

# 1. Introduction

## 1.1 Problem Statement

People with disabilities often need special equipment to do things that most people can do easily. With modern technology, doing things like playing sports, skiing, and rock climbing are no longer out of reach for people with disabilities. Even with advancements in this area, there are still some issues that can make activities like this problematic for people with disabilities. One of these potential problems is pressure sores. Pressure sores occur when there is too much pressure or an imbalance of pressure on some body part. Pressure sores can develop within minutes, and for people who are partially paralyzed or have missing limbs, it can be very hard to know when they may be at risk of developing one. Pressure sores can potentially become so severe that they are life-altering or life-threatening. For someone who is disabled and does not have an effective way of preventing pressure sores, this can become a constant worry when going out and doing things that are more physically demanding. For people like this, a device that can monitor pressure in areas where they cannot feel it is almost necessary; however, such a device does not yet exist.

## 1.2 Intended Users

### a. Individuals with adaptive equipment

#### **Description:**

- These disabled individuals must abandon their standard equipment and use adaptive equipment to do things like play sports or some other physical activity. These users have some lack of sensation or nerve damage on some parts of their body, making it difficult to feel in those areas. They may also be missing limbs or paralyzed in some way.

#### **Needs:**

- A way to recognize an excess of pressure on certain parts of the body.
- A way to be able to play adaptive sports safely without a high risk of complication.
- A way to detect preventable injuries and take action accordingly.

*Design Document - User Needs*

**Benefits:**

- With a device to monitor pressure, they would be able to accurately recognize pressure on parts of the body with little sensation.
- Users would have peace of mind when doing physical activity, such as playing adaptive sports, and would be able to participate freely without worrying about pressure-related injury.
- Users would be able to prevent injuries related to pressure that could cause serious complications.

**b. Caregivers/Coaches for adaptive sports athletes**

**Description:**

- These are coaches or caregivers for persons with disabilities who wish to participate in adaptive sports. These users are trained to work with individuals with various needs or disabilities. They also understand the risks associated with adaptive sports and the potential complications.

**Needs:**

- A way to assist individuals needing care when the individual cannot communicate or detect the problem.
- A way to ensure that the individuals they work with are doing what they can to prevent injury.
- A way to entice individuals who are too worried to participate in adaptive sports due to the risks of pressure-related injuries.

**Benefits:**

- Caregivers would be able to assist players in detecting pressure-related injuries that they are unable to feel.
- Caregivers can ensure that their players are being as safe as possible in regards to this specific type of injury.
- Caregivers can provide peace of mind to people who are skeptical of participating in adaptive sports.

*Design Document - User Needs*

**c. Healthcare providers**

**Description:**

- These are individuals who have specialized medical training for dealing with the disabled. These users can recognize when preventive measures are necessary and when a user may be at high risk of certain complications.

**Needs:**

- A way to ensure patients are being safe when outside of their care.
- New options to recommend to individuals looking to play adaptive sports but are too worried about injury.
- A way to gather accurate patient data to recommend potential preventative measures for pressure-related injuries.

**Benefits:**

- Healthcare professionals would be able to recommend a device for individuals suffering from pressure sores they cannot feel.
- Healthcare professionals would now be able to ensure patient safety when participating in risky activities outside of their care.
- Healthcare professionals would be able to use the information the patient gathers to recommend treatments or alternatives to prevent further injuries.

