

DEVELOPMENT OF EARLY WARNING SYSTEM FOR FLOOD AT RECREATIONAL SITE USING WEB-BASED APPLICATION

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ABSTRACT - The development of Early Warning System (EWS) focuses on providing information and early warning, if necessary, to the public about the condition of the river and if there is a predicted flood at the recreational area. This project is an extension from an Internet of Things (IoT) project in which a data retrieved from IoT device is stored in a real-time database to be integrated into the web application. The purpose of this project is to develop a web-based application that allows users to view updates about the intensity level of the possibility of a flood at the recreational area and to test and analyze the Early Warning System web application and its usability in displaying accurate information for users. The significance of this project is to provide convenience for recreational area visitors and most importantly, to help avoid casualties. By studying the records of the 25 respondents that has participated in the usability and functionality test, it is obvious that the majority of them are satisfied with the system and are likely to use the application, when necessary, in the future.

Keywords: early warning system, flood, recreational area, Internet of Things (IoT)

1. INTRODUCTION

The problem arises when the visitors visit the recreation site only to be disappointed that it is not suitable for them to stay there due to the rises of the water level that could be dangerous to stay. This is because they do not have access to information about the water level beforehand. In the context of flood, it was written that the lack of an Early Warning System and delayed rescue efforts play a part in causing the death toll of 54 people in 2022 which is the highest death toll in the flood history in Malaysia (Syed Ahmad Idid, 2022). This project highlights the function of the web site to provide information from IOT device. The scope of this project involves the recreation area in Padang Terap, Kedah. The target users are the visitors of the recreational area. There is also a notification mechanism using pop-up alert notifications appearing on the web application page to alert the users if the area is not safe to stay. These messages vary according to the indicators or the threshold that has been determined. There is also a navigational structure that uses hyperlink to bring the users to the Twitter web and generate the pre-written tweet that has been customized with specific hashtag, #infoPadangTerap. Users can use the hashtag to share any information about the area and also read through the hashtag to stay updated. Twitter was acknowledged as a useful social media as it was used as an information sharing tool actively during the Great East Japan Earthquake that has occurred on March 11, 2011 (Hadjadj-Aoul et al., 2019). The EWS system focuses on the data representation as to satisfy the objective highlighted in the project. EWS represents the data through graph and table. Furthermore, there is also a page that provides additional info such as the guideline on what the visitors should and should not do.

2. METHODOLOGY

The Early Warning System (EWS) is developed using System Development Life Cycle (SDLC) framework. The method involves planning, analysis, design and development, implementation, and testing phase (Yadav, 2019). The requirements to build the system includes Visual Studio Code as the source code editor writing PHP, HTML, and CSS language, SQLyog and Firebase Realtime Database for database where SQLyog keeps system administrators' data and Firebase on the other hand, retrieve data from IOT device and keep them in real-time and also Laragon as the local web server in addition to the hardware requirements which is the device used to build the system.

3. RESULTS AND DISCUSSION

Based on the two tests, a usability and functionality test that has been conducted, 18 participants took part in the test. The purpose of the two tests is to evaluate the performance, functionality, and user experience of the system. It helps in identifying any issues or usability problems that may exist, so that improvements can be made to ensure better user

experience. There are two roles involved in the testing which is the public user and admin since there are two different interfaces for different roles. According to the finding analysis, for the question about if the users are satisfied with the system that uses linear scale as the method, 88.9% of the total respondents went with scale 5 which means strongly agree and the remaining 11.1% chose scale 4 that indicates agree. For the admin interface, 100% of the total respondents which is 25 respondents are totally satisfied with the interface. For the public user interface, 2 out of 15 respondents were satisfied meanwhile another 13 of the respondents are totally satisfied with the interface. To include other questions, none of the respondents valued the system with the scale 2 and below. Therefore, it could be concluded that there is no major issue with the web application that needs to be addressed and fixed.

4. NOVELTY OF RESEARCH / PRODUCT

In this project, Early Warning System (EWS) serves as a warning system specifically for the visitors of Puncak Janing Waterfall, Yan, Kedah. Unlike the 'Public Infobanjir' official website which provides early predictions for every river in Malaysia, this project focuses solely on providing information about the condition of the environment at the recreational area in Puncak Janing Waterfall and providing notifications in the form of pop-up alert messages on the web page. The system retrieves data such as water level, humidity and temperature according to timestamps from an IoT device that has been placed at the recreational area. This ensures that accurate reading or information can be noted. Additionally, the readings of the river stated in the official website are not equivalent to the readings at the recreational area. Hence, the system that is centered around the recreational area was built to help visitors plan their day at the recreational area.

5. CONCLUSION

In conclusion, the development of the Early Warning System (EWS) for flood at Recreational Site using a web-based application is proven to be relevant. The respondents, or the possible visitors, have acknowledged that the existence of the system is needed to fulfill the objective of the project. Future works that could be done to improve the relevancy of the EWS web application system include implementing a forum section on the website so that users can communicate with each other without having to go on Twitter.

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