

**Pathfinders: A Public Commuters' and Parents' Safety and Assistance Application**

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**ABSTRACT**

The Manila metropolitan area is identified as the world's worst for traffic congestion, compounding challenges faced by commuters. In an effort to contribute to the alleviation of this situation, the Pathfinders app is designed to offer comprehensive guidance and safety features, aiming to improve commuting experiences and safety in Metro Manila. The study aimed to develop an application that educates public commuters on safe travel by providing useful information, suggesting efficient routes, and offering safety measures. The significance of the study lies in its provision of vital commuting information, aiding parental monitoring for safety, ensuring children's well-being during travel, and offering insights for future researchers delving in this field. The project design includes features such as an emergency message button, Global Positioning System (GPS) tracking, budget planning assistance, detailed mapping, and user consent terms. This application was developed following the AGILE methodology. The project emphasizes problem recognition, user-friendly design, iterative development, testing, and review processes for optimal functionality and user experience. Evaluation involves panels of evaluators assessing the app's performance, followed by a final phase utilizing a Likert Scale for interpretation. The program was

found to perform effectively across all evaluated criteria—functional suitability, reliability, portability, usability, performance efficiency, security, compatibility, and maintainability—indicating its overall success in meeting user needs and operational requirements. To ensure comprehensive evaluation and success, it is recommended to involve a more diverse programmer cohort and prioritize these attributes to effectively meet user and operational requirements. Through these endeavors, the Pathfinders app seeks to alleviate traffic-related challenges and enhance safety for commuters and residents of Metro Manila.

*Keywords:* Commuters, GPS Tracking, Step-by-Step Procedures, Parental Monitoring, Fare Rates

Manila is ranked the worst metropolitan area globally when it comes to traffic congestion, topping over 387 metro areas around the world as reported by Acebuche (2024). David (2019) writing for ABS-CBN News, highlights the escalating challenges faced by commuters in Metro Manila, where commuting has evolved into a burdensome ordeal. The worsening traffic conditions, coupled with inefficient mass public transportation and various other factors, contribute to the difficulties faced by commuters in the metropolis. According to David (2019), Filipino commuters are compelled to leave their homes well in advance of their appointment, navigate through long and disorderly queues, and endure crowded trains, buses, and jeepneys, as the existing modes of transport leave them with limited options. The situation underscores the pressing need for improvements in the transportation infrastructure to alleviate the commuting hardships experienced by residents in Metro Manila. David (2019) further observed that “It’s not only the economy that is robbed of productivity – commuters, mostly workers and students, also suffer from negative health impacts and time wasted.” Luna (2022) stressed the need for the Department of Transportation (DOTr) to increase the transport supply of the country to reduce the “dangerous public transport commuting behaviors such as commuters chasing buses and jeepneys to catch a ride, sometimes crossing unsafe roads that lack good grade crosswalks.”

Pathfinders, the user-friendly app being proposed in this study, integrates safety features inspired by "PasaHero" from ABS-CBN News and offers a straightforward step-by-step guide to aid commuters. Similar to PasaHero, users can effortlessly record trip details and utilize a "Panic" button for emergencies by sharing their location with emergency contacts for added safety. What distinguishes Pathfinders from PasaHero is its practical commuting guide, facilitating smooth navigation through public transportation. The app also introduces a helpful feature allowing users to estimate prices and choose from various transportation options such as jeepneys, light-rail transit (LRT), tricycles, carousels, and more. From selecting the right mode of transportation to providing clear steps on boarding and the best route, Pathfinders ensures a hassle-free and secure commuting experience, enhancing convenience for users on the go with the use of various forms of providing information like textual directions, visual representations, and images.

The aim of this study is to create an online platform that could help commuters efficiently travel to their desired destinations. Navigating through their journeys with ease and safety is made possible using the proposed application. Establishing a live connection between commuters and parents/guardians is another important component of the app that could enhance safety and preparedness for emergency situations. Pathfinders strives to function as a platform that could educate and effortlessly deliver dependable, accurate, and updated information for the benefit of commuters in the broader community.

### **Objectives of the Study**

1. To create an application that helps educate public commuters to travel safely from their current position to their destination.
2. To provide public commuters with useful commuting information, directions and efficient alternate routes, and safety before, during, and after travel.
3. To integrate a safe tracking medium where parents/guardians can monitor their children during their commute allowing for precautionary features to be in place for emergency situations.

## **Significance of the Study**

1. Commuters: To provide them with useful information that can educate them about the current state of commuting at a particular time by providing information on fare rates, directions and alternate routes, and precautionary measures to avoid emergency situations for the commuters themselves.
2. Future researchers: To offer valuable insights into the importance of safe commuting and the challenges that come with it and provide future researchers preliminary information on which development of similar applications or programs can be based.
3. Guardians: To aid guardians in tracking their children's whereabouts during their commutes, ensuring the safety and well-being of their kids and providing assistance in emergency situations.
4. Parents: To help them monitor the whereabouts of their children during the time of their commute to help them safeguard their children's' well-being and the chance to assist them in dire situations.

## **Scope and Delimitations of the Study**

The scope of the program includes provision of a commuter-friendly and comprehensive step by step guide for public commuting. This helps users navigate various modes of transportation such as jeepney, buses, train and walking. The application aims to assist commuters in planning their commute efficiently by offering detailed instructions, fastest route and commute fare. It also features GPS for parents or guardians to locate the commuter's location and a built-in emergency text to assist commuters caught in dire situations.

The one significant limitation of an application providing step by step guide is the inability to adapt or to update in real-time and unexpected events or possible changes in transportation. While the application provides a well-planned route based on the data it may not adjust to factors like sudden heavy traffic, road closures, and delays in commuting.

