

E-Jeep NN: An Android E-Jeep Guide App with GPS and Open Trip Planner API for the New Normal

Abegail S. Comandao, MIT
Our Lady of Fatima University
Valenzuela City 1440, Philippines
ascomandao@fatima.edu.ph

Walfredo G. Santos, MSIT, MAEd
Our Lady of Fatima University
Valenzuela City 1440, Philippines
wgsantos@fatima.edu.ph

Londren U. Velasco, MIT, MBA
Our Lady of Fatima University
Valenzuela City 1440, Philippines
luvelasco@fatima.edu.ph

Jeffrey G. Romano, MSCS, MACoEd
Our Lady of Fatima University
Valenzuela City 1440, Philippines
ggromano@fatima.edu.ph

Prof. Raymond S. Macatangga, DIT
Our Lady of Fatima University
Valenzuela City 1440, Philippines
rsmacatangga@fatima.edu.ph

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ABSTRACT

Incidents of some foreigner Our Lady of Fatima University students in Valenzuela Campus experienced getting lost as they travelled in going to and from the university are common. Strangers in Valenzuela City, they had to ask for directions and the fares during commuting to and from school. Thus, the proponents developed an application titled "E-Jeep NN: An Android E-Jeep Guide App with GPS and Open Trip Planner API for the New Normal" in communication with the various transportation sectors which has provided important information and formulas related to the Public Utility Jeepneys (PUJ). The E-Jeep NN aims to assist passengers to easily circumnavigate selected areas via jeepneys by enabling the accessibility of fare matrix through assessed standard fares from starting point to destination, online map, self-distancing sensor, temperature reader, alcohol dispenser and E-payment. Respondents include 38 commuters in Valenzuela, and 5 IT experts. Modified Waterfall model is the Software Development Life Cycle used in the development. Blackbox Testing [8] will be used to test the system. The proponents used 5-point Likert Scale [7] for the analysis of the data. Overall, the application gained a total mean of 4.18 with an interpretation of Very Acceptable.

KEYWORDS

new normal, self-distancing sensor, temperature sensor, alcohol dispenser, e-jeepney routes

1 INTRODUCTION

The New Normal has caused an awakening on the importance of health safety in the areas of the society. The whole year of

2020 is considered the year of the pandemic which has affected the lives of the people around the world. Worldwide all leaders of the nations are doing the best they can to defend their society in the war against this invisible enemy. One area that can be a solution to mitigate this effect is the transportation sector.

In the country the main mode of this service is the new breed of jeepneys imposed by the LTFRB. Likewise, the Inter-Agency Task Force are implementing certain guidelines [3]. Long-term scenarios on the development of passenger mobility in cities should also be taken into account [6]. The proponents designed a jeep that is equipped with a navigation system, self-distancing sensor, temperature sensor, and alcohol dispenser.

Nowadays, it has become gradually difficult to travel to Manila as the worsening transportation, in association with the lack of well-organized community transport and several other reasons, continue to burden commuters. These jeepneys – a primary means of transportation – use the traditional ways to disseminate the information for the newest charge matrix with direction-finding guides, which cannot be easily obtained by the common traveler. In addition, the transport sector counseled travelers to demand for charge matrix prior to disbursing the amplified passenger fare prices. Thus, the proponents added a fare matrix system with the use of an Android application to also help the passengers. With smartphone and mobile "apps", they aggregate and optimize these mobility services [2]. Smartphone apps are also changing mobility by improving access to transportation services, increasing mobility, and enhancing traveler engagement [4]. This research concentrates on the development of an Android application named E-Jeep using the information provided by

the LTFRB for the area of Valenzuela City. The E-Jeep application will help commuters easily navigate the city by providing multiple suggested jeepney routes according to origin and destination. Users can view estimated travel duration and distance using walk or jeepneys. The system has Global Positioning System (GPS) technology to get the user's specific location for preferred origin and destination. The system also displays fare calculation for regular and discounted fare for PWD, Senior Citizen and Students by coordinating with LTFRB. The app shows live and online traffic map of Valenzuela City and surrounding cities provided by Google Maps. In addition, E-Jeep App can help passengers submit reports and complaints related to Public Utility Jeepneys (PUJ) to regulate and improve the safety of the commuters. This application will only run on android devices and only available online. The current General Transit Feed Specification data and fare matrix used by the instance of Open Trip Planner API hosted online by the researchers is implemented by the LTFRB. Submitting reports to LTFRB is possible through Email, Call and Facebook Messenger. However, the app may not provide a confirmation message.

