

# Development of a Public Transportation Location-Based Service in Web Application

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## Abstract

Makassar City is one of the largest cities in Indonesia, which is quite densely populated and often gets visits. There was already public transport to take us to the desired place to travel or wander to a place in this big city. But the trouble is that the absence of adequate resources so that the city government such as the Department of Transportation on public transport lines from a location that you want to visit. One solution to address this problem is to create a Public Transportation Location-Based Service in Web Application. This application uses google maps to serve as a determinant of the route and at the same place where the application can obtain data about the route to be traversed from point of origin to point of destination desired. To facilitate the use of this application, users simply input on Information origin and destination point. After that, there will be an output of information to passengers in the form of details of the route to be traversed.

## Keywords

Transportation, Web Application, API, Location-Based Service, UML.

## 1. Introduction

Makassar city is the capital city of South Sulawesi Province. Located in the southern tip of Sulawesi Island and is the largest international and largest city in eastern Indonesia. To travel or travel to a place in this big city there is already public transportation to provide a ride and take us to the desired place. But the problem is that there is no

source of information that is so adequate from the city government such as the Transportation Office about public transportation lines from a location that wants to be visited, this certainly has an impact on the community or residents who still do not know with certainty the flow of transportation in the city of Makassar. For example, when you want to go to a location that he has never visited before. Especially for tourists or immigrants who do not know anything about transportation information in the city of Makassar.

This problem can be solved by creating an application that can provide information about the route for transportation users to go to the intended location. This application uses google maps service as a route determinant and at the same time a place where the application can get data about the route to be traversed from the point of origin to the desired destination point (Rahmanti et al., 2019). To facilitate the use of this application, users only enter about the origin point information, and the destination point (Candra & Ariani, 2017). After that there will be an output about information to the passenger in the form of the type of transportation route to be passed.

Previous research also proposed various methods to provide information related to transportation locations using GPS made with android-based mobile applications (Monica, 2019). But there are some disadvantages in the application, namely the absence of GPS installed on public transportation, so in this study more focus on public transportation, how to see the route of public transportation travel in the Makassar city area (Tahyudin & Saputra, 2016).

## 2. Theoretical Review

In the design of a computer-based information system, it will not be separated from some of the theories that are the basis in the design of the system, it is necessary so that the system design process can be made easily and following what is desired (Henchiri, 2017; Forda et al., 2016). Figure 1 represents a review of literature.

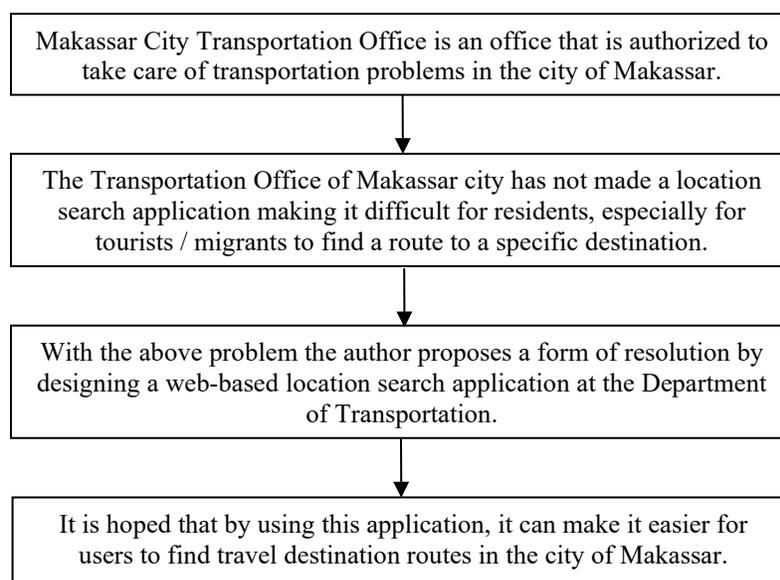


Figure 1. Review of literature

### 2.1 UML (Unified Modeling Language)

UML (Unified Modelling Language) is one of the most reliable tools in the world of developing object-oriented systems based on graphics/images to visualize, specify, build and disseminate (Object-Oriented) based software development systems. UML itself also provides a blueprint writing standard, which includes business process concepts, writing classes in specific program languages, database schemas, and components required in software systems.

