International Journal of Research and Applied Technology

3(1)(2023) 23-30
Journal homepage: https://ojs.unikom.ac.id/index.php/injuratech
DOI: https://doi.org/10.34010/injuratech.v3i1.9866

Smartwatch-Based Information System as a Compliance Detector in Traffic

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Abstract. The purpose of this study is to design a mobile-based application that serves to provide reminders to vehicle users to create orderly traffic and aims to build an obedient attitude to applicable traffic rules. To support this research, we used a qualitative method. While in the application development process using the Prototype approach. The results of this study indicate that the development of this system can increase compliance in traffic and reduce the number of accidents so that an orderly traffic can be created. The main concept of this system is as a reminder so that drivers are orderly traffic, for example, when a driver commits a violation by driving on the wrong road, he will get a reminder. This information system will later get a warning signal that will be sent to the smartwatch when the user violates traffic, the user will be aware of things that endanger his life or others.

Keyword: Compliance Detector, Smartwatch, Traffic.

ARTICLE INFO:
Submitted/Received 23 Des 2022
First revised 15 Jan 2023
Accepted 31 Jan 2023
First available online 10 Feb 2023
Publication date 01 June 2023

1. Introduction

Driving compliance on the road is an obligation that must be carried out by every public road user. Using a helmet when riding a motorcycle, using a seat belt and not exceeding the speed limit set are some examples of driving compliance. Driver speed plays an important role in influencing the risk of accidents, and remains a key safety factor [1]. This behaviour is often campaigned by the Indonesian government to all levels of society. At this time, many people drive vehicles but not everyone understands how to drive a vehicle properly and pays attention to security and safety [2]. The trigger for a very large accident is caused by the human aspect that does not practice discipline in traffic, low awareness, and lack of knowledge about

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driving safety [3]. The factors that most often contribute to the occurrence of traffic accidents from the selected risk groups have been analyzed for example young drivers, elderly people and at-risk drivers [4]. Self-driving compliance must be created from oneself, if compliance has arisen from oneself then every public road user will feel comfortable. Driving compliance has been regulated in Government Regulation No. 37 of 2017 and Law No. 22 of 2009. In order to create order and security for traffic users, traffic signs are created to be obeyed to create these conditions. In everyday life, it seems that there are still many who violate traffic signs, this can endanger the violator and other people.

Other research states that the development of this information system is very beneficial for users, especially the public, regarding the importance of driving safety. Users of this kind of information system can easily access driving safety information that is practical, easy to understand and access without being limited by location and time [2]. In this paper, we propose SafeDrive, an effective wrist-worn sensing-based application that detects most commonly occuring distracted driving events [5]. In this paper, we present Midtrack, a driver monitoring system that is based on tracking magnetic tags worn by the user. With a single smartwatch and two low-cost magnetic accessories [6]. Other studies also mention that the system that uses smart watches is very good at detecting unsafe behaviour of drivers directly [7]. So, the previous research stated that a system like this could detect the driver's drowsiness lever based on the driver behaviour derived from the motion data collected from the built-in motion sensors in the smartwatch, such as the accelerometer and the gyroscope [8].

The purpose of this study is to design a mobile-based application that serves to provide reminders to vehicle users to create orderly traffic and aims to build an obedient attitude to applicable traffic rules. The research method used in this study is a qualitative method.

2. Method

In this study, the method used is a qualitative method, namely by collecting data based on analysis and discussion. The application of the system in important for the informasion system developer in assessing the success of the information system whether it runs according to the plan and whether it has fulfilled the wishes of its user [9]. The prototype method is a sequential method in making an application, starting from the stages of System Requirements Analysis, Application Design and Evaluation. The prototype method is shown in Figure 1.