Design Document - User Needs

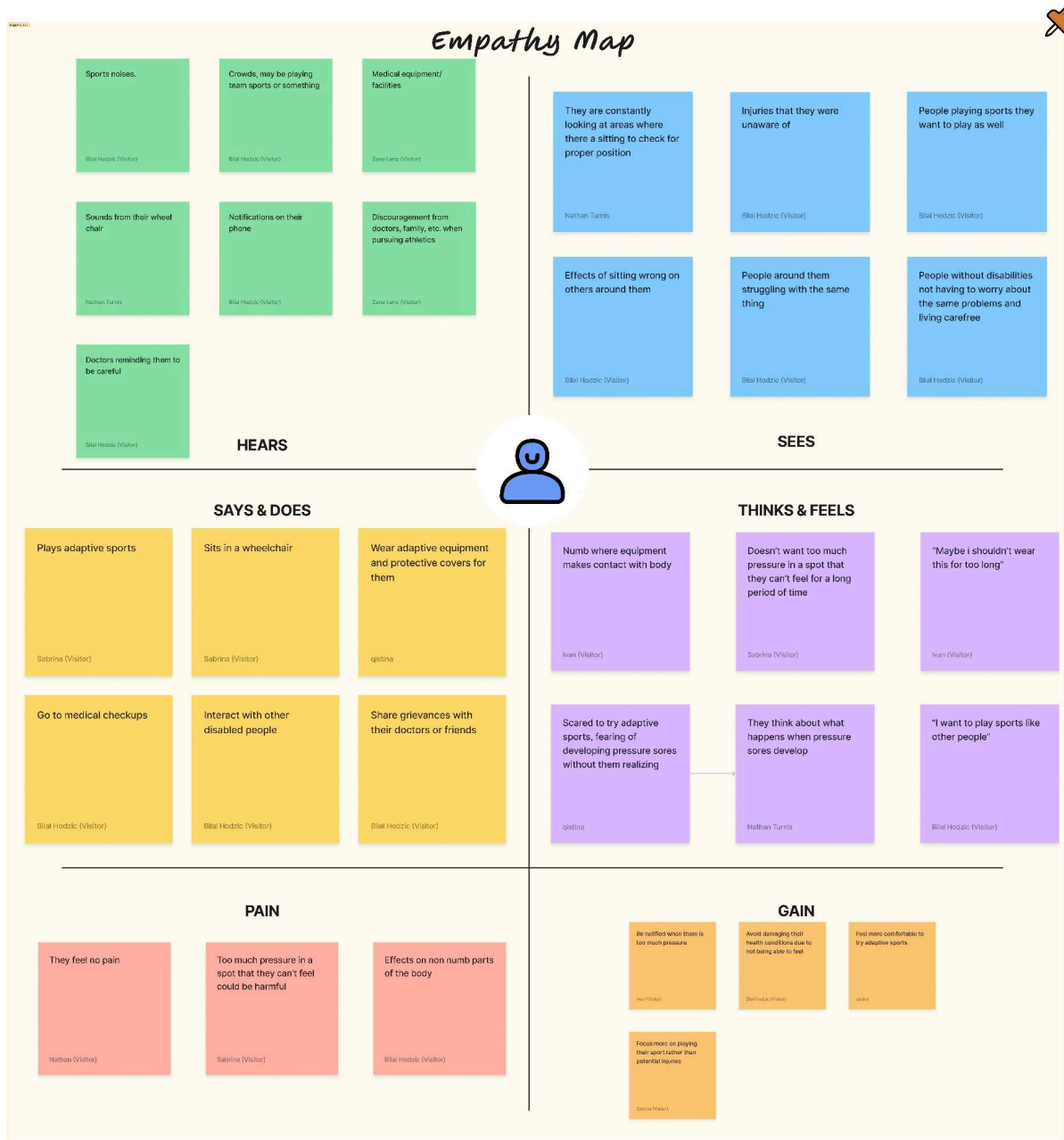


Figure 1

*Design Document - User Needs*

Users	Needs	Constraints
<ul style="list-style-type: none"><li>• Individuals with adaptive equipment</li><li>• Doctors</li><li>• Instructors/ Coaches</li></ul>	Pressure sensors and an app that alerts individuals/ instructors that they have too much pressure in certain area and needs to shift position to prevent pressure sores.	<ul style="list-style-type: none"><li>• Sensors should be small and frictionless due to damaged nervous system and target area</li></ul>

*Figure 2*