The analysis and design approach in using the OO model began to be introduced around the mid-1970s until the end of 1980 was established at that time the software application was already complex and complex. The number using the OO method began to be trialed and applied between 1989 and 1994, as did Grady Booch of Rational Software

Co., known as OOSE (object-oriented software engineering), and James Rumbaugh of General Electric, introduced as OMT (Object Modelling Technique).

UML as a language given vocabulary and order of writing words in 'MS Word' for communication use. A model language is a language that has vocabulary and concepts of order/writing rules and is physically presented from a system. UML is a standard language for developing software that can convey how to create and shape models but does not convey what and when models should be created which is one of the implementation processes of software development (Al-Hawari, Al-Sammaraie, & Al-Khaffaf, 2020). UML is not only a visual programming language, but it can also be directly connected to various programming languages, such as HTML, PHP, JAVA, or connected directly into an object-oriented database (Ait-Cheik-Bihi et al., 2011). Likewise, documenting can be done according to requirements, architecture, design, source code, project plan, tests, and prototypes. Unified modeling language includes symbols and grammar that explain how they can be used. By studying symbols and grammar, everyone can understand a picture of the documentation of the previous model. UML is a universal modeling language used as a means of communication to exchange ideas in the design of software (Candra & Ariani, 2017; Jiang et al., 2021).

## **2.2 MySQL / phpMyAdmin**

MySQL is an implementation of a relational database management system (RDBMS) that is distributed for free. Every user can freely use MySQL. MySQL is a derivative of one of the main concepts in a previously existing database. SQL (Structured Query Language). SQL is a concept of database operation, especially for the selection or selection and entry of data, which allows the operation of data to be done easily automatically, phpMyAdmin is free software written in the PHP programming language that is used to handle MySQL administration through the World Wide Web (Chen et al. 2014). phpMyAdmin supports a variety of MySQL operations, including managing databases, tables, fields, relations, indices, users, permissions, and others.

## **2.3 HTML (Hypertext Markup Language)**

HTML (Hypertext Markup Language) is a programming language for creating web pages. An HTML document is a text file created from HTML elements. In general, HTML elements are defined using HTML tags, which are a markup in HTML writing. Although basically HTML tags are not case sensitive (do not distinguish uppercase from lowercase), World Wide Web Consortium (W3C) recommends writing HTML using lowercase all (Tabarés, 2021).

HTML does not have 'looping' like other programming languages. But in this case, it cannot be denied that HTML is always present in a web page, because HTML can be used as a hypertext link that is able to form relationships between text and other documents. The working principle of accessing HTML-based web documents, namely the browser requests a page to one website through the HTTP protocol, then the request is received by the Web server (Singhal & Shukla, 2012). The web server immediately sends the requested HTML document to the client (Xiang et al., 2019). The browser on the client immediately displays the received documents based on the format codes contained in the HTML document.

## **2.4 JavaScript**

JavaScript is a popular scripting language on the internet and can work in most popular web browsers such as Internet Explorer (IE), Mozilla Firefox, Netscape, and Opera. JavaScript code can be inserted into web pages using script tags. JavaScript was first developed by Brendan Eich of Netscape under the name Mocha, which was later renamed Live Script, and eventually to JavaScript.

## **2.5 JSON**

According to json.org, JSON (pronounced "Jason"), short for JavaScript Object Notation (Indonesian: JavaScript object notation), is a concise format of computer data exchange. The format is text-based and human-readable and is used to represent simple data structures and associative arrays (called objects). The JSON format is often used to transmit structured data over a network connection in a process called serialization. Its main application is in AJAX web application programming by acting as an alternative to the traditional use of XML format.

