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INNOVATION IN ACTION: TURNING IDEAS INTO REALITY

Chapter 4
GeoStride: GPS-Integrated Safety Boots

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ABSTRACT

GPS-integrated safety boots from GeoStride effectively address the critical workplace safety gap by combining real-time location tracking with advanced protective footwear. Aiming primarily at the construction, mining, and manufacturing industries, these boots contain an SOS button and a GPS module, enabling instant emergency response. One of the product's significant innovations is using eco-friendly materials, consisting of microfiber leather, ergonomic insoles, and lightweight composite toe caps, providing comfort, durability, and sustainability. The survey findings from 42 respondents show that GeoStride features were strong points, with almost 82% admitting a need for real-time tracking and 73.8% pointing out the SOS button. Despite battery life, durability, and the privacy issues mentioned, the unique functionality and design details of GeoStride certainly enable it to be regarded as a trendsetter in the field of security innovation. Features include mobile app integration, pro-aesthetics, and several customization options, making the product even more appealing. GeoStride is the emblem of the future of the equipment that provides personal protection by assuring worker safety, elevating productivity, and upholding sustainable practices. This cutting-edge product, propelling us into a new era of occupational safety, will, however, be in a class of its own by being up to date with the recent advances in technology and the environment.

Key Words: GPS-integrated safety boots; real-time location tracking; emergency response; eco-friendly materials.

1. INTRODUCTION

The deficiency of proper safety measures exposes workers in the construction sector to higher risks around larger and hazardous worksites (Rahman et al., 2022). If the former type of safety boots can physically protect employees, they are without the possibility of their location being traced quickly. This may be a reason for the delay of rescue operations, worsening conditions for severe injury or death (Ochoa-De-Eribe-Landaberea et al., 2024). Therefore, approaches

for developing solutions such as GPS-integrated work boots can be an option to solve this problem.

GPS-integrated safety gear offers real-time location tracking to organize workplace/blog emergency handling better. This is done by integrating a GPS module in the boots and crafting a mobile app to manage the user's location. During the process, construction workers will collect data to understand the purpose of ensuring they are provided with safety equipment (Arabshahi et al., 2021).

GPS use in safety footwear has a variety of advantages, among others. It promotes safety by providing immediate access to the location, which benefits workers in remote or risky jobs. Moreover, it can enhance productivity as supervisors will be monitoring the position of their workers. Apart from that, the step-counting feature sets a health consciousness among the workers. Nevertheless, implementing GPS-based integrated safety boots carries challenges. The battery lifeline, stability of the GPS module under challenging conditions, and educational aspects concerning users are some of these, which should be overcome by knowing the benefits and proper usage of the product. Fighting such difficulties will stand for the creation of a favorable environment, which is necessary for the popularization and development of this technology among different populations of people (Arabshahi et al., 2021; Ibrahim et al., 2023; Ochoa-de-Eribe-Landaberea et al., 2024).

However, the invention ideas in this field do not stop at the barriers. Future versions of safety boots could include advanced health monitoring features and artificial intelligence to predict potential hazards. Overall, integrating GPS technology into safety boots represents a significant advancement in personal protective equipment, enhancing workers' safety, efficiency, and convenience.

2. PRODUCT OVERVIEW

GeoStride safety boots, incorporating a GPS tracking feature, are the ultimate tools in enhancing safety protocols, which is the most acute requirement for the personnel amidst hazardous vocations. Although traditional safety boots block industrial hazards, the lack of real-time tracking and the communication of emergencies is not their strongest point. GPS technology in boots makes safety a constitutional right with a touch of modern technology, so the environment is much safer and productive. Such an idea is more applicable to industries such as construction and mining, where workers are exposed to dangerous risk areas and work in remote locations (Milner, 2016). Workers' geolocalization will offer timely assistance by emergency services, which undeniably will enhance job safety and decrease the wait time for rescue, which is vital for keeping victims and employees safe.

GPS-integrated boots have become a modern product development trend: product amendments, product lines, repositioning, and pricing mechanisms. Manufacturers can win by using top-notch technology and its integration into standard-issue safety gear, knowing the market needs and supplying complete safety solutions. GeoStride boots have the safety features of providing comfort and endurance, as well as protecting the environment. The boots are created of lightweight, eco-friendly, and ergonomic materials, thus minimizing fatigue, improving comfort, and featuring a fashionable design. These boots also feature sophisticated communication and security because of GPS tracking, an SOS button, and integration with the mobile app. To stress this point further, the GeoStride boots, equipped with GPS technology, bring a revolutionary change in PPE, since they can help with the most common

safety issues workers and businesses face. The summary of this product is shown in Figures 1 and 2.

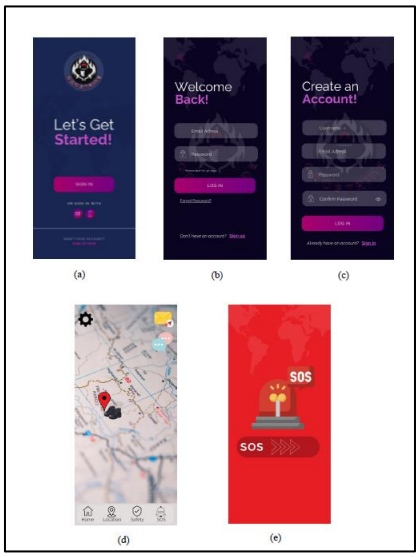

Figure 1. Overview of the safety boot application in the Apple Store (IOS) and the Play Store (Android). (a) Launch screen, (b) Log in page, (c) Sign up page, (d) Home page, (e) SOS Alert Button.

