPACT

Our product aims to both alleviate the incessant fear of falling in the minds of the seniors and the financial loss incurred coupled with the anxiety of a long recovery process. It also helps seniors avoid the associated stigma with the use of waking sticks of “walkers”
Thank you!

Statistics from:
B shoe: http://www.b-shoe.com/balancing-shoes/
TEAM WELL PLAYED (WP)

2ND MONTHLY UPDATE MEETING WEDNESDAY, NOVEMBER 30.
DESIGN COMPETITION 2016-2017

Team Members:
Yilong Chen,
Yijing Li,
Xiaohan Liao,
Yilun Liu,
Yanjun Pan,
Pin Wang,
Yijun Zhang
Problems Observed

1. Forgetfulness
2. Too many medications to confuse the elders
3. Movements, standing problems
4. Spatial judgements
5. Lighting, hearing and communication problem
Interactions with Senior Citizens

Meet & Greet with UCSD Retirees
■ Met three different seniors

Meet & Greet with La Costa Glen Community
■ Met seven different seniors
Project Idea

The idea is building a small medicine box which detachable from a large medical pill dispenser that reminds and helps senior to take daily medications according to prescriptions. This medicine dispenser will also have reminder system with digital platform so that seniors won’t forget to refill their medicines.
Impact

- The product will help **solve the seniors’ forgetfulness problems** when taking and sorting medicines.
- The product will also **reduce the difficulties of sorting and storing medicines**.
Thank You