**Project Purpose**

**Need:**
Visually impaired swimmer require assistance when swimming to assure their safety.

**Goal:**
Minimize the require supervision of visually impaired people to swim safely.

**Target Market:**

- **Name:** Karen (Physical therapist)
  - **Context:** Plans to use the device to help visually impaired patients with orthopedic training

- **Name:** Harry (Special Olympics athlete)
  - **Context:** Visually impaired athletic swimmer. Uses device to stay straight in his lane.

- **Name:** Suzie
  - **Context:** Casual swimmer who is visually impaired. Uses device for improvement of aquatic exercise experience.

**Hardware**

Our apparatus gathers data from the MPU9250 IMU and camera and then guide the user (swimmer) down the lane. If the user veers off course, this system will notify them what direction to turn via the vibration motors.

**Lane Tracking**

Standard lap swimming pool layout. The device will track the black lines shown running along the bottom of each lane.

\[
[L_1, L_2, g_w] = R_w \cdot [L_1^C, L_2^C, g_c]
\]

**World frame**

**Correction vector**\( \vec{g}_w = (g_w \cdot L_1, L_1_L_2, L_2) \)

1. Load a frame from live video taken by camera and load rotation matrix from IMU
2. From image, find lines on the bottom of the pool. Obtain \(L_1, L_2\) from the image and \(g\) from the IMU
3. Calculate correction vector
4. Send feedback to user via haptic motors

**Next Steps**

- Add end of lane detection functionality
- Test with end users
- Consult with end users to improve form factor and functionality
- Move device to wearable technology

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