Figure 2. Safety Boots Features

3. METHODOLOGY

The methodology used in developing GeoStride GPS-integrated work boots involved a survey method to assess the feasibility and acceptability of the product. A questionnaire was designed to collect data from construction workers, site supervisors, and safety officers on the importance of safety features, the practicality of GPS inclusion, design issues, and willingness to use the technology. The questionnaire included multiple-choice and scale-type questions to gather responses on issues like problems with current safety equipment, the need for real-time tracking, and potential use cases for GPS-enabled boots. The survey was distributed digitally via email and social media groups related to civil engineering and construction and received 42 responses.

4. RESULTS AND DISCUSSION

The research on safety boots with built-in GPS found several important things. First, most people do not know that these kinds of boots exist. About 83.3% of the people in the survey said they had never heard of safety boots with GPS. This shows a new and unique idea here, and companies can be the first to bring this product to market. It also means more effort is needed to teach people about these boots and their benefits.

The study also asked if people thought GPS tracking in safety gear was needed. About 47.6% said they had been in situations where GPS tracking would have helped. This supports the idea that the boots are helpful. Workers are often in dangerous or far-away places in construction, mining, or oil and gas. Knowing where they are in real time can help save lives in emergencies. Almost half of the people in the study said they had faced such situations, which proves the boots are relevant and needed.

The research also examined how important people think GPS tracking is for workplace safety. Around 45.2% said location tracking is “very important.” This shows that people want this feature and that it meets real safety needs in risky jobs. It also shows that GPS tracking can help keep workers safer by helping supervisors respond faster during emergencies.

Lastly, the study examined the most important features in GPS safety boots. The most wanted feature was real-time location tracking; 81% said it was a must-have. The SOS alert button was also very important, with 73.8% saying it was necessary. These features focus on quick response in emergencies. GeoStride boots, including real-time tracking and an SOS button, match what users want. The research supports that GPS safety boots like GeoStride should be developed and used.

5. CONCLUSION

The journey to create GeoStride boots has been unique. We did market research, created early designs, and tested the product in a small market. The idea first came from comics, where safety problems were solved using new and smart tools. Our surveys showed that people want important features like GPS tracking and an SOS button. We also used eco-friendly materials and ensured the design was comfortable. This matches what today’s customers want. We tested different designs and made changes to ensure the boots work well, are safe, and look good. During our test marketing, many people showed interest in GeoStride. Most said they would buy the boots because the price is fair and the features are new and useful. Some people were worried about battery life, how strong the boots are, and how safe the data is. But these problems can be fixed with better design and clear user instructions. Overall, GeoStride is a product that can do well in the market. More people are looking for smart safety tools, and GeoStride can help protect workers and make their jobs easier and safer.

6. RECOMMENDATIONS

GeoStride GPS-integrated safety boots research and trial findings may support these products' further advancement and market launch. To ensure successful adoption, we have identified several recommendations to enable this transition. These include improving the

product's daily life, increasing the battery life and durability, and developing the design to come up with metal-free materials that can enhance privacy. Moreover, it is crucial to prepare appropriate and straightforward user guidelines, which are, in turn, important in making the product usage effective and trustworthy. A marketing campaign should focus on the advantages that will accrue to the workers using the boots, including enhanced safety and emergency response. Pricing research must be in-depth to align price with affordability. Expansion of the target market beyond construction and mining into emergency services and forestry is also an option to consider. By adopting these suggestions, we believe that GeoStride boots will be considered a revolutionary invention that significantly improves workplace safety and operational efficiency.

REFERENCES

Arabshahi, M., Wang, D., Sun, J., Rahnamayiezekavat, P., Tang, W., Wang, Y., & Wang, X. (2021). Review on sensing Technology adoption in the construction industry. *Sensors*, *21*(24), 8307. https://doi.org/10.3390/s21248307

Ibrahim, K., Simpeh, F., & Adebowale, O. J. (2023). Benefits and challenges of wearable safety devices in the construction sector. *Smart and Sustainable Built Environment*, 14(1), 50-71 https://doi.org/10.1108/sasbe-12-2022-0266

Milner, G. (2016). What is GPS? *Journal of Technology in Human Services*, 34(1), 9–12. https://doi.org/10.1080/15228835.2016.1140110

Ochoa-De-Eribe-Landaberea, A., Zamora-Cadenas, L., & Velez, I. (2024). Untethered Ultra-Wideband-Based Real-Time locating system for Road-Worker safety. *Sensors*, *24*(8), 2391. https://doi.org/10.3390/s24082391

Rahman, S. H. A., Kamaruding, M., Nusa, F. N. M., & Dzulkifli, S. N. M. (2022). Strengthening the development of safety and health guidelines during post COVID 19 condition for construction site project. *Journal of Sustainable Civil Engineering & Technology*, *1*(1), 9–19. https://doi.org/10.24191/jscet.v1i1.9-19