1. **INTRODUCTION**

1.1. PROBLEM STATEMENT

PTSD episodes can be a hindrance and debilitating to veterans' quality of life. Thus, we have been tasked to develop a PTSD detection device that proactively detects onset PTSD episodes and alerts their service dog to provide comfort before the symptoms become incapacitating.

Current mental health care market alternatives are reactive to symptoms versus aiming to hinder the development of a PTSD attack. Additionally, their market products are costly and cumbersome as they currently entail brain electrodes to monitor activity. Due to the inadequate and expensive monitoring capabilities, Veterans continue to suffer from PTSD episodes which negatively harm their quality of life.

This is why we aim to solve these issues; to create a foresighted product to bring comfort to our nation's warfighters. To implement this solution, we will create a wrist-wearable device that monitors the Veteran's physiological data. This information will include heart rate monitoring via an electrocardiogram as well as blood pressure measuring by a photoplethysmogram. If symptoms arise, a signal via Bluetooth will be sent from the wearable to a receiver on the service dog that will exhibit a vibration to call for comfort.

1.2. INTENDED USERS

Two groups of people will use our product. One group includes those who suffer from PTSD attacks and have service dogs to comfort them. The other group that will work with our product is the professional dog trainers who train service dogs to comfort veterans suffering from PTSD.

Our first user is a veteran with PTSD. This user feels PTSD symptoms, which can occur sporadically and are challenging to manage without help. This user needs comfort from their service dog whenever these PTSD episodes arise. They want to be able to participate in activities of daily life without having to worry about PTSD episodes going out of control.

Another user of this product is people with PTSD. The needs of this user are largely similar to a veteran with PTSD, but the environments or situations in which they may have symptoms can vary greatly from the typical veteran. Examples may include but are not limited to first responders and victims of abuse or other traumatic experiences.

Our last users are service dog trainers. These individuals specialize in training dogs to be able to react to an owner's PTSD attack and provide comfort to alleviate symptoms. This user is currently faced with the challenge of having to train dogs to detect PTSD episodes purely from owner behavior, without any quantitative or technical measures to diagnose episodes. Therefore, they need some device that can detect with high certainty that a PTSD episode is about to occur and can inform the dog in such a way that the trainer can then teach the dog what to do when it perceives this PTSD alert. This would provide the trainers the benefit of not having to teach the dog how to read physical signs of a PTSD attack, as they could simply teach the dog to respond to a haptic vibration.