SCHOOL OF ENGINEERING

DAYANANDA SAGAR UNIVERSITY

KUDLU GATE, BANGALORE – 560068

Bachelor of Technology
in
COMPUTER SCIENCE AND ENGINEERING

Major Project Report

E-COMMERCE WEBSITE FOR THE VISUALLY IMPAIRED

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DAYANANDA SAGAR UNIVERSITY,

(2023-2024)

DAYANANDA SAGAR UNIVERSITY

KUDLU GATE, BANGALORE – 560068

Department of Computer Science & Engineering

CERTIFICATE

This is to certify that the Major project work titled **"E-COMMERCE WEBSITE FOR THE VISUALLY IMPAIRED"** is carried out by **Khushi Periwal (ENG20CS0155), K. Shravya (ENG20CS0140), Jayasudha S. (ENG20CS0132),** bonafide students of Bachelor of Technology in Computer Science and Engineering at the School of Engineering, Dayananda Sagar University, Bangalore in partial fulfillment for the award of degree in Bachelor of Technology in Computer Science and Engineering, during the year **2023-2024**.

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Name of the Examiner **Signature of Examiner**

1.

2.

DECLARATION

We, **Khushi Periwal (ENG20CS0155), K. Shravya (ENG20CS0140), Jayasudha S. (ENG20CS0132),** are students of Eighth-semester B.Tech in **Computer Science and Engineering**, at School of Engineering, **Dayananda Sagar University**, hereby declare that the Major Project titled **"E-COMMERCE WEBSITE FOR THE VISUALLY IMPAIRED"** has been carried out by us and submitted in partial fulfillment for the award of degree in **Bachelor of Technology in Computer Science and Engineering** during the academic year **2023-2024**.

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USN :

Name2

USN :

Name3:

USN :

Place : Bangalore

Date :

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Signature of Students

USN :

Name:

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LIST OF ABBREVIATIONS

JS	JavaScript
API	Application Program Interface
HTML	Hypertext Markup language
PHP	Pre-Processor Hypertext
MySQL	My Structured Query Language

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ABSTRACT

People who are blind or visually impaired frequently encounter obstacles when purchasing online. The problem is that traditional e-commerce platforms don't offer enough accessible options or security, which makes it hard for those with visual impairments to shop online.

This is addressed by our project, "E-commerce Website for Visually Impaired Users," which creates a website that is suited to their requirements and makes it possible for them to buy freely and comfortably. It provides speech APIs, voice assistance, and an intuitive design. This system uses methods such as collaborative filter-based suggestion, voice help, etc. Furthermore, our website has an easy-to-use interface that is straightforward, interactive, and navigable. Our goal is to provide visually impaired people with an E-commerce website that is extremely accessible, user-friendly, and compatible. letting the individual make solo purchases without help.

CHAPTER 1: INTRODUCTION

E-commerce has completely changed how we purchase in the current digital age, providing millions of people with convenience and accessibility across the globe. But even with all of this technological progress, there is still a sizable demographic that is sometimes disregarded: the visually impaired. For this population, accessibility challenges still exist despite the significant growth in e-commerce platforms, making it difficult for them to freely browse and interact with online buying experiences. Because traditional interfaces mostly rely on visual signals, people with visual impairments may find it challenging to navigate and pick products. Although screen readers provide an alternative by speaking text aloud, they sometimes struggle to understand intricate web designs and dynamic material, which makes using them frustrating. Acknowledging this disparity, current research has investigated substitute methods to enhance accessibility, such as incorporating speech recognition technology. In this work, we use the capabilities of JavaScript voice APIs to construct an e-commerce website specifically designed to meet the needs of the visually impaired.

Our goal is to develop a smooth and intuitive surfing experience that enables visually impaired individuals to independently explore products, make purchases, and interact with online information by harnessing the power of speech recognition.

1.1. SCOPE

The goal of the project is to create a visually impaired user-friendly platform that can be easily navigated and interacted with using JavaScript voice APIs. Accessibility elements such as voice-activated navigation of product categories, item search, basket addition, and transaction completion will be highlighted on the website. To guarantee complete accessibility, the platform will also have screen reader compatibility and audio descriptions. The project's main goal is to develop an easy-to-use, inclusive online shopping experience that meets the unique needs of people with visual impairments. Furthermore, the platform's deployment and upkeep will guarantee ongoing accessibility and improvement. The result will be a voice-activated accessible e-commerce platform that enables visually impaired individuals to easily purchase online.

CHAPTER 2: PROBLEM DEFINITION

The difficulty is in the traditional E-commerce platforms' lack of accessible solutions, which makes online shopping for people with visual impairments challenging. Many technologies have been created to help visually impaired people and enhance their quality of life. Unfortunately, the majority of these technologies have restricted functionality. Web content is rendered inaccessible by non-standard page layouts, embedded graphical elements, and dynamic Hypertext Markup Language (HTML), especially when it comes to JavaScript and Flash animation.

The goal of this project is to address this problem by creating an E-commerce website that meets their demands and enables them to purchase freely and comfortably.

CHAPTER 3: LITERATURE REVIEW

Anagha S. Kulkarni, K. Shravani, A. N. Kanishkvardhan, Srinivas B. Patil, and Vinaya Jahagirdar (2019)[1] explore the urgent problem of digital inclusiveness for the visually impaired community in the context of e-commerce in their article "E-Commerce Website for Visually Impaired". Understanding the particular difficulties this group faces, the writers offer a fresh method for creating an accessible online store that is catered to their requirements. The project aims to improve the overall usability and accessibility of online purchasing for visually impaired consumers by focusing on integrating elements like screen reader compatibility, intuitive navigation, and user-friendly interfaces. However, we recognised that using screen readers is difficult because they merely read aloud the entire webpage, which might make it difficult for those with vision impairments to utilise websites because they won't see as clearly. We thought of adding a voice assistant as a way to get around this problem.

Maria Claudia Buzz, Barbara Leporini, and Fahim Akhter's paper "User Trust in eCommerce Services: Perception via Screen Reader" [2] explores the complex topic of user trust in eCommerce services, paying particular attention to screen reader users—a group that is frequently disregarded in online trust studies. The authors provide insight into the decision-making processes of people with visual impairments when they transact online by looking at how trust is viewed within this community. Their findings stress the importance of user experience in influencing perceptions of dependability and security in eCommerce platforms, as well as the critical role that accessibility considerations play in establishing trust among varied user communities. The present study makes a noteworthy contribution to the wider discourse on trust in virtual spaces by emphasising the significance of inclusive design strategies in guaranteeing fair access and user contentment in electronic commerce.

