Research Article

Lucent: Personal Safety Mobile Application for Women

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Abstract: *Lucent represents a bespoke mobile application catering specifically to the safety needs of women in Malaysia. It boasts a repertoire of multiple cutting-edge safety functionalities, encompassing emergency call functionality, siren activation, and location sharing, each meticulously designed to address and ameliorate precarious or threatening scenarios. This remarkable innovation serves as a judicious alternative to prevalent communication platforms like WhatsApp or Telegram, which, although proficient in facilitating interpersonal exchange, lack the specialized features requisite for robust safety provision. By virtue of its utilization of Java programming language within the Android Studio framework, Lucent manifests as a technical marvel. The integration of Geofencing technology, powered by Google API, empowers the application to acquire precise user location data, further enhancing its efficacy. Employing the Waterfall Methodology, renowned for its applicability to modest-scale endeavors and ease of implementation, this project has yielded a comprehensive system that endows Malaysian women with a diverse array of safety measures, fostering an augmented sense of security in the days to come.*

Keywords: Geofencing; Location-based service; mobile application.

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1. INTRODUCTION

As per the findings of a comprehensive public survey, jointly conducted by the Centre of Governance and Political Studies (Cent-GPS) in collaboration with the All Women's Action Society (AWAM), an alarming 57% of Malaysian women have reported experiencing unwelcome physical contact in public spaces. Additionally, an unsettling 68% of women expressed feeling unsafe when driving alone. Further analysis of the survey results reveals that 21% of women have encountered instances of being followed to their vehicles, while 25% have endured the distressing experience of being pursued to their residences at some point (Loheswar, 2021). These disheartening statistics find reinforcement in a recent incident that captured widespread attention across various social media platforms. In April 2022, numerous women came forward with accounts of sexual harassment perpetrated by a single individual within the confines of the parking area at Tamarind Square in Cyberjaya, Selangor. The victims' distress was palpable, as they could be heard screaming and some were left traumatized by the harrowing encounters. Regrettably, law enforcement authorities were unable to promptly respond to the situation, leading to a delay in identifying and apprehending the suspect (Leong, 2022).

As reported in the news, a significant number of assaults targeting victims occurred within the confines of mall parking areas. The inherent challenges of detecting the precise location of victims in vast, enclosed spaces like basement parking structures make them particularly susceptible to planned

attacks. Despite the presence of closed-circuit television (CCTV) systems, numerous blind spots within these areas remain undetectable by surveillance cameras. Consequently, it becomes evident that there are notable deficiencies within the existing safety systems intended to protect women from such distressing situations. Women are persistently exposed to these threats, particularly when they find themselves alone, as they are unable to promptly access assistance from local authorities or bystanders. In circumstances where time is of the essence, every passing second becomes critical. Engaging in the process of dialing emergency hotlines or contacting family and friends can be both time-consuming and burdensome for the victims. It is against this backdrop of existing shortcomings that the concept for developing a mobile application emerged, aiming to address these flaws and provide a more efficient means of support.

In recent times, the ubiquitous presence of GPS chips in modern smartphones has revolutionized the realm of location-based services. These chips enable users to leverage a myriad of functionalities, ranging from location sharing and route adherence to utilizing mapping applications for navigating specific destinations and monitoring traffic conditions. By utilizing geographical measurements and coordinates, geofencing technology harnesses the power of GPS to accurately determine a device's position. Geofencing essentially establishes a virtual perimeter, which can be achieved by either defining new boundaries or creating virtual fences around existing boundaries (Shah, Shukla, Prasad, & Mandalia, 2022). Leveraging low-power geofencing technologies, mobile applications can track device positions through Bluetooth or Wi-Fi connections (Shergil, 2022). This technology empowers users to access a multitude of features, including navigation applications that draw on GPS technology to provide real-time insights on optimal routes. By factoring in variables such as weather information, traffic congestion, road conditions, and the user's location, these navigation apps enhance the user experience by offering tailored route recommendations (Shergil, 2022).

The remarkable success of the mobile application has paved the way for a thriving market in the realm of information relevance. Within this landscape, Location-based Services (LBSs) have emerged as a particularly innovative and dynamic category. Social community platforms have eagerly embraced the concept of LBSs, incorporating features such as location sharing and geofencing. This enables platform members to actively communicate their current whereabouts, fostering a sense of connectedness. By leveraging geofencing, users can precisely and accurately share their location information. It's important to note that this information is only accessible while the user is actively engaged in the service session or utilizing the specific feature. Once the user disengages or interrupts the session, the positioning process is terminated (Bareth, Küpper, & Freese, 2011).

