Enhancing Access and Efficiency in healthcare with a car booking system

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***Abstract*—To address the significant challenges of limited access and inefficiency faced by many individuals. This is especially true for people who are sick or have limited mobility. To navigate to and from a healthcare medical center Our project offers a revolutionary solution - implementing a comprehensive and implemented car booking system is a significant improvement to our healthcare infrastructure. The initiative aims to optimize transport logistics for patients. medical staff and necessary resources This aligns with our mission to provide accessible care. It leverages cutting-edge technology to improve scheduling, reduce wait times, and improve overall efficiency in healthcare services and help solve logistical challenges. This allows people to receive medical care more smoothly and quickly.**

Keyword -healthcare, car booking system, access, efficiency.

I. Introduction

The Medical Center maintains a steadfast commitment to providing high-quality health care, recognizing the crucial role that access to medical facilities plays in determining patient well-being. The challenges faced by many individuals, particularly those with medical conditions or limited mobility, underscore the need for innovative solutions. In light of this, the proposal to introduce a car booking system represents a significant advancement in our healthcare infrastructure, responding to the growing demand for efficient transportation solutions and aligning with our mission of delivering accessible and compassionate care to patients and their families.

For individuals with mobility problems, accessing health services is a serious concern, and our proposal aims to address this issue. Furthermore, the logistical challenges of transport as a major barrier to health services are also considered. The disruptions in routine appointments, treatments, and medical care due to unreliable transport arrangements can be mitigated through the implementation of a car reservation system—an innovative solution to overcome transportation challenges and ensure timely and continuous care for patients.

While the proposal marks a commendable step forward, acknowledging potential improvements is paramount. The opportunity to refine and enhance the system to make it more accurate and user-friendly is recognized. The user interface (UI) of the car booking system is designed to be easily accessible and understandable to all users.

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The purpose of this seminar is rooted in providing a positive experience for patients. The introduction of a convenient vehicle booking system serves as a strategy to alleviate the stress and uncertainty associated with traveling to and from medical centers. This commitment to improving the patient experience aligns deeply with the core mission of patient-centered care. Beyond the direct benefits to patients, the utilization of car reservation systems has the potential to optimize vehicle and resource allocation, leading to cost savings, reduced patient waiting time, and improved overall efficiency of healthcare services.

II. Literature review

A. Transportation Challenges in Healthcare

Geographical Barriers: My app see how people in certain areas may have difficulty receiving medical care due to limited transportation or long distances. Look for studies or reports that demonstrate these challenges. Especially the differences in access based on where people live we found out how difficult financial issues such as high transportation costs make it for people to see a doctor? Look for studies that address the financial challenges people face when trying to access medical care and the transportation issues that affect patients receiving timely medical care. Slow shipping causes missed appointments or treatment. This may worsen the health of the user. Therefore, the system must be developed to be fast and respond to users in a timely manner. [2] From our research, we came up with an idea of a booking format for Two-way station-based car sharing system that allows Take advantage of drivers' time flexibility. Integrated projects. Both reservations and flexibility can benefit both. Car sharing providers and drivers are getting better. Booking information management Currently, the car sharing system works in a nonspecific way. Booking priority, for example, the first person to book a car will receive Use until there is no car available for the specified period of time. and stations, the proposed booking model can be easily implemented. And it can help car-sharing operators to better plan their fleet. necessary and increase the number of trips per vehicle at at the same time Drivers will be given the option to demonstrate flexibility. Book time in exchange for reduced fares. The results show that the operator was able to reduce the dosage. Vehicle groups that have a low impact on

overall rental income This is especially true if the driver shows flexibility at the rental start time. Booking fees are presented as alternative income to compensate for lower rents. Sensitivity The analysis shows that various aspects of bidding on different drivers [2]Reservations for station-based two-way car sharing systems This allows to take advantage of the driver's time flexibility. A program that combines booking and flexibility benefits both rideshare operators and drivers. Due to better management of booking information the ride-sharing system currently operates without booking priority. This means that the first person to reserve a car will receive that privilege. Until there is no vehicle available during the specified time and station. To guarantee customer satisfaction and vehicle availability. Ride-sharing operators may need to provide large vehicles at multiple stations, which is expensive.

The proposed booking form can be easily implemented. and help car-sharing operators better plan the vehicles they need. and increasing the number of trips per vehicle at the same time Drivers will be given the option to express flexibility at the time of booking.

