DEVELOPMENT OF A SMART FOOTWEAR

T. Olutosoye[1], F. Chukwudi[1], I. Oriji[1], A. Okofu[1]

[1]Afe Babalola University

INTRODUCTION

Automated footwear that monitors human vital signs can be described as smart footwear equipped with sensors to track health indicators, such as heart rate, blood oxygen level (SpO2), body temperature, respiratory rate, and blood pressure, without requiring manual input from the user. The problem being studied is addressing the difficulties people face in tracking their health data. According to research, we found that approximately 2000 people die monthly due to a lack of timely health monitoring. The project aims to help individuals monitor their health more effectively by providing a solution that continuously tracks vital signs such as Heart rate (HR), Respiratory Rate (RR), Temperature, Oxygen Saturation level, and Steps taken, all in real-time.

Current devices often suffer from limited battery life, hindering their ability to support continuous monitoring. Most are restricted to tracking basic metrics, like heart rate, without the capability to measure a wider range of vital signs for a more comprehensive health assessment. Additionally, issues with data security persist, raising concerns about user privacy and the safety of sensitive health information. User comfort, biocompatibility, and the durability of sensors are also often overlooked. Many devices lack protective coatings for sensors, which can reduce accuracy and device longevity, especially in challenging environments. Moreover, the high costs of some devices make them inaccessible to wider populations.

MATERIALS AND METHOD

The smart footwear, the prototype, and the microcontrollers are the main components of the design. The sole would be made out of rubber, an outlet for charging. Arduino Uno would serve as the microcontroller that collects all the readings from the sensors and sends them to ESP8266, which sends them to the web platform.

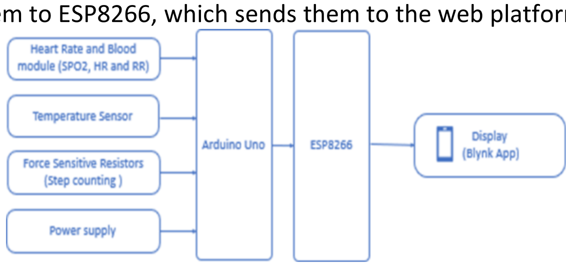
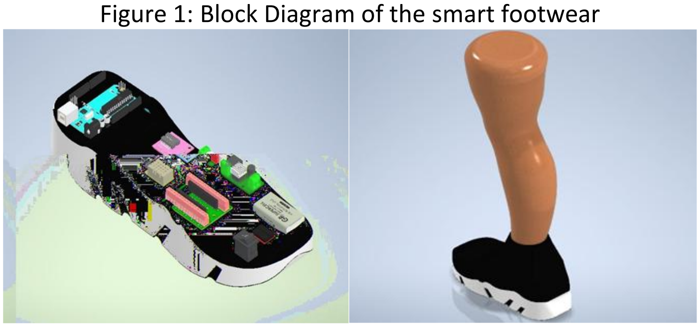
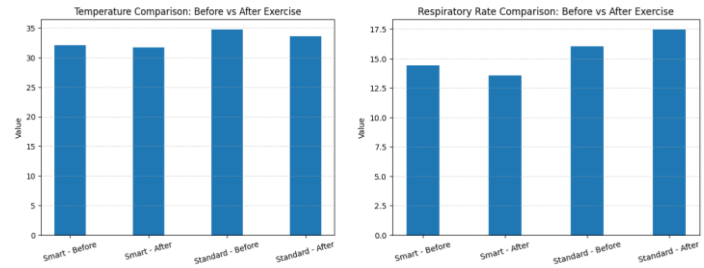


Figure 1: Block Diagram of the smart footwear

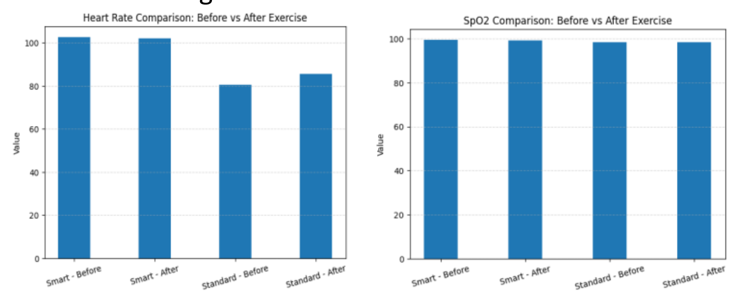


Figures 2&3: 3D model of Smart footwear

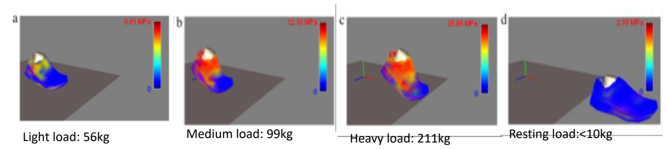
RESULTS



Figures 4&5: Bar chart of results



Figures 6&7: Bar chart of results



Stress analysis simulation: Results show that the highest stress concentrations occurred during the heavy loading condition (image c), suggesting that the material may deform significantly under such conditions.

CONCLUSION

With data transmitted to a web interface in real time, the device provides an accessible, non-invasive health monitoring system.

This wearable solution supports early health issue detection and proactive health management, particularly for users with busy lifestyles or limited access to healthcare.

Overall, the smart footwear stands as a promising tool for monitoring vital signs in real time.

ACKNOWLEDGMENT

AFE BABALOLA UNIVERSITY ABUAD Labor Servitium Et Integritas