## **REVIEW OF RELATED LITERATURE AND STUDIES**

Commuting extends beyond the moment one reaches his/her destination. Calderwood and Mitropoulos (2020) introduced the term 'commuting spillover,' highlighting the interconnectedness between commuting and work experiences. This phenomenon, recognized for its practical significance, holds potential implications for employee strain. The following synthesis encapsulates findings from studies identified by Calderwood and Mitropoulos (2020).

In simpler terms, commuting affects one's ability to effectively fulfill responsibilities the following day, impacting energy levels. Moreover, potential negative commuting spill over may either exacerbate or alleviate based on the strain or recovery experienced during the post-work commute (van Hooff, 2015). This explains why commuting continues beyond reaching one's destination as reflected in the extent to which the morning commute induces strain or aids in recovery can significantly influence the availability of self-regulatory resources.

During the pandemic, commuting in Metro Manila has become exceptionally challenging; with limited public transportation options and strict safety measures in place, as highlighted by a survey conducted by the Social Weather Stations (SWS) in November 2020. The study revealed that a staggering 72% of working individuals expressed difficulty traveling to their workplaces, citing limited public transportation as the primary hurdle (CNN Philippines, 2021).

According to the survey, 42% of non-home-based workers found commuting to be "very much harder now," while 19% and 11% indicated it as "somewhat much harder" and "slightly harder now," respectively. Only 28% reported that their commuting experience remained unchanged. The challenges prompted various coping mechanisms, with 44% of respondents opting to walk to work. Outside Metro Manila, this mode of commuting was even more prevalent, with 58% in Mindanao, 44% in the Visayas, and 39% in areas outside Metro Manila choosing to walk (CNN Philippines, 2021).

The rise of home-based work was also evident in the survey findings, with the highest percentage of home-based workers in Metro Manila at 29%, followed by areas outside Metro Manila (22%), Mindanao (13%), and the Visayas (10%). These findings not only reflect the challenges of commuting but also the adaptations individuals have made in response to the changing dynamics of work and transportation. The survey, conducted through face-to-face interviews with 1,500 adults, provides a poignant snapshot of the struggles faced by the majority, shedding light on the complex interplay of public transportation limitations and the resilience of Filipino workers in navigating these difficulties (CNN Philippines, 2021).

The transportation landscape within Metro Manila has witnessed shifts in commuting patterns, with jeepneys or multi-cabs emerging as the top mode of commuting at 25%, closely followed by walking at 21%. The struggles of the commuting population extend beyond the capital region, with diverse transportation options being explored. The survey indicated that aside from walking, other modes of commuting included motorcycles (24%), tricycles (14%), bicycles (5%), buses (3%), private cars (3%), and even motorboats or bangkas (1%) (CNN Philippines, 2021).

In the comprehensive analysis conducted by the Philippine Institute for Development Studies (PIDS) on December 23, 2022, titled "PIDS: 'Grueling commuter experience' remains after Build, Build, Build," significant challenges faced by commuters in the Philippines, particularly in Metro Manila, are underscored. The study reveals a nation grappling with inadequate and poor-quality road and rail transport infrastructure, as confirmed by load factor data that validates commuters' grueling experiences of congestion and long queues. Overcrowded public transportation exacerbates the situation, with the MRT-3 along EDSA operating well beyond its capacity since 2004, transporting 500,000 people daily—142% more than its intended 350,000-passenger capacity. Both the LRT-1 and MRT-3 surpass the target average load factor of 60%, as recommended by the Japanese International Cooperation Agency for urban rail transit systems. It states that the Philippines' train delays and incidents are due to the MRT-3 along

EDSA operating beyond its capacity since 2004, ferrying some 500,000 people daily, or 142% more than its 350,000-passenger capacity. The absence of institutionalized monitoring and evaluation systems adds to the complexity, resulting in a dearth of data on targets outlined in the Philippine Development Plan. This analysis provides a sobering picture of the enduring hardships faced by commuters in Metro Manila, highlighting issues of congestion, delays, poor infrastructure, and planning deficiencies (Luna, 2022).

The article titled “Terminal: The constant agony of commuting amid the pandemic” on the Philippine Center for Investigative Journalism (PCIJ) website discusses the challenges faced by commuters in the Philippines, particularly in Metro Manila. The article highlights that commuting has always been a struggle for Filipinos, and the pandemic has exacerbated the situation due to varying degrees of mobility restrictions during lockdown (Piojo, 2020).

The article points out that commuters often endure long hours of queues for public utility vehicles and trains and exhausting travel time in cramped buses and jeepneys crawling through heavy traffic. In 2019, Metro Manila was named one of the cities with the worst traffic in the world by a well-known navigation app, Waze. A study conducted in 2017 by the Boston Consulting Group showed that a commuter in Metro Manila spent 66 minutes in traffic every day, the third longest in Asia (Piojo, 2020).

Waze is a routing application used by drivers and bikers alike, providing various routes and alternative ways to reach from point A to point B. One of Waze's key features is predicting the estimated time of arrival in real-time. The application receives real-time updates about events occurring worldwide, displayed on the map. Waze users can easily identify traffic jams or other obstacles that may affect their estimated time of arrival, ensuring they stay informed about road conditions and potential hazards.

Regarding safety precautions, Waze continuously updates its users about current road conditions, enhancing awareness and safety during travel. The app aims to ensure that all commuters reach their destinations on time. With accurate and reliable data, Waze strives to make commuting convenient and hassle-free for students, parents/guardians, and all commuters.

Life 360 is another reliable application that prioritizes user safety. It consistently updates the user's current location for parents/guardians and friends to access, along with other user reports. According to Life 360 (n.d.), the benefits include emergency assistance and enhanced digital safety for all app users. These features enhance the app's protective and efficient capabilities. Additionally, the app's real-time location tracking provides peace of mind for both users and their loved ones, especially in emergency situations.

