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Abstract:

The E-Commerce Management System is a web-based application designed to facilitate online buying and selling of products across various categories. This system serves as a comprehensive platform where users can browse items, add products to a shopping cart, make purchases, and track their orders. Vendors can manage product listings, inventory, and view customer orders, while administrators oversee platform operations such as user management, product approval, and report generation. The system aims to streamline the e-commerce process by offering an intuitive interface, secure authentication, and efficient order processing. Developed using technologies like HTML, CSS, JavaScript, PHP (or Node.js), and MySQL, the platform is scalable and can be adapted for use by small and medium-sized businesses. This project addresses the growing demand for online shopping solutions and demonstrates how digital platforms can enhance the traditional retail experience.

Chapter 1 Introduction:

1.1 Background

The rise of the internet and digital technologies has revolutionized how businesses operate, making e-commerce a key part of global trade. E-commerce allows businesses to reach a wider audience and offers customers the convenience of shopping anytime, anywhere. In 2022, global e-commerce sales reached **\$5.7 trillion**, with projections to hit **\$8.1 trillion by 2026** [1]. The COVID-19 pandemic further boosted online shopping, highlighting the need for strong digital platforms. However many small and medium businesses still struggle to access affordable and user-friendly e-commerce solutions. Current platforms can be expensive or overly complex. This project aims to build a flexible E-Commerce Management System to bridge that gap.

Motivation:

With the growing shift toward online shopping, especially after the pandemic, businesses—particularly SMEs—must adopt digital platforms to stay competitive. Those without an online presence risk losing customers and market relevance.

This project aims to develop an affordable and user-friendly E-Commerce Management System that can:

- Help businesses reach more customers,
- Automate tasks like inventory and order management,
- Enhance customer experience with an easy-to-use interface.

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Additionally, the project offers hands-on experience in full-stack development and real-world problem-solving, while supporting digital innovation and entrepreneurship.

1.2 Purpose and Goal of the Project:

The aim of this project is to develop an efficient e-commerce management system that simplifies the process of online shopping for users and administration for businesses. Key contributions include enhancing user experience through features like personalized product recommendations, multi-language support, and advanced analytics tools for vendors. The novelty lies in its modular, scalable design, ensuring adaptability for businesses of various sizes, and its global accessibility with multi-currency options. In our project Browsing our platform is a breeze. Discover a vast range of products, from fashion. people can Shop with confidence knowing that their transactions are safe and secure. We employ state-of-the-art encryption technology to protect their financial information. The main benefit is that people can purchase the trustable product from home and they can get the product as soon as possible.

Contribution of the project:

1. Tashfia Adibazaman Nizum (2131228642): Front page, User panel (checkout, logout, login, order, payment, registration), Footer, Functions, Blog page, Single product showing, Search product, Product details, showing cart system, Shop, sign in, Product details, Database insertion (Table create and data insertion)
2. Mariam Islam Marjia (2131441042): Admin area, Admin index, insert brands, insert categories, Insert products, Database insertion (Table create and data insertion)

1.3 Organization of the Report:

We will discuss in our report,

- Chapter 2 presents the Research Literature Review: We discussed why our project is better than the previous project, what are the limitations in our project, We also discussed what are the problems in our project. The way of researching the project will be discuss in this part.
- Chapter 3 presents the Methodology: presents the Methodology: Here we design flow chart and we discuss about software component that the component we used in our project. We use CSS, html, java script, My SQL. Then we discussed about how to implement our software. The software implementation of the e-commerce beginning with system modeling and progressing through application development.

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- Chapter 4 presents the Investigation/Experiment, Result, Analysis and Discussion: Here we discussed to evaluate the performance and functionality of the developed e-commerce website, a series of experiments and simulations were conducted. The following sections describe the experimental setup, obtained results, and an in-depth discussion of the findings.
- Chapter 5 presents the Impacts of the Project: Impact of this project on societal, health, safety, legal and cultural Issues. And we also discussed about how a software, based project polluted both environmental and ecological.
- Chapter 8 presents the Conclusions: The e-commerce website project successfully demonstrates the core functionalities required for an online shopping platform. It provides a seamless user experience with essential features like product browsing, user registration, shopping cart management, and order placement.
- Chapter 7 Complex Engineering Problems and Activities: Chapter 7 focuses on identifying and addressing challenges in e-commerce systems, such as managing complex requirements like scalability, security, and user experience. It also highlights innovative approaches, stakeholder interactions, and societal impacts, including enabling small businesses and aligning with sustainable development goals.