The 2019 [3] paper "Visually Impaired Friendly E-commerce website" by Mallika Chand, Shreya Mulchandani, and Sulalah Mirkar describes a novel method for creating an e-commerce website that is accessible to those with visual impairments. The application's use of voice commands for teaching and the ability for users to interact with the interface through the use of keys or a mouse define its design. The authors want to make online purchasing for those with vision impairments more inclusive and accessible. The application's usability was thoroughly tested, and the results, which the creators disclosed, showed an efficiency rate of 75%. This result indicates a respectable degree of efficacy in terms of enabling user interactions and assisting visually impaired users in navigating the e-commerce website. One important conclusion from the results that are displayed is that, in comparison to using a mouse, visually challenged persons can benefit more from using keys as an interface. According to the authors' findings, key-based commands produced a greater efficiency rate when used to communicate with the application. This highlights the need of taking into account alternate input methods for users who are visually impaired.

Prof. Jayshree Patil, Swaranjali Sanjay Balikai, Jyoti Dhanaji Ramane, Vishal Rajabhau Nannvare, and Sarjerao Bajirao Pujari[4] examine the possible advantages and difficulties of integrating voice-enabled virtual assistants (VAs) into e-commerce web applications in their paper "Voice Enabled Virtual Assistant For E-Commerce Web Application." The authors examine the advantages and disadvantages of incorporating virtual assistants (VAs) into online shopping experiences as the use of smart devices and voice interaction grows in popularity. Through an analysis of voice-enabled virtual assistants' functionality and user experience in e-commerce, the writers offer valuable perspectives on how this technology might enhance customer accessibility, convenience, and productivity. They also cover issues like security, privacy, and how well natural language processing works to enable smooth communication between people and virtual assistants. By illuminating the consequences of voice-enabled virtual assistants (VAs) for both customers and businesses, the authors' research advances the field of e-commerce technology and opens the door for more investigation and application of this ground-breaking method of online buying.

Er. Shrinidhi Gindi, Azizul Patni, Abubaker Sayyed, Sadiya Phudinawala, and Aafiya Shaikh[5] explore the vital intersection of technology and inclusivity in their study "Web Accessibility to E-Commerce for Blind Users." The writers examine the challenges that blind people encounter when trying to use online shopping sites, and they look at how different assistive technology and accessibility features might enhance their browsing and buying experiences. The authors' investigation clarified the challenges faced by blind users, including figuring out intricate interfaces, comprehending visual content, and finishing transactions on their own. They also look at best practices and potential fixes for improving the accessibility of e-commerce websites, such as using screen readers, alternate text descriptions, and user-friendly interface designs. Through tackling these concerns, the writers underscore the importance of inclusive design principles in guaranteeing impartial access to digital resources and amenities for every person, irrespective of their capabilities, thus cultivating a more comprehensive and just virtual shopping encounter.

The crucial topic of web accessibility testing for visually impaired people in Indonesia is examined in the study "Web Accessibility Testing for Visually Impaired People in Indonesia" by Maria Cahyahadi and Nina Setiyawati[6]. This is a topic that has grown in importance in the digital era. Through an analysis of the particular difficulties encountered by this group in gaining access to online content, the writers emphasise the need for customised accessibility testing procedures in order to guarantee fair access to data and services. Through their research, they are able to identify the main obstacles that Indonesia's visually handicapped face when attempting to access the internet; these barriers range from a lack of awareness among website developers to inadequate assistive technologies. Their results highlight the need of closing accessibility gaps immediately and offer insightful information for creating more inclusive digital spaces. This study adds to the larger conversation on inclusive technology design and implementation by illuminating the particular context of web accessibility in Indonesia. This opens the door to more practical approaches to improve digital accessibility for all users.

CHAPTER 4: PROJECT DESCRIPTION

The practice of purchasing online has ingrained itself into daily life. But using e-commerce websites can be difficult for those who are blind or visually impaired, which frequently leads to access restrictions and a lack of independence. By creating a cutting-edge e-commerce website designed especially for the community of visually impaired people, our project seeks to close this disparity. By using JavaScript speech APIs, our platform will enable voice-based commands to provide a smooth browsing and buying experience. This will allow users to explore product catalogues, search for items, add items to their cart, and complete transactions without the need for traditional visual interfaces. Additionally, we will give top priority to accessibility features on our website, like screen reader compatibility and audio descriptions, so that all users may easily and independently interact with the platform. Our goal is to revolutionise the online purchasing experience for visually impaired people by improving accessibility and promoting independence via the development of an inclusive and user-centric E-commerce solution.

4.1 PROPOSED DESIGN

The voice assistant-enabled e-commerce website's suggested design aims to create an accessible and user-centered platform for the blind. Through integration with top voice assistant APIs, the website will have a responsive user interface that allows for hands-free interaction and navigation. Accessibility is given top priority in the fundamental design, guaranteeing screen reader compatibility and providing a smooth experience for people with different levels of visual impairment. An essential function of the voice assistant will be to understand voice instructions and help users with product search, selection, and checkout. Incorporating a reliable payment gateway and adhering to industry standards for safe transactions are crucial components of security. To help the visually impaired people purchase online with inclusivity and efficiency, the design also includes user training tools to acquaint users with the voice-assisted functionalities.

4.2 ASSUMPTIONS AND DEPENDENCIES

Assumptions:

1. User Accessibility: Users have access to a device with voice assistant capabilities. The success of the project relies on users having access to devices that support voice interaction.

2. Internet Connection: Users have a stable internet connection. The e-commerce website relies on real-time data retrieval and online transactions.

3. Voice Assistant Accuracy: The voice assistant accurately interprets and executes user commands. The effectiveness of the system depends on the reliability and accuracy of the voice recognition technology.

4. Security Compliance: The e-commerce platform adheres to security standards for online transactions. Security is crucial when handling sensitive user information and financial transactions.

5. Product Information Availability: Accurate and up-to-date product information is available for integration. Users rely on accurate product details, prices, and availability.

6. Compatibility with Screen Readers: The website is compatible with screen readers for users with partial visual impairment. Some users may rely on both voice assistants and screen readers for accessibility.

7. Payment Gateway Integration: Seamless integration with a secure payment gateway is possible. The success of the project hinges on a smooth and secure payment process.

Dependencies:

1. Voice Assistant API: The functionality of the system relies on the capabilities and accuracy of the chosen voice assistant.

2. Database Availability: Availability of a database with product information, user profiles, and order history. The system requires real-time access to product data and user information.

3. Internet Service Provider (ISP): Reliability of the internet service provider for seamless online operations. Uninterrupted internet access is critical for users to interact with the e-commerce website.

4. Accessibility Standards: Compliance with accessibility standards (e.g., WCAG) for web content. Ensures that the website is accessible to users with disabilities, including the visually impaired.

5. **Payment Gateway API:** Integration with a secure and reliable payment gateway API. The payment process is a critical component, and its functionality depends on the integration with the chosen payment gateway.