Piad (2022) reported that the application named Grab offers a competitive base fare rate that provides customers with an affordable and convenient transportation option. The base fare rate serves as the starting cost for a ride, enabling users to estimate the initial cost of their journey. This transparent pricing structure ensures that passengers have clarity and predictability when using Grab's services, contributing to a positive user experience. Additionally, the competitive base fare rate makes Grab an attractive choice for individuals seeking cost-effective and reliable transportation solutions for their daily commute or travel needs.

Lastly, one of the features that has helped many commuters is the Google Maps Street View which operates by assembling billions of panoramic images to create a virtual depiction of the environment on Google Maps. These images are gathered through different means, including cars, bikes, backpacks, and cameras, both from Google and its contributors. After collection, the images undergo processing and alignment to generate a smooth and immersive representation of the world.

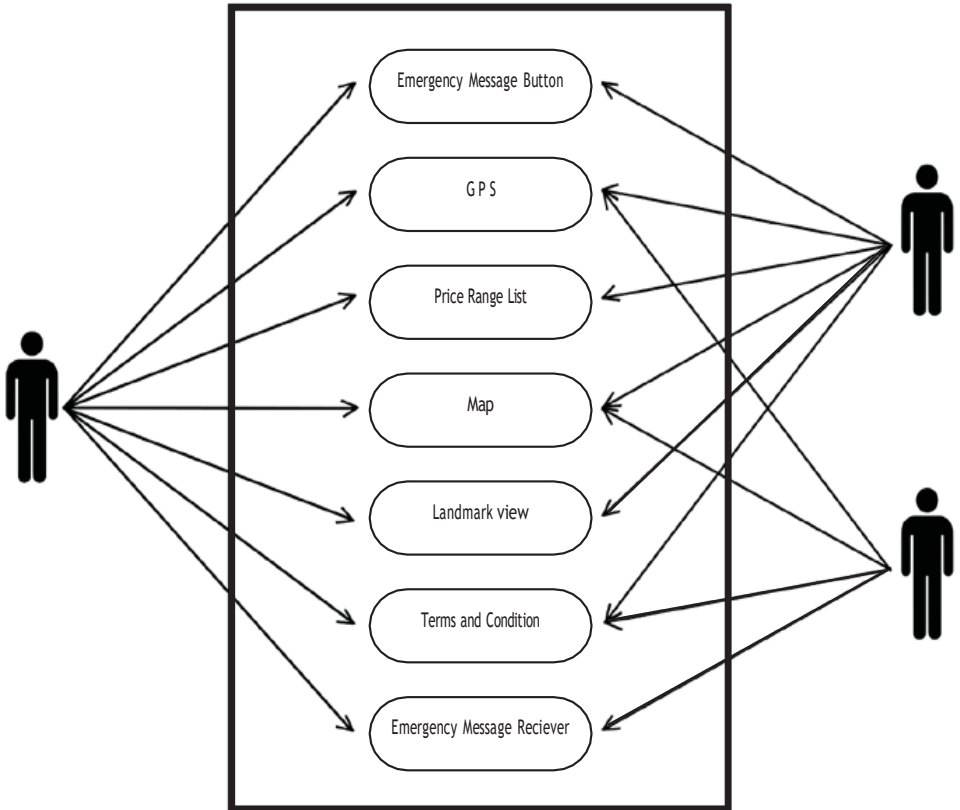
For users, this means that Street View on Google Maps or the Street View app can be utilized to virtually explore places like museums, arenas, restaurants, and small businesses. It is like taking a virtual stroll through various locations. Additionally, with 360-degree images, the user has an option to contribute the images to Google Maps using the Street View app or a compatible camera. In essence, Street View makes it possible to navigate and experience diverse places from the comfort of one's device, offering a unique and interactive way to engage with the world.

Cortés Rojas (2024) mentioned that in evaluating the program to establish the requirement for quality prototype, the software should be evaluated using indicators such as functionality, performance efficiency, usability, and reliability. Ortega *et al.* (2023) confirmed this and added that an ISO/IEC 25010 Software Quality Model can be used to confirm the ability of the program to achieve its intended objectives and meet user requirements. An application can be evaluated using the ISO/IEC 25010 focusing on quality characteristics such as functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. Functional suitability focuses on the system functioning as it is supposed to function and caters to the need of the users. Performance efficiency measures how well and quick the system is while using the memory and storage. Compatibility measures how well a system function with other systems. Interaction capability focuses on how users easily interact with the system to complete the tasks. Reliability emphasizes the consistency of the system as expected under certain conditions while security protects data of the system and restricts unauthorized access and attacks from malicious users. Maintainability is how the system can easily and efficiently be changed to fix the concerns, enhancement, and adaption to new needs while flexibility focuses on the product adjustment in changing the requirements, usage, or environment, and safety on how the system prevents harm to users, other people, property and the environment (Suryadi & Sulistiyani, 2024).

## MATERIALS AND METHODS

### Project Design

**Figure 1:**  
*Use Case Diagram*

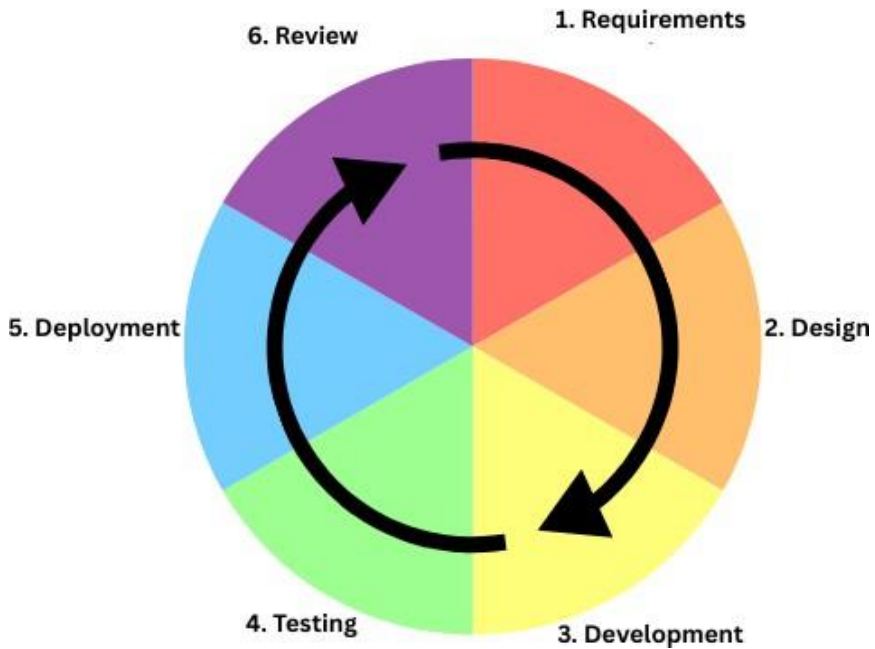


Following are features of the application or program.

