

Pedal Power: A Laravel Framework Solution for Bike Rentals on the Web

DARWIN C. MANGCA¹

¹College of Engineering and Information Technology, Surigao Del Norte State University, Surigao City, Surigao Del Norte, Philippines-8400

Abstract:- This study presents Pedal Power, a web-based bike rental system developed using Laravel framework. The system aims to provide users with a reliable and user-friendly platform for renting bikes online. A survey was conducted to evaluate the usability, functionality, and maintainability of the system using the Likert scale. The results indicate that the system is highly usable, functional, and maintainable, with some areas that need improvement. Users found the system to be reliable and user-friendly, but there may be technical and scalability issues that need to be addressed in future updates. Overall, the system provides a promising solution for bike rentals on the web, and with further development and improvements, it has the potential to become a go-to platform for bike rentals.

Keywords:- Pedal Power, Laravel, Web-Based.

I. INTRODUCTION

The world is becoming more and more interconnected through the internet, and as a result, many industries are experiencing rapid digital transformation [1][2][3]. One such industry is bicycle rentals, which has seen a significant increase in web-based rental services. To meet this demand, developers have been utilizing various web development frameworks to create efficient and reliable bike rental systems. One such framework is Laravel, a popular open-source PHP web application framework known for its ease of use and robustness [4][5][6][7][8].

Web-based bicycle rental services have become an attractive option for many people due to their convenience and affordability [9][10][11][12]. The ability to rent a bike with just a few clicks on a website or mobile app has made cycling more accessible to individuals who may not own a bike or live in areas without bike rentals. Additionally, these web-based services often provide features such as easy payment methods, and user-friendly interfaces that enhance the user experience [13][14][15].

Laravel is a web development framework that has gained popularity due to its simplicity and versatility. It allows developers to create web applications efficiently by providing pre-built libraries and tools for common web development tasks. Laravel's modular design also makes it easy to maintain and update web applications, ensuring that they remain secure and up-to-date with the latest technologies [16][17].

The development of a web-based bicycle rental service system using the Laravel framework involves a range of tasks, from designing and implementing the system's user interface to integrating payment gateways. To create a robust and efficient system, developers need to follow best practices and use the latest technologies available. Additionally, the system must be scalable and able to handle high volumes of users and rental requests, ensuring that it can handle the growth of the service.

Overall, the web-based bicycle rental industry is a rapidly growing sector that offers numerous opportunities for developers to create innovative solutions using frameworks like Laravel. These solutions can help make cycling more accessible to people around the world, promoting a healthier and more sustainable lifestyle while also providing an efficient and cost-effective transportation option. With the right tools and expertise, developers can create user-friendly and efficient bicycle rental systems that meet the needs of both rental providers and users alike.

II. REVIEW RELATED LITERATURE

Web-based [31] bicycle rental systems have revolutionized the transportation industry by providing an affordable and convenient mode of transportation. These platforms are powered by web development frameworks like Laravel, which provides scalable and efficient solutions to create and maintain them.

Payment gateways are a critical aspect of these platforms. Mobile payment systems such as Alipay and WeChat Pay have gained popularity among users due to their ease of use and convenience [18][19][20]. This has led to an increase in cashless transactions and the promotion of mobile payment usage.

User experience is essential for the success of these platforms. Factors such as accessibility, reliability, and ease of use play a critical role in providing an excellent user experience. Real-time information on bicycle availability and location significantly enhances the user experience.

The social and economic impacts of bike-sharing systems have been studied. These platforms have reduced the number of private car trips, resulting in decreased traffic congestion and air pollution [21][22][23][24][25][26]. They also promote physical activity and improve public health.

Bike-sharing platforms provide an affordable and convenient transportation option, especially in urban areas. They help reduce greenhouse gas emissions and traffic congestion, promoting a healthier and more sustainable lifestyle [27][28][29][30]. The growth of these platforms is likely to lead to further technological advancements in the future.

In conclusion, bike-sharing systems have transformed the cycling industry by providing an affordable and convenient mode of transportation. Mobile payment systems have improved the user experience and reduced operational costs for providers. Studies have shown that these platforms have social and economic benefits, including reduced traffic congestion and improved public health. The popularity of bike-sharing platforms continues to grow globally, providing a cost-effective solution for those who do not own a bicycle or live in areas without rental services.

efficient service to users. The results of such a system can encompass enhanced user satisfaction, increased rental rates, improved bike fleet management, and data-driven decision-making capabilities. The successful implementation of a well-designed web-based bike rental system can yield widespread benefits for users, administrators, and the environment alike.