2.1 Software Development Life Cycle

The Modified Waterfall model is a method approach in scientific procedures in designing the flow of the system. This classical model came into existence in software engineering due to the inadequacies in the old-style design. This software development activity is divided into different phases and each phase consists of a series of tasks and has different objectives [5]. The main shift is that it is permissible to overlay the stages in this progressive model. A portion of adaptability is constructed since the stages overlap. At about the same time, a diversity of tasks will function about the same time, ensuring that all belongings in the program are removed during the growth phase.

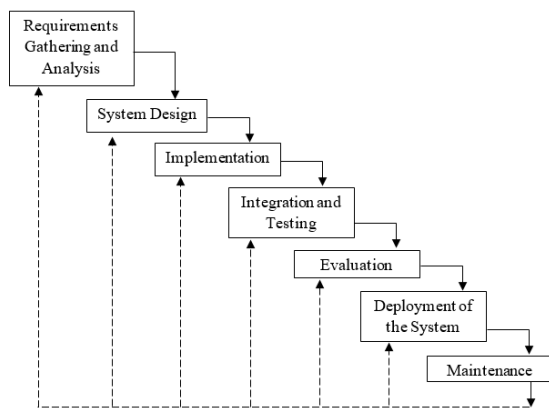


Figure 1: Modified Waterfall Model

Purposes of these phases are:

- **Requirements:** The proponents conducted a meeting to various transport sectors proposing the system and getting the information needed. The transport sector provided the routes and fare medium to be used for the system. They also gave explanations of what the scheme reports must show to the end operator.
- **System Design:** The proponents started to make a user-friendly architecture for the E-Jeep NN. Different features have remained added to Project Structure together with its purposes. The proponents listed down the resources and requirements needed to create the application such as different APIs for Graphical User Interface. It also enables ease of use when used.
- **Implementation:** The E-Jeep Scheme Structure from System Design will then be developed in real application. Programming codes were developed and all resources have been linked to each other to develop the E-Jeep Application.
- **Integration and Testing:** All units built in the operation process was combined into an app. The built application will undergo thorough continuous testing. Testing will be conducted by the proponents and IT Experts to see if there are bugs together with their comments of what to improve on the system.
- **Evaluation:** Assessment method will be replied by IT Experts, end users and the beneficiary. They will be provided an evaluation to rate the scheme according to different standards.
- **Deployment of System:** When the testing and all evaluation had been completed and the app passed the evaluation, the E-Jeep NN can now be presented to marketplace to be used by the end users and beneficiary.
- **Maintenance:** This stage takes place after connection. Changes arise as a result of changing either customer requests or uncovered defects during live use. The proponents can access and change fare rates by the use of website connected to their app.

2.2 Procedure for the Calculation of Data

The proponents used 5-point Likert Scale [7]. The weighted mean of the data set defined as x_1, x_2, x_3, \dots can be represented by its respective frequency or weight as the total of the data multiplied.

$$\text{Equation 1} \quad WM = \frac{\sum(w_i \cdot N_i)}{n_x}$$

Where

w = data set total

N_i = sub criteria

n_x = number of sub criteria

Calculation of Data

2.3 Testing Procedure

The tester tests an application in Black Box Testing without understanding the inner workings of the program being evaluated. Information is inserted into the system and the result is contrasted with the actual results; what the software does with the incoming data or how the system arrives at the export data is not a question for the black box testing carried out by the tester.

There is also non-functional black box testing, such as performance testing, which measures how long it would take for a system to react to user commands, and just how long does it take for information processing and output generation.

Tests are performed on each software function to assess its actions, using a blend of inputs that represent standard operating circumstances, and intentional irregularities and mistakes.

A series of tests are included in the functional testing process: smoke, equilibrium, implementation, regression, design, device and finally beta / usability testing. Such case sequence bugs are likely to be active on several devices and may not be present on others.

