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Custom Single Frame Builder

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Abstract

Custom Single Frame Builder project is a web-based platform developed to improve the traditional process of custom framing. In the usual method, customers have to visit stores, explain their requirements, and imagine the final product without seeing an exact preview. This often leads to confusion, errors, and dissatisfaction. To solve this problem, this project provides an online system where users can design and order custom frames easily from home. The platform allows users to upload their images and customize different aspects of the frame such as size, colour, material, mat borders, and glass type. It also shows a real-time preview of the final frame, which helps users make better decisions and feel more confident before placing an order. The system automatically records all customization details and generates accurate specifications, reducing manual errors. The application is built using modern web technologies and includes features like a user-friendly interface, customization logic, preview system, and order management. It supports a made-to-order approach, which helps in reducing waste and improving efficiency.

KEYWORDS: *Custom Frame Builder, Web-Based Application, Image Processing, Real-Time Preview, E-commerce, Personalization, Online Customization System, Digital Transformation, User Experience, Order Management System.*

1. Introduction

In recent years, the way people shop and use services has changed a lot. Most people now prefer doing things online because it saves time and is more convenient. This shift has affected many traditional businesses, but some areas, like custom framing, still mostly depend on offline methods. Even today, getting a custom frame usually means visiting a shop, choosing from a few samples, and trying to imagine how the final product will look.

This process is not always smooth. Customers often find it difficult to explain exactly what they want, and without a proper preview, they have to rely on guesswork. Sometimes the final result does not match their expectations. On the other side, shop owners have to manage everything manually, from taking measurements to writing down order details. This increases the chances of mistakes, which can lead to wrong orders, wasted materials, and delays.

The *Wall Vastra – Custom Single Frame Builder* project is an attempt to make this process simpler and more convenient. The idea is to bring the entire framing experience online so that users can design their frames without having to visit a store. It gives users the freedom to experiment with different options and create something that matches their exact needs.

With this system, users can upload their images and choose how they want their frame to look. They can adjust the size, pick different colors and materials, and add features like mat borders or glass. One of the most helpful parts of the platform is that it shows a live preview of the frame. This means users can actually see how their final product will look before placing the order, which makes the whole process much easier and more reliable.

Another important part of this project is reducing manual work. Once the design is completed, all the details are automatically saved and converted into proper specifications for production. This helps avoid common errors and makes the work easier for businesses as well. It also helps them handle more orders without confusion.

The project is developed using modern web technologies so that it works smoothly on different devices like laptops, tablets, and mobile phones. The main focus is to keep the system simple, easy to use, and useful for both customers and businesses.

1.1 Motivation

As it stands today, there are many people who have no way to track their orders and thus have no definite idea where their items are at this point or when they will receive them. This creates a lot of anxiety for both consumers and companies, as consumers want to know where their products are located, and companies want to know how to keep operating by working on products that they cannot find. The products, or "goods," are able to be shipped all around the world, usually with multiple countries, multiple shipping companies, and days or sometimes weeks sitting in customs with no outside visibility on their location.Virtually every shipment will cross between multiple countries on multiple freight carriers with many different tracking numbers when delivered. Because the logistics carrier business is very independent, many customers will eventually lose the ability to obtain a complete view of their parcels, with that resulting in customers having questions or concerns about the fact that they are unable to get visibility of their shipments. The Issues (Challenges) Facing Businesses: The Problems Created for Businesses—The challenge created by this situation has led to the need for a tool that brings all elements of tracking together into a single platform that provides complete, real-time information to users regardless of carrier. Customer behaviour has also changed in terms of how they expect things to be executed. Due to the rise of real-time status updates on rides, food deliveries, and flights, when customers do not receive similar real-time updates on their packages, this can lead to frustration and uncertainty for the customer. If the customer had a comprehensive tracking system that would provide them with enough information so that they would have confidence and clarity about where their shipment is and what stage of that shipment it is in, they would be much happier. Technology is a primary driver in the ongoing digital transformation of logistics; therefore, there is an

increasing desire to build more intelligent, interconnected systems that improve how goods are shipped around the world through continued technological advancement.