1. Emergency Message Button - the button that enables a commuter to send an emergency message dictating his/her current location and status to his/her assigned emergency recipient via a form of an online messaging service.
2. Global Positioning System (GPS) - a system that uses satellites to provide location and time information that can be utilized anywhere in the world.
3. Price Range List - a detailed catalogue of fare rates during travel, an estimated range list that provides the commuter with a budget range.
4. Map - an interface that displays the entire geographical area of a location, including roads, pathways, restricted routes, and geographical structures.
5. Landmarks View - a detailed perspective of a location, that is presented using images or videos to fully illustrate the landmark and its surrounding areas to the user.
6. Terms and Conditions - a legally binding agreement interface between the developers and the users of the application. This gives the developers consent to collect critical information from the users of the application and to also allow them to make use of this information according to their specified terms and conditions stated in the interface.
7. Emergency Button Receiver - an interface for parents/guardians indicating that an emergency has occurred to their child during commute. Sending an SMS text highlighting their child's current location and an image illustrating the area their child is currently in.

## Project Development

**Figure 2:**  
*AGILE Method*



104

The following section shows the steps that were undertaken in the development of the app.

1. Requirements – The process of creating an application of the researchers' choosing started with identification of the problem. An intense discussion among the researchers revealed that a very significant problem concerns commuting among residents of Metro Manila.

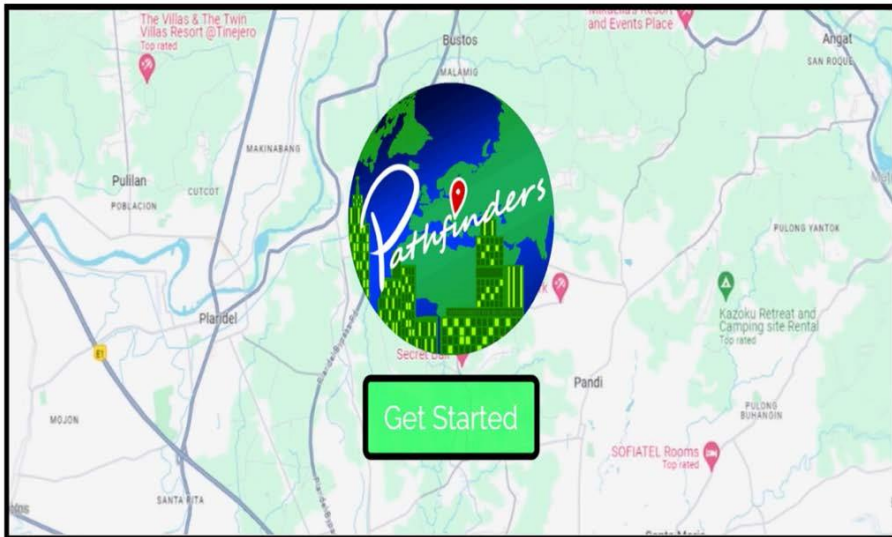
2. Design – The researchers agreed to design and establish a medium, a reliable place for information, where commuters can feel safe during their travels. This place must have a user-friendly design so that all its users can precisely navigate through the application.
3. Development - Numerous prototypes were deployed and many features have been analyzed before being implemented. The application’s development had numerous revisions due to the complexity of creating the system itself while also having to retain the user-friendliness the researchers aim to preserve.
4. Testing - Certain technical tests and trial and error debugging were meticulously done during this phase of development. There was constant solving and searching for new glitches in the system, incoherences during system testing, and during application use.
5. Deployment - The prototype was released to a focus group, ensuring that the quality of the application is at its finest before its release. Interviews, surveys, focus group discussions, and other various forms of data collection were conducted during this phase. This is to gather sufficient data from the respondents regarding the quality and effectiveness of the application.
6. Review - A comprehensive review process, including performance, usability, and effectiveness assessment, was incorporated during user feedback by the researchers to determine necessary improvements for subsequent iterations, ensuring optimal application functionality and user experience over time.

ISO 25010 was used to evaluate the app by the focus group. The results showed acceptability and approval of the respondents. A software on product quality evaluation to test new programs was used as the standard evaluation form for this app.

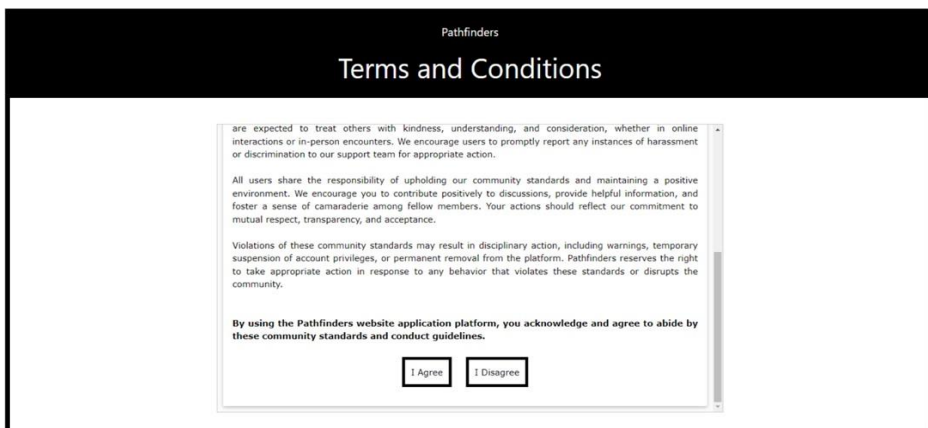
## Operational Procedure

The items below show the user interface of the program. These are the actual features as seen in the app.

