FINAL YEAR PROJECT

UI/ UX RESEARCH & DEVELOPMENT FOR AUGMENTED REALITY BASED APPLICATION: E-COMMERCE

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Multimedia and Creative Technology

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DAFFODIL INTERNATIONAL UNIVERSITY

DHAKA, BANGLADESH

13 FEBRUARY 2022

APPROVAL

This Project titled **"RESEARCH & DEVELOPMENT FOR AUGMENTED REALITY BASED APPLICATION: E-COMMERCE"**, submitted by Eshrakur Rahman (ID: 181-40-482) to the Department of Multimedia and Creative Technology, Daffodil International University, has been accepted as satisfactory for the partial fulfilment of the requirements for the degree of B.Sc. in Multimedia and Creative Technology and approved as to its style and contents. The presentation has been held on 13th February 2022.

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DECLARATION

I hereby declare that this project has been done by me under the supervision of **Dr. Shaikh Muhammad Allayear, Professor & Head, and Department of MCT** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted elsewhere for the award of any degree or diploma.

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ACKNOWLEDGEMENT

First, I express my heartiest thanks and gratefulness to Almighty God for His divine blessing in making us possible to complete the final year project/internship successfully.

I am really grateful and wish our profound indebtedness to **Dr Shaikh Muhammad Allayear, Professor & Head**, Department of MCT Daffodil International University, Dhaka. Deep Knowledge & keen interest of our supervisor in the field of "*User Experince*" to carry out this project. His endless patience, scholarly guidance, continual encouragement, constant and energetic supervision, constructive criticism, valuable advice, reading many inferior drafts and correcting them at all stages have made it possible to complete this project.

I would like to thank my entire coursemate in Daffodil International University, who took part in this discussion while completing the course work.

Finally, I must acknowledge with due respect the constant support and patients of my parents.

ABSTRACT

E-commerce is rapidly expanding, that over a billion Internet users bought goods from e-commerce websites in 2013[1]. In reality, in 2019, retail e-commerce sales totalled $3.86 trillion, with e-commerce revenues expected to reach $5.48 trillion by 2022[2]. With a fast-rising user base, the digital retail sector has undergone a dramatic transition, forcing e-commerce companies to separate themselves from their competitors and employ innovative strategies to cater to their customers. As a result, rich media material has been included in websites to improve the customer experience, such as high-resolution product photos, movies, and 3D graphics. One of the most difficult aspects of online shopping is that it does not allow for a complete sensory product experience. You can try on items, touch fabrics, and see for yourself how big a couch looks in a room in a real shop. While those things aren't physically achievable in e-commerce, augmented reality (AR) applications provide a method to provide customers with more in-depth and comprehensive information about your products – all from the comfort of their own homes.

The main objective of this study was to create an augmented reality-based e-commerce platform that can tackle several long-standing issues. Also, with the e-commerce shop, improve the end-user experience. The app we created is useful in addressing those issues and providing solutions through the platform. We solved the real-time product experience problem with Augmented Reality (AR). We also addressed the user experience problem consumers faced during their online purchases and solve those problems with extensive user research and user testing. The project is meant to overcome the drawbacks of the existing user experience problems with e-commerce.

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CHAPTER 1
INTRODUCTION

1.1 Background

Technological advancement makes it easier for people to adopt it in many aspects of their lives. One of them is electronic commerce. Electronic commerce, commonly known as E-Commerce, refers to a business conducted over the internet. It includes internet-based commercial practices such as purchasing and selling things, services, and information. In business, it mostly employs communications based on digital information technology. It uses communication and information technology to provide a platform for buyers, sellers, and other stakeholders to share information about products and services. Figure 1 shows the generic e-commerce platform.
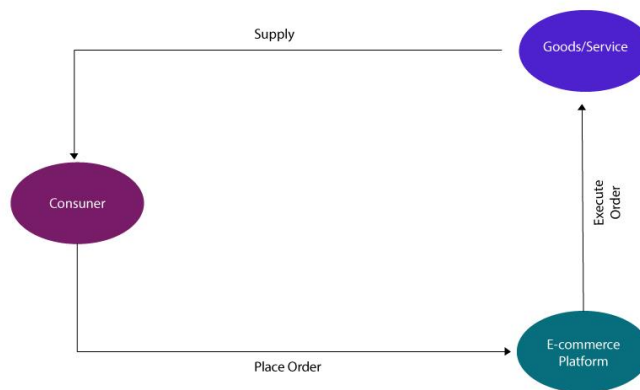