The Global Shipping Tracker illustrates how web-based technology can effectively create solutions to some of today's most complicated real-world issues. Global shipping became complex; however, this product helped convert that complexity into user-focused information. This project will address consumers' concerns, improve communications between consumers and shippers or transportation carriers, and empower consumers to manage their day-to-day activities. This project seeks to provide transparency to the complexities of global shipments through a single best-in-class platform for customers to receive relevant live updates to the shipment status (tracking updates). Additionally, this project will provide an efficient and effective means to close the gap in communication and transparency/clarity of relevant shipping data between the consumer and the shipper/transportation provider. The research will demonstrate a user-friendly, easy-to-understand, basic, human-readable shipment tracking site.

1.2 Contribution

The *Wall Vastra – Custom Single Frame Builder* project contributes by making the custom framing process easier and more practical for both customers and businesses. The main idea behind this project is to replace a complicated, manual process with something simple, clear, and accessible online.

One of the key contributions is giving users the ability to design their own frames without visiting a store. In the traditional method, customers are limited to a few samples and have to depend on the shopkeeper's suggestions. This project removes that limitation. Users can upload their images and try different combinations of frame size, color, material, mat borders, and glass options on their own. This gives them more freedom to create something that matches their exact needs and preferences.

Another important contribution is the real-time preview feature. In most framing shops, customers have to imagine how the final product will look, which can sometimes lead to disappointment. This system solves that problem by showing a live preview. As users make changes, they can instantly see how the frame looks with their image. This makes the process more clear and helps users feel more confident about their choices.

The project also reduces the chances of mistakes that usually happen in manual work. In many shops, order details are written down by hand, which can lead to errors in size or material selection. Here, everything is handled digitally. Once the user finalizes the design, all the details are saved properly and used to generate accurate specifications for production. This helps in avoiding confusion and ensures that the final product matches what the user selected.

From a business point of view, this project makes order management much easier. Instead of handling everything manually, all orders are stored in a system where they can be tracked and managed properly. This is especially helpful when there are many orders at the same time. It also saves time and reduces the workloastaff.

Another useful contribution is support for a made-to-order system. Frames are only created after a customer places an order, which means there is no need to keep large amounts of stock. This helps in reducing material wastage and makes the process more cost-effective for businesses.

2. Related work

In the past few years, there have been several efforts to improve the custom framing process using digital tools. These solutions show that the industry is slowly moving away from completely manual work and adopting online platforms to make customization easier and more accessible for customers. With the growth of e-commerce and personalization, many businesses are trying to provide digital solutions that reduce physical effort and improve user convenience.

One of the most common approaches is the use of virtual framing tools. These tools allow users to upload an image and experiment with different frame styles, colors, mat borders, and sizes. It gives users a general idea of how the final product might look before placing an order. This is especially helpful because it removes the need for imagination, which is usually required in traditional framing shops. However, most of these tools are basic in nature and often lack accuracy in terms of scale, color matching, and proportion. In some cases, the preview generated does not fully represent the actual final output, which can still lead to customer dissatisfaction.

In addition to basic customization tools, some advanced systems also include features such as dynamic price calculation, order management, and inventory tracking. These systems are mainly designed for business use and help framing companies manage their operations more efficiently. They can automatically calculate pricing based on selected materials and dimensions, generate invoices, and track order status. While these systems are powerful, they are often complex and require technical knowledge to operate. As a result, they are not always suitable for general users who are looking for a simple and easy customization experience.

Some framing companies have also developed their own online customization platforms, where customers can directly design frames, upload images, and place orders. This approach reduces dependency on physical stores and allows customers to complete the entire process from home. Although this is a positive step toward digital transformation, many of these platforms still have limitations. The customization options may be restricted, the user interface may not be very intuitive, and the preview quality may not be clear enough to make confident decisions. In some cases, users may find the process confusing or time-consuming.

Another development in this area is the use of interactive visualization technologies, such as augmented reality (AR) or wall preview tools. These systems allow users to see how a framed image would look in a real environment, such as on a wall in a room. This adds a realistic and engaging experience, helping users better understand the final appearance of the product. However, these features often increase system complexity and may require additional hardware or software support. For basic customization needs, such advanced features are not always necessary and can sometimes make the system harder to use.

