

SE Project Proposal

Your project. What will it do?

Our project will be a belt to help blind people “see” their surroundings through haptic feedback. As the wearer comes closer to an object or obstacle, the belt will vibrate in the direction of the obstacle, creating a haptic feedback “cushion” to prevent the wearer from colliding with the obstacle. This will all be made possible with multiple ultrasonic sensors placed evenly around the belt working in tandem with DC motors. The belt will have four 3D-printed casings, one for the front, two for each of the sides, and one for the back. The front and side casings will house both an ultrasonic sensor for distance measurement and a DC motor for haptic feedback, while the back casing will house the Arduino. All the wiring will be run through the belt itself. Powering the belt will be a large battery, most likely stored in a backpack worn by the user, or if possible, attached to the belt itself.

Major Software Components of the Project

The major software component of this project will be setting up active listening systems to check for objects and react to detected objects at all times. Handling multiple streams of input while actuating multiple haptic feedback systems (motors) may require parallel processing.

Prototype Plan

We are planning to use an AGILE method in this project. We will incrementally build our final product by first, building the software component for the motherboard. Simultaneously, we will be assembling our prototype that will consist of a single pair of range sensor and motor attached to a motherboard. Then we plan on testing the software and hardware compatibility and this will be considered our minimum viable product. We will then expand on this MVP by adding more sensor and adjusting the software to process more inputs in order to finally achieve our final product that will consist of 3 range sensors and 4 DC motors attached to a motherboard and the battery.

The hardware you acquired for the project and intend to use.

- Arduino Uno

- Motor Shield (capable of driving 4 DC motors)
- 4 DC Motors
- 3 Range Sensors
- Soldering Iron
- Solder
- Wire (multiple guages)
- Breadboard
- 12ah, 6v Sealed Lead Acid battery
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The challenges you anticipate.

At first, we plan to get one ultrasonic sensor//DC motor pair working, figuring this out will definitely be our first challenge. Getting multiple pairs to be working simultaneously, all run and powered through the same Arduino, will be our biggest challenge. Since we're working on this programming project as a team, and this is our first time collaborating on a project like this using Git, strong communication will be key in developing each iteration of our prototype. Designing the 3D printed housings to be the proper measurements, while making the belt itself comfortable and realistic for a person to wear will also be a challenge. Learning how to create working wiring setups for the Arduino will also be a challenge, given our beginner-level ability with hardwrae.