## **2.6 Google Maps API**

Google Maps is an app created by Google Developer to display a Map view that covers the World. This application has many features, such as place location, GPS, and many more. An API (Application Programming Interface) is an

interface that software components use to connect. Google Maps API contains code or script libraries to take advantage of Google Map functions, especially on web pages that we create let alone function as a commercial web and google maps as additional features (Sulistijono et al., 2020).

GPS or Global Positioning System, is a tool or system that can be used to inform its users where it is (globally) on the surface of the earth based on satellites. Data is sent from satellites in the form of radio signals with digital data. GPS services are available for free, not even needing to cost anything except buying a GPS receiver. Initially GPS was used in the military, then in the 1980s it could already be used for civilian interest. GPS can be used anywhere within 24 hours. The position of the GPS unit will be determined based on the coordinate points of latitude and longitude (Zacepins et al., 2019).

### 3. Method

For the success of the research, two types of data collection methods are used: the first is literature research, which is conducted by using several books as a reference for writing research on the Design of Web-Based Location Search System at the Makassar Transportation Agency. The second field research is conducted by visiting the office and observing the activities carried out by the office (Sutar, Koul, & Suryavanshi, 2016). The research was conducted at the Transportation Office, which is located on Jl. Mallengkeri Raya in Makassar. The study was carried out over a three-month period in order to collect data.

The first method of data collection is used. Interview Technique, this technique is a data collection technique that involves interviewing the Chairman, Office Staff, and other individuals at the Department of Transportation who are directly related to the research (Anandkrishna Srinivasan, 2011). The second observation technique is a method of collecting data by observing and directly looking at the activities or processes that occur (Tabassum, 2020). Figure 2 depicts the application's operation.

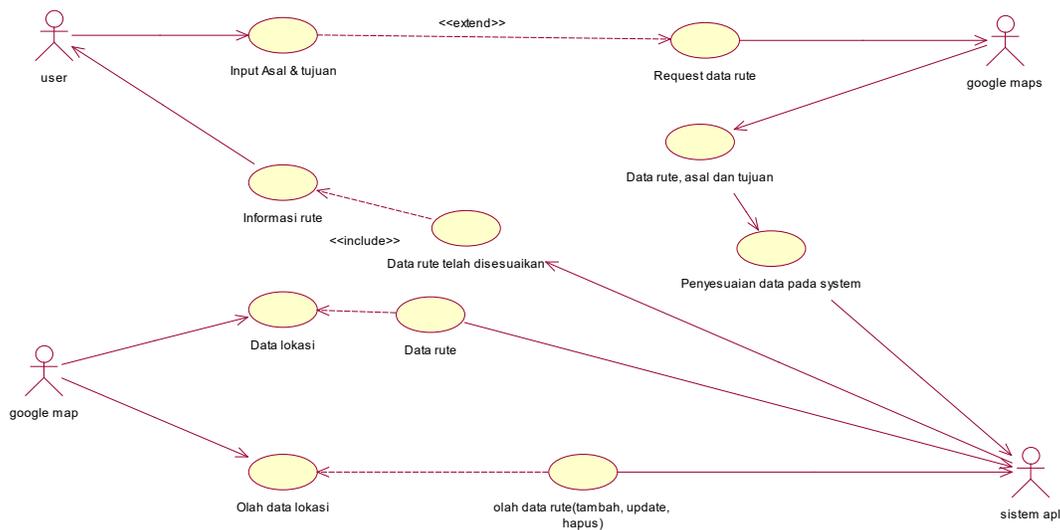


Figure 2. Location search system

The testing method employed is a direct testing technique that employs black-box testing techniques. Black-box focuses on the software's functional requirements. Thus, black-box testing enables software engineers to obtain a set of input conditions that fully utilize all of a program's functional requirements. Black-box testing is not a replacement for white-box testing, but rather a complementary approach that is more likely to uncover a class of errors than white-box methods (Ependi & Suyanto, 2016).

