Custom PC Building System

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Abstract: **The Custom PC Build website offers users an intuitive platform to design and configure personalized desktop computers based on their specific requirements. The website allows users to select individual components, including the processor, motherboard, graphics card, memory, storage, and more, while ensuring compatibility between selected items. It also provides a real-time calculation of estimated power consumption (wattage) and the total price of the build. Users can view detailed specifications of each component and compare them to make informed decisions.**

In addition to custom builds, the website features a selection of pre-built PCs and laptops for users who prefer a ready-made solution. Users can create a wishlist to save their custom configurations and easily access them later and also enables users to delete builds from wishlist, providing a seamless user experience. This platform not only simplifies the PC building process but also offers helpful features like component comparisons and price estimation to aid users in making well-informed purchasing choices.

Index Terms - Custom PC Build, Estimated Power Consumption, Detailed Specifications, Pre-Built PCs, Custom Configurations, Price Estimation.

I. INTRODUCTION

The rapid advancement of technology has led to an increasing demand for personalized computing solutions. Custom-built PCs, in particular, offer users the flexibility to design systems tailored to their specific needs, whether for gaming, professional work, or everyday use. However, the process of selecting compatible components and ensuring optimal performance can be a daunting task for many users. To address this challenge, online platforms have emerged that simplify the process of building custom PCs, allowing users to select and configure individual components such as processors, graphics cards, storage, and memory while ensuring compatibility.

This paper explores the functionality, benefits, and user experience of a Custom PC Build website, a platform designed to empower users in designing personalized desktop computers. By offering features such as real-time power consumption calculations, price estimations, detailed component specifications, and an intuitive interface for selecting compatible parts, the website aims to streamline the building process and assist users in making informed decisions. Additionally, the platform provides an option for users to explore pre-built PCs and laptops, offering a convenient alternative for those who prefer ready-made solutions.

Through this research, we seek to understand how these platforms contribute to the accessibility of custom PC building and how they enhance the overall user experience. Furthermore, this paper examines the significance of features such as component comparisons, wishlist functionalities, and the importance of pricing transparency in helping users achieve the best possible value for their investments.

II. LITERATURE REVIEW

The literature on custom-built PC solutions encompasses various approaches that cater to both novice and expert users, aiming to simplify the complex process of assembling a personalized computer.

Gerard Romero Bujalance (2021) focuses on the challenge faced by first-time buyers who lack expertise in selecting compatible computer components. His project highlights an essential contribution to this problem by introducing automatic compatibility checks, which filter and display only compatible parts. This system reduces the difficulty of building a custom PC and makes the process more accessible to users who may otherwise avoid it.

Similarly, Alena Respopa (2021) presents a web-based application that enables users to search for PCs or laptops tailored to their specific needs. By leveraging existing e-commerce platforms like Amazon and eBay, her solution not only facilitates finding the right components but also helps users save money by comparing prices across different vendors.

Mohd Shahrizan Bin Sabli (2015) addresses the fragmentation of custom PC-related services by proposing a comprehensive web platform, which combines multiple functionalities in one place. This includes hardware identification, guidance on assembling components, and a planner that allows users to design their own PCs according to their preferences. Additionally, it integrates online sales services, offering a seamless experience for users who are interested in building a custom PC but may lack the necessary knowledge. His study also includes a survey showing that while many people are interested in custom PCs, they often lack sufficient knowledge about hardware components and assembly, making an easy-to-use, informative platform crucial.

In contrast, Sameer Khursheed et al. (2022) address the challenges faced by users in Pakistan, where the COVID-19 pandemic disrupted international shipments, leaving a gap in the availability of custom PC components. Their solution, the Nice PC Maker (NPM) platform, facilitates local users by offering an e-store where they can purchase both pre-built systems and individual components for custom PC assembly. This initiative highlights the importance of creating localized solutions for regions where international e-commerce may be unreliable.

Finally, the research on applying genetic algorithms to PC configuration problems (Singapore, 2021) focuses on a sophisticated, data-driven approach to addressing the complexity of selecting optimal hardware combinations for specific use cases. The authors propose a flexible framework that utilizes heuristic search methods to solve discrete optimization problems related to PC configuration. This framework can be customized by users to reflect their unique preferences, such as budget constraints or desired performance specifications. The study suggests that incorporating machine learning techniques, such as the ID3 algorithm, could further improve the optimization process by learning from previous configurations to guide future selections. Collectively, these works contribute to the development of customized, user-friendly platforms that not only simplify the process of building a custom PC but also offer cost-effective, localized, and optimized solutions for a diverse range of users.

III. SOFTWARE AND TOOLS USED FOR CUSTOM PC BUILDING SYSTEM

For the development of the custom PC build platform in my research paper, I utilized a range of software tools and technologies to ensure efficiency, scalability, and an optimal user experience. The core framework used was ASP.NET Core MVC, which is a powerful, cross-platform framework designed for building dynamic web applications. By following the Model-View-Controller (MVC) architecture, ASP.NET Core MVC helps maintain a clean separation of concerns, allowing for easier maintenance and scalability. To further streamline the development process, I incorporated Razor Pages, which is part of the ASP.NET Core framework and simplifies the creation of dynamic, page-based applications. Razor Pages allows for more straightforward handling of user interactions on the front-end, such as selecting components and checking compatibility, without the need for complex controller logic. For data management, I relied on Entity Framework Core (EF Core), an Object-Relational Mapper (ORM) that provides an abstraction layer between the application and the database. EF Core allows for seamless database interactions, simplifying CRUD (Create, Read, Update, Delete) operations and enabling more efficient data manipulation using C# code. The database itself is powered by Microsoft SQL Server, a robust and secure relational database management system (RDBMS) that stores essential data, such as user profiles, component information, and custom PC configurations. Together, these tools form the backbone of the platform, enabling smooth and efficient operation, from handling user requests and displaying real-time updates to ensuring secure and scalable data storage.

