Project Requirements

Open editing is currently disabled. If you attempt to make changes to your requirements (not tests), they will not take immediate effect and will be reviewed by the course instructor.

You already have 10 requirements, either edit the ones below or delete one and then you will be able to add a new one.

Battery Life
Customer Requirement: Battery must last a long time.
Engineering Requirement: The system will operate for at least 12 hours while objects are within 10cm of the system in all directions.
Weight: 7

Test Steps:
Place objects within 10cm of every sensor in the system.
Test Pass Condition:
PASS if after 12 hours, the system is still functional.

Blindfolded Setup
Customer Requirement: Users must be able to use the product blindfolded.
Engineering Requirement: After a 10-minute training session, 9/10 blind or blindfolded users will correctly put on and enable the product in less than 1 minute, and will change the batteries in less than 2 minutes.
Weight: 5

Test Steps:
Give at least 10 users a 10-minute training session on enabling the system and changing the batteries.
Test Pass Condition:
PASS if 9/10 users can correctly put on and enable the product in less than 1 minute, and change the batteries in less than another 2 minutes.

Feedback Differentiation
Customer Requirement: Users must be able to accurately sense object distance
Engineering Requirement: After a 30-minute training session, 9/10 users will discern the distance to an object with a precision of 1m at 100% accuracy for objects 1-5m directly in front of the user, and with an accuracy of 20cm for objects within 1m of the user in all directions.
Weight: 11

Test Steps:
1. Give at least 10 users a 30-minute training session on differentiating system feedback.
2. Blindfolded/blind user will remain stationary while a 1x1m wide object is placed in one of the defined intervals.
Test Pass Condition:

PASS if 9/10 users can correctly identify the distance interval in which the object was placed to within 1m directly in front of the user, and to within 20cm in any direction.

Low Power Mode
Customer Requirement: Battery must last a long time.
Engineering Requirement: System has an optional low power mode where: objects will be indicated with a precision of 1m at 100% accuracy for objects 1-5m directly in front of the user and an accuracy of 20cm within 1m of the user in all directions; the system will refresh in less than 300ms; and the system will operate for at least 24 hours while objects are within 10cm of the system in all directions.
Weight: 7

Test Steps:
1. Configure the system for maximum power draw by placing objects within 10cm of every sensor.
2. Switch the system to low power mode
Test Pass Condition:
PASS if after 24 hours, the system is still functional.

Navigation
Customer Requirement: Users must be able to navigate with the product without hitting anything.
Engineering Requirement: 9 out of 10 blind or blindfolded users will walk down a hall of at least 20M long and at least 1M wide and turn into a doorway without touching the walls, after up to 30 minutes of training and practice
Weight: 7

Test Steps:
1. Give at least 10 test subjects a 30 minute training and practice session with the system.
2. Have 10 test subjects walk down a hall of at least 20m long and at least 1m wide and turn into a doorway.
Test Pass Condition:
PASS if 9/10 users successfully walk down the hall and enter the doorway without hitting any walls.

Object Direction
Customer Requirement: User must be able to accurately sense obstacle direction.
Engineering Requirement: System feedback module will indicate the direction to an object to within 30Â° of the direction measured by the system sensor module.
Weight: 7

Test Steps:
1. Place a 1x1m wide object in a fixed location in range of the sensors
2. Leaving the feedback band stationary, rotate the sensor band a full 360Â° in place.
Test Pass Condition:
PASS if the direction indicated by the feedback modules is always within 30Â° of the actual direction of the object for the full rotation of the sensor band.

Response Time
Customer Requirement: The feedback must update quickly
Engineering Requirement: System feedback responds to changes in object position in less than 100ms for objects within 1m in any direction, or within 5m directly in front of the user.
Weight: 7

Test Steps:

1. Place an object just over 4m away from directly in front of the ultrasonic sensor.
2. As quickly as possible, move the object to within 4m away, and measure the time it takes for the feedback system to switch from the 4-5m range to the 3-4m range.
3. Place an object 50cm away from any given laser sensor group.
4. As quickly as possible, move the object to the adjacent laser sensor group, and measure the time it takes for the feedback system to switch from the initial group to the ending group.

Test Pass Condition:

PASS if the feedback updates within 100ms in both cases

Water Resistance

Customer Requirement: Product must be durable.

Engineering Requirement: The system is water resistant according to the IPX4 standard.

Weight: 7

Test Steps:

1. For 5 minutes, splash 10 litres per minute on the system at a pressure of 80â€“100 kPa.
2. Repeat step 1 for every component in the system

Test Pass Condition:

PASS if no water enters any enclosure during any of the tests

Wearable Comfort

Customer Requirement: Product must be comfortable.

Engineering Requirement: The system weighs less than 500g, and after 1 hour of use, 9/10 users report the system is comfortable.

Weight: 5

Test Steps:

Have at least 10 users wear the system for 1 hour.

Test Pass Condition:

PASS if 9/10 users think that it is comfortable and the system weighs less than 500g.

Wireless Communication

Customer Requirement: System must include a sensor band that reliably communicates wirelessly with a separate feedback band.

Engineering Requirement: Wireless communication between the sensor inputs and feedback outputs of the system will incur a delay of less than 5ms.

Weight: 7

Test Steps:

1. Measure the time it takes to send data between the microcontrollers on the two bands.
2. Leave the two microcontrollers communicating wirelessly non-stop for 24 hours.

Test Pass Condition:

PASS if data transfers in less than 5ms, and the wireless communication has 100% uptime for 24 hours.

Total: 70