For this research, the proponents provided E-Jeep files to be installed by devices used for testing.

3 RESULTS AND DISCUSSIONS

This chapter discusses the project description and structure. The proponents conducted an assessment or post survey to assess if the proposed system replied the existing problems of passengers and traffic enforcers in riding and handling PUJ's issues. The respondents were composed of passengers in the area of Valenzuela City and IT Experts. The data that were gathered from post survey were arranged, computed and analyzed to be acceptable. The proponents then got the average of the respondents rating for each query where the calculation of mean was practical.

3.1 Project Description

E-Jeep NN uses Android Application mainly focused on assisting the PUJ passengers by alerting them and by displaying all possible routes with navigation, fare price, kilometers, time upon destination and GPS service to monitor one's location while following the navigation. Usability of a software program or a web site developed for a mobile device is the main factor behind its performance [1]. E-Jeep NN is also focused on helping traffic enforcers watching all complaints and violations happening in road rules. E-Jeep NN can help LTFRB in applying and doing their responsibilities on real time and simply. It was done by showing all violations and grievance reports sent directly to their designated email by the end operator.

3.2 Project Structure

Figure 3 shows the Project Structure of E-Jeep. Upon opening the application, E-Jeep Map interface is the first thing the end user will see. There will be different navigation with corresponding functions. The system can insert directly their origin and destination and show the different routes available. Users can also report a complaint through email, direct calls to LTFRB hotline, and through Facebook messenger. End User can choose their preferred language while using the application. They can also set if the type of passenger the fare matrix will base. The application can also be shared by different user through Share it, messenger, Bluetooth and many other ways.

Figure 3 shows the Story Board of how to use the E-Jeep Trip Suggestions. It is an illustration of an easy way to show the sequence of what to do to process E-Jeep Navigation with fare settings.

3.3 System Requirements

Table 1 shows the summarize software requirements for the android devices where the application will be installed.

Table 1: Software Specification for Android Devices

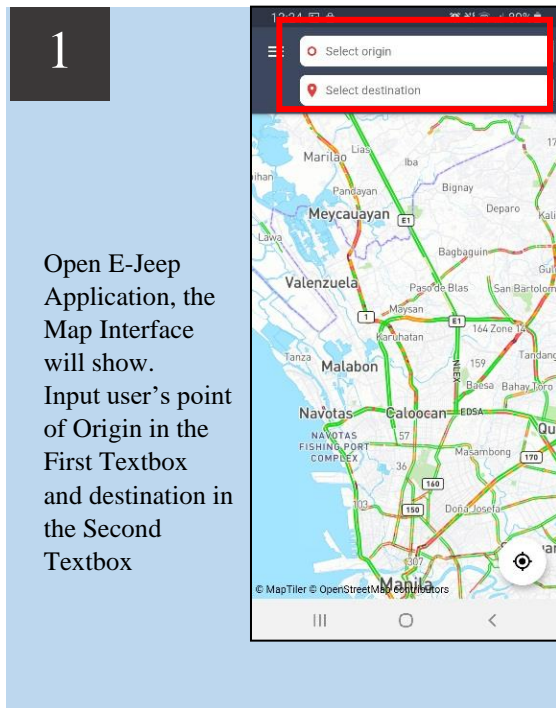
	Minimum	Recommended
Android Operating System	Kit Kat (4.4)	(5.0) and up
Storage	126 MB	2 GB
Memory	40 MB	500