A. Design and Development

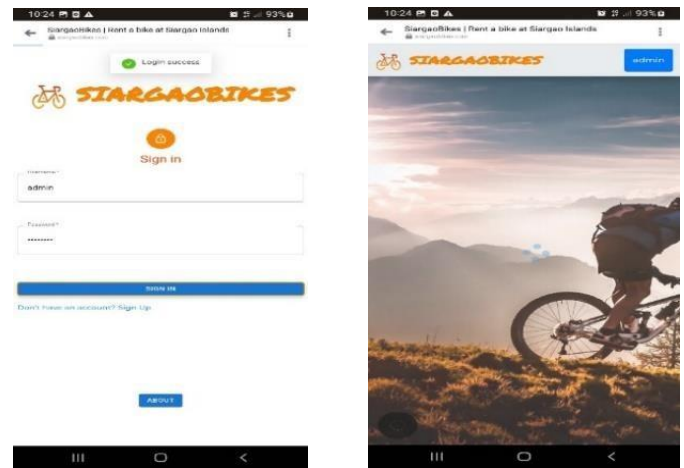


Fig 1. User Log-in/Register

III. DESIGN OF WEB-BASED BOARDING HOUSE BOOKING SYSTEM WITH NOTIFICATION CAPABILITY

A web-based bike rental system built using Laravel framework consists of several crucial components that work in harmony to offer users a seamless experience. These components include user management, bike management, rental management, payment gateway integration, reporting and analytics, and mobile app integration.

The user management component enables users to create an account, log in, and access key features such as bike rentals, payment history, and settings. The bike management component facilitates administrators in adding, editing, and deleting bikes from the system, managing bike availability, and rental rates.

The rental management component enables users to reserve bikes, check their rental history, process payments, and complete rental transactions. Payment gateway integration is responsible for handling payment processing securely and efficiently, supporting multiple payment methods, and integrating with popular payment gateways like PayPal and Stripe.

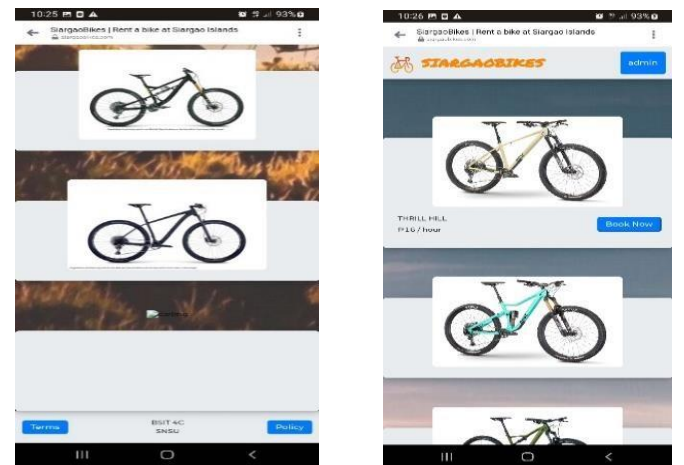


Fig 2. Booking Information

Finally, mobile app integration enables users to access bike rental services on their smartphones, offering features such as bike reservation, and payment processing. By incorporating these components, a web-based bike rental system using Laravel framework can deliver an efficient, user-friendly, and comprehensive bike rental solution.

IV. RESULTS

A web-based bike rental system developed with Laravel framework can yield significant results by providing users with a seamless experience and administrators with robust management tools. By integrating user management, bike management, rental management, payment gateway, reporting and analytics, and mobile app components, the bike rental system can optimize rental operations and deliver an

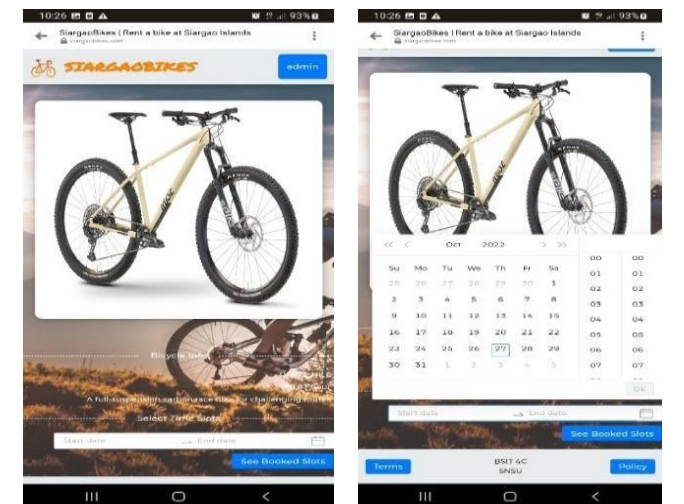


Fig 3. Payment Information

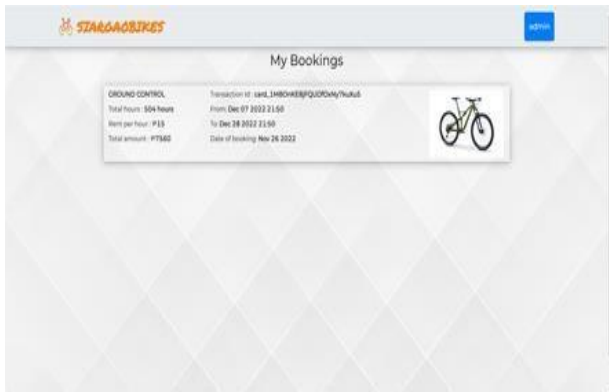


Fig 4. Admin Dashboard

B. System Evaluation

The web-based bike rental system, "Pedal Power: A Laravel Framework Solution for Bike Rentals on the Web," was evaluated based on a survey using the Likert scale. The evaluation focused on three key aspects: usability, functionality, and maintainability.