Black-box testing attempts to find errors in the following categories:

1. Improper or missing functions
2. Interface error

3. Errors in data structures or external database access
4. Performance errors
5. The test method can be applied to all levels of software testing

Black-box testing techniques concentrate on the software's information domain by performing a test case by partitioning the input domain of a program in a way that provides comprehensive testing coverage. Graph-based testing methods investigate the relationship and behavior of program objects. The equivalence partition divides the input domain into data classes that are likely to be used to perform specific software functions. The program's ability to handle data within acceptable limits is tested using boundary value analysis. A wide range of software capabilities and application areas are covered by specialized testing methods. Graphical User Interface (GUI), client or server architecture, documentation and help facilities and real-time systems each require specific guidelines and techniques for software testing (Jain et al., 2019).

Several stages of the study were carried out, as follows: Data collection is carried out at this stage in the form of archives and library materials related to the application to be designed. Data analysis is the process of analyzing the data that is currently being collected in order to identify and evaluate problems, opportunities, and obstacles that arise, as well as the anticipated needs. If the data has been collected, the system planning stage is completed. Data testing is the stage at which the designed data is tested for wrinkles and whether it is error-free using the black-box testing method. Data implementation is the process of putting data into action (Tang, Shi, & Lei, 2016).

This method does not focus on control structures such as white box test techniques but on information domains. The trial is designed to answer the following questions:

1. How functional validity is trialed
2. What is the best input class for a good trial
3. Is the system very sensitive to certain input values
4. How if a limited data class is separated
5. How the volume of data can be tolerated by the system
6. How the data combination affects the operation

Typical Black-box testing design techniques include:

1. Decision Table  
Decision Table is an appropriate yet compact way for complex logic models, such as flowcharts and if-then-else and switch-report cases, conditions associated with actions to perform, but in many cases do so in a more elegant way. In the 1960s and 1970s, various "Decision Table Based" languages such as File tab were very popular for business programming.
2. All-Pairs Testing  
All-pairs testing or pairwise testing is a combinatorial software testing method that, for each pair of input parameters to a system (usually, a software algorithm), tests all possible discrete combinations of those parameters. Using carefully selected test vectors, this can be done much faster than a complete search of all combinations of all parameters, by "parallelizing" the parameter pair testing. Since no testing technique can find all the bugs, all-pair testing is usually used along with various quality assurance techniques such as unit testing, symbolic execution, fine fur testing, and checking code.
3. State Transition Table  
In automata theory and sequential logic, a state transition table is a table that shows what state (or state in the case of a limited nondeterministic robot) a finite semi automation or finite state machine will move to, based on current conditions and other inputs. A state table is essentially a truth table where some inputs are current conditions, and output includes the next state, along with output.
4. Equivalence Partitioning  
Equivalence partitioning is a software testing technique that divides input data from a software unit into multiple data partitions from which the test case can be derived. In principle, the test case is designed to cover each partition at least once. This technique attempts to define test cases that uncover error classes, thereby reducing the number of test cases that must be developed.
5. Boundary Values Analysis  
Boundary value analysis is a software testing technique in which tests are designed to include representatives of boundary values. The values of an equivalence partition or as large as the smallest values on either side of the edge. Values can be input ranges or outputs from device components.

#### 4. Result and Discussion

The test results show that when one of the drop-down lists is clicked, the query of location search results can be displayed on the drop-down list based on the corresponding search criteria displayed in Figure 3 of the textbox set value function.



Figure 3. Query Drop Down List

Figure 4 function viewer information route shows how the application can display tray information based on the name of the selected tray on the list. Rare by step can be clicked based on the route of the trip, users can see the route passed, users can find out the current position, and there is a description of where the next user direction reaches the final destination by utilizing the Google Maps API.