Despite all these advancements, there are still several gaps in existing solutions. Many systems either focus too much on business operations or fail to provide a user-friendly experience. Some platforms are expensive to develop and maintain, while others do not integrate all essential features such as customization, real-time preview, and order

management in a single system. Additionally, issues like lack of accuracy, limited flexibility, and poor usability continue to affect user satisfaction.

The Wall Vastra – Custom Single Frame Builder project is inspired by these existing approaches but aims to overcome their limitations by focusing on simplicity, usability, and practicality. The system is designed to provide an easy-to-use interface, accurate real-time preview, and complete order handling within a single platform. Unlike complex business systems or limited customization tools, this project combines essential features in a balanced way, ensuring that both customers and businesses can benefit from a smooth and efficient digital experience. The main goal is to make custom framing more convenient, accessible, and reliable without adding unnecessary complexity.

3. Research Methodology

Problem statement

The traditional process of custom framing is mostly manual and depends heavily on physical store visits. Customers who want to frame photographs, artwork, or certificates are required to go to a framing shop, explain their requirements, and select from a limited number of available samples. This process is not only time-consuming but also inconvenient, especially for users who prefer online services or do not have easy access to such stores.

One of the main problems is the lack of proper visualization. Customers usually have to imagine how the final frame will look based on small samples or suggestions from the shopkeeper. Since there is no accurate preview, the final product may not match their expectations. This often leads to dissatisfaction, rework, or even cancellation of orders.

Another major issue is the dependency on manual work. Shop owners typically take measurements and note down customer requirements by hand. This increases the chances of human error, such as incorrect dimensions, wrong material selection, or miscommunication. These mistakes can result in wasted materials, additional costs, and delays in delivery.

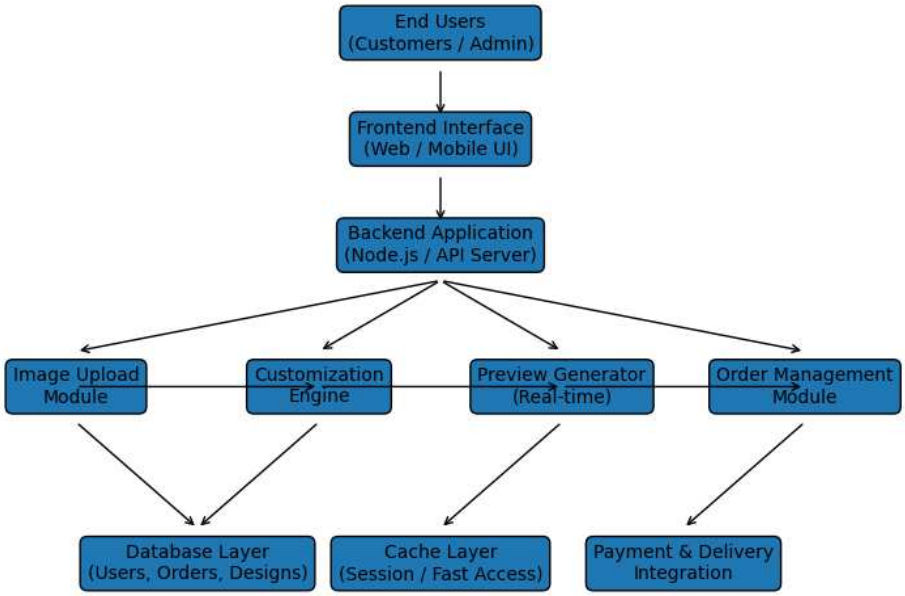

Fig 1: Block diagram of the proposed model

In this shipment management system architecture shown in Figure 1, there are primary components that have been divided into multiple functional areas, with each component having a specific duty or task throughout the system. When you look at all of these components combined, they provide secure access, allow for shipment processing, provide real-time updates, allow for report generation, and integrate with other logistics systems.

3.2. Proposed Algorithm

The proposed algorithm for the *Wall Vastra – Custom Single Frame Builder* is designed to handle the full process of creating a custom frame in a simple and step-by-step manner. The main focus is to make sure everything works smoothly from the moment a user uploads an image to the final order placement.

