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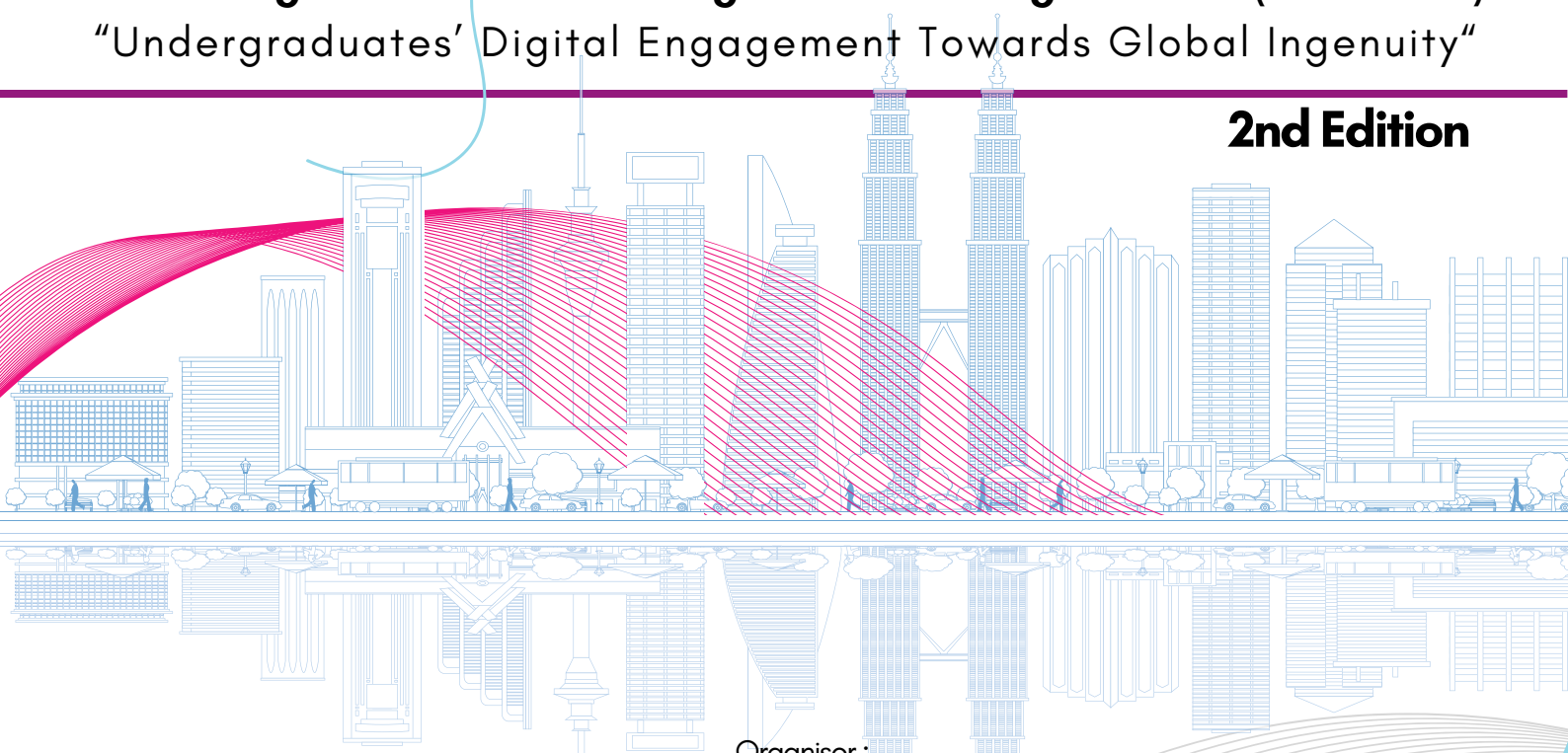
"Undergraduates' Digital Engagement Towards Global Ingenuity"

2nd Edition



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Co-organiser :

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SMART AID SAFETY VEST

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Abstract
This detailed study explores the Smart Aid Safety Vest, focusing on its development, evolution, and adoption in the construction industry. The methodology employed involves rigorous experimentation, wherein the vest's efficiency and precision in ensuring worker safety undergo meticulous evaluation within a controlled setting. Our design framework incorporates features aimed at enhancing problem-solving capabilities and providing factual visualizations aligned with predefined research parameters. Extensive desk research provides invaluable insights into public perception, practical applications, pricing structures, capabilities, and commercial availability. The meticulous analysis of data serves as a cornerstone in advancing the Smart Aid Safety Vest, shedding light on technological intricacies, safety process efficacy, and the vest's adaptability to diverse environments. The design study meticulously examines the conceptual underpinnings of the project, encompassing structural components, navigation techniques, safety methodologies, and the utilization of simulations to gauge performance across various scenarios. Ergonomics and user interface considerations are carefully integrated into the design, resulting in a solution that aligns seamlessly with project objectives. This avant-garde solution, crafted through collaborative efforts among domain specialists, is meticulously detailed within the report's chapters. The research findings not only enrich the burgeoning realm of safety technologies in construction but also underscore the paramount importance of innovative design and evidence-based decision-making in fostering excellence in construction safety.

Keywords: *Smart Aid Safety Vest, Construction safety, Technological intricacies, Adaptability to diverse environments, Safety technologies, Innovative design*

1. INTRODUCTION

Due to population increase and climate change, the construction industry urgently needs sustainable and innovative solutions. The industry's commitment to planning, design, and construction economics, with a focus on sustainability, emphasizes the significance of this necessity. However, concerns like as inadequate application of intelligent safety aids have slowed progress, resulting in delays, insufficient safety standards, and budget overruns. The identified concerns emphasize the need of contractors thoroughly understanding and efficiently managing categorization challenges. (Lischka, K. 1999). Smart aid safety vests enhance worker safety by combining real-time location tracking, health surveillance, and immediate first aid assistance. They use PS technology for real-time geofencing, ensuring rapid emergency response and effective labour oversight. Heart rate monitors detect weariness or stress early, preventing incidents. The vests also provide critical medical supplies, ensuring prompt treatment for injuries. (Brown, A. 2022).

A smart aid safety vest with GPS, first aid, and heart rate sensor is developed through a multi-step process. Key components are selected, integrated, and powered by a rechargeable battery.

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The vest's circuit design ensures efficient integration, while software development includes firmware, and a mobile app. Production involves planning, assembly, and quality control. (Smith, J.2021).

In conclusion, the smart aid safety vest, which includes integrated GPS, first aid, and heart rate monitoring features, improves personal safety and health monitoring in high-risk areas. It enables real-time location tracking, sends notifications for aberrant readings, and stores long-term health data. The vest also has a first-aid kit, automated notifications, and two-way communication capabilities. It is designed to survive hard circumstances and may be centralized for real-time monitoring, hence increasing safety measures in construction, industrial sites, outdoor activities, and emergency response situations. (Taylor, R.2020).

2. MATERIALS AND METHODS

A design framework is a systematic approach or collection of principles that aids the design process. It ensures a systematic and organized approach to designing a product, service, or system, ensuring consistency, efficiency, and effectiveness in design tasks. Figure 1 depicts the research flow for the Smart Aid Safety Vest project. The research phase begins with a thorough review of the literature, followed by simulation design and prototyping, and finally assessment and validation. This step consists of formulating the research problem and establishing research objectives. A design framework is an organized strategy or set of rules that helps the design process. It ensures a systematic and organized approach for designing a product, service, or system, ensuring consistency, efficiency, and effectiveness in design tasks. Figure 1 depicts the Smart Aid Safety Vest project's research flow diagram. The research process begins with a thorough literature review, followed by simulation design and prototyping, and finally assessment and validation. This phase comprises developing the research problem and setting research objectives.

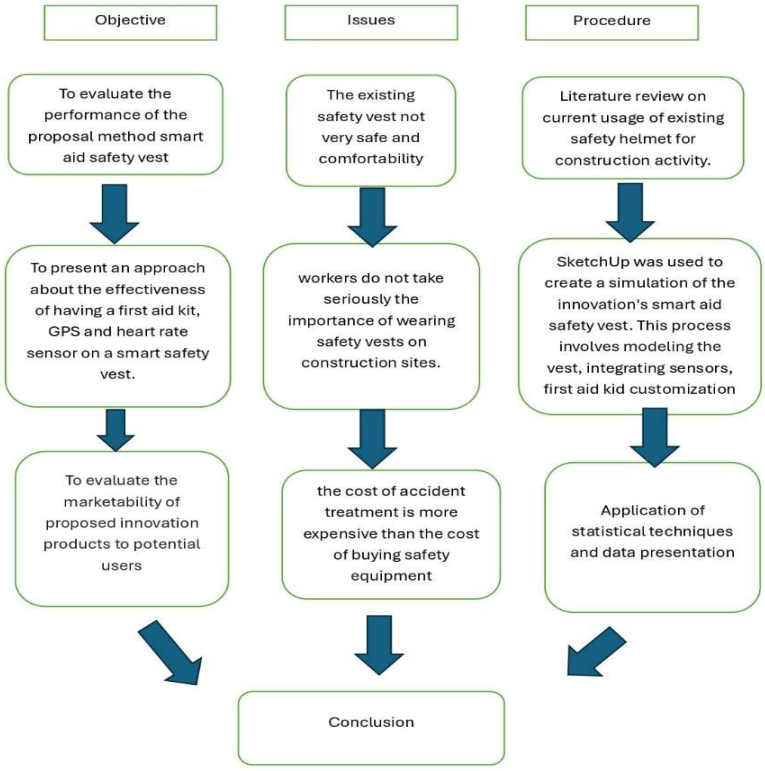

Figure 2 Research flow of the Smart aid safety vest innovation project.

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3. RESULT AND DISCUSSION

Performance of Proposed Innovation Product

A product's performance is crucial to its marketability and penetration. Product innovation is critical for organizations to remain competitive, expand, and improve throughout time. It is widely understood that a company's ability to innovate is critical to its long-term success. Smart Aid Safety Vest, an innovative product, will remain relevant and valuable to stakeholders in the safety and health management industries as it incorporates performance-based features. Table 1 compares and analyses existing safety measures and the Smart Aid Safety Vest.

Feature	Previous safety vest	Smart aid safety vest
Safety	Reflective materials for visibility	GPS tracking, First aid kit, Heart rate sensor
Functionality	Primarily enhances visibility	Integrates multiple tools
Emergency Response	Relies on external responders for emergencies	GPS can track location wearer, first aid on vest pocket.
Cost	Lower initial cost, potential higher indirect costs.	Higher initial cost due to advanced technology
Target user	Construction worker	Contractors and Project Managers, Construction Workers

4. COMPONENT OF SMART AID SAFETY VEST

Figure 2 Show detailed component of Smart Aid Safety vest consisting of Mesh Fabric cloth, reflective tape, zipper, mini first aid, GPS with heart rate sensor, rechargeable battery.

Figure 3 The component in smart aid safety vest

Meanwhile, Figure 3 illustrates the detailed components of the smart aid safety vest's body part, which includes a Global Positioning System (GPS), an ECG sensor, a first aid pocket, a sensor surface on the back of the neck, and a rechargeable battery.

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Figure 4 The component in body part of smart aid safety vest

Finally, Figure 4 shows the Figure 4 shows how workers at a construction site wear the smart aid safety vest. It is designed with features that do not hinder the wearer and allow for unimpeded movement. Additionally, it is lightweight and easy to transport.

Figure 5 Shows the product be wear

5. CONCLUSION

The Smart Aid Safety Vest innovation project marks a significant step forward in addressing sustainability, safety, and efficiency in the occupational health and safety sector. This initiative provides several benefits by incorporating advanced technology into safety equipment, which aligns with overall sustainable development goals. The research began with an understanding of the novel implications of improved safety measures, particularly in businesses that require strict health monitoring and emergency response skills. The desire to improve workplace safety, increase productivity, and optimize health management emphasizes the need of smart technology in modern safety equipment. The Smart Aid Safety Vest's practical benefits include real-time health monitoring and exact position tracking, which are especially important in hazardous circumstances where quick response and accurate information are critical.

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This innovation is consistent with Sustainable Development Goal 3, which prioritizes good health and well-being, and Goal 9, which encourages sustainable industrialization and innovation.

The lengthy research revealed considerable benefits, including increased workplace safety, improved health outcomes, faster emergency response times, and improved surveillance features. The Smart Aid Safety Vest program demonstrates a commitment to progress and the use of innovative technology to overcome traditional barriers in occupational health and safety. The project demonstrates how technology innovation may promote long-term growth by increasing efficiency, reducing health risks, improving emergency response, and raising the bar for workplace safety.

This innovation has the potential to transform industry norms and pave the way for a more robust and successful future in the dynamic field of workplace safety.

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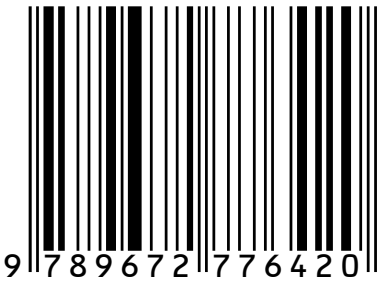

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