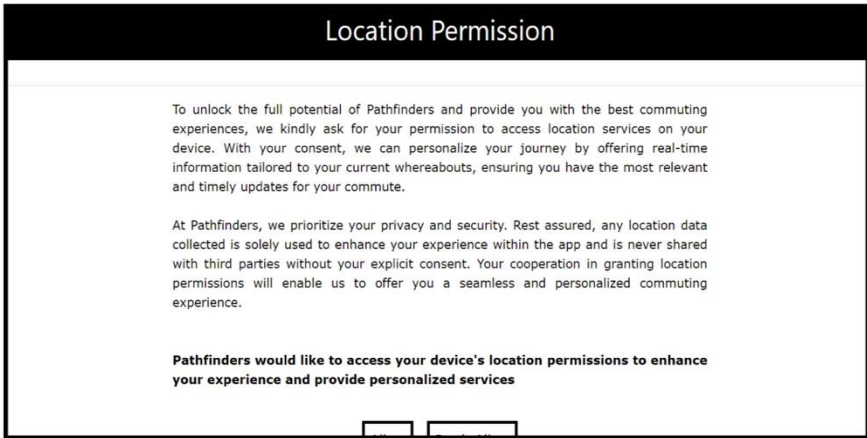
1. Home Page - the starting interface of Pathfinders. This is what all users of the application will be able to see before using the application.



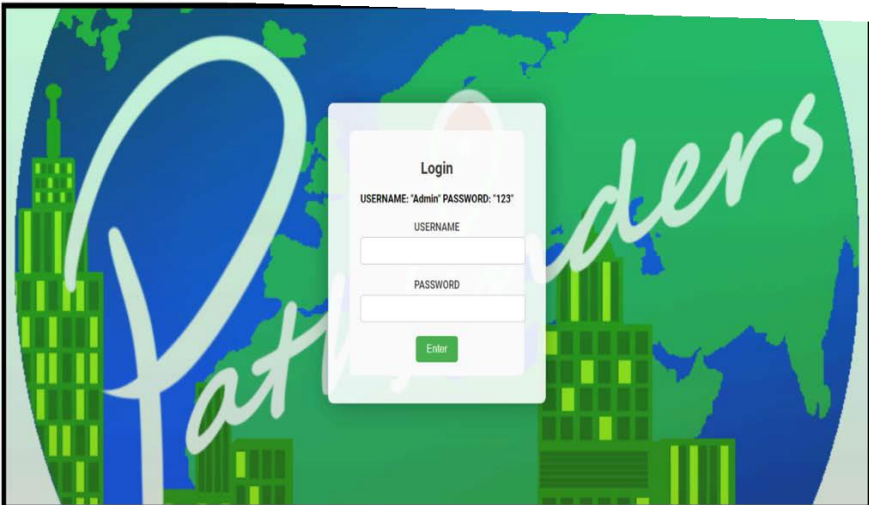
2. Terms and Conditions - the regulation page of Pathfinders. This is where the application, Pathfinders, will ask for the user's compliance with certain terms and conditions before, during, and after the use of the application.



3. Location Permission - the location consent interface of Pathfinders. The application will ask for the permission of the user about allowing the use of GPS tracking during the use of the application, making Pathfinders aware of where they currently are.



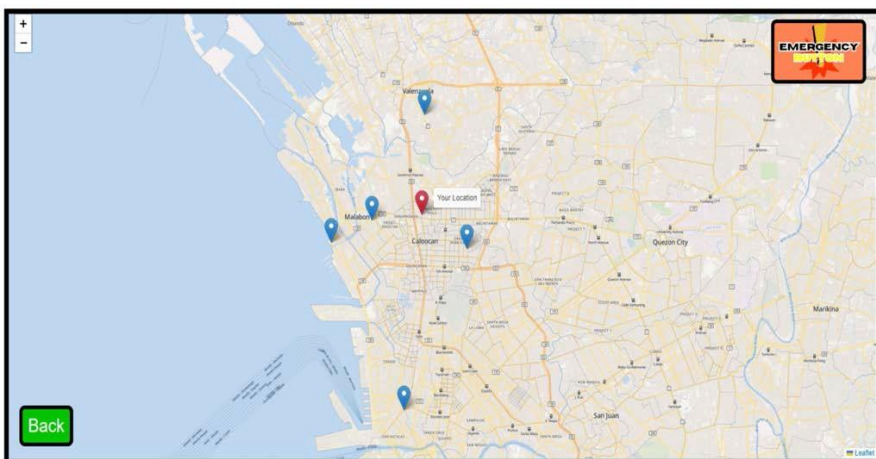
4. Login - the account designation page of Pathfinders users. This is where the user will input his/her username and password to login to his/her account to use the application.



5. User Type - the user-purpose designation on the page of Pathfinders. Here, users can choose between the features for commuters, which provide them with the information and tracking necessary for safe commuting, or the features for parents, which give them the necessary tracking information about their child's current status.