7. User Training: Availability of training resources for users to learn how to interact with the voice assistant and the e-commerce website. Users need to be familiar with the system to utilize its features effectively.

CHAPTER 5: REQUIREMENTS

5.1. FUNCTIONAL REQUIREMENTS:

- HTML, CSS & Javascript: For developing the front end.
- Speech Synthesis API: To convert Text-to-Speech.
- MySQL Database: The system uses MySQL in the backend to store data like login information, product images, and product wish list data.
- Figma: To plan the website's user interface, flow and design the prototype.
- Visual Studio Code: The website will be built using this coding platform.
- XAMP: Hosting the web application.

5.2. NON-FUNCTIONAL REQUIREMENTS:

- **Performance:** The application must demonstrate high performance, with minimal latency in processing the product list and updating the cart. It should maintain responsiveness even under high user load to ensure easy and good shopping experience for the users.

- **Reliability:** The website must be reliable to ensure availability at all times for quick response.

- **Security:** The application should prioritize data security and user privacy. It must protect sensitive information and prevent unauthorized access to user's profile or payment details.

- **Scalability:** The system should be designed to scale efficiently to accommodate potential growth in users shopping experience.

- **Usability:** The user interface should be intuitive and user-friendly for the visually impaired.

- **Robustness:** It must gracefully handle unexpected situations such as network interruptions.

- **Cost-Efficiency:** Development, deployment, and operational costs should be optimized to ensure that the project remains within budgetary constraints.

- **Response Time:** The website must maintain quick response times, ensuring that user interactions are instantaneous avoiding any frustration to the user.

CHAPTER 6: METHODOLOGY

6.1 AGILE METHODOLOGY

Fig. 6.1.1: Agile methodology phases

Figure 6.1 shows the phases and approach that make up the agile methodology design that is used in this project.

In the initial phase of this project, requirements were defined through a study of previous research papers, leading to the identification of both functional and non-functional requirements. The primary objective was to integrate AI into a web-based e-commerce platform to cater to visually impaired users, utilizing speech recognition for input. The functional aspects included enhancing reliability and ease of use, with specific performance indicators and cost limitations. The design phase incorporated Adobe to create a user-friendly prototype. The development phase involved building and deploying the web-based e-commerce platform using Visual Studio Code, integrating the Alan AI program for voice assistance. Testing ensures the system's functionality, reliability, and user-friendliness.

6.2 BLOCK DIAGRAM

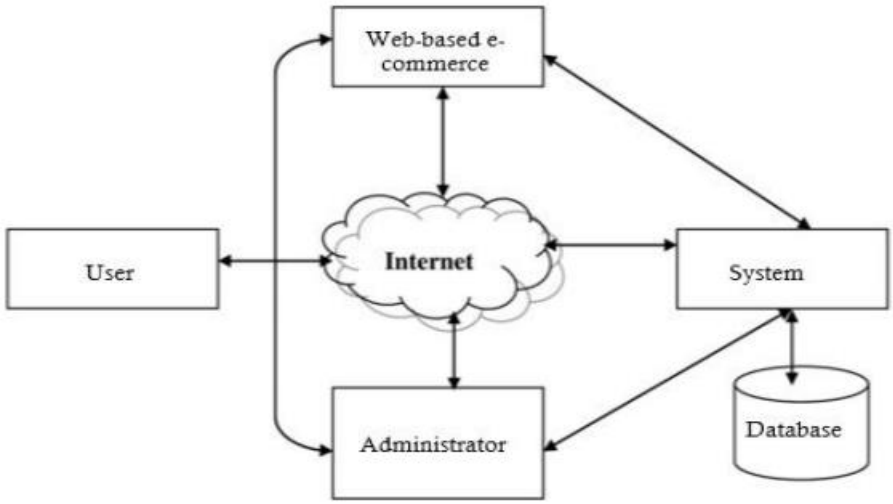

Fig. 6.2.2 Block diagram

This block diagram is meant to give an overview of components used to create this tool and how the connectivity and interactivity between the tools. The Fig 6.2 includes all the main components of the project and the flow of the data started form the back-end development to the front-end development. As this project is a web-based e-commerce, it requires internet to able to use this project in a real time process. Every block will link with the internet such as the user in filling the user information, administrator to view the purchase order, and the system for payment details. The database will link with the system such as item stocks. Lastly, the administrator can handle the system.

CHAPTER 7: EXPERIMENTATION

Our experimentation includes prototyping the interface using Adobe XD before implementation. The aim of designing the prototype is to match the final result. The interfaces includes:

7.1 INTERFACE PROTOTYPE

7.1.1 HOME AND LOGIN PAGE:

The Home page is the initial page the user sees, when they enter the online store. The features on Home page include: Profile, View Cart, Login, Shop products. The user should be able to access these features via voice assistance.

If the user does not already have an account, he or she can create one by clicking the register button. For those who have created an account, they may log in using their registered username and password.