2. METHOD & MATERIAL

The development of this system followed the Waterfall methodology, which involved three distinct phases. The initial phase was the requirement gathering and analysis stage, where suitable requirements were identified. This involved conducting interviews and reviewing relevant literature to gain a comprehensive understanding of the project's needs. Subsequently, the design phase was undertaken, encompassing the creation of storyboards, system architecture, and database design. These artifacts served as the blueprint for the system's development. Finally, the design phase outputs were utilized to proceed with the actual implementation of the system.

The decision to employ a mobile application stemmed from its inherent portability and faster processing capabilities compared to web-based systems. By leveraging the advantages of mobile technology, the system aimed to deliver a more streamlined and efficient user experience. The development process centered on Java programming language and targeted the Android platform, ensuring compatibility and optimal performance for mobile devices.

3. FINDINGS

The findings of the project are presented in this section.

3.1 Requirement Gathering and Analysis

In this phase, requirement for the mobile application were gathered and analysed. A set of questionnaire was distributed to the target user, women in Malaysia. The questionnaire contains three sections separating three different sets of questions with a total of 17 questions as a whole. 35 respondents were identified and their responds were recorded.

Based on the result, the most common harassment experienced by women in Malaysia is being catcalled which all of the respondents chose. Catcalling is the act of calling people using derogatory or disrespectful comment. Next is being stared at. Both catcalling and staring can cause extreme discomfort and can be degrading. There is also 50% of the respondents which equals to the total of 10 people experienced unwanted touching. Being followed from behind also tied with the same number with the total of 10 respondents. The least type of harassment chosen is invasion of personal space with only four respondents had experienced it. Based on this information, it may help to decide the suitable feature that should be included in the mobile application.

Apart from that, all respondents agree with the idea of implementing location sharing feature in Lucent using geofencing technology is necessary. Most respondents which is 95% responded they have not used any safety application which means that Lucent should be user-friendly as most users will not be familiar with this kind of mobile application. Lastly, all 35 respondents agreed that by having safety application, it can help them to feel more secure. Based on all the identified responses, a use case diagram representing Lucent were produced as in Figure 1.

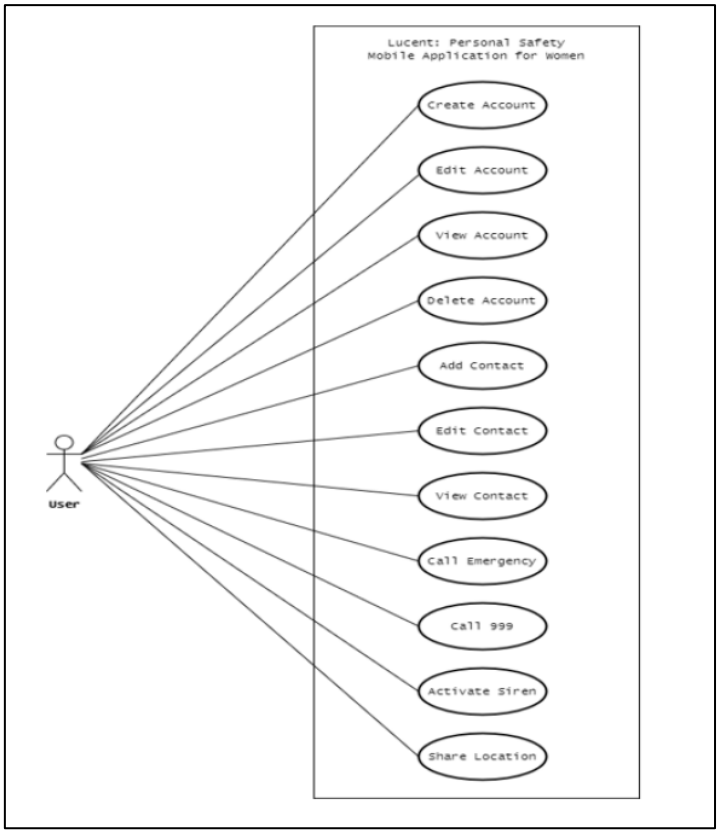

Figure 1. Use Case Diagram for Lucent Mobile Apps

3.2.2 Design

The activity that had been done in the system design phase is design the user interface of the system by using the storyboard. The importance of using storyboard is to visualize on how the actual system may appear to the user with the front-end scripting.

3.2.3 Implementation

In this phase, Lucent is being developed and implemented. For this purpose, Java programming language was used on Android Studio which supports the development of a mobile application. Figure 2 shows the dashboard for Lucent. All the features of Lucent appears here. User will be able to call their contacts, activate siren during emergency, call 999 and share their location from the dashboard.