The process begins when the user uploads an image. The system first checks if the image is in a valid format and whether its size is suitable. If there is any issue, the user is asked to upload a proper image before moving ahead. Once the image is accepted, it is displayed on the screen so the user can start working on it.

Next comes the customization part. The user selects different options like frame size, color, material, mat borders, and glass type. As these selections are made, the system keeps track of each choice. At the same time, it checks whether the selected options are valid. For example, it makes sure the size is within limits and that the selected frame and materials can go together properly. This helps in avoiding problems later.

After that, the system starts showing the preview. It adjusts the uploaded image based on the selected size by resizing and positioning it correctly. Then it adds the frame, borders, and other selected options around the image. The updated result is shown immediately on the screen. If the user changes anything, the preview updates again, so they can clearly see how the final frame will look.

Once the user is satisfied with the design, the system moves to the next step. All the selected details are collected and saved properly. The system then calculates the price based on the size and materials chosen. After that, a unique order ID is created, and all the information is stored in the database.

In the final step, the system prepares all the required details for making the frame. This includes exact measurements and

material information, so there is no confusion during production.

Overall, this approach keeps the process simple and organized. It helps the user design easily, avoids mistakes, and makes sure the final result is accurate.

4. Research Methodology

This chapter explains the steps followed to plan, design, develop, and evaluate the Wall Vastra – Custom Single Frame Builder system. It describes how the research was carried out, how the system was built, the tools and technologies used, how the data was prepared, and the methods used to test the system to ensure it works properly in real-world situations.

4.1. Research Approach

The project follows a practical, development-oriented approach. While there is some theoretical understanding of web-based customization systems, the main focus was on solving real-world problems faced by customers and framing businesses.

The research process was carried out in the following steps.

First, the problem was studied by understanding how traditional framing services operate. Issues such as lack of visualization, incorrect measurements, manual errors, and time-consuming processes were identified. It was observed that customers often struggle to imagine the final product, and businesses face difficulties in managing customized orders accurately.

Second, the system was developed using a full-stack approach. Different modules such as image upload, customization engine, preview generator, order management, and admin panel were designed and implemented step by step. Each module was tested individually to ensure it worked correctly before integrating it into the complete system.

Third, the system was tested and improved through continuous evaluation. This included checking the accuracy of real-time preview, validating customization options, and testing the overall user experience. Feedback from users was also considered to refine the interface and improve usability.

An iterative development approach was followed throughout the project, allowing continuous improvements based on testing results and user feedback. This ensured that the final system is not only functional but also easy to use and reliable.

4.2. Obtaining Dataset

To test and validate the system, a suitable dataset was required. Since real customer data could not be used due to privacy concerns, a simulated dataset was created to represent real-world usage.

Custom image samples were used for testing frame customization.

Different frame styles, sizes, colors, and materials were included to simulate real design options.

User input data such as uploaded images, customization selections, and order details were generated.

Multiple order scenarios were created, including new orders, completed orders, and cancelled orders.

Sample pricing data was used to test cost calculation based on customization options.

This dataset helped in testing how the system handles different customization combinations and user interactions.

4.3. Environment for Developing the System

The Wall Vastra – Custom Single Frame Builder was developed using modern web technologies to ensure efficiency, scalability, and maintainability.

Frontend: HTML5, CSS3, JavaScript, and React were used to build an interactive and responsive user interface. The frontend allows users to upload images, select frame options, and view real-time previews.

Backend: Node.js with Express framework (or Python/PHP) was used to handle server-side operations such as processing customization data, managing orders, and handling user requests.

Database: MySQL or MongoDB was used to store user data, customization details, and order records in a structured format.

Image Processing: Basic image processing techniques were used to generate real-time previews based on user inputs.

Payment Integration: A third-party payment gateway API was used to securely handle transactions.

Web Server: Apache or Nginx was used for hosting the application.

Development Tools: Visual Studio Code, Git, GitHub, and Postman were used for coding, testing APIs, and version control.

These tools together ensured that the system is reliable, scalable, and suitable for real-world applications.

4.4. Data Pre-processing

Before using the dataset, data pre-processing was performed to ensure accuracy and consistency.