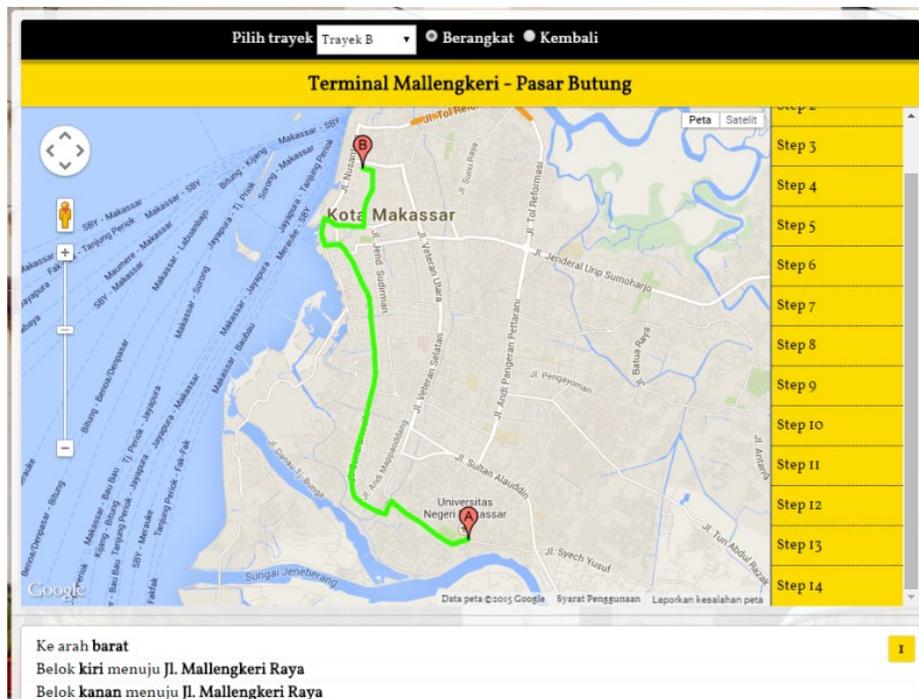


Figure 4. Route Information Viewer Function

Figure 5 route viewer detail information route shows how the application can display tray detail information based on the name of the selected tray on the list.