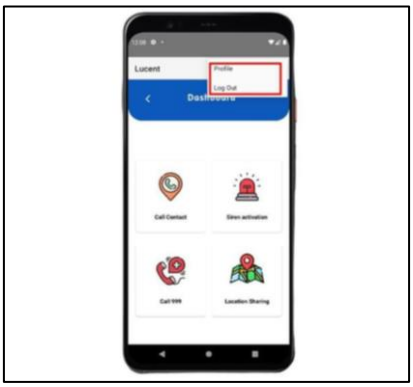

Figure 2. Lucent's dashboard

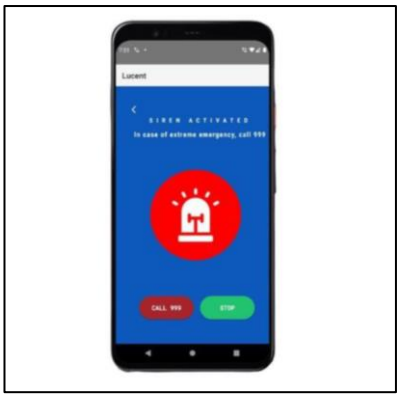

Figure 3. Siren activation page

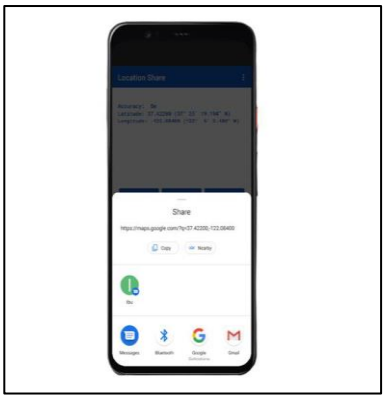

Figure 4. Location sharing

Figure 3 shows how siren can be activated when the features were chosen. From here, user can also directly called 999. Meanwhile Figure 4 shows how Lucent can send the user's location when the features is activated.

4. DISCUSSION

There are a few key strengths that can be identified in Lucent including having a user-friendly interface that helps user to navigate easily. Lucent is designed in a way that allows its main functions such as the safety features to be the first thing that user will see once they are logged into the system. Making a call to emergency contact, activate siren, calling emergency number, and sharing location

functions are displayed on the dashboard. This is to allow immediate access to these functions during emergency.

In addition, Lucent allows fast calling during emergency. By using Lucent, user can make an immediate call to local authorities and their listed emergency contact within a single click. To make a phone call, the users are required to click on the phone icon beside the contact's name and they will be redirected to the call page and make a phone call without needing to dial the number. This goes the same way for the function calling 999 or local authority. A single click on the function button and user will be brought to the call page and immediate phone call can be made. This function can help to avoid consuming too much time which crucial during emergency.

Lastly, Lucent also provide it users with the ability to share their location to their emergency contact. This allows emergency contacts to get notified on the users' whereabouts which is one of the main functions of this system. The implementation using Google API allows accurate location sharing which can help to provide sense of reassurance to both the users and their contacts.

5. CONCLUSION

The development of Lucent necessitated the identification of specific requirements, which were gathered through the distribution of a comprehensive questionnaire to the target user group in the previous semester. The obtained data was subsequently analyzed and studied to gain valuable insights. Additionally, in-depth research was conducted on various subjects, such as mobile application development and geofencing technology, to ensure a thorough understanding of the relevant domains.

The primary objective of this project was to create a personal safety mobile application tailored for women in Malaysia, offering them a reliable tool in times of danger. However, there are potential areas for enhancement, including improving compatibility with other operating systems to cater to a wider user base. Additionally, incorporating additional security features into the application could further augment its effectiveness and provide an even greater sense of security for the users.

Acknowledgments: We would like to extend our gratitude to everyone involved for their contributions in this innovation and research project. Furthermore, we would also like to extend our acknowledgement to everyone who had helped directly and indirectly with completing this research.

References

Bareth, U., Küpper, A. & Freese, B.. (2011). Geofencing and Background Tracking - The Next Features in LBS.

Leong, A. (2022). Molester Spotted Sexually Harassing Multiple Women In Tamarind Square, Police Are On The Hunt. Retrieved from therakyatpost.com: https://www.therakyatpost.com/news/2022/04/06/molester-spotted-sexually-harassing-multiple-women-in-tamarind-square-police-are-on-the-hunt/

Loheswar, R. (2021). Survey: Over two in three women say must run the gauntlet of sexual harassment every day. Retrieved from therakyatpost.com: https://bit.ly/3s462DM

Shah, S. N., Shukla, A., Prasad, R., & Mandalia, P. (2022). "Geofencing Application using IRNSS/NavIC," 2022 2nd International Conference on Intelligent Technologies (CONIT), Hubli, India, 2022, pp. 1-6, doi: 10.1109/CONIT55038.2022.9848361.

Shergil, A. (2022). Top 10 Advantages Of Incorporating Geofencing In Mobile App. TopDevelopers.co. https://www.topdevelopers.co/blog/advantages-incorporating-geofencing-mobile-app/