Chapter 2 Research Literature Review

2.1Existing Research and Limitations:

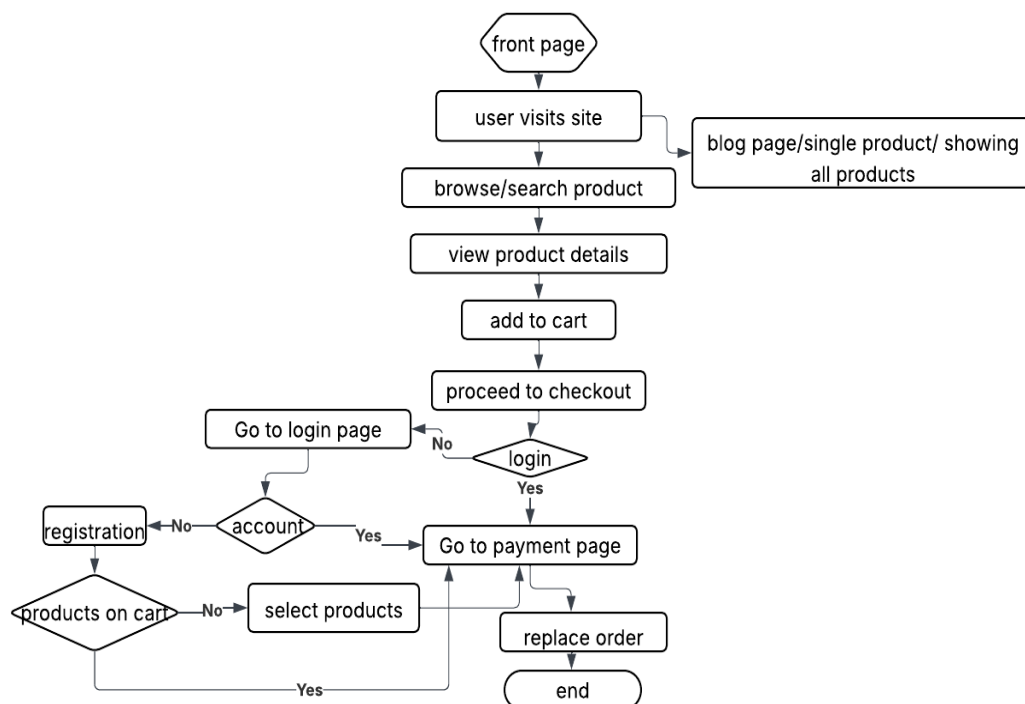
Recent research on e-commerce management systems has explored various areas of improvement. For instance, authors have developed recommendation algorithms using machine learning to provide personalized shopping experiences. Studies highlight the use of real-time inventory management systems and dynamic pricing models to enhance efficiency. Furthermore, integrations with payment gateways have been a focus to ensure secure transactions. However, limitations exist in current research. Many studies rely on datasets from single e-commerce platforms, limiting generalizability across different scales of businesses. Moreover, few studies compare the performance of various recommendation algorithms or system architectures in real-world scenarios. Another limitation is the lack of focus on multilingual support, which is essential for global accessibility. Additionally, integrating advanced features, like augmented reality for virtual try-ons, remains underexplored. These gaps motivate the development of a more inclusive and scalable e-commerce management system with innovative features to overcome these limitations and better address the needs of users and businesses. Let me know if you'd like to elaborate on any of these! E-commerce has significantly transformed the way businesses operate and interact with customers. The advancement of web technologies, secure payment gateways, and user-friendly interfaces has contributed to the growth of online shopping. We are still working. We will work on many more features in the future. We have developed multiple pages for our website, incorporating features like Navbar, Hero Section, Featured Products, Banners, New Arrivals, Newsletter, and Footer. Our site is fully media responsive, supporting small, medium, and large screens. A separate navbar is displayed for smaller screens, with a hamburger menu for easy navigation.