3.4 Project Evaluation

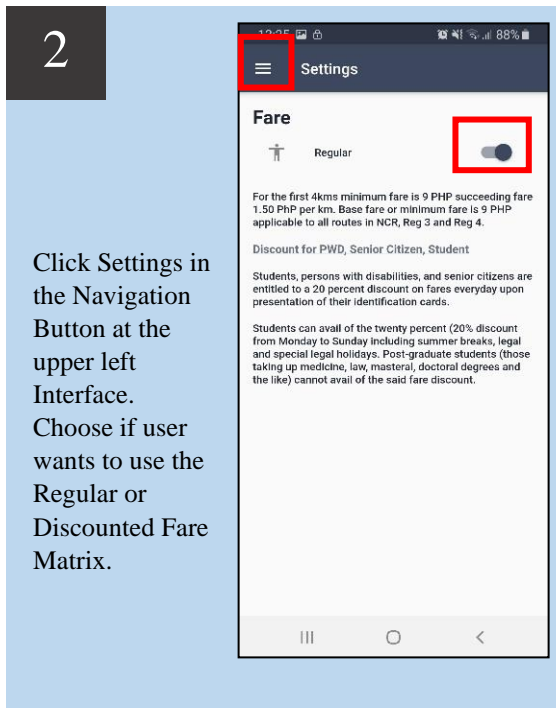
The system was assessed and evaluated by 38 end users and 5 IT experts for a total of 43 respondents. In order for the respondents to figure out what are the functions and how to use the system, the proponents did the system presentation. Each respondent was given a questionnaire and rated the system based on their experience using it. The results of the evaluation were analyzed and interpreted based on set of criteria the End-User and IT experts' acceptance.

Table 2: Population of Respondents

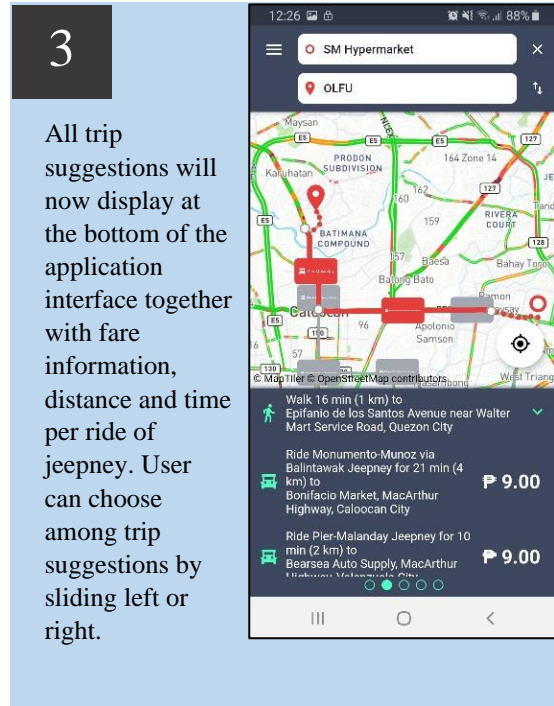
Users	IT Experts
38	5



1
Open E-Jeep Application, the Map Interface will show. Input user's point of Origin in the First Textbox and destination in the Second Textbox



2
Click Settings in the Navigation Button at the upper left Interface. Choose if user wants to use the Regular or Discounted Fare Matrix.



3
All trip suggestions will now display at the bottom of the application interface together with fare information, distance and time per ride of jeepney. User can choose among trip suggestions by sliding left or right.

Figure 2: Storyboard of the E-Jeep

Table 2 shows the all end-users' weighted mean coming from the evaluation. Among the six (6) criteria, Efficiency got the lowest total mean equivalent to 4.05 (Very Acceptable) while Usability got the highest mark of 4.43 (Very Acceptable). Overall, the application gained a total mean of 4.18 with an interpretation of Very Acceptable. Majority of the results showed favorable response for the system.

Table 2: The Summary of the Mean Performance Evaluation of 43 Respondents on E-Jeep NN: An Android E-Jeep Guide App with GPS and Open Trip Planner API for the New Normal

CRITERIA	MEAN	INTERPRETATION
Functionality	4.26	Very Acceptable
Reliability	4.03	Very Acceptable
Usability	4.43	Very Acceptable
Efficiency	4.05	Very Acceptable
Maintainability	3.95	Very Acceptable
Portability	4.38	Very Acceptable
Overall Weighted Mean	4.18	Very Acceptable

4 CONCLUSION

Assumptions for E-Jeep NN: An Android E-Jeep Guide App with GPS and Open Trip Planner API for the New Normal displays directions and trip suggestions using the jeepneys in Valenzuela City, with good fare calculation, projected duration time, distance and reporting to traffic enforcers about jeepney violations. This will give assistance to the traffic enforcer to apply their rules on the road and help commuters to be informed about directions. Its other features, such as self-distancing sensor, temperature sensor and alcohol dispenser will also help in terms of safety requirements.