Data cleaning involved removing duplicate entries and correcting incomplete or incorrect data.

Data standardization ensured that all customization parameters such as frame size, color, and material were represented in a consistent format.

Data validation checked that all inputs provided by users were within acceptable limits, such as valid image sizes and frame dimensions.

Data categorization organized the data into groups such as frame types, customization options, and order status, making it easier to process and test.

This pre-processing step reduced errors and ensured smooth functioning of the system during testing.

4.5. Model Training Applie

The main purpose of the system is customization and order management. However, simple analytical techniques were used to enhance system performance.

These include identifying popular frame styles, analyzing user preferences, and estimating frequently selected customization options. This helps in improving user experience and providing better suggestions.

The dataset used for this analysis was carefully prepared to ensure accuracy and completeness. The goal was not to build a complex machine learning model but to use simple techniques to gain useful insights.

4.5.1. Hyperparameters

During analysis, certain parameters were adjusted to improve system performance:

Number of iterations used for analyzing user preferences

Rate of updating recommendation patterns

Number of records processed at a time

Complexity of analysis based on customization data

These parameters were tuned to ensure consistent and reliable results.

4.5.2. Loss Function

For simple prediction tasks such as identifying popular customization options, suitable evaluation methods were used to measure accuracy.

The objective was to minimize errors in predictions and ensure that the system provides reliable suggestions based on user data.

4.6. Evaluating System Performance by Component

The system was evaluated based on its ability to perform key functions such as customization, preview generation, and order processing.

4.6.1. Confusion Matrix

A confusion matrix was used to evaluate prediction-related features, such as identifying popular frame choices.

This helped in:

Measuring accuracy of predictions

Identifying incorrect predictions

Understanding patterns in user preferences

4.6.2. Performance Metrics

Different performance metrics were used to evaluate the system:

Accuracy to measure correctness

Precision to evaluate prediction reliability

Recall to measure detection of actual patterns

F1 Score to balance precision and recall

These metrics provided a clear understanding of system performance.

4.6.3. Observation

During testing, all major features of the system worked effectively. Image upload, customization, and real-time preview were smooth and accurate. The system responded quickly to user inputs, and preview updates were shown instantly.

Order processing and data storage worked correctly without any errors. Users found the system easy to use and helpful in visualizing their designs.

The analytical component also provided useful insights into user preferences, although its accuracy can be improved further with real-world data.

Overall, the system performed reliably and achieved its objective of providing a simple and efficient digital framing solution.

5. Experimental Design

The experimental design of the *Wall Vastra – Custom Single Frame Builder* system was carefully planned to evaluate its performance, reliability, and usability under realistic working conditions. A controlled testing environment was created to simulate real-world usage scenarios, allowing the system to be tested for both functional correctness and user experience.

5.1. Hardware Environment

Required Specifications:

- An Intel i3 processor or equivalent
- 8 GB RAM for efficient multitasking
- 256 GB storage for application and data handling
- Stable internet connection for accessing the web platform

For server-side operations, a machine or cloud server with moderate processing power was used to handle image processing, user requests, and database operations.

5.2. Software Environment.

The software environment plays a crucial role in the development and execution of the system. The application was built using modern web technologies to ensure compatibility, scalability, and ease of maintenance.

The frontend was developed using HTML, CSS, and JavaScript, providing a responsive and interactive user interface. Frameworks such as React can be used to enhance dynamic behavior and improve user interaction.

The backend was implemented using technologies like Node.js or Python, which handle server-side logic, user authentication, order processing, and communication with the database.

A database management system such as MySQL or MongoDB was used to store user data, customization details, and order information in an organized manner.

Additional tools such as Visual Studio Code, Git, and Postman were used for development, testing, and version control. The system was also integrated with image processing libraries to generate real-time previews based on user inputs.

5.3. Test Data Setup

To evaluate the system effectively, a variety of test data was created to simulate real-world scenarios. Since real customer data could not be used due to privacy concerns, synthetic data was generated that closely resembles actual usage patterns.