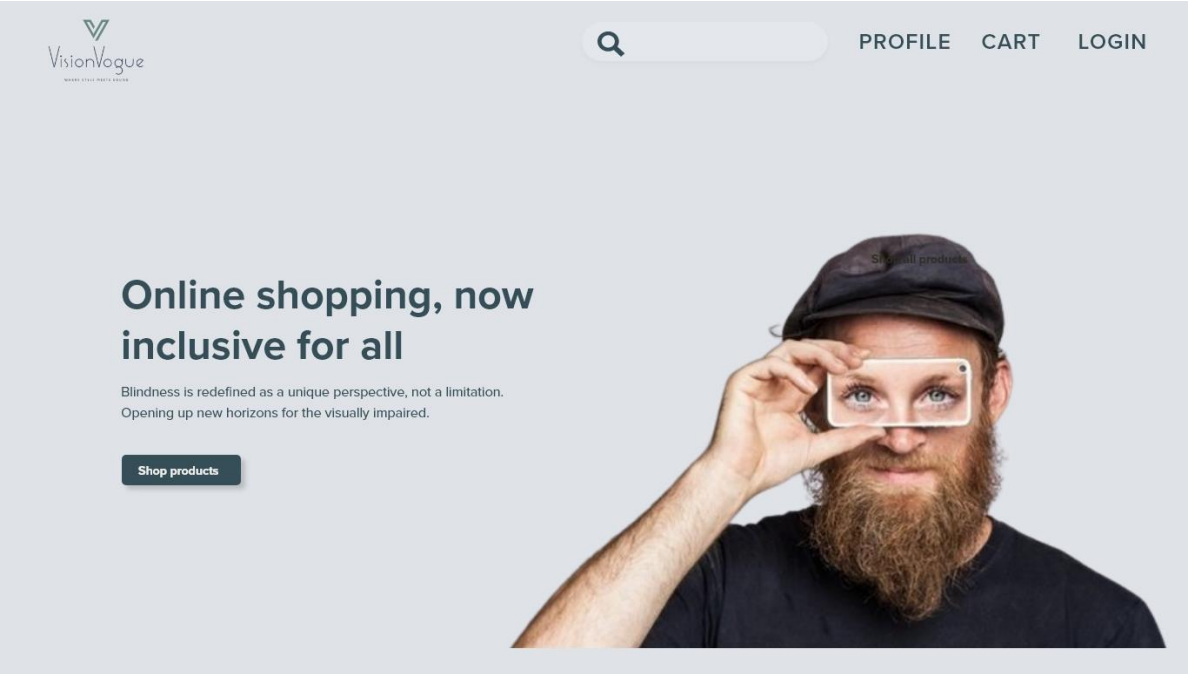

Fig. 7.1.1.1 : Home Page

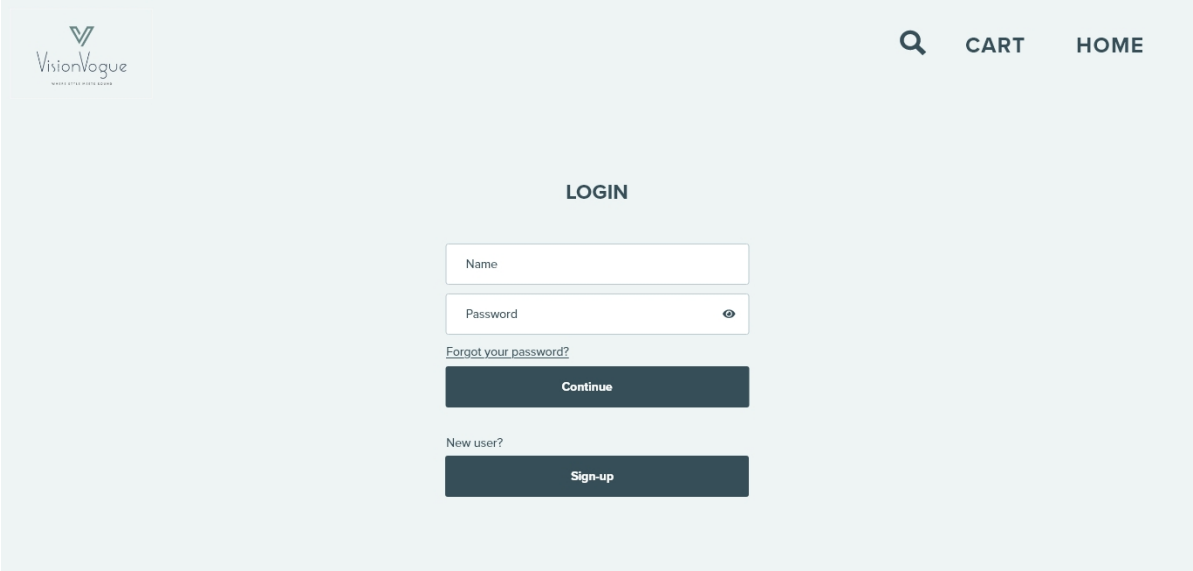

Fig. 7.1.1.2: Login Page

7.1.2 SEARCH AND PRODUCT PAGE:

The Search Page includes categories such as Men, Women and Kids.

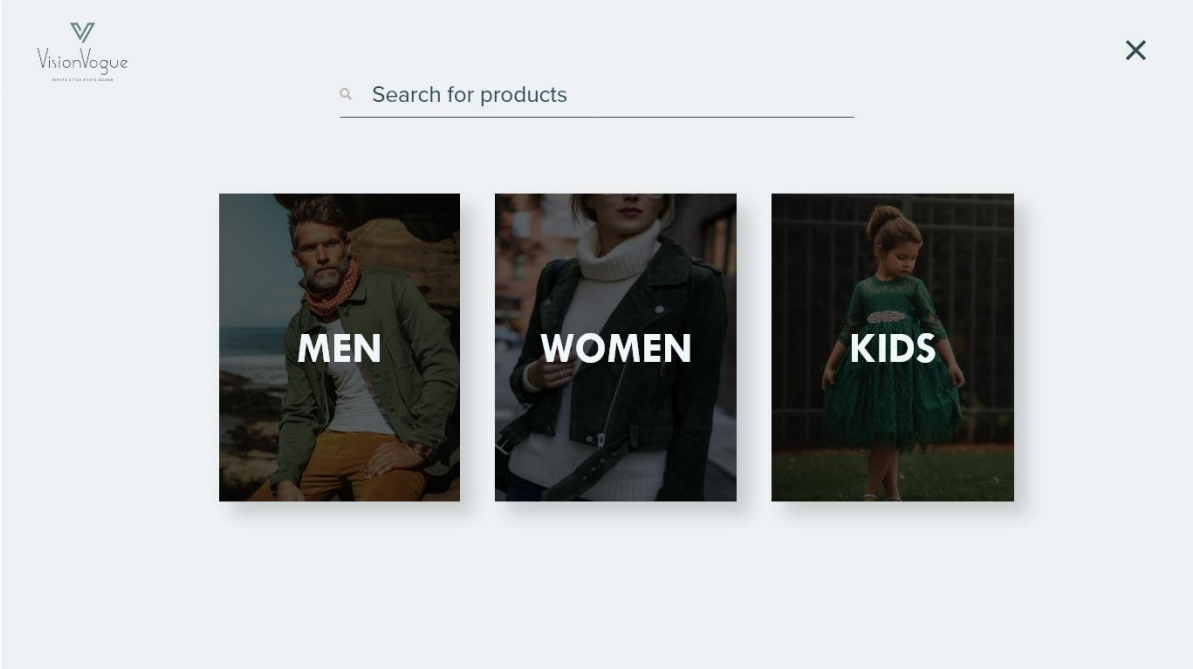

Fig. 7.1.2.1: Search Page

In the product page the items searched by the user are listed. The user can press the Tab key to focus on each item , where the voice assistance would describe each product details.

