

# Vulca Loc: A Mobile Application for Finding Vulcanizing Shops embedding GPS

Romy Jun A. Sunico, Elwin S. Argana, Mark Anthony T. Golo, Maribel A. Aniñon



**Abstract:** This paper discusses the ideas and process of developing a mobile locator application for Vulcanizing Shops in Siargao Island with Global Positioning System (GPS) and Google Map Application Programming Interface (API). This mobile application is an innovation tool to show the location, availability and services of the vehicle services shops available in the island to ease the hassle of the tourists with vehicle errors. It also provides shortest possible route method that includes relevant information about the services of the shops. The study adopts the Rapid Application Development model and used ISO 9126 to evaluate the application in terms of usability (4.37), functionality (4.13) and Maintainability (4.20). Therefore, the application is certain to provide a significant support to the local and foreign tourists; therefore, providing an accurate and hassle time-free locating a vulcanizing shops.

**Keywords:** API, GPS, RAD Model, Siargao, Vehicle Services Shop

## I. INTRODUCTION

Siargao is one of the top islands remain on the radar of tourists and beach lovers as they topped an international travel magazine's annual list of the best islands in Asia [1]. Primarily, vehicles are used to travel around the island and enjoy its world class spots where one of the problems tourist encounters is vehicle errors. Although Siargao has many vehicle and vulcanizing shops to upkeep tourists on vehicle errors, however, no application is developed to support tourists when vehicle errors occur during their travel. This study focuses on the development of VulcaLoc: A Mobile Application for Finding Vulcanizing Shops embedding GPS. It is an android app with a Global Positioning System (GPS); a mapping service on a mobile phone may utilize global coordinates to identify a current location of the mobile phone.

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In this way, users may plan a travel route from the current location to a particular destination of interest to the user [2]. Thus, this article aimed to develop an innovative mobile application to show the location, availability, and services of the shop with relevant and accurate information.

The use of GPS has extended into people's lifestyles, where they can use it for travelling purposes, as traveling direction, and etc. Besides, it is useful for the user to search for nearby amenities, especially for someone who is unfamiliar to a new location [3]. Conventionally, Locator Maps as directional aids are next-to-usefulness since it would help to examine and understand the area [4]. On the other hand, Smartphones are increasingly becoming an ordinary part of our daily lives; with their remarkable capacity, applications used in these devices are extremely varied [5]. Also, Mobile phones constitute a technology that has become part of our everyday usage [6]. Additionally, Google Maps helps people in reaching the destination in the most efficient way [7] on mobile or web. Innovations observably exist to address problems in the community. Technology also provides quality of life; the innovation of such locator technologies was developed, and it changes the world to progress by providing immediate information [4]. Siargao Islands have no application yet designed to reduce the problem of finding a vulcanizing shop during travel on the island. Hence, VulcaLoc was a tool to improve the current system by providing a solution that allows the users to access real-time information of their current location and locate the specific vehicle or vulcanizing shop through their mobile phones. As the island anticipates more tourist influx, both local and foreign, it is then preferred to improve the current issue which must be unraveled. VulcaLoc provides relevant information in terms of: map of the vulcanizing shops; services and prices; location and route direction, shop review and feedback. Thus, this study served as an initiative to enhance the tourist services in Siargao Island in terms of locating specific vulcanizing shop, providing shortest possible route and giving relevant information about the vehicle services shop.

## II. OBJECTIVES

The study generally aimed to develop a VulcaLoc: A Mobile Application for Finding Vulcanizing Shops embedding GPS. Specifically, it seeks to:

1) Design an application called VulcaLoc which will consist of:

- Map of vulcanizing shops in Siargao Islands;
- Vulcanizing shop services and prices;



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- Location and route direction;
  - Shop review and feedback.
- 1) Implement the VulcaLoc App in Siargao Island with the incorporated GPS and embedded Google Map API;
  - 2) Evaluate the application using the system evaluation tool parallel to the ISO 9126 Standards for usability, functionality, and maintainability.