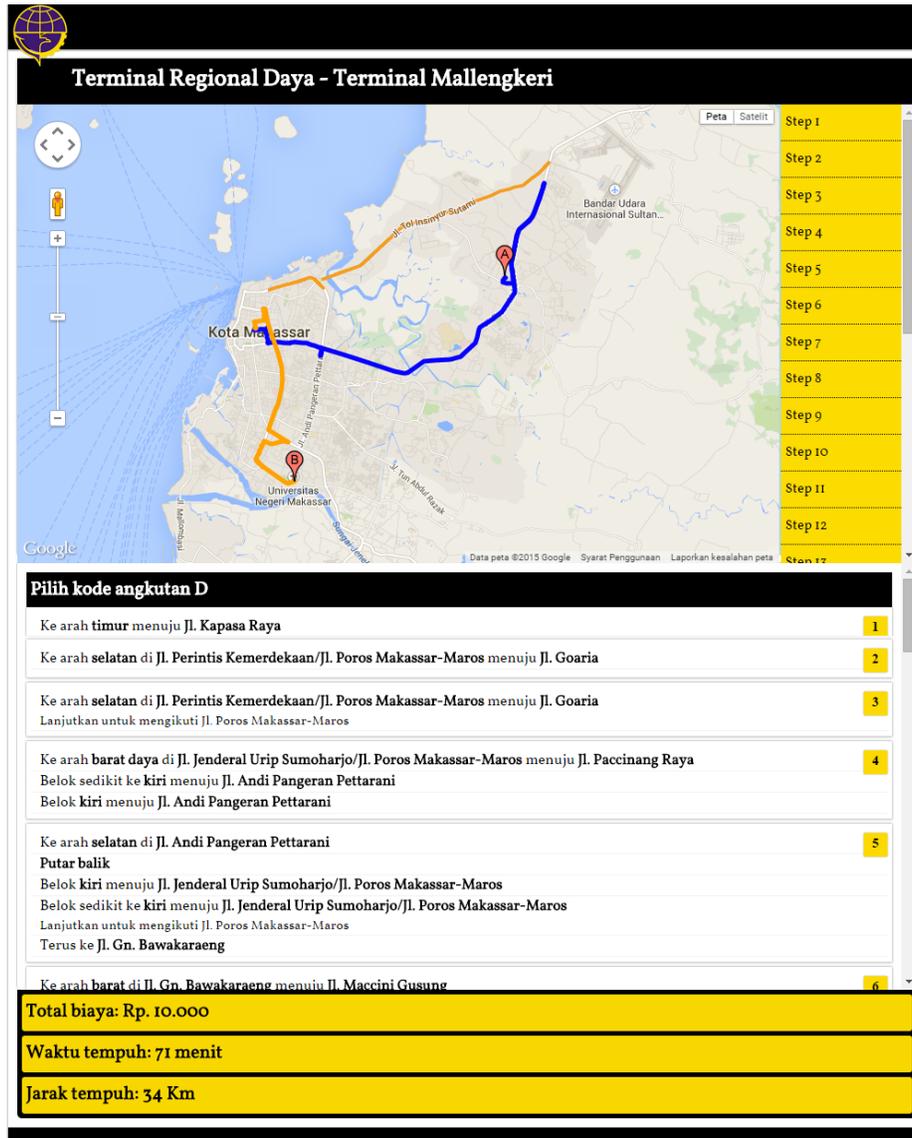


Figure 5. Route Details Viewer Function

## 5. Conclusions

Following a series of tests on the built application, it can be concluded that the application can provide information to users in the form of a digital map that utilizes Google Maps API to know the route of the incoming transportation route from the point of origin to the destination. This application works well and can provide information to calculate the amount of time and distance traveled from the original route to the destination; each route can be seen step by step, and each public transportation route has its own route. By examining the information on the application, this application can also calculate the transportation costs that the user must incur.

Suggestions include new information obtained by the author that can improve or expand on the essence of the discussion. Commonly written items include suggestions for further development, final project improvement, and suggestions for improving development methods.