Figure 1.1 shows a general outline of an e-commerce

The worldwide e-commerce market was valued at USD 9.09 trillion in 2019, with a compound annual growth rate (CAGR) of 14.7 per cent predicted from 2020 to 2027[3]. In 2019, Asia Pacific dominated the e-commerce market with a 55.31 per cent share. This is

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due to a rising propensity among enterprises to conduct business via B2B e-commerce platforms, expanding infrastructure, and an increase in the number of internet users. Alibaba Group Holding Limited, Amazon, Apple, Dell Technologies, Flipkart Pvt. Ltd., Gome Electrical Appliance Holdings Ltd., JD.com, Macy's Inc., Otto Group, Sunning Commerce Group Co. Ltd. and Walmart are some of the major companies in the global e-commerce business. Several countries that had previously lagged behind began to shop more online during the Pandemic. In 2021, several of these will continue to grow significantly. Since 2020, several national and regional rankings for retail online sales and growth have remained mostly unchanged. In China, for example, customer size and purchasing power are still important determinants.

Bangladesh has also kept up with global trends. Over the last three decades, the country has seen continuous socio-economic growth. Bangladesh must adopt increasing levels of mechanization, industrialization, and contemporary technology as it strives to become an upper-middle-income nation (UMIC) by 2031 and a developed economy by 2041[4].

Bangladesh, like the rest of the globe, is advancing in E-commerce. According to the German research company Statista, Bangladesh's GDP has surpassed one and a half billion dollars and is predicted to reach two billion dollars this year and three billion dollars by 2023[5]. The spreading epidemic has confined the whole globe to their houses, but that does not imply that market demand has decreased. During the COVID-19 Pandemic, e-commerce was revolutionized. When compared to the preceding period, internet sales have climbed by 70 to 80 percent [6].
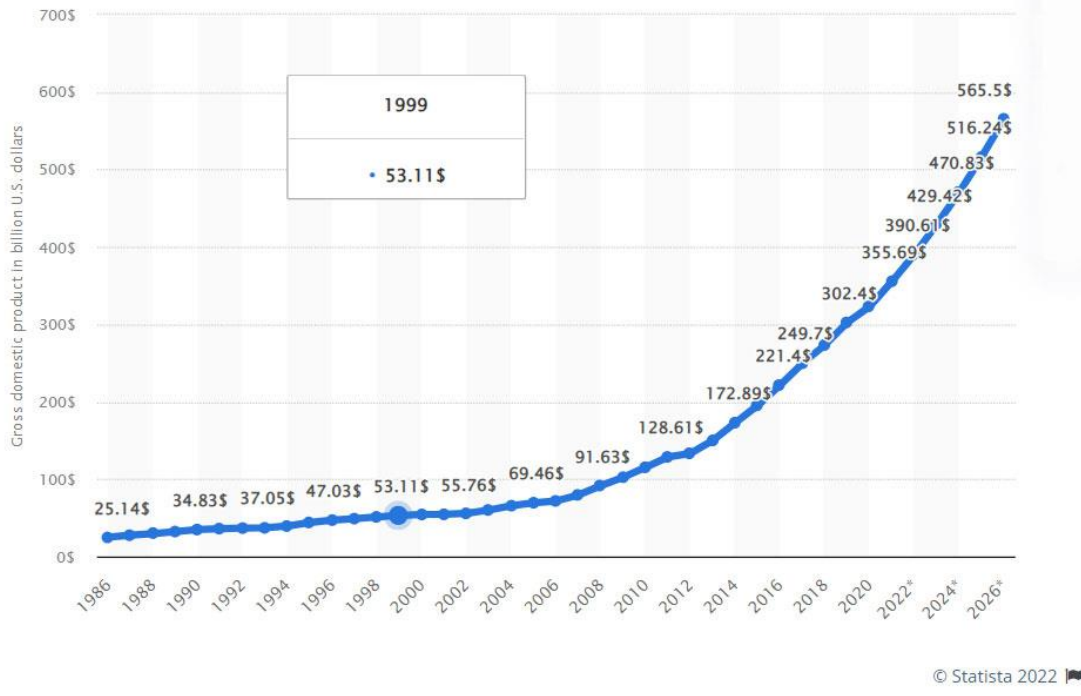
Figure 1.2 Gross domestic product (GDP) in Bangladesh 2026

