UHE

Audio Sterilization Assistant

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Problem Statement

In surgery rooms, many sterile procedures must be followed in order to maintain a sterile environment for those operating in the room as well as for the patient.

Often times, there are more than 5 people in a surgery room at a time and it is difficult to make sure that everyone is following sterile procedures, which leaves individuals to be accountable for themselves.

We look to relieve that burden with an audio sterilization assistant.

Deliverables

- Interview potential users
  - Gage the Surgery Room Environment
- Solidify User Scenarios for sanitation
- Create Sound Alerts
- Design Processing Simulation and wearable device

Progress

- Interviews with Users have been conducted
- Sound Alerts are made. Have been sent to gain feedback
- 2D model of surgery room
- 3D model of hardware design

Interviews

- Sanitation procedure is consistent throughout surgery rooms
- Often times, no one is checking for sanitation
  - Self checking accountability
- Sounds to keep hands above waist would be helpful
- Everyone should keep 2 feet of distance between each other
- Backs are unsanitary.
  - Must pass each other front to front or back to back.
- The Only sounds present currently are
  - Anesthesia machine (heartbeat),
  - dull beeps whenever device is turned on

User Scenarios

1. Elbows remaining above waist
2. Keep 2 feet of distance from others
3. Passing others back to back/ front to front

Sound Alerts

Distance Ambient Sounds

Good distance away - https://drive.google.com/file/d/0BwgkFKgDC6MNVFpOUm5DYzlwekI2UnoydWdlY3dBSFVDdmpn/view?usp=sharing

Getting closer to another person - https://drive.google.com/file/d/0BwgkFKgDC6MNVHpieWxOeXJWRlVyM2ZJT3RTM09WY0FOSUpv/view?usp=sharing

Nearly 2 feet away from someone - https://drive.google.com/file/d/0BwgkFKgDC6MNLThCeGNKNndCS3pITElmRGotdGx0WU5FZzZB/view?usp=sharing

Alerts

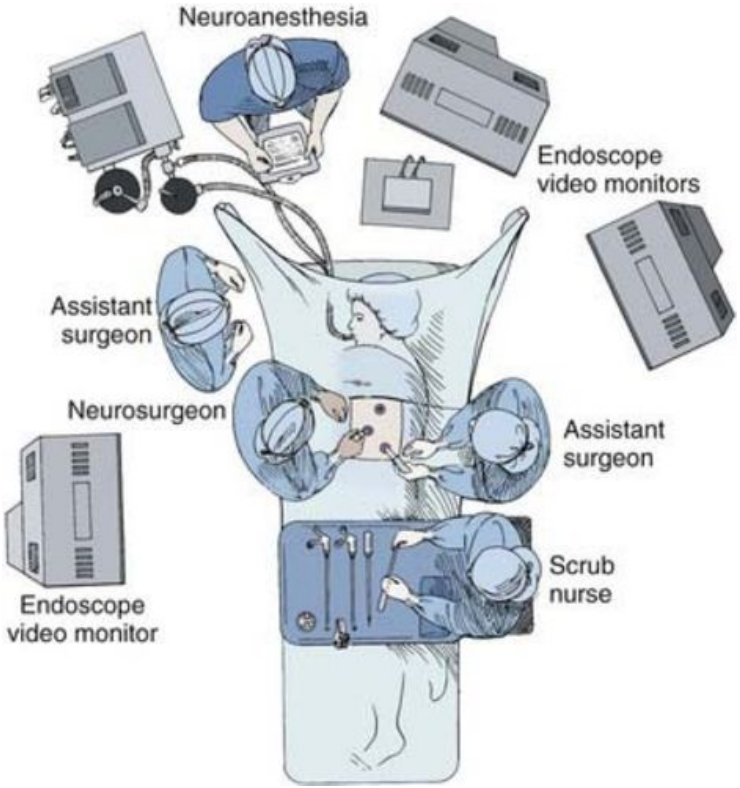
Reminder Alert - https://drive.google.com/file/d/0BwgkFKgDC6MNV3VMN0ZVakUxYTRKYWFQWXdFWmV5LU5qSVpr/view?usp=sharing

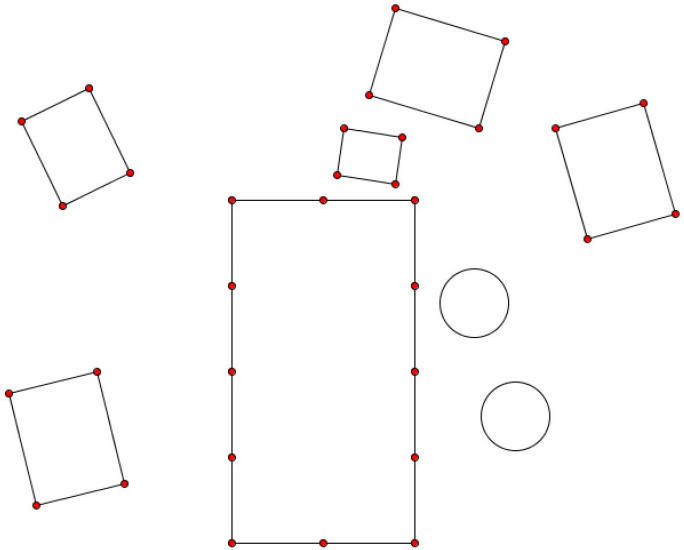
Hands above waist Alert (played twice)- https://drive.google.com/file/d/0BwgkFKgDC6MNY0IwWWIxR2xXZER4LTlFU0lVaFRXeTctdS00/view?usp=sharing