## III. CONCEPTUAL FRAMEWORK

Fig. 1 shows the Input-Process-Output (IPO) Model used in conceptualizing the development of the system. The IPO Model involves the stages of Input, Process, and Output with its variables. The evaluation was also included after the said model is done

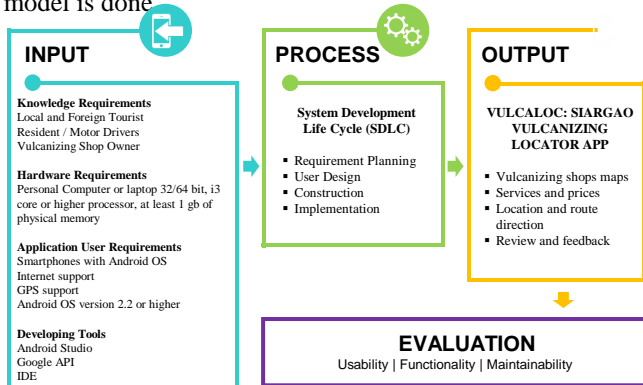


Figure 1. IPO Model

To develop the application, knowledge, hardware, and software are needed on the input stage in IPO Model. The application development requires the knowledge of Local/Foreign Tourist, Resident/ Motor Drivers, and Vulcanizing Shop Owner to better understand the application development. In the second box, the application's design and development are being done as part of the process stage. The System Development Life Cycle (SDLC) includes system conceptualization, planning, analyzing, designing, developing, and integrating with other components. The application deliverables can be seen in the third box. The various features are some of the outputs in the application development. Lastly, the application's evaluation is done to ensure conformity to the standards as to usability, functionality, and maintainability.

## IV. METHODOLOGY

The Rapid Application Development (RAD) methodology of System Development Life Cycle was used in the study. Fig. 2 shows the model used by the researchers to accomplish the requirement of the application.

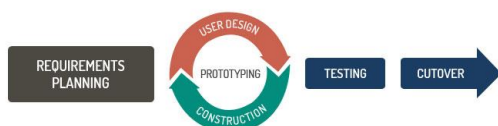


Figure 2. Rapid Application Development

### A. Requirement Planning

In this phase, the researchers utilized the interview method to determine the vulcanizing shop's information on the island. The researchers also study the current vulcanizing shop via Google map that will serve as the basis of selecting the tools

used in the development. Besides, the researchers conducted group discussions and did the brainstorming for the concept of the application. During the meetings, the application's scope, the processes included, and the required data to execute the operations were identified.

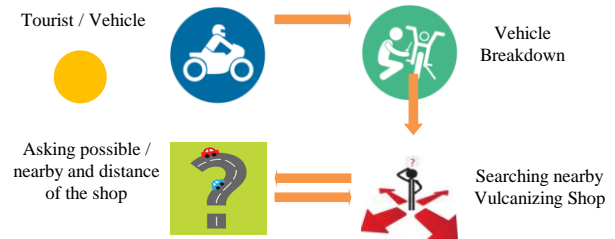


Figure 3. Current Technical Situation

### B. User Design

In this phase, the researchers analyzed the application modules' designs with the requirements to address issues identified in the required planning. It utilized the Global Positioning System (GPS) to provide the location of Vulcanizing Shops on the island.



Figure 4. System Architecture

### C. Construction

The researchers developed the application guided based on the current infrastructure and preference of the client. The researchers used the recommended tools for developing the application in terms of the models' interface design. The researchers focused on the application's functionalities, layout the user interface in Android Studios, and utilized Adobe Photoshop as a graphic editor. Also, the application has embedded the Google API and IDE that was used in the Global Positioning System. Furthermore, the application development needs a computer unit with the specifications of at least 1GB RAM, Hard Disk Drive of 500 GB.