The e-commerce or online purchasing market in Bangladesh has reached TK.6,000 crore, according to the e-Cab (E-Commerce Association of Bangladesh). E-commerce transactions currently total more than TK.8000 crore every year. In Bangladesh, 1200 organizations are now involved in this industry.
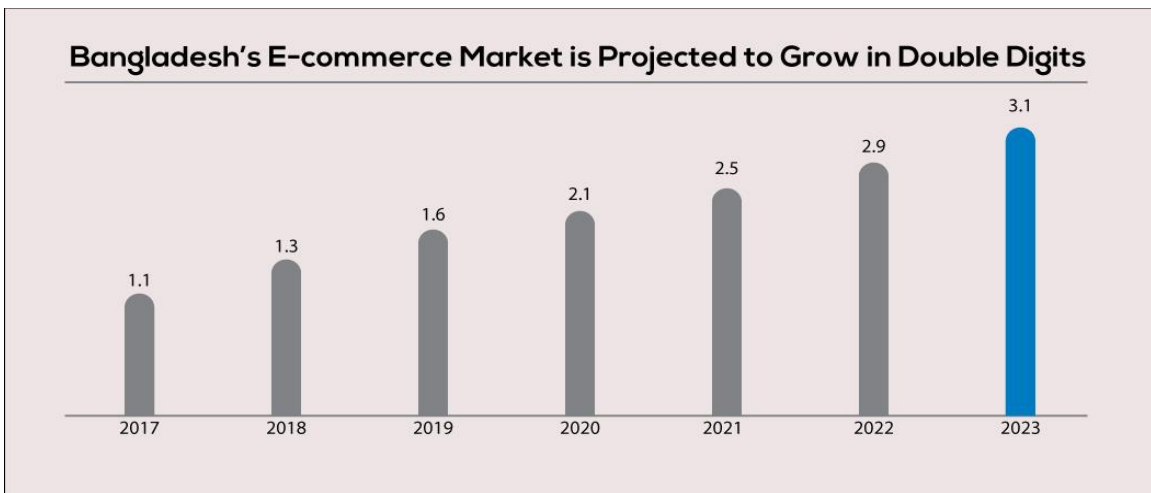
Figure 1.3 E-commerce market projected growth in Bangladesh

There are definitely certain issues that are preventing Bangladesh's e-commerce platform from expanding. The absence of online payment options and fraudulent schemes are two big difficulties. Consumers are eager to purchase online, yet there are few solutions for customer satisfaction.

Figure 1.4 Total card users in Bangladesh

1.2 Motivation

During this epidemic, the e-commerce industry soared to new heights, with individuals purchasing more things online than ever before. On the other hand, the consumer experience has not improved over time. Customers are still making purchases in the same way they were before. There is no chance to test the product before making a purchase. The only way to obtain a sense of the product is to read the product description and look at the product photographs provided by the vendor. Customers may purchase the incorrect thing, or the product may look entirely different from the image.

