# Problem Statement

This system will provide additional senses to the hearing impaired. some people are unable to use hearing aids so this would provide an alternative to hearing directly.
Much of our environmental awareness comes from our sense of hearing. This device give hearing impaired individuals accessibility support by allowing them to be more aware of their surroundings. This device could prevent the user from getting themselves into a dangerous position or provide an indication if someone nearby is trying to get their attention. The system will provide a small vibration and give a visual que when noise is sensed around them.

# Specifications

- System will detect sound.
- LEDs will visually display the sound level (green, yellow, red).
- Vibration motor will give feedback based on the sound level.
- Can adjust the sound sensitivity via a rotary encoder. Lowering sensitivity will decrease feedback via the LEDs and vibration motor.
- Implementation must use:
  - Watchdog
  - Synchronization technique
  - At least 1 bitwise control
  - Critical section protection
  - Task/Thread
  - At least 1 Interrupt

# Constraints

- Detect sound and will stimulate an alternative sense rather than sound.
- Provide a visual and physical que that noise is nearby.
- Desired sound sensitivity can be adjusted.
- Toggle on and off the device.

# Ask

- Purpose:
  Provide an alternative hearing device to hearing aids.
- Inputs
  - Audio Transducer - Detects Sound
  - Rotary Encoder - Adjusts the sound input levels
  - Onboard Button - Toggle switch
- Outputs
  - LEDs - Visual sound indicator
  - Vibration Motor - Physical sound indicator (may need more than 1)
- Constraints

# BOM

- LEDs - They light up.
  - Red
  - Yellow
  - Green
- Vibration Motor - Oscillating motor that causes vibrations.
- Audio Transducer - Detects sound as input.
- Rotary Encoder - Converts angular position to an input signal.