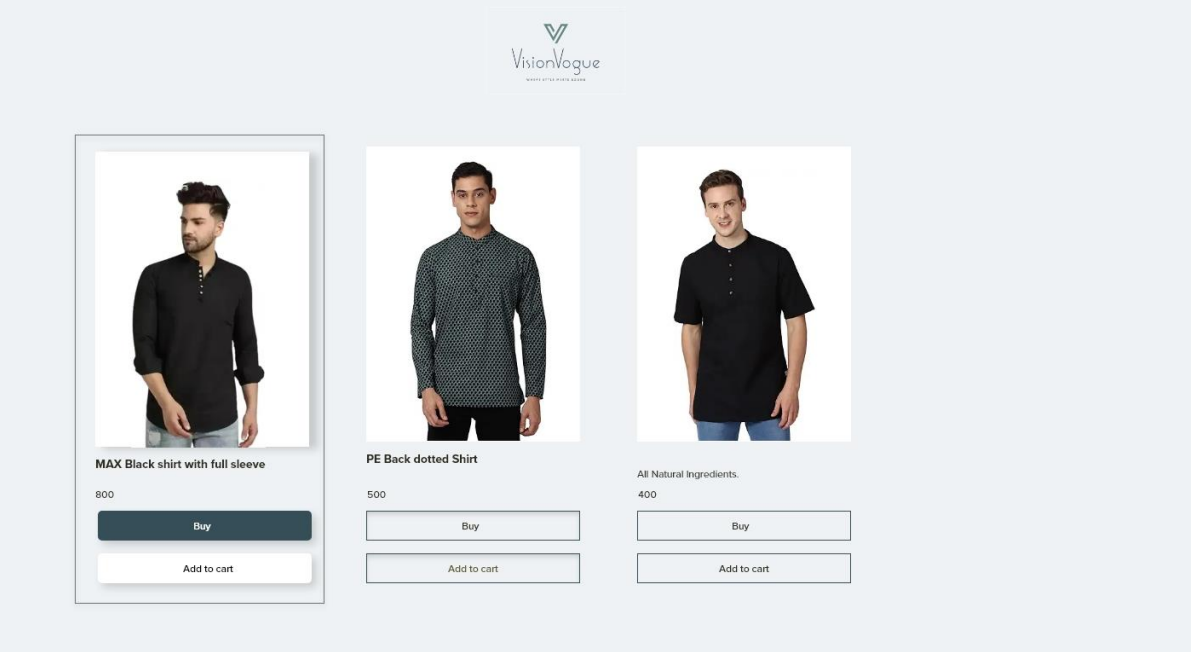

Fig. 7.1.2.2: products page

7.1.3 CART PAGE

In the Cart page all the items added by the user are displayed. The user can now press the Tab key to focus on each product and choose the item to send for purchase.

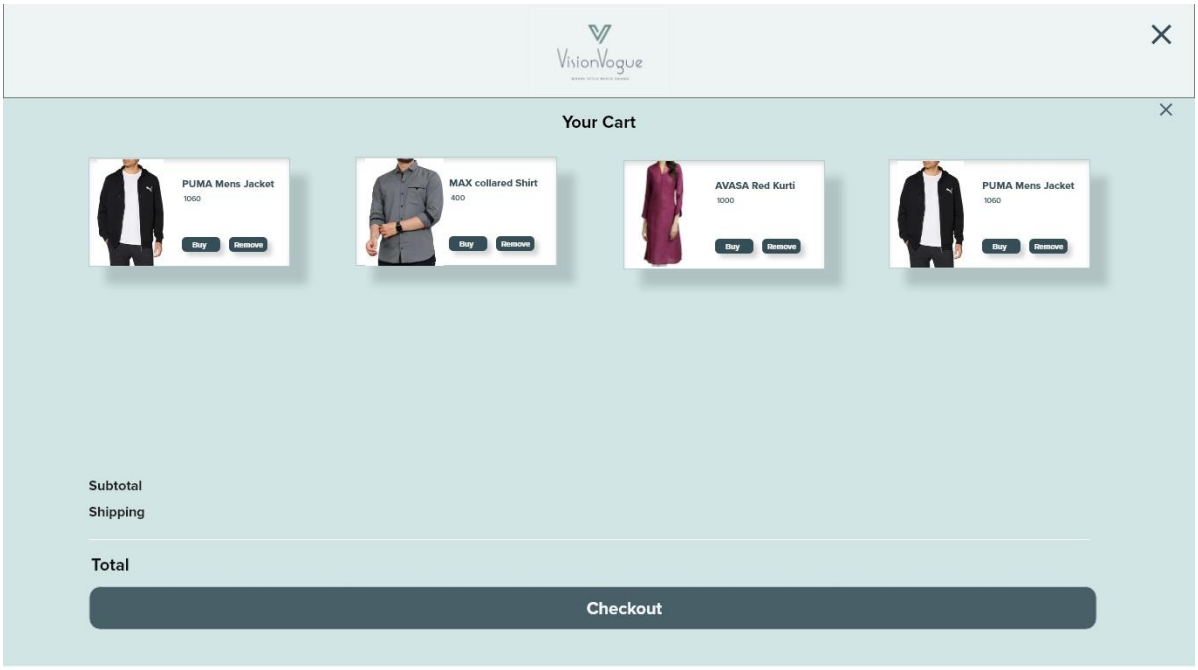

Fig. 7.1.3: Cart Page

7.2 BACKEND

7.2.1 Tables Overview:

The backend database consists of several interconnected tables to manage various aspects of the application's data. These tables include:

Category: Stores information about product categories such as category ID, title, and description.

Product Categories: Acts as a bridge table to establish a many-to-many relationship between products and categories.

Products: Contains detailed information about products including the product ID, category ID, date, title, images, price, keywords, and description.

Customer: Stores customer information such as customer ID, name, email, password, address, contact details, image, and IP address.

Cart: Manages the shopping cart functionality by storing details of products added to the cart including product ID, IP address, quantity, size, date, and customer ID.

Orders: Handles order processing and keeps records of orders placed, including order ID, quantity, price, customer ID, and date.