To get different platforms smoothly at the same time Mobile platform compatibility is also considered. And there is a specific module design and usage method. Finally, the test results of the system show that the plan can process and analyze customer reservation data in a timely manner. Provides a data basis for analyzing management decisions. and improve customer and store satisfaction. In exchange for reduced fares [6] A comprehensive car booking system should have strong resource management capabilities to handle various aspects. of vehicle allocation, use and supervision efficiently Vehicle inventory management The system should maintain a detailed database of available vehicles, including type, capacity, readiness status.

Maintenance history and location should track the usage and availability of each vehicle in real time in the Booking and Booking Management section. Allows users to efficiently make, edit and cancel reservations. The system should handle booking requests. Ensures accurate scheduling Prevent duplicate bookings and increase efficiency in vehicle allocation according to needs Allocation efficiency optimization Use smart scheduling algorithms or mechanisms to optimize vehicle allocation. This may involve considering factors such as proximity to the user. The type of vehicle required for a specific trip and reduce idle time between bookings to a minimum .

However, the health of the user is important , [1] Benin's health system is like any other health system. who are facing the challenge of providing quality, safe, and affordable health care services The shortage of health care workers compared to WHO recommendations, on the one hand, and the problem of poor distribution of these health care workers beyond the boundaries of the health care system, on the other, reminds us of the model of Mobility and access to health care in Benin This work is aimed at setting up intelligent algorithms for accessibility and mobility in healthcare. And it will allow patients who act at any point in the health system to be automatically cared for by doctors and nurses. and to answer the challenges of the health care system [3]According to a comparison of hospital information systems in Portugal, data is a key resource for the success of a corporate organization. The adoption of informational technologies to support the decision-making process has become increasingly relevant.

Although the above principles are true for all organizations, But health care institutions have specifics that must be taken into account. In this study The Enterprise Systems Success (ESS) model will be used to compare management perceptions and performance. On the research side, [4] academic researchers are creating a wealth of insights and technologies that have the potential to significantly improve patient care. However, to address the need to improve the quality, cost, and access of healthcare with funding that are more limited Efficiency and consistency in converting into cost-effective products and/or services. Need to be updated The Healthcare Commercialization Program (HCP) is described and proposed as an option at institutions. They can be added to a portfolio to enhance translational research. To help teams translate specific healthcare innovations into practice, HCPs expand investigators' skill sets. and increase the innovation capacity of the institution Lessons learned will be shared from configuring and delivering HCP, building on the foundation of the National Science Foundation's Innovation Corps program. To address the unique challenges of supporting innovation and innovators in healthcare. [5] Finally, health care is an important issue for users because of its role in people's lives. The world's population continues to increase and other factors such as insufficient healthcare budgets.

As a result, hospitals are overcrowded. Medical staff work hard and lengthen queuing time for patients Considering the problems occurring around the world Researchers are developing new approaches to improve the level of care provided by health care providers. At the same time, all the previously mentioned issues are minimized. Big data can be used to ensure that medical services reach those most in need in a timely manner [3]. Big data analytics can provide accurate diagnosis by offering the ability to analyze and make inferences from a person's history. patient Daily routine, food, allergies and genetic information, etc. Such analysis can be time consuming and requires a certain level of expertise to perform. Conducted by healthcare professionals [4], an example discussed in [5] reports the use of big data analytics by Columbia University Medical Center. To diagnose complications in patients with hemorrhagic stroke caused by ruptured intracranial aneurysms. From physiological data Early diagnosis of 48 hours has been reported in patients with TBI. This allows medical professionals to begin addressing these complications.

in the healthcare sector There are many Big Data sources such as medical-related sensors, IoT, smart watches. and smartphone medical applications What the above mentioned data generators have in common is their reliance on network connectivity. Maintaining this connection and ensuring quality is a problem that many researchers are trying to properly solve. In this case, patient big data may play a two-fold role.

In addition to diagnosis The system can also direct network providers to patients with the highest and most urgent needs. and help direct network resources to these patients. We believe that ensuring high-quality connectivity between patient-connected peripherals and healthcare providers is an important step towards electronic healthcare services and applications. High level of personalization

III. Development

The project aims to create a user-friendly web application for booking cars at a medical center. The main goals include reducing waiting times. Collection of information regarding booking patterns and improving patient care by improving scheduling for students and university staff in the first phase. We start from Survey needs using forms of students, staff, and university personnel to gather direct experiences and problems. Survey for a broader perspective and analysis of historical data to identify trends and inefficiencies in past bookings.

Interviewing stakeholders to understand needs, preferences, and problems Documenting system requirements based on user input. It serves as a blueprint for design and development.