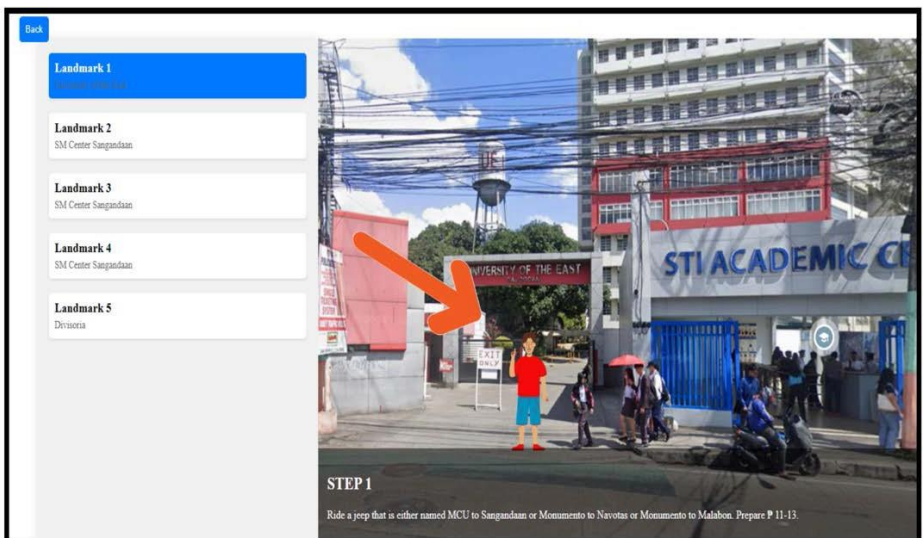
6. Commuter Map - the geographical interface view of commuters. This is what a commuter immediately sees when he/she presses the Commuter Map in the User Type interface.



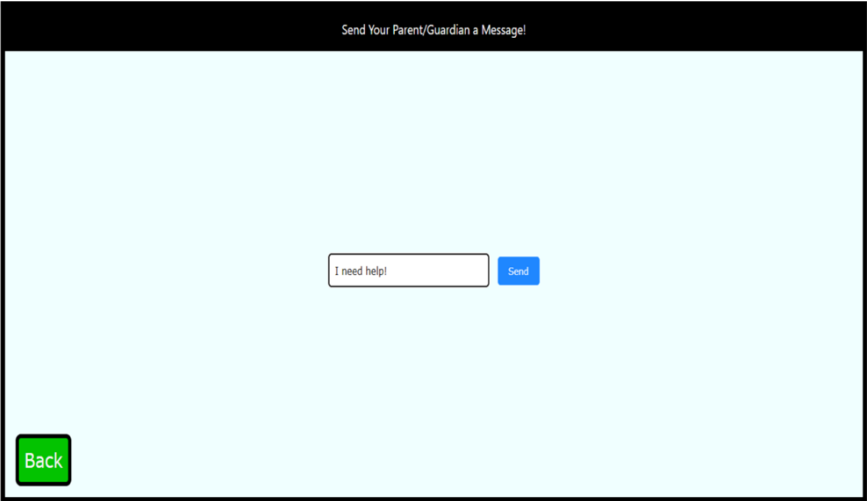
7. Choose Route - the interface where commuters can see all the prerequisite information to their travel. This includes the amount of journey steps, estimated time of arrival (ETA), minimum fare, and an orthographic view presentation of the possible journey track.



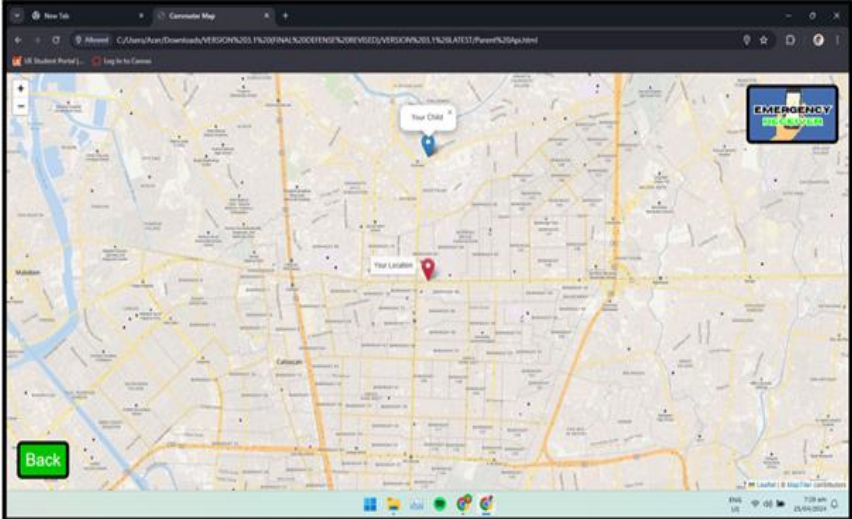
8. Step-by-step procedures - the interface where commuters can see the procedural guide of how to get to their destination. This includes numbered landmarks, the closest landmark, a visual representation of the landmark, and the textual description of what to do in said landmark.



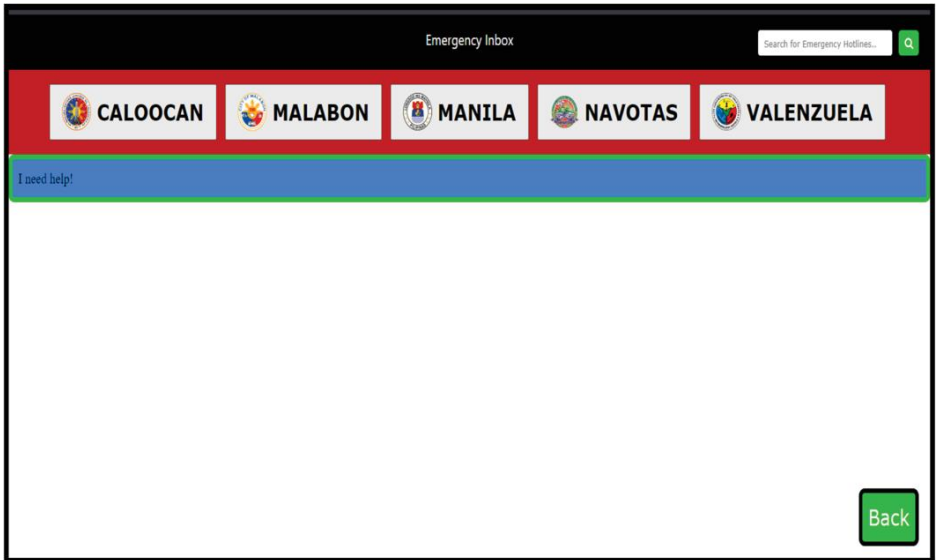
9. Emergency Button - the interface where commuters can communicate with their parents/guardians. Telling them important information in case of emergencies or difficulties they might have encountered during their travel.



