As technology advances, so does society’s ability to provide tools for people with physical disabilities. TiresiaScope’s objective is to help the blind by creating a headset that uses sounds to assist in navigating their surroundings.

**Overview**
- Functions as a proximity sensor for the blind
- Detects nearby objects with ranging sensors, detects nearby faces with a camera
- Relays information to user through sound: musical tones indicate object location and distance, alert tones notify of nearby people

**Hardware / Key Components**
- **PYNQ by Xilinx**
  - ARM processor supports Python
  - Microblaze for hardware control
- **LV-MaxSonar-EZ1**
  - Ultrasonic ranging via UART
  - Range: 160mm to 6.45m
- **Simblee™ IoT 3D ToF Sensor**
  - Optical ranging via I²C
  - Range: 100 mm to 2 meters
- **Audio Codec WM8731**
  - Stereo audio via SPI
- **OpenMV M7 Camera**
  - On-board ARM processor
  - 640x480 8-bit grayscale, 30 FPS
  - 320x240 RGB565 at 30 FPS

**How Sound is Generated**
- Sound appears to come from direction of object
- Frequency gets higher as objects get closer
- Each of the five directions have five range bins
- Plays a particular note that corresponds to each direction and bin
- The ultrasonic and optical sensors work in tandem; if one of a pair fails, the other can be used instead

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