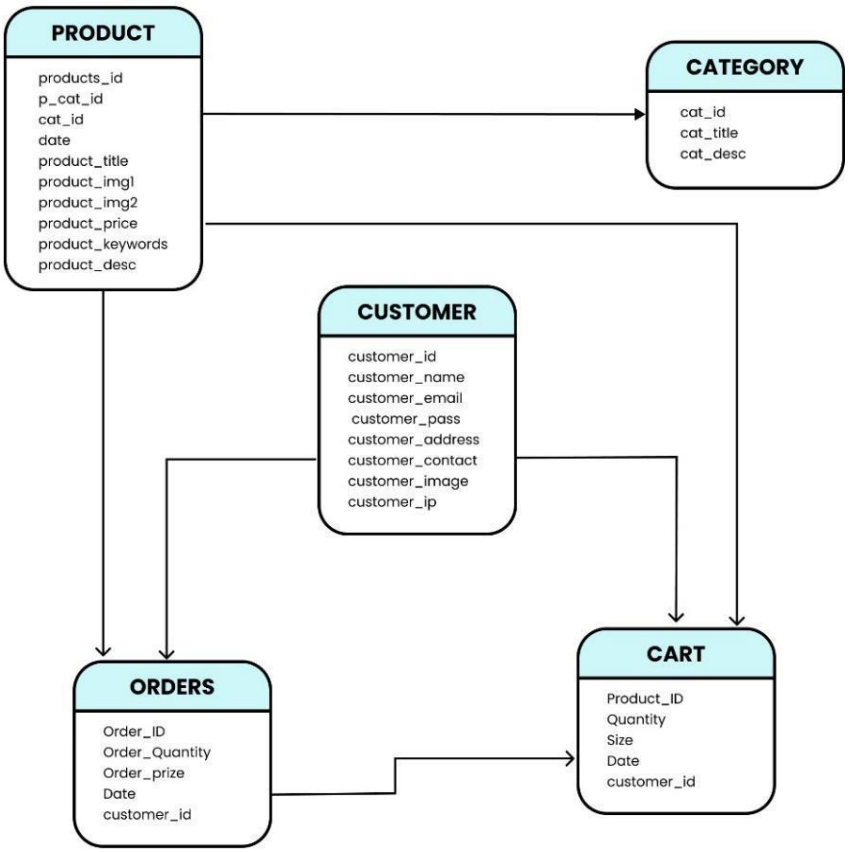

Fig. 7.2.1: Database Schema

7.2.2 Server Environment:

We have chosen XAMPP (Cross-Platform, Apache, MySQL, PHP, Perl) as our server environment for hosting the e-commerce website. XAMPP provides a comprehensive package that includes Apache HTTP Server, MySQL database, PHP, and Perl, making it suitable for developing and testing web applications locally. The use of XAMPP facilitates easy setup and configuration of the server environment, enabling developers to focus more on building and refining the website's features.

CHAPTER 8: RESULT AND DISCUSSION

Our results include a website that is navigated by voice. This website is created in such a manner that it helps the visually impaired shop online efficiently. The results include:

8.1 HOME AND LOGIN PAGE:

The Home page is the initial page the user sees, when they enter the online store. The features on Home page include: Profile, View Cart, Login, Shop products. The user can access these features via voice assistance.

If the user does not already have an account, he or she can establish one by pressing the key 1. For those who have created an account, they may log in using their registered username and password verbally using voice Assistance. On the signup page, the system will request basic information such as the user's Name, Phone No, Mail, etc.

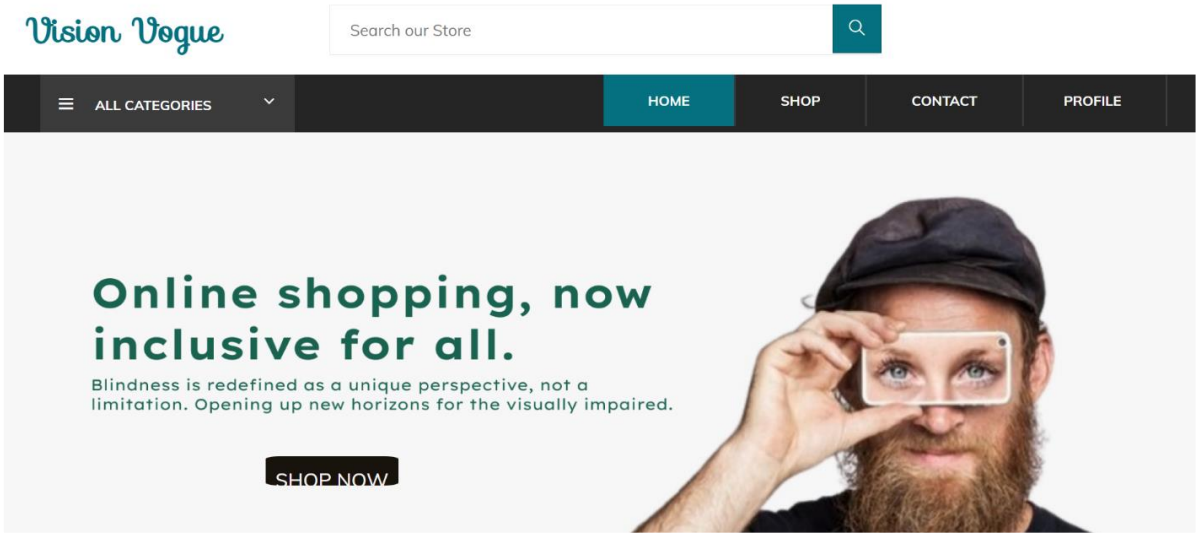

Fig. 8.1.1 : Home Page

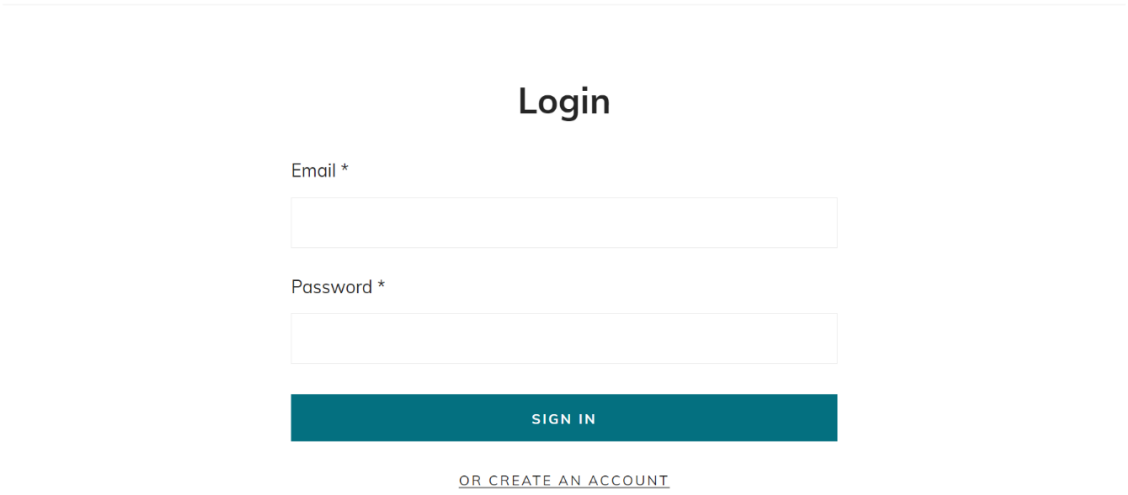

Fig. 8.1.2: Login Page

8.2 SEARCH AND PRODUCT PAGE:

The Search Page includes categories such as Men, Women and Kids. The user can search for their desired product using the voice interface.

For example: “I want T-shirt”.

In the product page the items searched by the user are listed. The user can press the Tab key to focus on each item , where the voice assistance would describe each product details.

For example: “Brand, Fabric, Price “etc.