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The menu can be opened and closed using bar and close buttons. Recently, we started working on additional pages and aim to bring further improvements soon. We have developed an admin panel for our website, enabling admins to add and manage categories and brands with updates stored in the database. If a duplicate category or brand is added, a notification is displayed. Our project successfully integrates the database, allowing updates like categories (e.g., shoes, pants) and brands (e.g., Adidas, Aarong) to be managed efficiently. New features include a search option and a welcome guest option. The admin panel uses `GET` variables for actions like inserting updates, and we're planning to enhance security in the future to ensure smooth and safe user experiences. We have developed an admin panel for our website that allows admins to add and remove categories and brands, with updates stored in the database. Duplicate entries show a notification, while new entries are successfully updated with auto-incremented Category ID and Brand ID to ensure uniqueness. These updates are displayed on the homepage. Additionally, we introduced a product insertion feature where admins can dynamically input product details like title, description, keywords, category, brand, price, and images. Admins can browse and edit pictures. Clicking the homepage links provides details about category and brand database locations for easy troubleshooting. Further improvements are planned for enhanced functionality and security.

Chapter 3 Methodology:**3.1 System Design:****3.2 Hardware and/or Software Components:**

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Tool/Technology	Function	Other Similar Tools (if any)	Why Selected This Tool
HTML/CSS/JavaScript	Frontend design and development (user interface, responsiveness)	Bootstrap	Popular for creating dynamic and interactive UIs
php	Backend server for handling requests	Vs code extension	Lightweight, efficient, and compatible with JavaScript
MySQL	Database management for storing user and product data	XAMPP	Reliable for relational and NoSQL data management
Stripe/PayPal API	Payment processing	Square	Secure, globally trusted payment platforms

3.3 Software Implementation

The software implementation of the e-commerce website involved the structured development of several modules:

1. Modeling:

The initial phase included the creation of system models using flow chart. These models provided a clear representation of user interactions, system functionality, and data flow, which helped in planning the architecture and components of the application.

2. Application Development:

The website was developed using a modular approach, dividing it into core functional components:

- **User Module:** Handles registration, login/logout, and user profile management.
- **Product Module:** Enables product listing, categorization, filtering, and search.
- **Cart & Checkout Module:** Allows users to add items to the cart, update quantities, and proceed with checkout.
- **Order Management Module:** Processes user orders, updates order status, and stores order history.

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- **Admin Panel:** Enables admins to manage products, view orders, and oversee customer data.

The front-end was implemented using HTML, CSS, JavaScript, and a modern framework

3. Simulations and Testing:

Before deployment, simulations were performed to test user flows such as browsing products, placing orders, and handling payments.

Chapter 4 Investigation/Experiment, Result, Analysis and Discussion:

For an e-commerce management system project, the investigation would typically involve testing the functional components of the system, analyzing performance metrics, and assessing user satisfaction. Here's a concise description:

1. Investigation/Experiment:

- Conduct tests on various functionalities: product search, cart operations, payment processing, and order management.
- Simulate different user scenarios: high traffic, large database queries, and payment integration.
- Evaluate security measures like authentication and encryption.

2. Result:

- Display results through tables, such as system response times under varying loads and success rates of transactions.

3. Analysis:

- Analyze trends observed in the results, such as performance bottlenecks during peak loads or areas where user interaction could be improved.
- Compare results against benchmarks or predefined metrics.

4. Discussion:

- Constructively interpret the outcomes, addressing key findings like optimal performance conditions, any detected issues, and possible enhancements.
- Highlight the practical impact of the system, such as improved customer experience and streamlined business processes.

Chapter 5: Impacts of the Project:

5.1 Impact on Societal, Health, Safety, Legal, and Cultural Issues:

- **Societal Impact:** The e-commerce management system promotes convenience and accessibility, allowing users to shop from the comfort of their homes, thus enhancing their quality of life.

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- **Health & Safety:** By reducing the need for physical store visits, it minimizes exposure to crowded environments, contributing to better public health, especially during health crises like pandemics.
- **Legal Considerations:** Secure payment gateways and compliance with data protection laws (e.g., GDPR) ensure user privacy and trust.
- **Cultural Impact:** The platform can be localized, supporting multiple languages and currencies, promoting inclusivity and accommodating diverse cultural preferences.

