

Rehabilitating Flood-Damaged Cars for Sustainable Car Rental Services: A Web-Based System

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Abstract

Reusing flood-damaged cars gives a unique opportunity in the car rental market in today's fast-paced world, where sustainable solutions are crucial. This study represents the result of efforts to design and construct a web-based car rental system that utilizes flood-damaged cars. The system will be developed using Rapid Application Development (RAD) methodology. Surveys and interviews are conducted to collect potential users' feedback. The results show that due to global economic recession and the increased awareness of global warming, citizens will prefer transportation that is eco-friendly and cost effective if the vehicle is in good condition and properly fixed. This project intends to transform the car rental environment by leveraging a strong technological stack and a user-centric design. With a strong emphasis on user experience and system efficiency, the web-based platform promises not only to ease seamless vehicle rentals but also to promote sustainability in the automotive sector. The favorable results of user acceptability testing confirm the system's success in reaching its objectives. GPS features and transparent vehicle history disclosure will be included for future enhancements.

Keywords: Car Rental System, Eco-Friendly, Flood

1. Introduction

The car industry has long struggled with the issues of sustainability and environmental friendliness. Simultaneously, natural calamities such as floods have resulted in many flood-damaged cars that, despite being salvageable, are frequently underutilized. Recognizing the potential of combining these two factors, this project will create a web-based automobile rental system that will reuse flood-damaged vehicles. This system solves the environmental challenges connected with underutilized cars while also catering to the increasing demands of modern consumers seeking economical and sustainable transportation alternatives by providing a digital platform for vehicle renters.

2. Methodology

2.1 Latest Statistic on Website Usage

In 2023, there are approximately 1.13 billion websites on the internet. Only a small portion of the world's 1.13 billion websites are regularly updated and used. Only 200,121,724 of the 1.13 billion websites are regularly maintained and viewed, a startling 82% of which are inactive. Each three seconds, a brand-new website is created.

In 2023, 71% of companies will have websites. This is a rise over prior years, owing primarily to the influence of the Covid-19 epidemic. Companies have realized the value of having a web site to reach a bigger audience and stay competitive in today's digital market because of the move to online commerce and remote employment. The trend of companies creating a website has been hastened by the Covid-19 pandemic, and it is probable that this trend will continue.

The latest research shows that 28% of all company activity is now done online. This transition to online shopping reflects the internet's growing significance in today's business environment and the expanding trend of e-commerce.

Recent studies show that 43% of small firms intend to spend money in 2023 to improve the functionality of their websites. This phenomenon highlights the growing significance of having a strong online presence for companies of all sizes. A business' success in today's digital environment depends on having a well-designed and optimized website, as consumers are increasingly turning to the internet to make purchasing decisions [1].

Moreover, 5.18 billion people used the internet at the start of the second quarter of 2023. The number of

individuals using the internet is increasing; according to the latest recent data, there were 147 million more users globally connected in the year before April 2023. Due to growing internet availability globally, the number of people who are "unconnected" to the internet has fallen to 2.85 billion, with the majority of these people living in Southern and Eastern Asia as well as Africa.

Mobile phones now account for approximately 60% of all web traffic and are used by 95% of internet users globally to access the internet at least periodically as shown in Fig 1. People spend more than 57 percent of their online time on mobile devices. However, in the world's major economies, more than 6 in 10 internet users still utilize laptops and desktop computers for at least some of their online activity [2].



Fig 1. Statistics of internet usage

2.2 History of Flood in Malaysia

According to studies conducted specifically in Malaysia, the fast-rising number of flood events in recent decades are the result of unregulated human activity in rivers, the cutting down of forests, and extreme weather events brought on by climate change [3]. Since 2001, there have been 143 floods on average annually, more than 90% of which have been flash floods. Such often recurrent floods pose a serious risk to the lives and property of Malaysian inhabitants, severely damaging the nation's infrastructure [4].

According to information from the Country Disaster and Risk Profile of the United Nations Office for Disaster Risk Reduction (UNDRR), floods in Malaysia account for 98% of average yearly damage between 1990 and 2014. According to a report from the Malaysian Department of Irrigation and Drainage published in 2003, flooding affects an average of 29 000 km², or 9 percent of the nation's total land area, and more than 4.82 million people (22 percent of the population) per year [5].