In web app design, we focus on user experience design to ensure user-friendly navigation and interface. Detailed functional design specifying how each feature will work. and compatibility for the various needs of users.

To create a system by the workflow steps of the medical center car reservation system. User login Enter personal details such as name, contact information, and unique identifiers. (Patient ID or Staff ID) Specify pick-up and drop-off locations (residence medical center department, etc.) Choose a date and time for booking. The system checks the readiness of the vehicle according to the specified criteria. Match user needs with existing vehicles in the system's database. Confirmation and Assignment Confirm your booking and provide details of your assigned vehicle, driver and estimated arrival time. Notify users via the platform, email or SMS about confirmed bookings. Assign tasks to existing drivers Inform the driver of the assigned reservation. This includes user details and any special instructions. Ensure that the assigned vehicle is provided according to the user's specified needs (e.g. wheelchair accessibility, availability of medical equipment) The driver confirms the availability of the car and the time of arrival. Users will receive notifications about approaching vehicles. The vehicle has arrived. The user is transported to the specified destination, ensuring a safe and comfortable journey. The system will mark the booking as complete after sending or returning it to the medical center. And finally, the system prompts users to provide feedback on their experience. User feedback is collected and analyzed to improve service quality and resolve issues. This workflow ensures a smooth process from user initiation to the end of the transport service. Focusing on user satisfaction vehicle availability and continuous improvement based on user feedback. Each step is important in providing efficient and customized transportation services within the medical center car booking system. And here is an example workflow show in Figure 1.

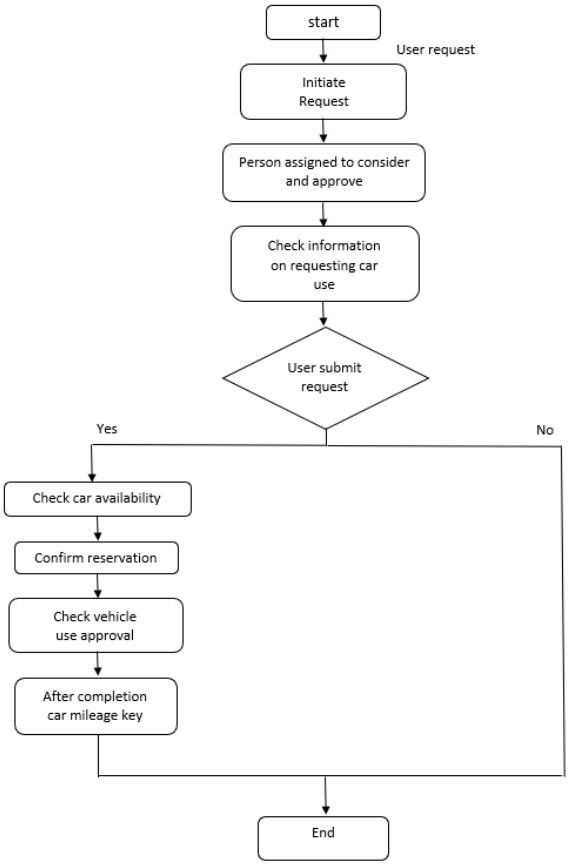

Fig. 1. Workflow

Coding is an important part of app creation and development based on its design and functionality. Version control for efficient collaboration and change tracking Regular checkpoints and reviews to maintain consistency and catch problems early. Integration of components using best practices for smooth system operation. Using the technology stack including Vue.js, Node.js, SQL, Git, and VSCode.

Fig. 2. Technology Stack

Iterative testing is important to keep the system up-to-date throughout development to identify and fix bugs early.

Thorough testing before use Continuous improvements based on feedback and system release after extensive testing. Provide training sessions to ensure user familiarity and adoption. Overall, this project focused on understanding user needs. User-friendly system design efficient development Rigorous testing and successful operations to improve car reservation services at medical centers.

IV. Evaluation

The evaluation of this project is the process of evaluating the performance and usability of a car reservation system developed for a medical center. It involves analyzing various aspects. of the system to ensure that it achieves its intended goals and satisfies the needs of its users. The evaluation of this project is the process of evaluating the performance and usability of a car reservation system developed for a medical center. It involves analyzing various aspects. of the system to ensure that it achieves its intended goals and satisfies the needs of its users.

Evaluation of system performance in terms of resource use The time it takes to make a reservation is less time than with the previous system. and overall operational efficiency This includes analyzing the speed of the booking process. Maximum use of existing vehicles and minimize delays or inefficiencies in the system. User satisfaction is also an important consideration. Conducting user testing and collecting feedback to evaluate how intuitive and user-friendly the web application is. Evaluating whether users find it easy to use, enter information, and complete bookings. Mechanisms for collecting feedback can help understand user preferences and areas that need improvement.