### D. Implementation

In this phase, the proposed application was built and introduced to the evaluators as end-users. The other evaluators used and tested the application. Its tasks are testing application implementation and application maintenance. They used the ISO 9126 Software Evaluation to determine the typical characteristics of the proposed application.

**E. Evaluation Methods and Tools**

The application usability, user functionality, and maintainability were evaluated based on the adopted instrument from John Brooke (1986) and ISO 9126.

The instrument was given to the user and evaluated the application which focuses on the items that would determine its usability, functionality, and maintainability. To ensure the instrument truly fits the study's objectives, the researchers underwent the process of establishing its validity.

The respondents' total number in application evaluation was 30, which are represented from tourist (local & foreign), faculty, and students with a vehicle. Purposive sampling was used in identifying the respondents. Respondents used a validation survey instrument in the application's evaluation.

**Table I - Distribution of Respondents**

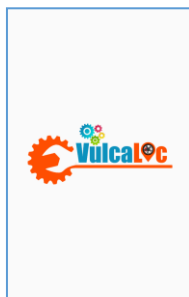
RESPONDENTS	N	PERCENTAGE
Tourist (local & foreign)	15	50 %
IT Professionals	5	17 %
Students	10	33 %
<b>Total</b>	<b>30</b>	<b>100%</b>

Table 1 shows the number of respondents. Thirty (30) persons evaluated the system; to wit, fifteen (15) from tourist (local & foreign); five (5) from the IT Professionals; and ten (10) from the students. The researchers used the adjectival rating to determine the value of the result, the application using the indicators using the scale of one (1) – strongly disagree from the rates of 1.0 – 1.7, two (2) – disagree from the rates of 1.8 – 2.3, three (3) – fair from the rates of 2.6 – 3.3, four (4) – agree from the rates of 3.4 – 4.1 and five (5) – strongly agree from the rates of 4.2 – 5.0.

**V. RESULTS AND DISCUSSION**

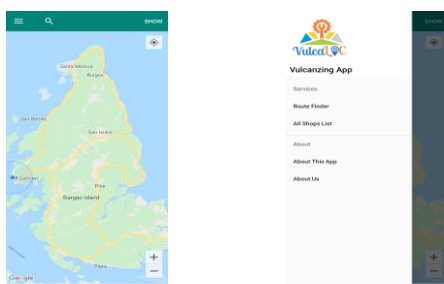
A location is a particular place or position where people are considered the "end-point" of the travel [4].

Fig. 5 shows the app's splash screen, which is the first image users see launching the mobile application.



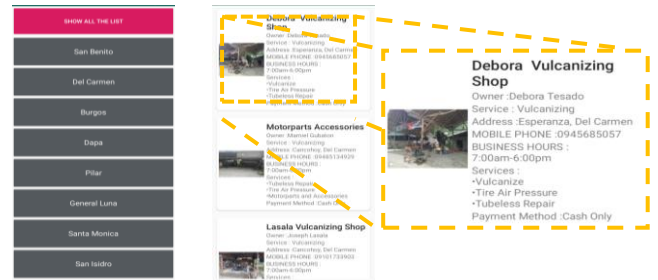
**Figure 5. Splash Screen**

Fig. 6 shows the Home Screen, which views the Siargao Island Map. Fig. 7 shows the Menu Screen; this page consists of buttons featured in the application: services, route finder, all shops list, etc.



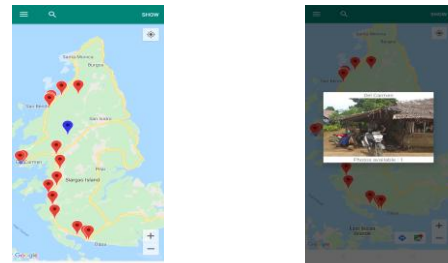
**Figure 6. Home Screen Figure 7. Menu Screen**

Fig. 8 shows the Show All List Screen. This user interface shows all the municipalities in Siargao Islands. When a municipality is clicked, the accessible vulcanizing shop with its relevant information will show, see Figure 9.