10. Parent Map - the geographical interface of parents/guardians. This is the counterpart of the commuter map. The difference is that this map primarily only focuses on the location of the parent/guardian and their child's location.



11. Emergency Receiver - the database where the emergency button messages are stored. The parent/guardian can receive emergency notifications from their child within this interface. The parent/guardian also has the ability to contact nearby government agencies to assist their child during emergencies.



## Evaluation Procedure

The evaluation process was divided into two stages: project demonstration and final evaluation.

### A. Project Demonstration

1. The panel of evaluators was made up of:
  - a. 3 programmers
  - b. 10 commuters
  - c. 10 parents
  - d. 10 guardians
2. The researchers demonstrated or explained how the program operates.
3. The members of the focus group were given a chance to try the app. Feedback and suggestions were given.
4. The feedback and suggestions were responded to.

- B. Final Evaluation was done one month after the initial evaluation, when the revisions in the app were completed.
1. The focus group filled up the evaluation instrument based on ISO 25010. The evaluation instrument was adopted from the main and sub-characteristics of ISO 25010 Software Quality Model.
  2. The mean score for each criterion was computed and eventually combined with the mean scores from other criteria.
  3. The Likert Scale shown in Table 1 was used to interpret the results.

**Table 1**  
*Likert Scale for Evaluation Form*

Likert Scale	Range	Descriptive Meaning
5	5.00 - 4.51	Excellent
4	4.50 - 3.51	Very Good
3	3.50 - 2.51	Good
2	2.50 - 1.51	Fair
1	1.50 - 1.00	Poor

## RESULTS AND DISCUSSION

**Table 2**  
*Frequency and Percentage in Terms of Evaluator*

Evaluator	Frequency	Percentage
Commuter	10	30.30%
Parent	10	30.30%
Guardian	10	30.30%
Programmer	3	9.09%
<b>Total</b>	<b>33</b>	<b>100.00%</b>

The study surveyed 33 respondents, distributed equally among commuters 30.30%, parents 30.30%, and guardians 30.30%, each comprising approximately one-third of the total sample. Programmers constituted the remaining (9.09%) of respondents. This distribution highlights the diverse representation within the sample population, with a predominant focus on commuters, parents, and guardians.

**Table 3***Weighted Mean of Functional Suitability*

<b>Aspects</b>	<b>Weighted Mean</b>	<b>Verbal Interpretation</b>
Completeness	4.45	Very Good
Correctness	4.33	Very Good
Appropriateness	4.52	Excellent
<b>Overall Weighted Mean</b>	4.43	Very Good

Table 3 shows the results of the evaluation of the app for functional stability. The highest Weighted Mean for Functional Suitability is with Appropriateness at 4.52, followed by Completeness at 4.45, with Correctness being the lowest at 4.33. The overall weighted mean for Functional Suitability is 4.43. These scores show that from the point of view of the respondents, the app was well designed to meet their needs with functions that are considered mostly complete, appropriate, and correct. It might be inferred that the application was considered reliable and effective in supporting safety and assistance.

**Table 4***Weighted Mean of Reliability*

<b>Aspects</b>	<b>Weighted Mean</b>	<b>Verbal Interpretation</b>
Maturity	4.42	Very Good
Availability	4.24	Very Good
Fault Tolerance	4.06	Very Good
Recoverability	4.06	Very Good
<b>Overall Weighted Mean</b>	4.20	Very Good

Table 4 shows the results of the evaluation of the app based on its reliability. Maturity received the highest Weighted Mean for Reliability, scoring 4.4, followed by Availability at 4.24. and Fault Tolerance and Recoverability tied for the lowest score, both at 4.06. The overall Weighted Mean for Reliability is 4.20 which corresponds to very good in the scale. This suggests that the application is dependable for users. It is able to handle errors and recover from the malfunction encountered effectively. Overall, the Pathfinders application was considered reliable and its functions when the users need it.

**Table 5**  
*Weighted Mean of Portability*

Aspects	Weighted Mean	Verbal Interpretation
Adaptability	4.52	Excellent
Durability	4.12	Very Good
Installability	4.42	Very Good
Replaceability	4.24	Very Good
Affordability	4.55	Excellent
<b>Overall Weighted Mean</b>	4.37	Very Good

Table 5 shows the results of the evaluation of the app on the basis of its portability. Affordability received the highest Weighted Mean for Portability, scoring 4.54, followed by Adaptability with 4.51, Installability with 4.42, Replaceability with 4.24, and the lowest being Durability with 4.12. The overall Weighted Mean for Portability is 4.37 which is "Very good" on the scale, corresponding to a "Very Good" rating according to the evaluation criteria provided within the study. Results on this criterion revealed that across different devices and environments, the application was considered as easy to use, affordable and simple to install. Generally, the application was durable and can be replaced or updated without much trouble, making it convenient and accessible for its target users.

