

1. PROBLEM STATEMENT

Although health monitoring equipment can save lives, elderly people have the most difficulty wearing it consistently, citing inconvenience of wearing it and difficulty to upkeep. The aim for VitalWeave is to make wearing these devices much easier and comfortable for the elderly.

1.1. Need Statement

Heart disease is the leading cause of death in the United States, causing about 1 in 4 deaths [1]. To effectively combat it, people need to monitor their own health. According to Statistica, out of 410 respondents, over half said they used a wearable device to monitor their fitness activity [2]. Nearly 50% of users of wearable devices rely on technology in their daily life [3]. Elderly people can benefit from this monitoring, but about 23% of seniors do not wear their health monitoring devices for the full amount of time requested by their doctors [4]. Current technology is hard for them to understand and can prove to be inaccurate at times. This is especially prevalent in fall detection devices, as most of these are implemented through watches. By not being near the user's center of gravity, these products allow for more discrepancies when detecting falls.

1.2. Objective Statement

The objective of this project is to design a non-intrusive compression shirt that integrates multiple health monitoring systems while being convenient and easy to use. Sensors in the clothing track different vital signs such as ECG signals, respiration rate, and blood pressure. It also utilizes a fall detection system to detect serious injuries. Information from these sensors is then logged so that the user or a doctor can easily access any medical information recorded from the device.

1.3. Background and Related Work

Many wearable devices are currently used for health monitoring; however, most of these are specialized devices and do not measure all vitals. They can also be cumbersome for the elderly, as these devices tend to be technologically heavy and may require some interaction. Many smart watches are capable of tracking vital signs, such as heart rate, respiratory rate, and ECG signals, however most elderly people lack the familiarity of using one. The Astroskin compression shirt attempted to remove this problem. Their shirt measures ECG signals, blood pressure, breathing rates, sleep patterns, temperature, and detects falls. The suits battery life seems to be a major drawback to users. Since they chose to rely on AA batteries for power, users have to swap them out every 48 hours, resulting in additional costs to run the product. We plan to use low-power sensors and methods to mitigate power consumption. Users also complained about sensor placement and inaccuracies, as they cannot be obscured and need to be stable. This takes away from promoting an active lifestyle and leads to excessive intrusion. This problem will be resolved by using more slim and lightweight sensors, as well as taking advantage of slim conductive materials like copper tape. The database they used for their product was also filled with complaints, as it was found to be unpolished and difficult to navigate. Our UI will emphasize simplicity for anyone to use. Our product should remove the hassle the elderly face with technology and instead create a compression shirt for everyday wear that can track these vitals. We must create a simple, user-friendly user interface that is readily accessible to the user, as well as their licensed physician/doctor or any of their loved ones.

References

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