Forget Me Not
Walking Stick
Final Project Presentation
Robots for Disability
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Age Related Memory Loss

- Forgetfulness can be a normal part of aging. As people get older, changes occur in all parts of the body, including the brain.
- About 40% of people aged 65 or older have age associated memory impairment—in the United States, about 16 million people.
- Some serious types of memory loss are: Amnestic Mild Cognitive Impairment (MCI), vascular dementia and Alzheimer’s disease.
- As a result, people tend to lose their valuables like wallet, key, phones, etc. Some cases of in-house neglect (e.g., in kitchen) also causes serious threat to oneself as well as the well-being of others living in the house.
What’s the Forget Me Not Walking Stick?

- A stand-alone walking stick that reminds/warns seniors suffering from any form of memory loss about all the important things in their home.
- Uses Raspberry Pi Zero controller to continuously talk to the iBeacons, that are placed on valuables, or inside an area of the house, like living room or kitchen.
- Can be used to remind if the user forgets valuables (mobile, wallet, keys) and safety aspects in the kitchen.
- When the user comes into proximity of the specific beacon and leaves, the Pi activates warning mechanisms to the user in the form of vibrations, light and sound.
Development

- iBeacon BLE setup with Raspberry Pi Zero
- Distance measurement from RSSI signal of the beacons.
- Haptic feedback to the user with vibration motors.
- Visual feedback with LEDs
- Piezo speaker for those with vision issues.
How it works
Features

Case 1:
- Stick is closest to the object:
  - LED, buzzer, motor are all off.
  - No warning is given.

Case 2:
- Stick goes halfway out of the room:
  - LED blinks 2 times, motor vibrates twice, no buzz.

Case 3:
- Stick is almost out of the room:
  - LED blinks thrice, motor vibrates thrice, buzzer gives a short beep.

Case 4:
- Stick is way out of the room:
  - LED blinks once and stays on, motor keeps vibrating, buzzer gives four long buzzes.
Design- Prototype
## Cost Analysis

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost ($)</th>
<th>Cost for Mass Production ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raspberry Pi Zero</td>
<td>4.99</td>
<td>2.99</td>
</tr>
<tr>
<td>Beacons (x2)</td>
<td>23.99</td>
<td>15.99</td>
</tr>
<tr>
<td>3D printing</td>
<td>10.00</td>
<td>3.00</td>
</tr>
<tr>
<td>Bluetooth 4.0 Dongle</td>
<td>5.99</td>
<td>3.99</td>
</tr>
<tr>
<td>Power Source</td>
<td>12.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Vibration motor</td>
<td>4.99</td>
<td>3.99</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>5.00</td>
<td>2.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>66.96</strong></td>
<td><strong>36.96</strong></td>
</tr>
</tbody>
</table>
Advantages

- Extremely easy to use with a very small learning curve.
- No need to have a smartphone.
- Plug and Play operation for use with additional beacons.
- Can be used by a person who is blind.
- Low cost microcontroller and components.
- BLE is highly energy efficient, beacons can go years before replacement.
- Dedicated on/off switch.
- Additional USB ports: charge other electronics.
Disadvantages

- Cheaper iBeacons drops broadcasting signals with too many obstacles.
- Highly accurate beacons are available, but are expensive.
- No audio output
Future Work

- Use better quality beacons.
- Interfacing with home automation systems.
- Interfacing with devices like Amazon Echo to remotely give voice outputs that could assist the users to be mindful of their surroundings.
Validation

Comments:

- Many related to the problem and felt the need for it.
- People are ready to pay upto $100.
- Different color.
- Not on a walking stick.

Improvements suggested:

- Smaller form factor.
- Speaker instead of buzzer.

Stats based on talking to 16 people aged above 60, at Bayridge Senior Center
Demo
Questions?