**Table 6**  
*Weighted Mean of Usability*

Aspects	Weighted Mean	Verbal Interpretation
Appropriateness Recognizability	4.61	Excellent
Learnability	4.58	Excellent
Operability	4.55	Excellent
User Error Protection	4.09	Very Good
User Interface Aesthetics	4.21	Very Good
Accessibility	4.39	Very Good
<b>Overall Weighted Mean</b>	4.40	Very Good

Table 6 shows the results of the evaluation of the app based on its Usability. Appropriateness/Recognizability received the highest Weighted Mean for Usability with a score of 4.6, followed by Learnability with 5.58, Operability with 4.55, Accessibility with 4.39, User Interface Aesthetics with 4.21, with User Error Protection being the lowest with the score of 4.09. The overall Weighted Mean for Usability is 4.04 interpreted as very good. This suggests that the app is considered as user - friendly. The application is assessed as easy to learn and operate because people can understand and use it quickly. Further, the focus group felt comfortable while using it and confident that the application will provide protections against user errors.

**Table 7**  
*Weighted Mean of Performance Efficiency*

<b>Aspects</b>	<b>Weighted Mean</b>	<b>Verbal Interpretation</b>
Time Behaviour	4.67	Excellent
Resource Utilization	4.61	Excellent
Capacity	4.36	Very Good
<b>Overall Weighted Mean</b>	4.55	Excellent

Table 7 shows the result of the evaluation of the app based on its performance efficiency. Time Behavior received the highest Weighted Mean for Performance Efficiency, scoring 4.67, followed by Resource Utilization 4.61, and the lowest being Capacity with a score of 4.37. The overall Weighted Mean for Performance Efficiency is 4.55 interpreted as excellent. From the point of view of the focus group, application worked very efficiently by processing information without using too many resources. It was able to manage a big load of users and data well although improving the app's capacity can immensely improve it. Overall, the app is evaluated to have performed efficiently providing a fast and smooth experience for users.

**Table 8**  
*Weighted Mean of Security*

Aspects	Weighted Mean	Verbal Interpretation
Confidentiality	4.30	Very Good
Integrity	4.27	Very Good
Non-repudiation	4.06	Very Good
Accountability	4.24	Very Good
Authenticity	4.24	Very Good
<b>Overall Weighted Mean</b>	4.22	Very Good

Table 8 shows the result of the evaluation of the app based on its security. Confidentiality received the highest weighted mean with a score of 4.3, followed by Integrity with 4.27, Accountability and Authenticity being tied with 4.24, and the lowest being non-repudiation with a score of 4.06. The overall Weighted Mean for Security is 4.22 interpreted as "Very Good" in terms of protecting information and data and to the degree in which the data has been accessed appropriately according to the level of authorization. The results suggest that the application is considered highly able in protecting information and making sure that the data can only be accessed by authorized users. However, even if the app was considered mostly secure and helpful in making users feel safe, further improvement can be made especially in making sure that actions that have been made cannot be denied later.

**Table 9**  
*Weighted Mean of Compatibility*

Aspects	Weighted Mean	Verbal Interpretation
Co-existence	4.52	Excellent
Interoperability	4.18	Very Good
<b>Overall Weighted Mean</b>	4.35	Very Good

Table 9 shows the result of the evaluation of the app based on its compatibility. Co-existence received the highest Weighted Mean for Compatibility with a score of 4.52. In contrast, Interoperability was rated lowest with a score of 4.18. The overall Weighted Mean for Compatibility is 4.35, interpreted as very good suggesting that the app can be easily shared and can be used with other devices. These results suggest that the application is able to work well with other apps and systems. Overall, the application was found to be compatible and convenient for users who use multiple applications.

**Table 10**  
*Weighted Mean of Maintainability*

<b>Aspects</b>	<b>Weighted Mean</b>	<b>Verbal Interpretation</b>
Modularity	4.48	Very Good
Reusability	4.42	Very Good
Analyzability	4.36	Very Good
Modifiability	4.33	Very Good
Testability	4.42	Very Good
<b>Overall Weighted Mean</b>	4.41	Very Good

Table 10 shows the result of the evaluation of the app based on its maintainability. Modularity received the highest Weighted Mean with a score of 4.48, followed by Reusability and Testability tied with 4.42, Analyzability with 4.36 with the lowest being Modifiability with a score of 4.33. The overall Weighted Mean for Maintainability is 4.41 interpreted as very good, suggesting that the application is effective and efficient although some modification should be done to improve, correct and adapt on changes required. Evaluation shows that the app was well-built

for maintenance. It was found to be easy to manage and can be updated in specific areas without affecting the whole system. Overall, the app was rated as effective and efficient to maintain, adapt, and improve as needed to meet the user's evolving requirements.

## **CONCLUSION**

The study developed an application designed to educate public commuters on safe travel by providing useful information, suggesting efficient routes, and offering safety measures. The app was evaluated by 33 respondents, with the majority being commuters, parents, and guardians, and a small group of programmers. The respondents reviewed and assessed the Pathfinders application and found the app as well-made, runs fast, easy to learn, used and installed, can be handled by many users smoothly, and easy to update. While the app could still use some improvement, it worked well with other apps. The app was easy to learn, runs fast, and handles many users smoothly. Furthermore, it is reliable, meets users' needs, and supports safety effectively.

The program demonstrated strong performance across key areas, including Functional Suitability, Reliability, Portability, and Usability, meeting its intended objectives effectively. It also excelled in Performance Efficiency, Security, and Compatibility, ensuring a seamless and secure user experience within shared environments. Maintainability was another strength, allowing for modifications with minimal impact on other components. While the program meets high standards across all assessed attributes, future evaluations should include a larger sample of programmers to ensure a more comprehensive technical analysis.

## **RECOMMENDATIONS**

To ensure the program's success, it is recommended to prioritize Functional Suitability by delivering precise and accurate results for specified tasks. Reliability must be upheld, enabling the system to operate seamlessly despite hardware or software issues, with robust data recovery capabilities. Portability and Usability should be enhanced to improve productivity, adapt to various environments, and safeguard users from errors. Additionally, Performance Efficiency, Security, Compatibility, and

Maintainability must be optimized to meet capacity requirements, protect data integrity, enable seamless integration, and support efficient modifications without compromising quality.

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