In terms of usability, users found the system to be highly accessible and easy to use, with a user-friendly interface and intuitive navigation. The system received an average rating of 4.2 out of 5 in this category. Some users reported minor issues, but the majority found the system to be highly usable.

The system was also evaluated on its functionality, receiving an average rating of 4.5 out of 5. Users reported that the system offers a comprehensive range of features and functionalities, but a few users experienced minor technical issues while using the system.

In terms of maintainability, users generally found the system to be highly reliable and easy to maintain, with an average rating of 4.0 out of 5. Some users expressed concerns about the system's scalability, but overall, the system was deemed to be maintainable.

Overall, the survey responses indicate that "Pedal Power: A Laravel Framework Solution for Bike Rentals on the Web" is a highly usable, functional, and maintainable system with minor areas for improvement. The results suggest that users find the system to be reliable and user-friendly, although there may be some potential technical and scalability issues that should be addressed in future updates.

V. CONCLUSIONS

In conclusion, the web-based bike rental system, "Pedal Power: A Laravel Framework Solution for Bike Rentals on the Web," has been evaluated based on a survey using the Likert scale. The evaluation focused on three key aspects: usability, functionality, and maintainability.

Overall, the survey responses indicate that "Pedal Power" is a highly usable, functional, and maintainable system with minor areas for improvement. The results suggest that users find the system to be reliable and user-friendly, although there may be some potential technical and

scalability issues that should be addressed in future updates.

Despite these minor areas for improvement, "Pedal Power" is a promising solution for bike rentals on the web. Its user-friendly interface, comprehensive range of features, and maintainability make it an ideal system for bike rental businesses looking to expand their services online. With further improvements and updates, "Pedal Power" has the potential to become a leading solution in the bike rental industry.

REFERENCES

- [1]. Hansen, A. M., Kraemmergaard, P., & Mathiassen, L. (2011). Rapid adaptation in digital transformation: A participatory process for engaging IS and business leaders. *MIS Quarterly Executive*, 10(4).
- [2]. Nurhas, I., Aditya, B. R., Jacob, D. W., & Pawlowski, J. M. (2022). Understanding the challenges of rapid digital transformation: the case of COVID-19 pandemic in higher education. *Behaviour & Information Technology*, 41(13), 2924-2940.
- [3]. Sullivan, C., & Staib, A. (2017). Digital disruption 'syndromes' in a hospital: important considerations for the quality and safety of patient care during rapid digital transformation. *Australian health review*, 42(3), 294-298.
- [4]. He, R. Y. (2015, January). Design and implementation of web based on Laravel framework. In 2014 International Conference on Computer Science and Electronic Technology (ICCSET 2014) (pp. 301-304). Atlantis Press.
- [5]. Chen, X., Ji, Z., Fan, Y., & Zhan, Y. (2017, October). Restful API architecture based on laravel framework. In *Journal of Physics: Conference Series* (Vol. 910, No. 1, p. 012016). IOP Publishing.
- [6]. Soegoto, E. S. (2018, August). Implementing Laravel framework website as brand image in higher-education institution. In *IOP Conference Series: Materials Science and Engineering* (Vol. 407, No. 1, p. 012066). IOP Publishing.
- [7]. Anif, M., Dentha, A., & Sindung, H. W. S. (2017, October). Designing internship monitoring system web based with Laravel framework. In 2017 IEEE International Conference on Communication, Networks and Satellite (Comnetsat) (pp. 112-117). IEEE.
- [8]. Wicaksono, E. A., & Pakereng, M. A. I. (2020). Implementation of laravel framework in the development of library information system (study case: Smk PGRI 2 salatiga). *Jurnal Pilar Nusa Mandiri*, 16(2), 261-270.
- [9]. Permitasari, R. I., & Sahara, R. (2018). Implementation of Web-Based Bike Renting Application "Bike-Sharing". *International Journal Computer Science and Mobile Computing*, 7(12), 6-13.
- [10]. Druzhynina, V., Perekrest, A., Sahaida, P., & Druzhynin, V. (2021). Towards the Creation of a Web-based Platform "Bike Sharing" in the Local Transport System (No. 5018). *EasyChair*.

