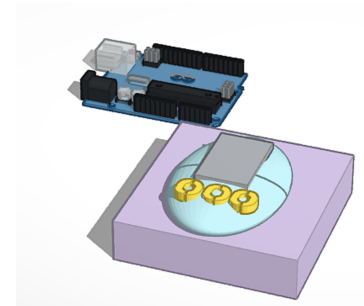


Accessible & Inclusive Data Capture + Display:

Creative Embedded Systems for Multi-Sensory Data Engagement

Team: Richard Lee, Ha Yeon Kim, Prof. Mark Santolucito

Client: Emerest, LLC



Aim: To discover how low-power, low-cost devices can be deployed in local communities to collect and display data effectively and inclusively.

Proposal: To design and implement a user-friendly, commutable device that enables active mood tracking and passive sound detection to observe patterns in general wellness and aural activity simultaneously. This device will utilize ESP32 with a T-Display module as well as external hardware components coupled with software to allow interaction and observation of collected data. This may ideally be integrated further into the senior care ecosystem as information for counselors, therapists, Emerest professionals, and loved ones to check in on how users are doing via permitted shared reports; subsequent studies correlating the audio and mental health metrics may be conducted pending prototype deployment and behavioral research approval.

Research Questions:

1. Can construction of an affordable, efficient, interactive device promote engagement of senior citizens with technology and personal data?
2. What constitutes accessible, user-friendly hardware and software design?
3. How may consistent mood tracking inform individuals of their own mental health and/or provide insight for professionals providing treatment?
4. Are there relative correlations between frequency of social engagement with reported well-being?
5. How might we construct a secure, trustworthy platform to promote an understanding and sharing of personal data (with regards to mood and social engagement)?

Timeline: 10 Weeks (June 31 - August 5, 2022)

Q1: Brainstorming phase - client research, literature review, component testing and budget finalization

Q2 (by July): Prototyping phase - choosing components, breadboarding, 3D printing

Q3: Design + Analysis phase -

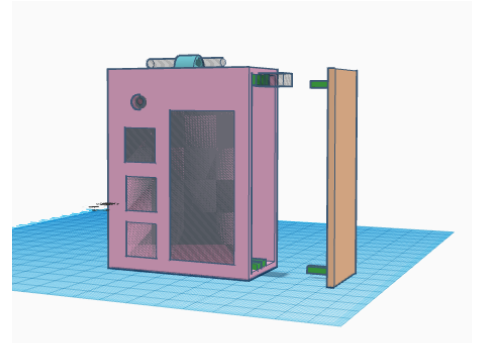
Q4 (by August): Preparation of deliverable - finishing touches for initial device (x2)

Budget: \$22 (ESP32+display) + \$3 (microphone) + \$10 (materials, manufacturing, components, software)
= **\$35.00** (estimated per unit, tentative)

Progress Update: Midpoint (June 30)

What we have so far:

- Hardware: ESP32 mechanism for several external buttons, speech detection via microphone, display testing
- Design: 3D printable model for enclosure, deployment plan for materials and add-ons
- Software: preliminary image/gif/video pushing, audio serialization



What we have to do:

- Hardware: solder board prototyping, energy consumption inspection
- Design: build towards final model; external stand + wearability optimization, customization, charging station, stickers, *user testing* (?)
- Software: tying it all together [ethos: collecting and displaying data effectively and inclusively]
 - Client side (ESP32):
 1. Local data storage (button clicks, audio capture)
 2. What do we want to display as an interaction incentive?
Ideas:
 - a. Digital pet?
 - b. Small visualization, progress bar
 3. Implementing selective hearing / display
 - Server side:
 1. Collecting from ESP32 sends (what and when to push externally?) and interpretation
 2. Data storage, database
 3. Data visualization (generative art?)
 4. Connection to Emerest
 5. Security

What we need help with: