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INNOVATION IN ACTION: TURNING IDEAS INTO REALITY

Chapter 48
IProtectV: Enhancing Workplace Safety Through Smart Technology

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ABSTRACT

Product innovation is one of the key methods to enhance capabilities and ensure that work processes can be carried out efficiently and effectively. The aim of innovation is to reduce waste, whether in terms of costs, time, or operational procedures, so that tasks can be performed optimally. Currently, worker safety has become a legal priority and a central focus in safeguarding employee welfare. Therefore, the development of the iProtectV smart safety vest is proposed for workers in all industrial sectors to address growing safety concerns. This innovative product is equipped with high-tech components such as geofencing and RFID to ensure the effectiveness in reducing accidents rates, especially among lone workers. In addition to the use of IoT, other features have been enhanced, including health sensors and ECG monitoring to detect workers health conditions in real time. The use of polyester as the main component of the design as available in the market then mesh in some parts increases comfort for users. With its user-friendly design, this product has strong potential for widespread commercialization across various industries.

Key Words: Warehouses, real-time monitoring, fatigue detection, safety, high tech

1. BACKGROUND

Workers in logistics, warehousing, and construction face daily risks, including heavy machinery and working alone in hazardous areas. Despite safety gear, accidents remain common, indicating current equipment is insufficient. In Malaysia and other countries, accidents often result from worker inattention and lack of monitoring, especially in isolated settings. The iProtectV vest addresses this by tracking worker locations, sending alerts, and ensuring real-time safety. With features like GPS, sensors, and warning lights, it enhances

safety and helps companies respond quickly to emergencies, offering a smarter, more effective safety solution.

2. PROBLEM STATEMENT

The logistics and warehousing industry face high accident rates, contributing significantly to global workplace fatalities, with Malaysia recording 99 incidents per 10,000 workers. Accidents often stem from worker negligence and lack of monitoring in large areas, especially affecting lone workers who struggle to communicate during emergencies. As recommended by Europe OSH, effective protective equipment is essential, since certain risks are unavoidable. However, a Kimberly-Clark survey shows that simply wearing safety gear is not enough—more advanced and effective solutions are needed to ensure worker protection.

3. OBJECTIVES

3.1 Enhanced Worker Safety
iProtectV reduces risks such as collisions, falls and equipment related accidents, especially for lone workers through real-time alerts and built in communications tools

3.2 Real-Time Monitoring & Geofencing
Tracks worker location and movement, prevents entry into hazardous zones and provides instant hazard alerts using smart geofencing technology

3.3 Boosts Safety Awareness & Compliance
Encourages safety-conscious behavior, improves discipline and helps companies meet DOSH safety standards while supporting ESG initiatives

4. NOVELTY

4.1 Smart Safety for Construction Workers
IProtectV is an innovative upgrade from standards safety vest, offering real-time hazard detection, location tracking and task support ensure greater safety on dynamic construction sites

4.2 IoT Integration for Health & Movement Monitoring
With IoT technology, iProtectV allows supervisors to monitor worker movements, fatigue levels and vital signs, reducing risks of overwork, accidents and unmonitored activity in dangerous zones

4.3 Instant Alerts & Mental Health Assistance
The vest includes automatic communication tools that detect distress such as anxiety or medical emergencies and send alerts to the admin and nearby workers for rapid response and support.

5. KEY FEATURES AND UNIQUENESS

The iProtectV vest combines comfort, durability, and technology. Its lightweight, breathable mesh polyester ensures comfort and prevents overheating, while Cordura fabric provides abrasion resistance, making it tear, puncture, and rub resistant. Next, iProtectV vest has a breathable mesh lining for comfort and airflow, especially in hot areas. Nylon webbing straps

with Velcro or buckles ensure a secure, adjustable fit, keeping the vest in place during activities like lifting or bending. The vest's LED warning lights are housed in lightweight, impact-resistant polycarbonate. Its flexible PCBs, connected with conductive thread, enable seamless integration of motion sensors, temperature monitors, GPS trackers, and vibration alerts.

6. PRODUCT USAGE

The iProtectV smart safety vest is designed for workers in high-risk environments like warehouses, construction, factories, and logistics. It's easy to use—simply wear it like a regular vest and adjust the straps for a comfortable fit. The vest automatically activates upon wearing, turning on its smart features without needing to press a power button. It monitors safety through sensors, with geofencing to alert workers when entering dangerous areas by vibrating or flashing lights. Fall detection is also automatic, triggering alerts if a worker falls. In emergencies, workers can press a button to send alerts to supervisors. The vest automatically turns off after the shift ends and should be charged before the next use to ensure full functionality.

7. COMMERCIALIZATION POTENTIAL

iProtectV has great potential because nowadays the global workplace safety market is growing rapidly, driven by increased awareness of worker health and safety, particularly in physically demanding industries such as construction, logistics, and warehousing. According to Markets (2022), the market is expected to expand from USD 14.2 billion in 2022 to USD 26.7 billion by 2027, with a Compound Annual Growth Rate (CAGR) of 13.5%, fuelled by contributions from smart wearable technologies.

Common warehouse accidents, such as slips, trips, falls, manual handling injuries, crash injuries, machinery accidents, and falling objects, frequently occur in the workplace (Solicitors, n.d.). For example, a man tragically fell to his death at Arlington warehouse (Coombs, 2025). The iProtectV vest can monitor worker fatigue, alert them to nearby hazards, and track conditions like body temperature, potentially reducing such incidents. This functionality is particularly valuable in warehouses, where workers face risks from prolonged strain and hazardous conditions. The commercial potential of this vest is significant, as it helps minimize warehouse accidents.

8. BENEFITS TO COMMUNITY

8.1 Improved Workplace Safety
iProtectV helps prevent common accidents such as falls, fatigue related incidents. Through features like motion sensors, fatigue tracking and real time hazard alerts.

8.2 Better Worker Well-Being
By reducing injuries, iProtectV promoted a healthier workforce and supported a better quality of life both on and off the job

8.3 Increased Productivity & Economic Impact

A safer work environment boosts employee morale, enhances performance, lowers turnover and reduces recruitment and training costs and leads to long-term economic benefits for the community.

9. FEEDBACK FROM COMMUNITY

Based on the survey results, the community shows interest in smart safety devices. Opinions shared through these surveys highlight the importance of increasing awareness and provide clear information about these devices to maximize the adoption and the impact on them.

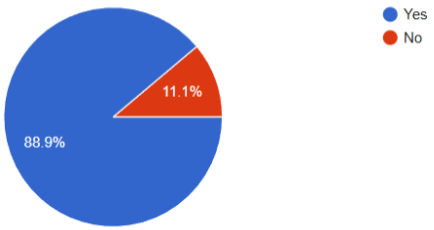

Figure 1: Results of survey distributed among UiTM students.

The chart shows that 88.5% of respondents are aware of wearable safety devices, highlighting growing recognition of smart technology in workplace safety. Devices like the iProtectV vest offer features such as geofencing and real-time monitoring to reduce risks. However, 11.1% remain unaware, indicating the need for improved outreach and education for wider adoption.

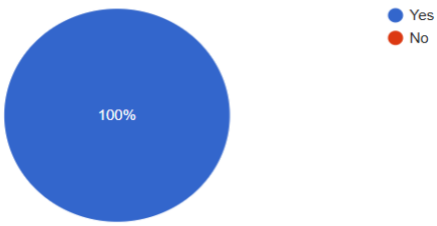

Figure 2: Results of survey distributed among UiTM students.

The survey results show 100% support for a system that alerts nearby people in case of a fall or danger, indicating high demand for immediate alert features. This feedback suggests that integrating automatic alerts into safety devices could improve emergency response and workplace safety by enabling quicker help.

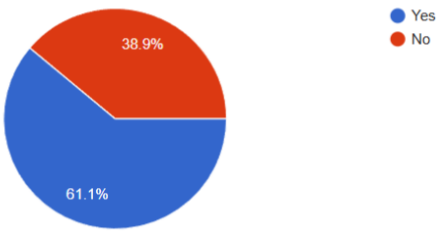

Figure 3: Results of survey distributed among UiTM students

The charts provide two overviews of how familiar people are with IoT (Internet of Things) and smart sensors. In the charts, 61.1% of respondents said they are familiar with these concepts, while 38.9% indicated that they are not, which suggests there is room to boost awareness. 61.1% of respondents showed familiarity, meaning they know about IoT and smart sensors. These differences might reflect diverse groups or targeted audiences, but they clearly show that while many understand these technologies, others could benefit from more accessible information

10. CONCLUSION

In conclusion, adopting advanced safety technology like iProtectV is crucial to addressing high workplace accident rates in the logistics and warehousing sectors. With logistics being a leading cause of work-related fatalities globally, iProtectV integrates smart wearables, geofencing, real-time monitoring, and fatigue detection to enhance worker safety, communication, and emergency response. It also improves compliance with safety regulations like those set by DOSH and offers significant economic potential as the market for smart safety solutions grows. By reducing injuries, iProtectV boosts worker morale, productivity, and overall societal well-being. This innovative solution provides a safer, smarter, and more sustainable approach to high-risk industries.

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