We looked into this issue and attempted a different method to solve it. Finally, after much discussion and research, we concluded that Augmented Reality may be a solution to this problem and that the e-commerce industry in Bangladesh offers a significant opportunity in that.

However, Augmented Reality has been around for a while. And while its popularity grows by the day, e-commerce platform adoption remains low. Because infrastructure and other needs are lacking, especially in underdeveloped nations like Bangladesh. In this corner of the world, user experience is really poor. In our nation, there is relatively little study on user experience and user demands. On the other hand, e-commerce in the nation is growing at a rapid pace. However, with so much demand, there is still a lot of work to be done on the user experience. Keeping this in mind, we chose to employ an e-commerce platform to bridge the gap between customer and vendor, solving those user experience issues.

To address our problem, we conducted a SWOT analysis. We observed that Augmented Reality can resolve capable of resolving the current issues facing the e-commerce platform. That is why we chose to create our product on an augmented reality-based e-commerce platform. `

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1.3 Objective

Our primary goal with this product is to provide consumers with the same experience they have when purchasing things in-store. Our solution has the potential to resolve a number of unresolved issues that the e-commerce platform is now experiencing. One of the primary issues is that people still want to touch and view the goods before purchasing it, as well as see how it appears or may look in various situations. We address these concerns by incorporating augmented reality capabilities into our e-commerce platform. The second primary objective was to create a user interface that was accessible to individuals of all ages. The purpose of this endeavor is as follows:

A. The main purpose of our project is to deliver a unique solution for our customers through Augmented Reality.
B. Improve customer satisfaction through live products visualization
C. Less hassle to choose the right product
D. Easy payment system
E. Easy navigation through our app

CHAPTER 2
PREVIOUS WORK

Augmented reality (AR) is one of the most exciting technological developments right now, and it's only going to grow in popularity as AR-enabled smartphones and other devices become more widely available. AR enabled us to view the real-world environment directly in front of us—trees swinging in the park, dogs chasing balls, and children playing soccer—but with a digital overlay. For instance, a pterodactyl may be seen landing in the trees, dogs may interact with their animated counterparts, and children may be seen kicking past an extraterrestrial ship on route to scoring a goal. It goes without saying that all prior research and efforts in the field of Augmented Reality cannot be summarized in one single document. However, we concentrated on the research that was most pertinent to our study.

2.1 Augmented Reality in the education sector

Individuals often gain information or knowledge through a variety of mediums. The traditional 'verbal' instructional style, on the other hand, is not always beneficial [7]. Many studies [8][9] have shown that students who rely only on lectures are unable to recollect information and appear to struggle to complete a task. Regardless, many educational institutions continue to employ inefficient and non-interactive methods, which frequently result in a lack of enthusiasm among students. As a result, educators are obliged to look for new ways to assist students to enhance their learning experiences.

There are several teaching methodologies that make use of AR affordances. Collaborative learning, for example, has been utilized to create AR learning environments. However, collaborative AR has received much too little attention, hence the purpose of this study is to evaluate the literature on collaborative AR learning, how it has been employed in prior studies, and its pedagogical potential.