IV. SYSTEM DESIGN

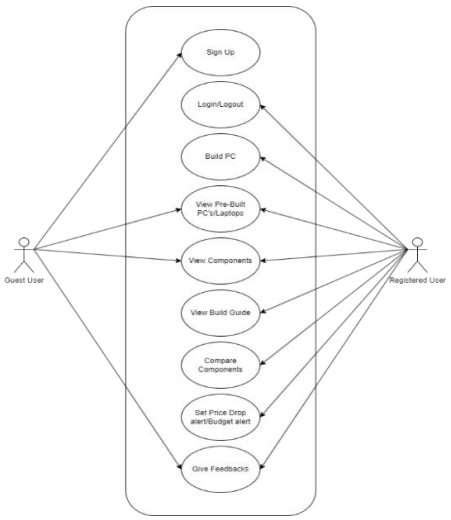


Fig 1. Use Case Diagram

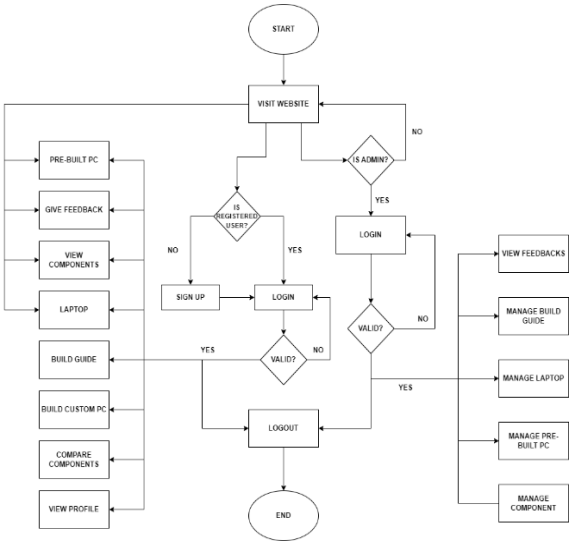


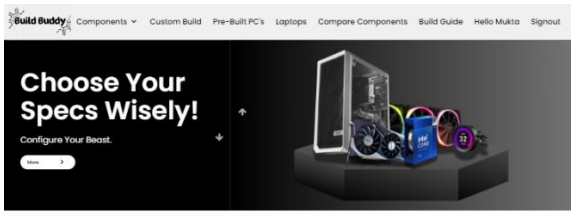
Fig 2. Flow Diagram

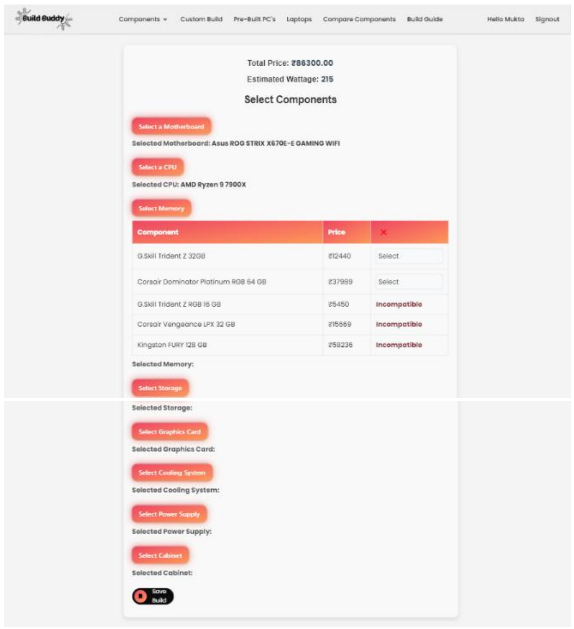
V. RESULT DISCUSSION

The Custom PC Build website provides a user-friendly experience, starting with the Home Page, which offers a clear overview and easy navigation. The Components Page gives detailed specifications for each part, helping users make informed decisions about their build. On the Custom Build Page, users can select individual components, ensuring compatibility, while real-time power consumption and pricing calculations keep them informed about their system's performance and cost.

For users preferring ready-made solutions, the Pre-Built PC Page offers curated desktop PCs, and the Laptop Page provides various laptop options with detailed specs. The Compare Page allows users to compare components side by side, aiding in decision-making. The Build Guide Page offers step-by-step instructions for assembling a PC, especially useful for beginners.

The Profile Page lets users to delete their custom builds through a wishlist, ensuring an organized experience. Overall, the website's structure supports users at every stage, from customizing builds to purchasing pre-built solutions, offering a seamless and informative journey.





VI. CONCLUSION

In conclusion, the online PC building configuration website provides a comprehensive and user-friendly platform for individuals looking to customize and build their ideal computer systems. Its intuitive interface, combined with a vast database of components, allows users to easily navigate through a wide array of options, including the latest hardware releases. The platform's real-time compatibility checks ensure that users select compatible components, reducing the risk of errors and ensuring a smoother building experience. Moreover, the integration of pricing information from multiple vendors allows users to make informed, cost-effective decisions without sacrificing quality. Overall, the website streamlines the PC building process, providing both beginners and experienced users with the tools needed to create high-performance, personalized systems.

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