5.2 Impact on Environment and Sustainability:

- **Environmental Impact:** By enabling online shopping, the system reduces the dependency on physical stores, leading to lower energy consumption and reduced carbon emissions from transportation.
- **Sustainability:** Digital inventory management and paperless transactions support resource efficiency. Partnering with eco-friendly logistics providers can further contribute to a greener supply chain.

Chapter 7 Complex Engineering Problems and Activities

7.1 Complex Engineering Problems (CEP)

To address Complex Engineering Problems (CEP) attributes for an e-commerce website project, you could adapt the provided template in the following way:

TABLE II. A SAMPLE COMPLEX ENGINEERING PROBLEM ATTRIBUTES TABLE

Attributes	Addressing the complex engineering problems in the e-commerce website project
P1 Depth of knowledge required (K3-K8)	Knowledge of web development (HTML, CSS, JavaScript, PHP, SQL), server-side programming (Mycrosoft edge), database management systems (SQL), cloud computing, cybersecurity , and user experience research papers .
P2 Range of conflicting requirements	Balancing website performance with rich features; managing security protocols while ensuring user convenience in accessibility.
P3 Depth of analysis required	Analysis required to select optimal frameworks and tools; trade-offs between scalability, cost, and maintenance for the site infrastructure.

Attributes	Addressing the complex engineering problems in the e-commerce website project
P4 Familiarity of issues	Familiarity with website security risks, data privacy issues (e.g., GDPR compliance), e-commerce trends, and payment gateway integration.
P5 Extent of applicable codes	Industry standards like PCI DSS compliance for payment security; coding conventions for web development frameworks used.
P6 Extent of stakeholder involvement	Stakeholders include business owners, customers, payment processors, logistics providers, and IT teams.
P7 Interdependence	Involves interdependent subsystems: front-end interface, back-end server logic, database, payment gateways, and third-party APIs.

7.2 Complex Engineering Activities (CEA)

To address Complex Engineering Activities (CEA) related to an e-commerce website project, here's an adaptation of the provided table:

TABLE III. A SAMPLE COMPLEX ENGINEERING PROBLEM ACTIVITIES TABLE

Attributes	Addressing the complex engineering activities in the e-commerce website project
A1 Range of resources	Involves human resources (developers, UI/UX designers), financial resources (hosting, domain costs), tools (CMS platforms, database software, and cybersecurity tools).
A2 Level of interactions	Requires collaboration with multiple stakeholders: development teams, business managers, logistics partners, and payment processors. Coordination needed for user feedback and feature refinement.
A3 Innovation	Employs innovative engineering approaches by integrating AI-driven personalized recommendations, secure payment technologies, and seamless user experiences.
A4 Consequences to society/Environment	Enhances accessibility for small businesses to participate in the digital economy, aligns with environmental goals by promoting paperless transactions, and addresses UN SDG #08: Decent Work and Economic Growth.
A5 Familiarity	Familiarity required with payment gateways, cloud computing platforms, e-commerce frameworks, data encryption methods, and SEO optimization techniques.

Chapter 8: Conclusions:

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8.1 Summary:

The e-commerce management system project successfully developed an efficient platform for managing online transactions, including user authentication, product browsing, cart management, payment processing, and order tracking. The system enhances user experience by offering a seamless and secure shopping process, coupled with robust backend functionality for administrators to manage inventory and customer data effectively.

8.2 Limitations:

- The system may face performance issues under high traffic due to limited server resources.
- It currently lacks advanced features such as personalized product recommendations or dynamic pricing models.
- Integration with multiple payment gateways is limited, which might restrict user options.
- Some security measures, like real-time threat detection, are absent and may require further enhancement.

8.3 Future Improvement:

- Implementing AI-driven features like product recommendations and customer behavior analysis.
- Optimizing the system to handle a significantly higher user load by employing scalable cloud solutions.
- Adding more payment gateway integrations to offer users greater flexibility.
- Enhancing security by including features like fraud detection systems and real-time threat monitoring.
- Introducing multilingual support and localized currency conversions to cater to a global audience.

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