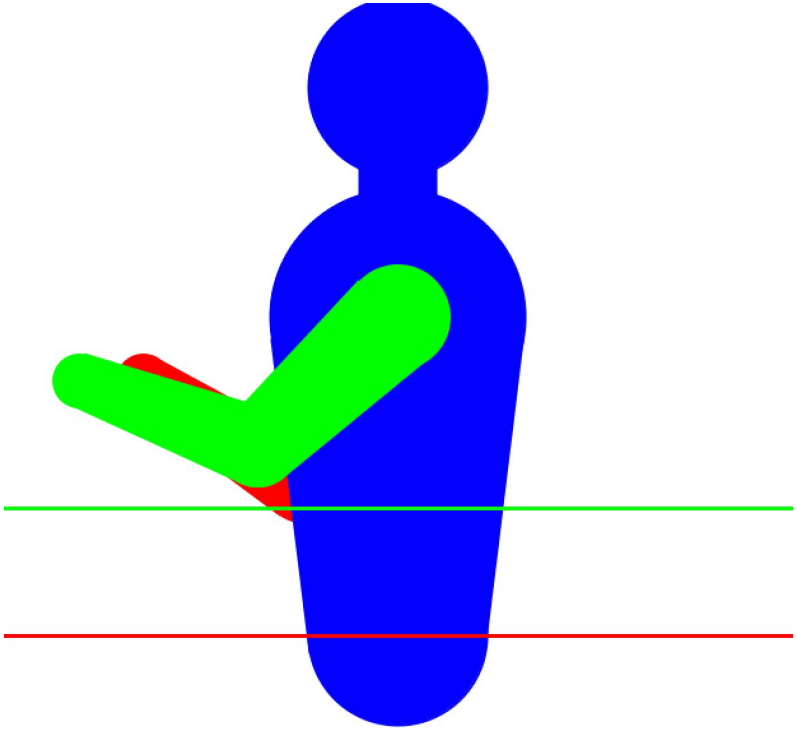
High Alert (unsterilization has occured) - https://drive.google.com/file/d/0BwgkFKgDC6MNbTROem9LUnRUX1JjR2RoNUpVekYzaUxhZ2Qw/view?usp=sharing

2D Model

https://github.com/klauszeng/Team-Project-UAE



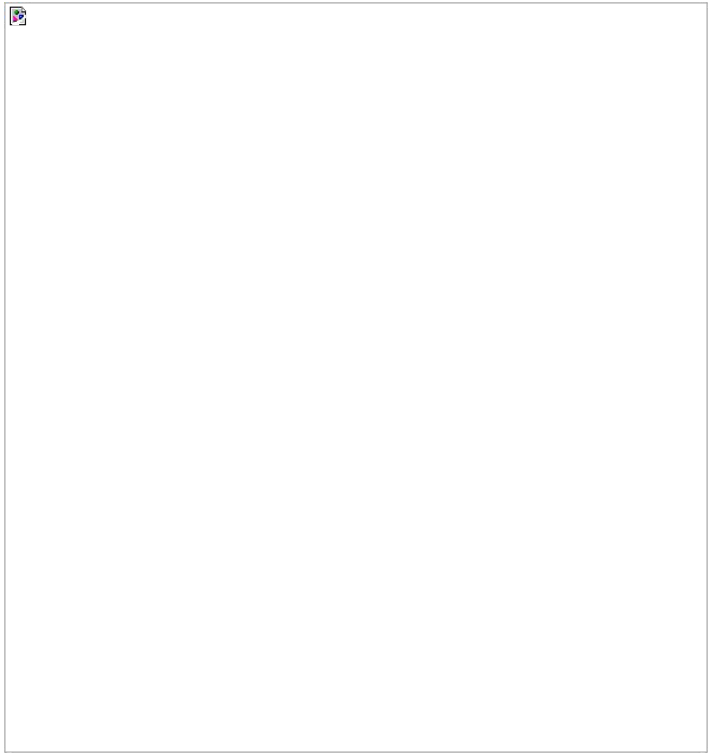




Specification of Our Device

For hardware, our device will use:

- Adafruit Bluefruit LE Micro
- Adafruit Pro Trinket LiIon/LiPoly Backpack Add-on
- Stereo 2.1W Class D Audio Amplifier
- Lithium Ion Polymer Battery - 3.7v 500mAh
- 8 ohm 0.25W Speakers
- LED indicator



How it Works

Each gown will be equipped with the proposed hardware. The main Bluetooth LE micro unit as well as the battery will be attached to the gown on the back of it right in between the shoulder blades. The two speakers will run across the shoulders and then down to the bicep where arm straps are usually located. The two gyroscopes will take the exact same path except go farther towards the forearms. The device can be charged via micro usb when not in use.

- Can connect to smartphone device to modify settings
- The bluetooth module will be calculating the Received Signal Strength Indication (RSSI)
- Each gown will be calculating this from one another and since we are dealing with surgery rooms the users will be very close to each other with few obstructions, so these distances should be quite accurate.
- Distances and positions of hands with use of gyroscopes will be calculated.
- Sonification of data will be outputted on either the right or left speaker depending on the data.

3D Model (Wearable Device)

Face View

3D Model (Wearable Device)

Side View

Next steps

- Gain Feedback for sounds/3D wearable device model
- Add User Scenarios to Processing Sketch
- Implement Sounds in Appropriate Scenarios