Two different forms of rainfall generate floods. The first kind of rainfall is of a moderate intensity and lasts for a long time over a large region. The second kind is localized heavy rain that lasts for a short time. Floods in Malaysia are predictable to happen. While the west coast of Peninsular is primarily plagued by thunderstorms from September to November because of the inter-monsoon

season, the east coast and eastern Malaysia are typically affected by floods during December to January when the northeast monsoon sweeps. Most floods in Malaysia typically originate from persistent, heavy rains that cause runoff because of surplus water supplies that exceed the capacity of streams and rivers. Many states in Peninsular Malaysia, including Kelantan, Johor, Pahang, Perak, Kuala Lumpur, and Selangor, as well as east Malaysia's Sabah and Sarawak, are home to the majority of flood-prone areas [6].

2.3 Overview of Car Rental System

The development of technology caused fierce competition among businesses to win over more clients [7]. Technology aids in decision-making by allowing the owner of the car rental to concentrate on the usage of IT to gain a competitive edge [8]. Car rental companies frequently struggle with transactions that are inefficient. The tenant must make individual calls to the rental provider to inquire on the car's availability [9]. Distance is a problem for communication and information technologies, yet a website allows us to access a wide range of information from around the globe. Online transactions are those when the buyer and seller conduct their business over the Internet. Web-based Information Systems were created because of the quick advancement of information technology. Research on general models for the study and design of web-based information systems has been done in numerous papers [10]. Due to the current rapid growth of information technology, it is essential to access information quickly and accurately to facilitate decision-making. Due to the accessibility of information and the effective and efficient processing of order data, using web design as a tool to promote the rental of vehicles is highly beneficial in attracting more consumers and making transactions easier.

2.4 Problem Statement

Natural calamities, such as floods, have caused severe damage to automobiles in Malaysia in recent years, bringing huge financial damages to individuals. Depending on the type and level of damage, it might cost the automobile owner between RM20,000 and RM40,000. Repair costs will be higher for luxury vehicles such as BMW, Porsche, Range Rover, Peugeot, Mini Cooper, and so on. Due to the amount of damage in the car, some car owners may be unable to afford the repair costs or may opt to sell it and acquire a new car. These cars will almost certainly wind up in landfills, contributing to pollution. This is because not all vehicles have flood insurance. Driving a flood-damaged car that has not been adequately repaired might be hazardous to the driver's health and threaten the safety of other vehicles on the road. Mold can form in flood-damaged cars if wet conditions are not handled, causing respiratory difficulties for the driver and passengers. A web-based car rental system for flood-damaged vehicles can provide a convenient option for

these car owners to sell their flood-damaged vehicles through a reputable platform. The owner can utilize the money from selling the flood-damaged car to our platform to buy a new car. Our platform will then repair these flood-damaged vehicles and rent them out at a low cost.

Without a web-based car rental system, flood-affected car owners must either continue to use the vehicle, dispose it in landfills, or spend time contacting secondhand car dealers who are prepared to acquire their flood-damaged vehicle, which is a time-consuming process. The goal of this project is to reduce the number of vehicles that wind up in landfills, hence reducing environmental effect. Furthermore, reusing flood-damaged vehicles through rental businesses is a more sustainable option than scrapping them. Furthermore, an affordable automobile rental system including flood-damaged vehicles would provide transportation options for people who might not be able to purchase a car otherwise. This accessibility would allow people to commute to job, education, or other important places, making their lives easier. Furthermore, these flood-damaged vehicles might be used in the film business. Our platform ensures that vehicles are thoroughly inspected and repaired prior to rental, ensuring renters' safety.

3. Implementation

3.1 Method

The proposed car rental website is built using the Rapid Application Development (RAD) methodology. The RAD methodology is divided into four phases: user requirements, user design, prototype, and implementation. During the user requirements phase, system requirements will be gathered through surveys and questionnaires. Once the requirements are defined, we will move into the user design phase. The emphasis here was on creating the high-level structure of the web-based car rental system. We envisioned the system's components, their interrelationships, and the general architecture that would support its functionality.