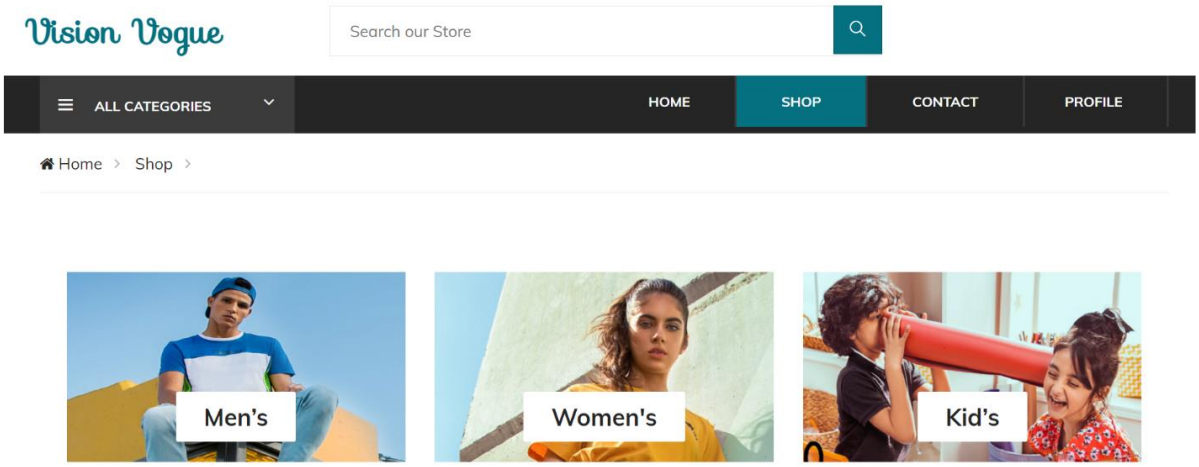

Fig. 8.2.1: Search Page

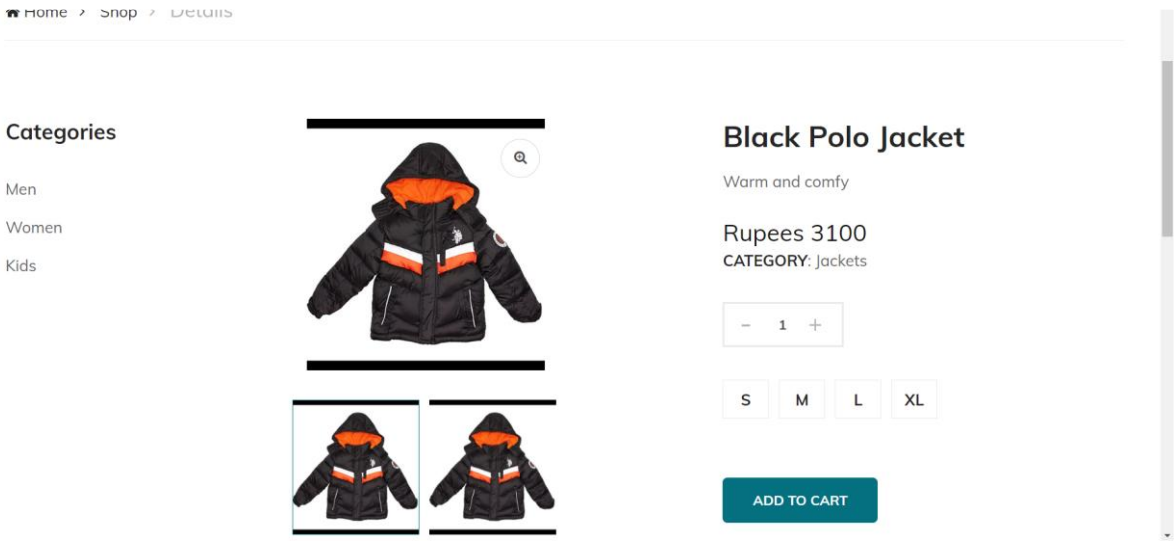

Fig. 8.2.2: Products page

8.3 CART PAGE

In the Cart page all the items added by the user are displayed. The user can now press the Number key to focus on each product and choose the item to send for purchase.

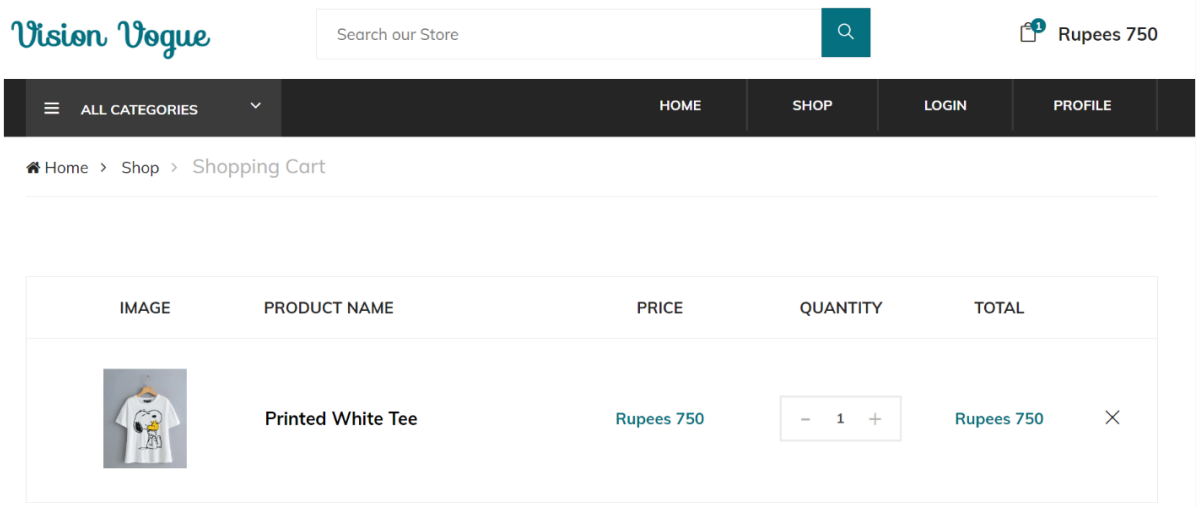

Fig. 8.3: Cart Page

8.4 PAYMENT METHOD PAGE

In the payment method page after the checkout page, the user is supposed to choose a payment they would like to proceed with using voice interface.