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Abegail S. Comandao, MIT is a practicum coordinator at Our Lady of Fatima University – College of Computer Studies. She finished her bachelor’s degree at University of the Philippines, Diliman and her Master of Information Technology at Technological University of the Philippines, Manila.

Walfredo G. Santos, MSIT, MAEd is a faculty of Our Lady of Fatima University – College of Computer Studies. He finished his Master of Science in Information Technology at Bulacan State University and his Master of Arts in Education at Meycauayan College.

Londren U. Velasco, MIT, MBA is a program head of Our Lady of Fatima University – College of Computer Studies. He finished his Master of Information Technology at St. Linus University and his Master of Business Administration at University of Manila.

Jeffrey G. Romano, MSCS, MACoEd is a faculty of Our Lady of Fatima University – College of Computer Studies. He finished his Master of Science in Computer Science and Master of Arts in Computer Education both at AMA University.

Prof. Raymond S. Macatangga, DIT is the dean of Our Lady of Fatima University – College of Computer Studies. He finished his Master of Science in Computer Science and Master of Arts in Computer Education both at AMA University. He also completed his Doctor of Information Technology at St. Linus University and has finished 36 units in PhD Development Education at CLSU Open University.

Note: PUJ General Fares issued by LTFRB is available on the online version on this paper for reference. It can also be viewed in: <https://ltfrb.gov.ph/fare-rates/>



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Republic of the Philippines
 Department of Transportation and Communication
LAND TRANSPORTATION FRANCHISING AND REGULATORY BOARD
 East Avenue, Quezon City

PUJ GENERAL FARE GUIDE
Mega Manila

PLATE NO.

EFFECTIVE :DECEMBER 4, 2018

Distance (kms.)	Regular	Student / Elderly / Disabled	Distance (kms.)	Regular	Student / Elderly / Disabled
1	9.00	6.20	26	42.00	32.50
2	9.00	6.20	27	43.50	33.75
3	9.00	6.20	28	45.00	35.00
4	9.00	6.20	29	46.50	36.25
5	10.50	7.50	30	48.00	37.50
6	12.00	8.50	31	49.50	38.50
7	13.50	9.75	32	51.00	39.75
8	15.00	11.00	33	52.50	41.00
9	16.50	12.25	34	54.00	42.25
10	18.00	13.50	35	55.50	43.50
11	19.50	14.50	36	57.00	44.50
12	21.00	15.75	37	58.50	45.75
13	22.50	17.00	38	60.00	47.00
14	24.00	18.25	39	61.50	48.25
15	25.50	19.50	40	63.00	49.50
16	27.00	20.50	41	64.50	50.50
17	28.50	21.75	42	66.00	51.75
18	30.00	23.00	43	67.50	53.00
19	31.50	24.25	44	69.00	54.25
20	33.00	25.50	45	70.50	55.50
21	34.50	26.50	46	72.00	56.50
22	36.00	27.75	47	73.50	57.75
23	37.50	29.00	48	75.00	59.00
24	39.00	30.25	49	76.50	60.25
25	40.50	31.50	50	78.00	61.50

COMPUTATION OF FARES: (Add-on Method)

REGULAR

First Four (4) kilometers = P 9.00

Succeeding kilometers = Additional P 1.50 per kilometer

STUDENT/ELDERLY/DISABLED (20% Discount)

First Four (4) kilometers = P 6.20

Succeeding kilometers = Additional P 1.20 per kilometer

Students are entitled to a fare discount of not less than 20% of the approved adjusted fare EVERYDAY, including Saturdays, Sundays and Holidays as per MC 2017-024

NOTE: Fares are rounded off to the nearest 25 centavos

For Clarification,

Pls. visit LTFRB web portal at www.ltfrib.gov.ph
 or call LTFRB 24/7 Hotline - 1342

COL. RENWICK K. RUTAQUIO (Ret.)
 Regional Director/ OIC-Executive Director

Joel J. Bolano
 Chief, Technical Division

ATTY. MARTIN B. DELGRA III
 Chairman