The test data included:

- Different user accounts (admin and customers)
- Multiple images with varying resolutions and sizes
- Various frame customization options such as size, color, and material
- Orders with different statuses such as pending, completed, and cancelled

5.4. Deployment Configuration

The system was deployed in a controlled environment to test its real-world functionality. The frontend was hosted on a

local or cloud-based server, while the backend handled all processing tasks.

The database was maintained as a separate component to ensure efficient data handling and avoid performance issues. The system architecture was designed in a modular way so that each component could function independently without affecting others.

5.5. Testing Procedures

A series of testing procedures were conducted to evaluate the system thoroughly. These tests were designed to ensure that all features work correctly and efficiently. Functional testing was performed to verify that all system components, such as image upload, customization, preview generation, and order processing, work as expected.

5.6. Result Evaluation and analysis

The system was evaluated based on performance, accuracy, and user satisfaction. The results showed that the application performs efficiently under normal operating conditions. The real-time preview feature worked accurately, allowing users to visualize their customized frames without delay. Order processing was smooth, and all customization details were correctly stored and retrieved from the database. The system demonstrated fast response times, with most operations completing within a short duration. It also handled multiple users without performance degradation. User feedback indicated that the platform was easy to use, reliable, and helpful in making customization decisions. The reduction in manual errors and improved visualization significantly enhanced the overall user experience.