## References

- Ait-Cheik-Bihi, W., Bakhouya, M., Nait-Sidi-Moh, A., Gaber, J., & Wack, M. (2011). A platform for interactive location-based services. *Procedia Computer Science*, 5, 697–704. <https://doi.org/10.1016/j.procs.2011.07.091>
- Al-Hawari, F., Al-Sammarraie, M., & Al-Khaffaf, T. (2020). Design, validation, and comparative analysis of a private bus location tracking information system. *Journal of Advanced Transportation*, 2020(iii). <https://doi.org/10.1155/2020/8895927>
- Anandkrishna Srinivasan. (2011). *Location Based Services to Improve Public Transportation* (Vol. 16). The University of Toledo.
- Candra, B., & Ariani, F. (2017). *Analysis Of Applications Mobile GPS Tracker In Public Transportation*. 3(2015), 1057–1061.
- Chen, Z., Xia, J. C., Irawan, B., & Caulfied, C. (2014). Development of location-based services for recommending departure stations to park and ride users. *Transportation Research Part C: Emerging Technologies*, 48, 256–268. <https://doi.org/10.1016/j.trc.2014.08.019>
- Ependi, U., & Suyanto, S. (2016). Implementasi Location Based Service Pada Aplikasi Mobile Pencarian Halte BRT Transmusi Palembang. *Journal of Information Systems Engineering and Business Intelligence*, 2(1), 33. <https://doi.org/10.20473/jisebi.2.1.33-39>
- Forda, G., Ulvan, M., Ulvan, A., & Hanafi, A. M. (2016). Design and implementation web based geographic information system for public services in Bandar Lampung City - Indonesia. *Proceedings - 2015 International Conference on Science in Information Technology: Big Data Spectrum for Future Information Economy, ICSITech 2015*, 270–275. <https://doi.org/10.1109/ICSITech.2015.7407816>
- Henchiri, M. (2017). *GPS and Localization Web Services Implementation Mourad Henchiri To cite this version : HAL Id : hal-01648484 GPS and Localization Web Services Implementation over Android Modern Satellite Navigation*.
- Jain, S., Trivedi, A., & Sharma, S. (2019). Application Based Bus Tracking System. *Proceedings of the International Conference on Machine Learning, Big Data, Cloud and Parallel Computing: Trends, Perspectives and Prospects, COMITCon 2019*, 152–154. <https://doi.org/10.1109/COMITCon.2019.8862254>
- Jiang, H., He, M., Xi, Y., & Zeng, J. (2021). Machine-learning-based user position prediction and behavior analysis for location services. *Information (Switzerland)*, 12(5), 1–15. <https://doi.org/10.3390/info12050180>
- Monica, K. I. (2019). Bus Tracking System using GPS on Smartphones. *International Journal of Engineering Research & Technology (IJERT)*, 7(11), 1–4.
- Rahmanti, F. Z., Permata, O. A., Amiroh, K., Daely, P. T., Ittaqullah, A., & Saputro, D. B. (2019). Integrated Information System Based on Google Maps APIs: Design of Surabaya Public Transportation System. *Proceedings - 2019 International Conference on Computer Science, Information Technology, and Electrical Engineering, ICOMITEE 2019*, 1, 154–159. <https://doi.org/10.1109/ICOMITEE.2019.8921161>
- Singhal, M., & Shukla, A. (2012). *Implementation of Location based Services in Android using GPS and Web Services*. 9(1), 237–242.
- Sulistijono, S., Pradana, M., Nugraha, D. W., Siregar, M. A. H., Habibi, R., & Hasbi, I. (2020). Web-based application of high school laboratory administration: Case study at sma pasundan 8, bandung, indonesia. *Proceedings of the International Conference on Industrial Engineering and Operations Management*, (August), 3007–3015.
- Sutar, S. H., Koul, R., & Suryavanshi, R. (2016). Integration of Smart Phone and IOT for development of smart public transportation system. *2016 International Conference on Internet of Things and Applications, IOTA 2016*, 73–78. <https://doi.org/10.1109/IOTA.2016.7562698>
- Tabarés, R. (2021). HTML5 and the evolution of HTML; tracing the origins of digital platforms. *Technology in Society*, 65(August 2019). <https://doi.org/10.1016/j.techsoc.2021.101529>
- Tabassum, K. (2020). An intelligent metro tracking system for Riyadh Smart City. *International Journal of Information Technology (Singapore)*, 12(4), 1103–1109. <https://doi.org/10.1007/s41870-020-00435-7>
- Tahyudin, I., & Saputra, D. I. S. (2016). Implementation of a mobile augmented reality application with location based service for exploring tourism objects. *ACM International Conference Proceeding Series*. <https://doi.org/10.1145/3010089.3010130>
- Tang, H., Shi, J., & Lei, K. (2016). A smart low-consumption IoT framework for location tracking and its real application. *ICEIEC 2016 - Proceedings of 2016 IEEE 6th International Conference on Electronics Information and Emergency Communication*, 306–309. <https://doi.org/10.1109/ICEIEC.2016.7589744>
- Xiang, Y., Xu, C., Yu, W., Wang, S., Hua, X., & Wang, W. (2019). Investigating dominant trip distance for intercity passenger transport mode using large-scale location-based service data. *Sustainability (Switzerland)*, 11(19). <https://doi.org/10.3390/su11195325>

Zacepins, A., Kalnins, E., Kvišis, A., & Komasilovs, V. (2019). Usage of GPS data for real-time public transport location visualisation. *VEHITS 2019 - Proceedings of the 5th International Conference on Vehicle Technology and Intelligent Transport Systems*, (Vehits), 277–282. <https://doi.org/10.5220/0007350902770282>

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