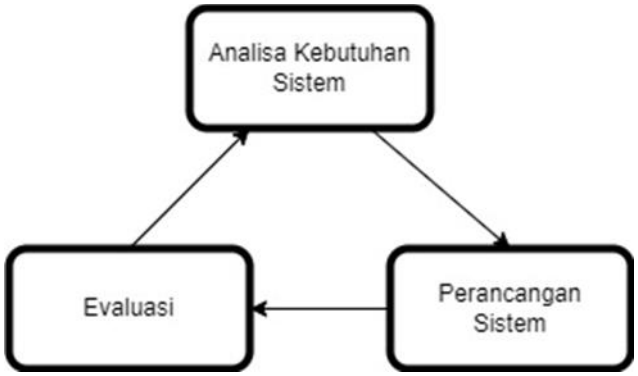

Figure 1. Prototype System Development Life Cycle

Needs analysis is carried out as the first step. At this stage, it is done to collect initial data, the initial data contains things that will be included in the system. After that, the next stage is

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the design of the application at this stage is done to design the application. After the application design is made, an evaluation stage will be carried out at this stage an evaluation of the results of the previously designed application will be carried out. These three stages of the process will iterate and continue until all requirements are met when the application is designed. The prototype can be applied to the development of small and large systems with the aim that the development process can run well, be organized and can be completed on time [10].

3. Result and Discussion

3.1. Identifying Requirement

The driving compliance information system is designed to provide reminders to vehicle users to create orderly traffic and aims to build an obedient attitude to applicable traffic rules. Simple research in needs analysis was conducted to determine what the users of this information system needed. The driving compliance information system is equipped with a starting trip provider feature that is equipped with guidance from Maps, a feature to check maps and a reminder feature if the driver makes a mistake in driving. Therefore, this information system is very helpful for motorists when traveling. The menu structure in the driving compliance information system is shown in Figure 2.

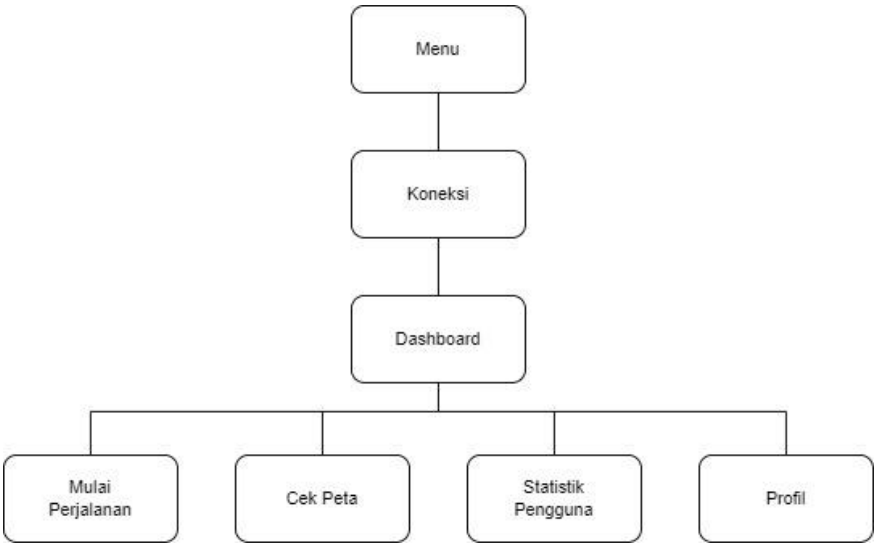

Figure 2. Menu Structure of Driving Compliance Information System

Figure 2 shows the design of the menu structure in the driving compliance information system. the connection menu is to connect the smartwatch to the smartphone. The dashboard menu is the main menu which is divided into 4 sub menus, namely starting the trip, checking maps, user statistics, and profiles.

3.2 Developing the Initial Prototyped

In the early stages of prototyping, the developer designed the front page of the Driving Compliance Information System (see Figure 3). The front page contains SafetyRidin logo.