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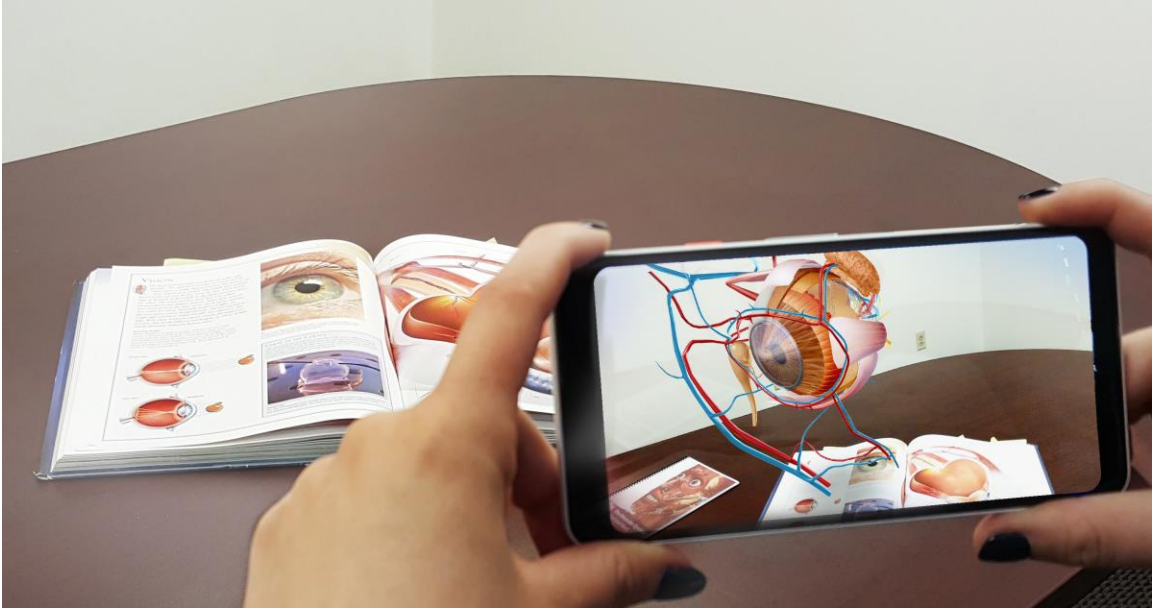
Figure 2.1 Augmented Reality used in medical studies

Figure 2.2 Augmented Reality used in a classroom

2.2 Augmented Reality in the healthcare sector

By integrating the virtual and physical worlds, more life sciences businesses are utilizing augmented reality (AR) to bring innovative medicines to life. AR enables the creation of rich, interactive experiences that demonstrate the interaction of new medications and medical technologies with the body. Through the use of this revolutionary technology, brand teams and content suppliers may create a more practical approach for their field force to engage healthcare practitioners (HCPs). AR also enables HCPs to be more illustrative while educating patients about new medicines.

Whether it's demonstrating a disease state, a treatment procedure, or the operation of a new medical gadget, augmented reality may significantly increase consumer engagement, improve teaching on complicated issues, and generate difference through more potent branding.

Figure 2.3 Augmented Reality used in the healthcare sector

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Most significantly, augmented reality enables life sciences businesses to convey a captivating tale about how the body experiences sickness and subsequently reacts to a new therapy at various phases of the condition. HCPs have a better understanding of how a new product can benefit patients throughout the illness progression process, allowing them to communicate this to patients.