- [11]. Leng, Y., & Yu, S. (2012). The design of bicycle rental system based on Web-based GIS. *Journal of System and Management Sciences*, 2(1), 50-57.
- [12]. Viktoriia, D., Andrii, P., Sagayda, P., & Valerii, D. (2022). Toward the Creation of a Web-Based Platform “Bike Sharing” in the Local Transport System. *IoT and Cloud Computing for Societal Good*, 59-70.
- [13]. Thirupathi, M., Vinayagamoorthi, G., & Mathiraj, S. P. (2019). Effect Of cashless payment methods: A case study perspective analysis. *International Journal of scientific & technology research*, 8(8), 394-397.
- [14]. Bezovski, Z. (2016). The future of the mobile payment as electronic payment system. *European Journal of Business and Management*, 8(8), 127-132.
- [15]. Berenson, R. A., Upadhyay, D., Delbanco, S. F., & Murray, R. (2016). *Payment methods: how they work*. Washington, DC: Urban Institute.
- [16]. He, R. Y. (2015, January). Design and implementation of web based on Laravel framework. In *2014 International Conference on Computer Science and Electronic Technology (ICCSET 2014)* (pp. 301-304). Atlantis Press.
- [17]. Sendiang, M., Kasenda, S., Polii, A., & Putung, Y. R. (2018, October). Optimizing Laravel authentication process. In *2018 International Conference on Applied Science and Technology (iCAST)* (pp. 247-251). IEEE.
- [18]. Párhonyi, R. (2005). *Micro payment gateways*. Centre for Telematics and Information Technology.
- [19]. Zhao, X., & Si, Y. W. (2021, December). NFTCert: NFT-based certificates with online payment gateway. In *2021 IEEE International Conference on Blockchain (Blockchain)* (pp. 538-543). IEEE.
- [20]. Manan, Y. (2019). Sistem Integrasi Proteksi & Manajemen Resiko Platform Fintech peer to peer (P2P) Lending dan Payment Gateway untuk Meningkatkan Akslerasi Pertumbuhan UMKM 3.0. *Ihtifaz*, 2(1), 73.
- [21]. Park, C., & Sohn, S. Y. (2017). An optimization approach for the placement of bicycle-sharing stations to reduce short car trips: An application to the city of Seoul. *Transportation Research Part A: Policy and Practice*, 105, 154-166.
- [22]. Philips, I., Anable, J., & Chatterton, T. (2022). E-bikes and their capability to reduce car CO2 emissions. *Transport Policy*, 116, 11-23.
- [23]. Lindsay, G., Macmillan, A., & Woodward, A. (2011). Moving urban trips from cars to bicycles: impact on health and emissions. *Australian and New Zealand journal of public health*, 35(1), 54-60.
- [24]. Shaw, C., Russell, M., Keall, M., MacBride-Stewart, S., Wild, K., Reeves, D., ... & Woodward, A. (2020). Beyond the bicycle: Seeing the context of the gender gap in cycling. *Journal of Transport & Health*, 18, 100871.
- [25]. Luo, H., Kou, Z., Zhao, F., & Cai, H. (2019). Comparative life cycle assessment of station-based and dock-less bike sharing systems. *Resources, Conservation and Recycling*, 146, 180-189.
- [26]. Fan, Z., & Harper, C. D. (2022). Congestion and environmental impacts of short car trip replacement with micromobility modes. *Transportation Research Part D: Transport and Environment*, 103, 103173.
- [27]. Castillo-Manzano, J. I., Castro-Nuño, M., & López-Valpuesta, L. (2015). Analyzing the transition from a public bicycle system to bicycle ownership: A complex relationship. *Transportation Research Part D: Transport and Environment*, 38, 15-26.
- [28]. Pan, X., Zhao, L., Luo, J., Li, Y., Zhang, L., Wu, T., ... & Jia, P. (2021). Access to bike lanes and childhood obesity: a systematic review and meta-analysis. *Obesity reviews*, 22, e13042.
- [29]. Chen, L., Zhang, D., Pan, G., Ma, X., Yang, D., Kushlev, K., ... & Li, S. (2015, September). Bike sharing station placement leveraging heterogeneous urban open data. In *Proceedings of the 2015 ACM International Joint Conference on Pervasive and Ubiquitous Computing* (pp. 571-575).
- [30]. Halvadia, N. B., Bhatt, K., Sharma, M., Sharma, A., & Dash, S. (2022). Consumers’ intention to use bicycle-sharing services: The role of consumer consciousness. *Cleaner and Responsible Consumption*, 7, 100076.
- [31]. GALLERA, J. (n.d.). Development of Crime and Incident Reporting Mobile Application with SMS Notification. *International Research Journal of Advanced Engineering and Science*, 8(2), 63–66.