EXECUTIVE SUMMARY

Monitoring vital signs is essential in the early diagnosis and treatment of many serious medical conditions such as heart disease, the leading cause of death among men, women, and people of most ethnic backgrounds. Frequent visits to the doctor can be inconvenient, however, and medical technology can be difficult to read and understand for those who are not medically trained. VitalWeave aims to provide its users with comfortable and convenient ways to monitor their health without having to take time out of their days for check-ups. Figure 1 demonstrates the functions of VitalWeave. VitalWeave is a shirt that incorporates various health monitoring technologies such as heart rate monitoring, blood pressure tracking, respiratory monitoring, and fall detection to allow users to manage their well-being without interrupting their daily lives.

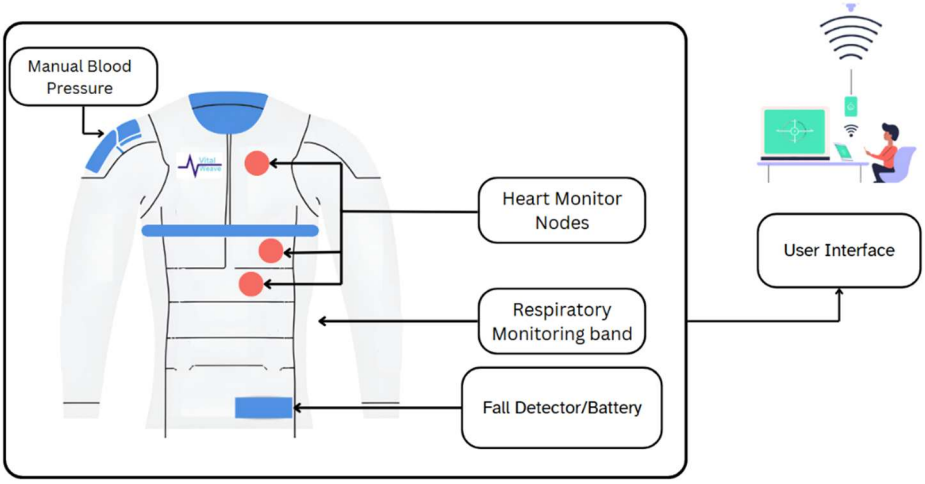

Figure 1. VitalWeave

The VitalWeave shirt has a close-fitting design, allowing for accurate data collection from its sensors. Its electronics are hidden and out of the way, allowing for safety and comfortability for the user. The ECG signal filtering is strong enough to filter out movement from the user. VitalWeave is capable of using consumer-grade 9V batteries. The VitalWeave app is easy to use and understand through large buttons and lettering. VitalWeave complies with ISO 60610:2014, ISO 10993:2020, ISO 18060:2022, and Title 21 CFR Part 11, ensuring safety, reliability, and accuracy for all users.

The VitalWeave system utilizes a combination of hardware and software elements to monitor respiratory rate, ECG signals, blood pressure, and fall detection. The respiratory monitoring subsystem utilizes a rubber cord worn around the stomach to detect respiratory rate. To detect ECG signals, copper tape is used to pick up the signals and an ADC converts and filters these signals. For the blood pressure monitoring subsystem, a heart rate sensor is embedded into the manual cuff and pump to help the user take their blood pressure without the need of a stethoscope. The fall detection subsystem uses an accelerometer and a gyroscope in conjunction to detect the change in orientation and speed to detect if a fall occurred.

VitalWeave helps promote an active lifestyle by enabling users to keep track of their health with little to no inconvenience. With additional fine tuning and testing, VitalWeave can provide phenomenal accuracy in real time to users. VitalWeave can also be expanded on by being used to track an athlete's performance and efficiency throughout a game. This can be done by using the vitals obtained through the sensors and comparing them to other metrics to see where the athlete seems to be lagging or excelling.