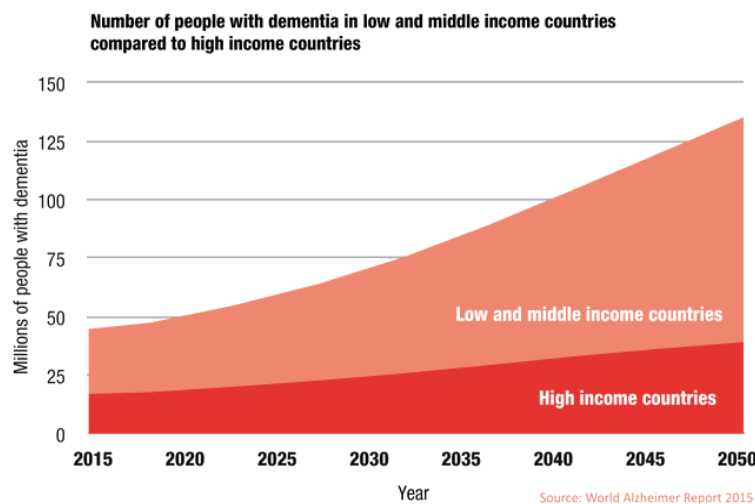


Alzheimer's Shoe

Project Description/Problem Statement: A way to address Alzheimer's for most patients with Dementia would be a pressure-sensitive, motion-tracking shoe that would inform a loved one about the patient/affected location. My device is a tracker built-in to the user's (with Alzheimer's) shoes that would text their loved one when they have moved from their location. This would be achieved with an Arduino Uno, Force Sensitive Resistor, and Triple Axis Accelerometer. This is important as most people with Alzheimer's do not always know where they're going. The loved one would not know where the user would be and they would spend hours finding them. This device would decrease the time required to find the lost user.

Problem: The Problem is that patients with Alzheimer's have dementia which means the patients forget things easily like what they are doing or where they are. This problem currently affects about 50 million people all over the world.



Causes:

- Age: Your risk for Alzheimer's goes up as you get older. For most people, it starts going up after age 65.
- Gender: Women get the disease more often than men.
- Family history: People who have a parent or sibling with Alzheimer's are more likely to get it themselves.
- Down syndrome: It's not clear why, but people with this disorder often get Alzheimer's disease in their 30s and 40s.
- Head injury: Some studies have shown a link between Alzheimer's disease and a major head injury.
- Other factors: High cholesterol levels and high blood pressure may also raise your risk.

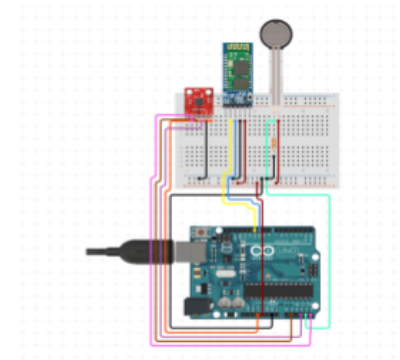
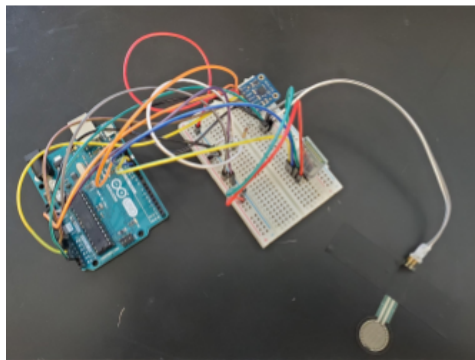
Symptoms: Memory impairment, Difficulty with daily tasks, Depth perception issues, Reduced/limited vocabulary, Poor judgment decisions, and Mood changes/behavioral changes.

Diagnosis: Doctors can diagnose patients with Alzheimer's by conducting basic tests. These tests include Memory tests, Interviews with family regarding how the patient acts at home, Physical tests (if other health conditions are causing these symptoms), Behavioral tests, Problem-solving, Function in daily tasks. Doctors can also use laboratory or specialist tests such as Magnetic Resonance Imaging (MRIs), Computerized Tomography (CT scans), Positron Emission Tomography (PET scans), Mental status testing, and Neuropsychological tests.

Current Treatments: No cure exists, but medications and management strategies may temporarily improve symptoms. Cognition-enhancing medication improves mental function, lowers blood pressure, and may balance mood. These medications are: Donepezil, Galantamine, Memantine, and Rivastigmine. Physical Exercise is another treatment as it is recommended that patients do 20-30 minutes of aerobic activity 5 days a week to improve cardiovascular health. If injured, pursuing an activity that avoids the injured muscle group or joint can help maintain physical function while recovering. There are also trained specialists like Occupational therapists, Geriatricians, Neurologists, Psychiatrists, and Primary care providers (PCP).

Solution: My Solution is a Force Sensitive Resistor that is attached to the bottom of the User's shoe. This would act as a start switch for our program. Once the user steps on the ground the accelerometer starts detecting movement. This constantly occurs until about 100 feet of distance has occurred. When 100 ft of movement has been detected the loved one (pre-programmed) will be informed about this via text. This would then make the loved one go and find the user so they do not get lost. This will continue to happen in increments of 200 feet. [\[Code Link\]](#)

Images:



These images show the initial design (right) and prototype (left) which has the Arduino Uno as the central processing unit. Connected to the Arduino is a Triple-Axis Accelerometer (Red Square) which will measure the distance traveled by the user of the shoe. The Force Resistor (Silver Circle) is also connected to the Arduino and is used to sense when the user has started walking. Finally, the HC-05 Bluetooth Module (Green Rectangle) will send the data to the user's loved one.

FAQs:

<u>Is my device safe?</u>	<u>Is my device user-friendly?</u>	<u>Is my device effective?</u>
Yes, my device is safe as all the metal parts of the cable are tightly secured. All electrical components are also wrapped in electrical tape for extra protection. This is also in the user's shoe so it does not come in contact with the human body.	Yes, my device is user-friendly because the device just has to be plugged into an external power source. This makes the whole device portable. Also, the device automatically texts your phone which then shows a timestamp as well. This is easy for tracking the loved one.	Yes, my device would be effective because it would reduce the number of people with dementia getting lost. This would also save time for the family filing a missing person report. I need to do more testing in a lab but this is our hypothesis.

Future Steps:

- In the future, I hope to:
 - Use a smaller Arduino (Arduino Nano)
 - Be able to install the circuit a cutout in the sole of a shoe
 - Reduce the size and bulk of the circuit
 - Include a fully functional GPS
 - Longer Range of Bluetooth

Final Project Video Presentation: [\[Link\]](#)

Distinctions: Received Recommendation from Advisor of Program, Aaron Cherian: Brown University