With a rising population, the country's healthcare system must keep pace with advancements in medical technology in order to maximize efficiency and better assist people in desperate need of medical treatment. Simulators utilized in surgical education across the country can assist in ensuring that each member of a learning group is conversant with difficult procedures. The ability to learn via participation is anticipated to result in a more optimum transfer of training when these individuals exercise their surgical abilities on actual patients in the future, hence improving the country's medical care quality.
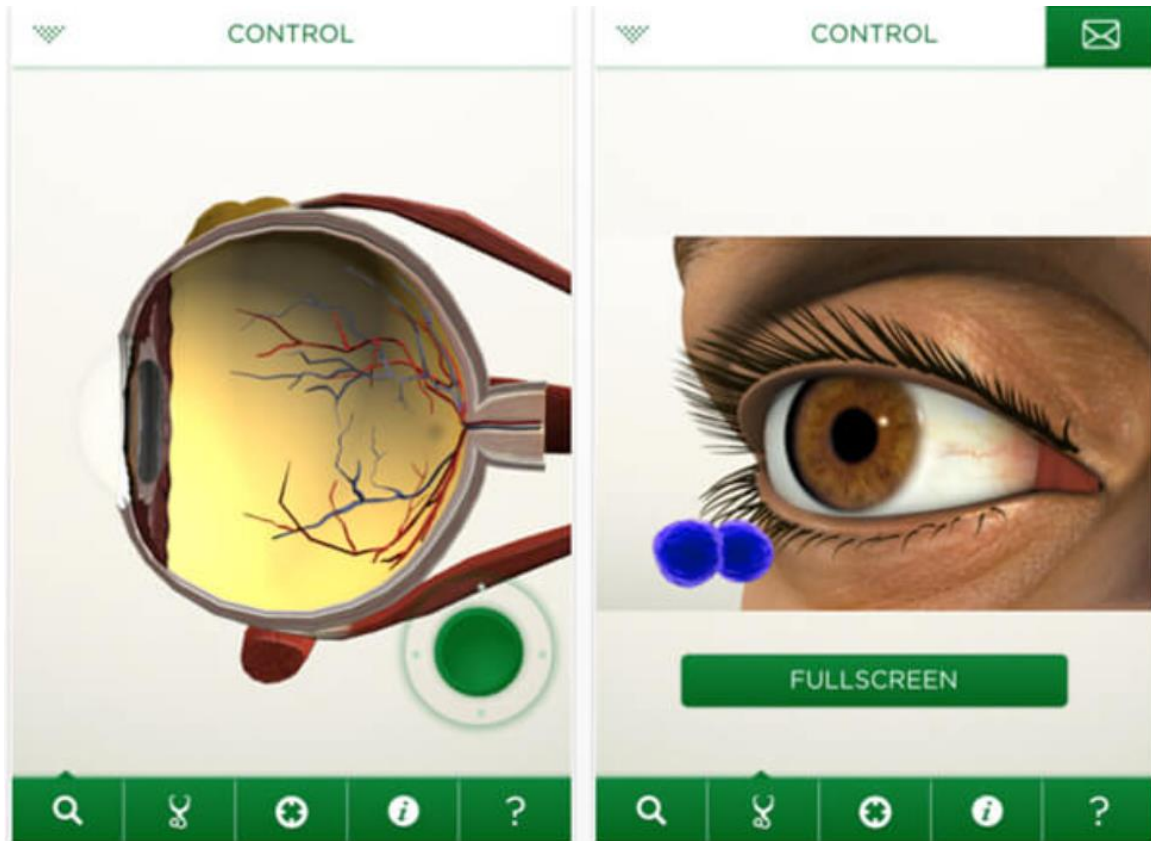
Figure 2.4 Augmented Reality used to care eye

2.3 Augmented Reality used in the game industry

Following the introduction of virtual reality into the physical world, augmented reality (AR) was born, which is a creative and immersive experience that enables people to feel delighted after engaging with the digital environment directly. Augmented reality is a real-time blend of game images and audio material that assists in the development of an artificial world. In the game business, augmented reality is utilized to establish a play zone within an already-created artificial world. When used on smartphones, tablets, or gaming consoles, this technology has been known to overload consumers. The first commercial deployment of augmented reality technology was the yellow-coloured "first down" line that appeared during a 1998 football game.

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This technology has had a significant influence on the game industry since the advent of the interactive experience of a real-world world situation in which every object in the actual world is augmented. It profoundly affected the technological world, affecting sectors like healthcare, e-commerce, marketing, automotive, education, military, and retail. The augmented reality gaming market is on track to reach the anticipated value of around $385 billion by 2023.

Figure 2.5 Augmented Reality used in a shooting game

The primary difficulty with augmented reality is that people are unaware of its existence. AR and VR material may take on a variety of formats, which may cause misunderstanding. There is still some uncertainty over whether customers are aware these technologies are available to them or if they are conscious they are engaging in augmented or virtual reality when they utilize them. In a recent GWI survey done in the United Kingdom and the United States, we discovered that over 90% of consumers in these countries are aware of VR, while over 65% are aware of augmented reality. AR