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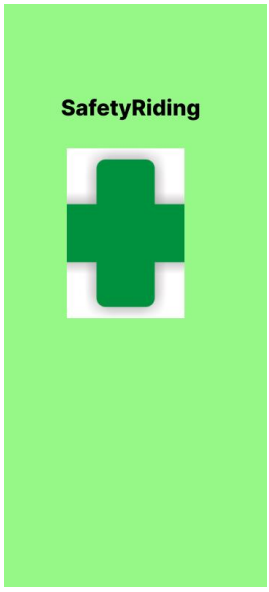

Figure 3. Home page of the Driving Compliance Information System

Figure 3 shows the start page of this system, before the user goes to the next page to connect the Smartwatch to the Smartphone using Bluetooth. The page for enabling bluetooth on this system is shown in Figure 4. Figure 4 shows the page activate bluetooth Smartwatch information system, where the user must connect the Smartwatch to the Smartphone so that they can enter the Dashboard page. The Driving Compliance Information System Dashboard page is shown in Figure 5. Figure 5 shows the Smartwatch Information System Dashboard page, on this page 4 menus are displayed to use this system, namely starting the trip, checking maps, user statistics and profiles.

Figure 4. Page Activate Connection Information System Driving Compliance

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Figure 5. Driving Compliance Information System Dashboard Page

3.3 Testing the Prototype

After the initial prototype has been successfully created, the initial stage is carried out to test the prototype and initial implementation that has been made. Where in the previous stage, the 4 menus of the driving compliance information system were discussed. The explanation of the four menus above is shown in Figure 6.

Figure 6. Start Page Travel Compliance Information System Driving

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Figure 6 shows the Start Trip page, after the user selects to start the journey on the driving compliance information system feature then the user is asked to activate the GPS on the User's Smartphone first. The map check page of the driving compliance information system is shown in Figure 7.

Figure 7. Check the Map of the Driving Compliance Information System Map

Figure 7 shows the map check page after the user selects map check on the driving compliance information system feature. If the user selects the start trip feature on this map check feature, the user will be redirected back to the trip start page in Figure 6. The Warning page that will appear on the smartwatch when the user is traveling is shown in Figure 8.

Figure 8. Warning page Driving compliance information system

Figure 8 shows a warning page where this page will appear on the smartwatch when the user is traveling. If the safety riding display is green, this indicates that the driver has not made a mistake, and if the safety riding display is red, this indicates that the driver has committed a traffic violation. The User Statistics page is shown in Figure 9.

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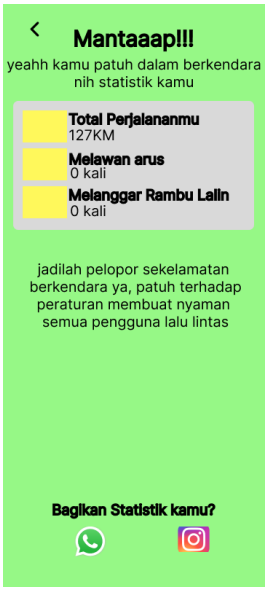

Figure 9. Check the Map of the Driving Compliance Information System Map

Figure 9 shows the user statistics page of the driving compliance information system. on this page there is information about the total mileage of the trip and the number of violations committed by the driver while driving. The Profile page is shown in Figure 10.

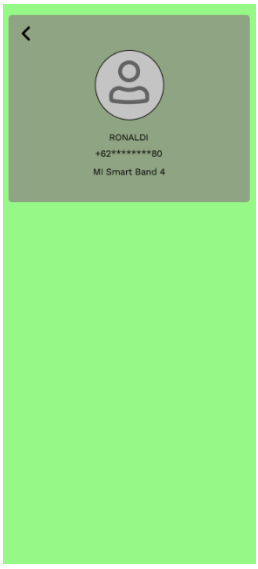

Figure 10. Check the Map of the Driving Compliance Information System Map

Figure 10 shows the user profile page of the driving compliance information system. on this page there is information about the user profile which includes the user name, telephone number and the type of smartwatch used.

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4. Conclusion

The driving compliance information system is designed to provide reminders to vehicle users to create orderly traffic and aims to build an obedient attitude to applicable traffic rules. The main concept of this system is as a reminder for motorists to be orderly in traffic, for example when the driver. The main concept of this system is as a reminder for drivers to order traffic, for example, when a driver commits a violation by driving on the wrong road, the driver will get a reminder signal.

Acknowledgement

We would like to thank Universitas Komputer Indonesia and the mentors who have helped us in writing this paper.

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