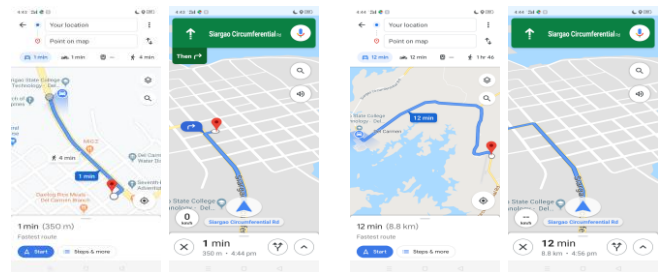
**Figure 8. Show All List Screen Figure 9. List of Vulcanizing Shop**

Fig. 10 shows the Siargao Map via Google Map; this user interface is used to locate or find a specific vulcanizing shop in each municipality. When one of the vulcanizing shops is clicked, a photo of the shop will show, see Figure 11.



**Figure 10. Siargao Map Figure 11. Vulcanizing Shop Photo**

Figure 12 shows the Route Finder interface; this user interface can locate the specific vulcanizing shop, provide the shortest possible route to the user, and estimate arrival time.



**Figure 12. Vulcanizing Shop Router**

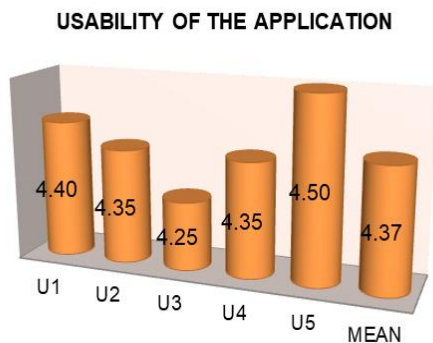
**A. Evaluation of the Application**

The application was deployed and evaluated using the regulatory standards set by the International Standard Association (ISO). In particular, it employed the ISO 9216, assessing the application usability, functionality, and maintainability. Under component 1, when asked if the application is likely to use frequently, users rated "Strongly Agree" with a mean score of (U1 - 4.40); when asked if the application was easy to use, a mean score of (U2 - 4.35) was obtained which also means "Strongly Agree". On various functions in this application were well integrated, a mean score of (U3 - 4.25) was obtained, on most people would learn to use this application very quickly, a mean of (U4 - 4.35).

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Respondents thought they are very confident in using the application evident from the mean (U5 - 4.50).

Generally, the mean of the usability index of the application is (MEAN - 4.37), which means that the respondent "Strongly Agree" that the application is usable (Figure 13).

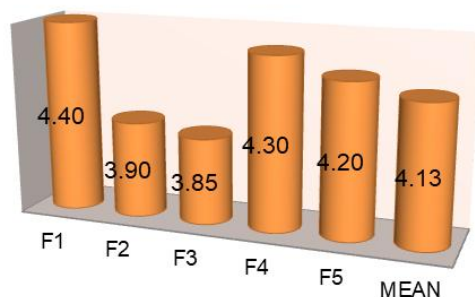


**Figure 13. Usability of the Application**

Furthermore, the results revealed that most of the respondents were satisfied with the performance on the usefulness of the application. Users have evaluated that the application has a friendly environment, such as to the points of commands and graphical user interface.

In the functionality of the application, when asked if there are appropriate essential functions of the mobile application, users rated "Strongly Agree" with a mean score of (F1 - 4.40), and there is a correctness of the functions and commands, a mean score of (F2 - 3.90) which also means "Agree". Then next asked is the given software component or mobile application does not typically function in isolation, a mean score of (F3 - 3.85) and the mobile application has met the institution appropriate laws and guidelines need to be complied with, with a mean score of (F4 - 4.30). The Respondent believed that the application has the security relates to unauthorized access to the software function from the mean (F5 - 4.20). Generally, the mean of the functionality of the application is (MEAN - 4.13), which means that the respondent "Agree" the functionality of the application (Figure 14).