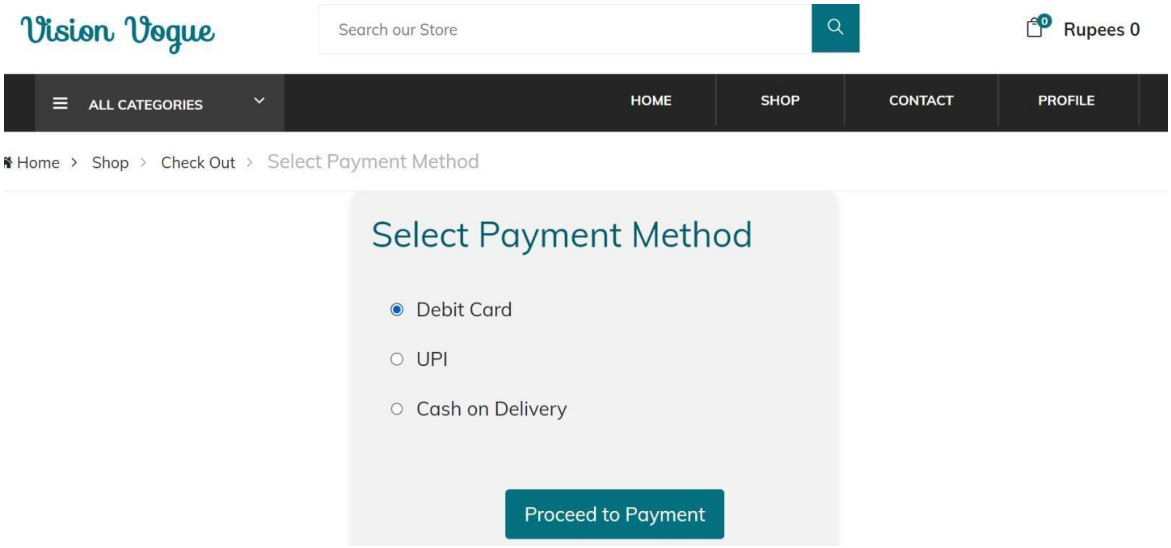

Fig. 8.4.1: Payment Method Page

8.5 CARD PAYMENT PAGE

In the card payment page, the user is supposed to fill in the details of their card like Card number, Exp month, Exp year, and CVV with the help of the voice assistance.

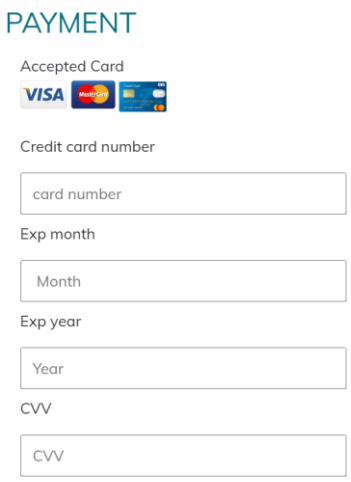

Fig. 8.5.1: Card page

8.6 ORDER PLACED PAGE

In the order placed page, the user is indicated that their order has been successfully placed.

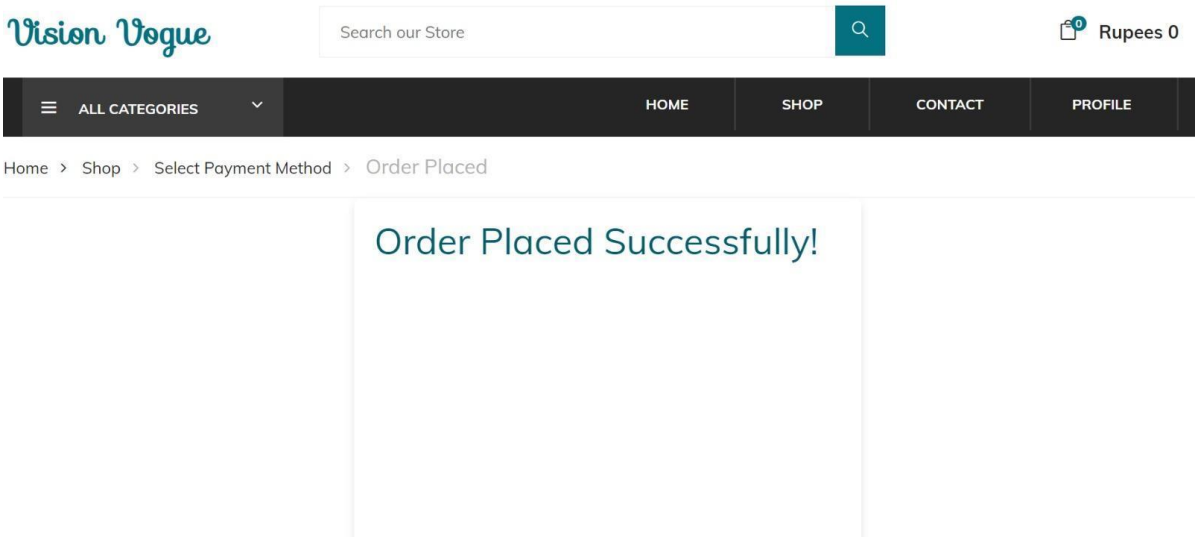

Fig. 8.6.1: Order Placed page

CHAPTER 9: CONCLUSION AND FUTURE SCOPE

9.1 CONCLUSION:

In conclusion, the development of this basic e-commerce website has provided a foundation for understanding the fundamental concepts involved in creating an online shopping platform. Throughout this project, we have covered the essential components of both the frontend and backend aspects, including product listings, user interface design, basic server-side logic and adding voice.

While this e-commerce website serves as a starting point to the visually impaired, there are numerous opportunities for further enhancement and refinement. By leveraging additional technologies, implementing advanced features, and adhering to best practices in web development, this project can be expanded into a more robust and user-friendly platform.

9.2 FUTURE SCOPE:

This e-commerce project's future scope includes a wide range of options for enhancing usability, scalability, and usefulness. The following are some possible areas for improvement and expansion:

1. **User authorization and authentication:** It includes setting up safe authentication procedures for user accounts and turning on functions like order histories, user profiles, and tailored suggestions.
2. **Payment integration:** It is the process of integrating payment gateways to enable safe online transactions with support for a number of payment options, including digital wallets, credit/debit cards, and online banking.
3. **Product management:** Adding functions to the admin panel such as inventory tracking, product classification, and automated reordering to make managing products easier.
4. **Advanced search and filtering features**: They are being implemented to assist customers in finding products fast by using parameters like category, price range, and product qualities.

5. **Responsive Design:** The process of making a website accessible to various screen sizes and devices so that users can access it easily on PCs, tablets, and smartphones is known as responsive design.
6. **Performance optimisation:** is the process of improving a website's code, making use of caching techniques, and reducing loading times in order to increase user satisfaction.
7. **Security Enhancements:** To protect user data and transactions, security methods including HTTPS, data encryption, and defence against common vulnerabilities like XSS and CSRF are implemented.
8. **Internationalization and Localization:** Supporting numerous languages and currencies to appeal to a worldwide audience and deliver a localised experience catered to the tastes of customers from various locations is known as internationalisation and localization.
9. **Analytics and Reporting:** Combining analytics software to measure user activity, keep an eye on the functionality of websites, and produce insights for well-informed choices and ongoing development.
10. **Social Media Integration:** To improve user engagement and reach a wider audience, social media integration tools, social login choices, and integration with well-known social media platforms should be enabled.

Through the integration of these improvements and further learning about new e-commerce trends and technologies, this project has the potential to develop into a competitive and all-encompassing online shopping platform that benefits both businesses and consumers.

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