The prototyping step marked the move from concept to actual representation. At this point, we'll start working on a workable model of the system. This prototype served as proof of concept as well as a visual depiction of the system's primary functions. It enabled my supervisors and potential customers the opportunity to interact with a simplified version of the system and obtain a hands-on grasp of how it would work. This phase included continuous testing and validation to ensure that the system remained reliable and of high quality throughout development.

The final phase, implementation, marked the web-based automobile rental system's preparedness for deployment. To ensure a successful launch, several critical procedures will be followed. Extensive testing will be carried out to

ensure that the system's performance, usability, and functionality are satisfactory.

3.2 User Functionality

Users should be able to quickly register on the suggested website. Important information such as their name and contact information will need to be obtained throughout the registration process. Users must be able to securely log in using their selected credentials (username and password) once registered, allowing them to tailor their interactions with the system and log in or out as needed.

Access to a comprehensive list of available cars is an important component of the user experience. This list should include specific information about each car, such as its model, year, rental fee, and a brief description. A search option should be included to improve user ease, allowing consumers to filter available cars based on particular parameters such as location and rental term. This enables users to quickly select the appropriate car that suits their individual requirements.

Furthermore, reserving a car for a specific time should be a simple process. Users should be able to enter their preferred pick-up and return dates, allowing for smooth booking procedures. Users should also be able to alter or cancel previous bookings to accommodate changes in plans if the request is made at least three days before the scheduled pick-up date.

The Touch & Go payment system, which was recommended by 96% of poll respondents, will be included in the system. This strategy offers quick and easy payment processing, which improves the entire customer experience.

Additionally, the system will highlight how important user feedback is. Users should be able to provide ratings and comments about their rental experience after completing a booking. Future users can benefit greatly from these user reviews, which offer insights and support well-informed decision-making. A thorough booking history that provides a summary of prior reservations for simple access and tracking of rental activity should also be available to users. To safeguard our clients, our business will offer a warranty on every vehicle. However, GPS features and transparent vehicle history disclosure will be included for future enhancements (Fig 2).

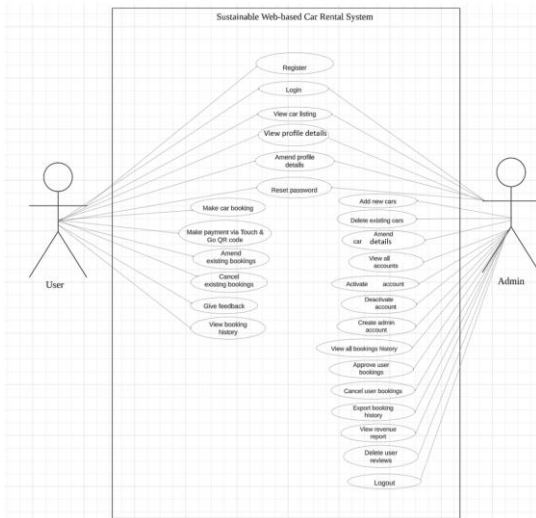


Fig 2. Use Case Diagram

4. Conclusion

Administrators should be equipped with powerful tools to efficiently manage automobile listings. This involves having the power to update current listings, remove out-of-date ones, and add new cars to the inventory. This guarantees the accuracy and currentness of the vehicle inventory.

Besides this, administrators need to be able to supervise and manage every user account. This includes having the power to activate and deactivate admin and user accounts as necessary. Admins also can make new admin accounts, which will improve platform integrity and security.

All bookings must be managed efficiently. Administrators should be able to approve or cancel reservations based on availability and particular criteria. Admin should be able to manage user reviews as well. The administration of user reviews is equally important in maintaining the platform's positive and trustworthy reputation.

Moreover, admins should be able to export booking history records to aid in record-keeping and analysis. This information is crucial in accounting and auditing. Admins should also be able to track the platform's financial performance over time by viewing revenue data, which will help them assess the platform's viability and growth.

Lastly, both users and administrators should have access to a visual booking calendar that displays all bookings made on certain days. This calendar tool aids in efficient planning and management, improving the system's overall functionality.

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