### FUNCTIONALITY OF THE APPLICATION



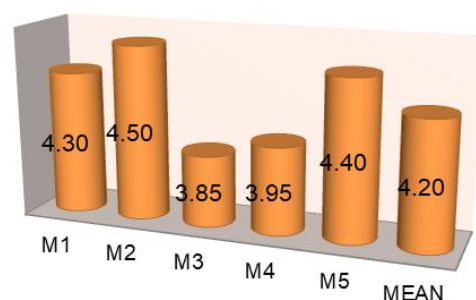
**Figure 14. Functionality of the Application**

Furthermore, the results revealed that most of the following respondents are satisfied with the functionality of the apps because even we design the application online, it is portable to install to the smartphone and portable to share with the other user. U2 has a weight arithmetic mean of 4.12, which falls on the scale Agree (High).

In the maintainability of the VulcaLoc, under component

1, when asked if the mobile application can easily identify the root cause of the feature within the software, the user rated "Strongly Agree" with a mean score of (M1 - 4.30); when asked if the mobile application can sustain on updates to verify (test) an application change, a mean score of (M2 - 4.50) was obtained, which also means "Strongly Agree". On can store an application/data changes, a mean score of (M3 - 3.85) was obtained, on the application that can change the data inside the application, a mean of (M4 - 3.95), asked if the mobile application has the capability of resources to store huge amount of data, a mean score (M5 - 4.40), with the rated of "Strongly Agree" asked if has the capability of speed to execute the process. Generally, the mean of the Maintainability index of the application is (MEAN - 4.20), which the respondent "Strongly Agree" that the application Maintainability (Figure 15).

### MAINTAINABILITY OF THE APPLICATION



**Figure 15. Maintainability of the Application**

Furthermore, the result of the Maintainability evaluation of the application on the performance was checked regularly to maintain the efficiency of the application to give a better service to all users. The developer will be accountable for upgrades.

**Table II - Application Evaluation Result**

System Evaluation in items of:	Mean	Verbal Description
Usability	4.37	Strongly Agree
Functionality	4.13	Agree
Maintainability	4.20	Strongly Agree
<b>Grand Mean</b>	<b>4.23</b>	<b>Strongly Agree</b>

The VulcaLoc evaluations in terms of usability, functionality, and maintainability are functional and acceptable. The mean score of 4.37, with the verbal description "Strongly Agree" for the Usability of the application; a mean score of 4.13, with the verbal description "Agree" in Functionality of the application; and for the maintainability of the application score rated is 4.20, with the verbal description of "Strongly Agree". Generally, the grand mean total of the application evaluation means is 4.23, with the verbal description "Strongly Agree".

The application is perceived as a fully usable function and can be maintained efficiently. The application evaluation yielded an agree on a response.



The application is easy to use, and the applications which were integrated gives user confidence to maneuver. Functions are essentially appreciated, which met the client's needs.

## VI. CONCLUSION

Based on the results, the researchers conclude that the VolcaLoc is significantly helpful to travelers on the Island of Siargao. It then provides information on the vulcanizing shop on the island, such as to municipality, services offered, route finder, origin to destination, distance feature, and Google map integrated features. Also, the application's characteristics on usability, functionality and maintainability got a rate beneficial to the users. Thus, this application would help to ease the hassle of the tourist in times of need.

## RECOMMENDATIONS

The developed application provides the user with the shortest path to a specific vulcanizing shop. This feature would benefit the user in saving time to locate and go to the desired destination. Thus, it is recommended that:

- 1) The application should be uploaded to Google Playstore for the easy access of other end-users.
- 2) The administrator should coordinate with the Google Map to update the picture and information of some of the vulcanizing shops
- 3) More researches shall be conducted to future advances to enhance the usability, functionality, maintainability characteristics of the application.

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