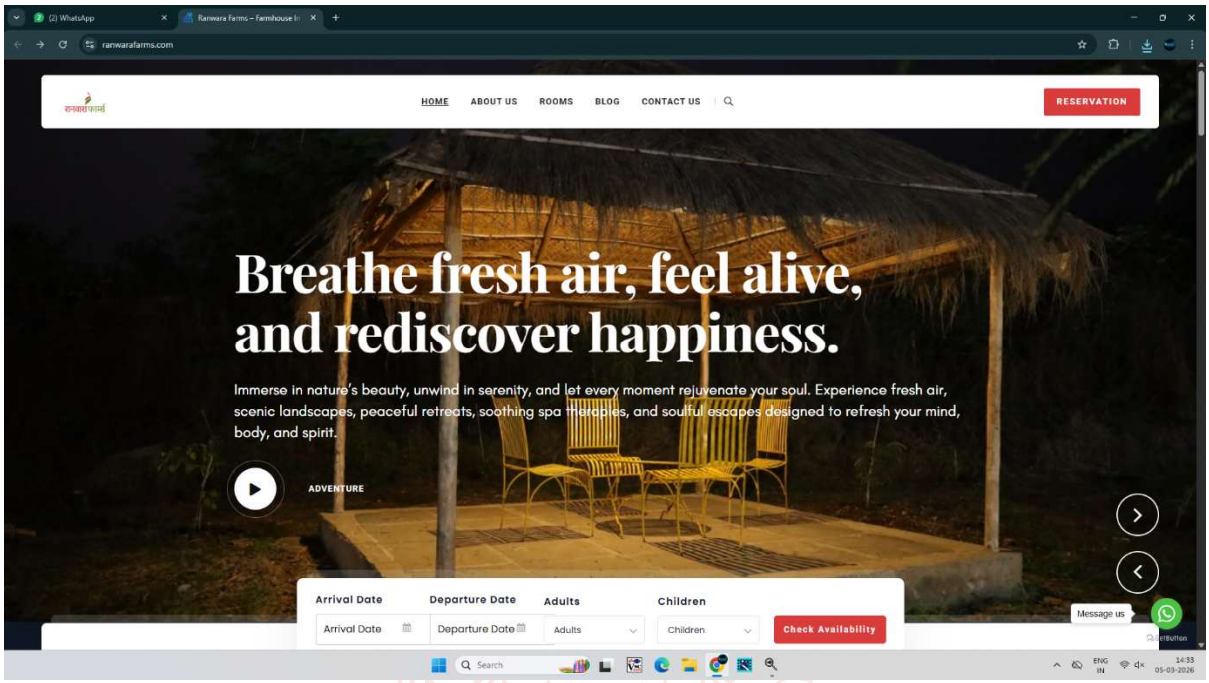

Fig 1.2: Home page for the customers for booking

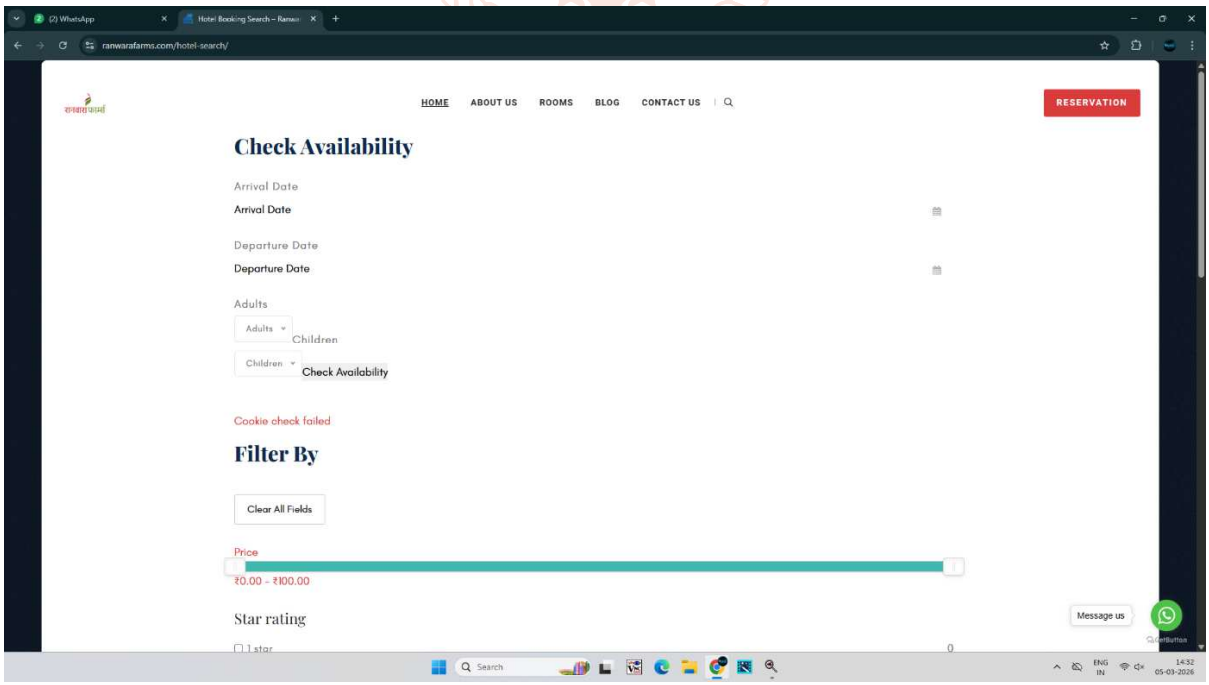

Fig1.3-Booking page to add the details to sort the resort and suggest to user

6. Conclusion and Future work

The Wall Vastra – Custom Single Frame Builder successfully presents a modern and efficient solution to the limitations of traditional custom framing systems. Conventional methods rely heavily on manual processes, physical store visits, and subjective visualization, which often lead to inaccuracies, delays, and customer dissatisfaction. This project addresses these challenges by introducing a web-based platform that digitizes the entire customization and ordering workflow.

The system significantly enhances the customer experience by allowing users to design personalized frames through an intuitive interface. Features such as image upload, customizable frame options, and real-time preview enable users to visualize the final product before placing an order. This reduces uncertainty and builds confidence in purchasing decisions. At the same time, the platform simplifies business operations by automating order processing, generating accurate production specifications, and maintaining centralized records of all transactions.

Although the current system provides a strong foundation, there are several opportunities for further enhancement and expansion.

One important improvement is the development of a dedicated mobile application. While the web platform is responsive, a mobile app would provide a more seamless user experience, faster access, and additional features such as push notifications for order updates, promotional offers, and delivery tracking.

Another significant enhancement is the integration of AI-based recommendation systems. By analyzing user preferences, previous orders, and trending designs, the system can suggest suitable frame styles, colors, and layouts. This would not only improve user engagement but also help customers make better design decisions.The addition of multi-language support would make the platform accessible to a wider audience. By supporting multiple regional and international languages, the system can cater to diverse users, improving usability and expanding its reach in global markets.

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