This is to ensure that the system runs smoothly without any unexpected errors or crashes. Testing under different conditions and stress testing the system's capabilities can help identify potential weaknesses.

In terms of safety, it is important. Ensuring the system meets industry standards Data protection regulations and maintain the privacy of user information Assessing the security measures used to protect sensitive information within the system.

Sentiment Analysis: Analysis of comments collected from users during and after using the system. This analysis helps identify specific areas for improvement and guides future improvements to the system.

Compare the performance of the previous system with ours In the previous system, time management took a lot of time, but we will improve our app from the time it took to send data in the previous system, which used to take several days. We developed it to process data in just a few hours show in figure 3

From figure 4, Booking Time (Days): The bars represent the average time taken for bookings in days. The length of the bars visually illustrates the difference between the previous system (shorter bar) and the new system (longer bar), indicating the reduced time taken for bookings in the new system.

Efficiency (percentage): Another set of bars represents operational efficiency as a percentage. Again, the length of the bars shows the difference in efficiency between the two systems, with a longer bar for the new system indicating an improvement.

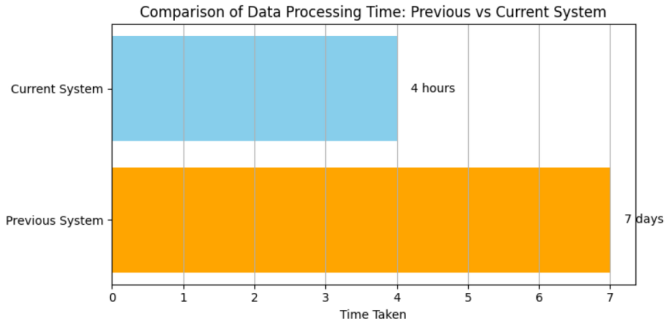

Fig. 3. Before-and-After Comparison

Overall, a comprehensive evaluation of the developed car reservation system in various dimensions is provided. To ensure that the project goals are achieved. Respond to user needs and operate efficiently within the medical center

V. Conclusion

the significant challenges faced by many individuals. This is especially true for people who are sick or have limited mobility. to navigate to and from the medical center We therefore propose the introduction of a car booking system as a significant improvement to our healthcare infrastructure. This project responds to the increasing demand for efficient transportation solutions. This aligns with our mission to provide accessible and compassionate care to patients and their families. A vehicle-led booking system can make a huge difference in healthcare accessibility and efficiency. It's all about making healthcare more accessible. and improve the way things work in hospitals and clinics. This system helps patients Especially those who have trouble traveling. Easier access to medical facilities Help solve logistical challenges Making it smoother and faster for people to receive medical care It helps everything run better. It means less waiting and stuff. Work more efficiently in healthcare settings and also eliminate concerns about how to receive medical care. Patients can focus on their own health. Instead of stressing about going there.

VI. Recommendations

Step-by-step operation of the car reservation system Start small by experimenting, expanding gradually and considering how it fits with what already exists in healthcare. Especially during busy times Or only a group of users will bring important people into participation. That means health care leaders, students, staff and university patients will be top of mind in the first phase. and technology experts Make sure everyone is a part of the workshops, training and communications. It is essential that everyone works together for the system to work well.

Establish a method for tracking system usage and solicit regular feedback. Create channels for users to share ideas or report issues. The challenges they face will help make the system better over time.

In the future, there may be bookings that can work with other healthcare systems, such as getting appointment schedules or medical records from that hospital. It is important to work together smoothly and update the system regularly. Helps to work well and safely. Schedule time to ensure technology is always up to date. and safe from problems that may occur.

VII. Future Work

Our upcoming app will revolutionize time management and data processing in healthcare logistics. This is different from the existing system which experiences delays in data transmission. Our app has been engineered to expedite this process. with our innovation Data processing that used to take days is now complete in hours. This advancement significantly improves efficiency. This ensures fast and smooth access to critical transport services for patients and medical staff. In other areas of our future development, we think that the app can be used with other medical centers. We think of improving the system in the initial stages from the vehicles used in the Mae Fah University Medical Center. Currently there is only 1 car. We may increase the number of cars to meet the needs of more users of the app. However, there may be a problem with the queue waiting for more cars to join, so our team will You must update or add a variety of interface functions to make the app perform as efficiently as possible.

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