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awareness maintains between 70% and 75% among 16-44 year-olds but reduces substantially to 56% and 56% among 45-54-year-olds and 55-64 year-olds, respectively (44 percent). Males (71 percent) have a significantly higher level of awareness about AR than females (59 percent). This has resulted in a narrow emphasis on the augmented reality sector. But still, AR usages increasing day by day.
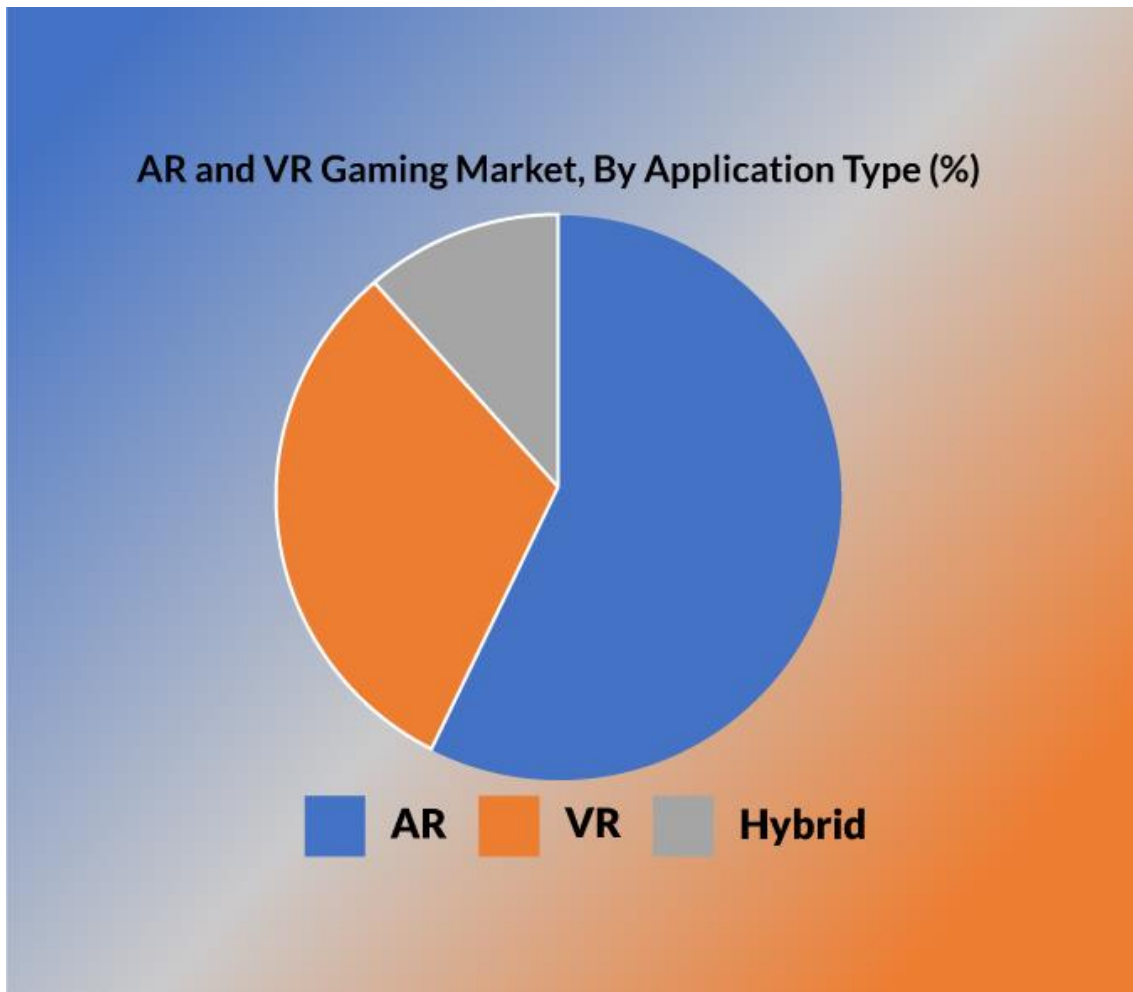

Figure 2.6 Augmented Reality and Virtual Reality usages in the game industry

2.4 Augmented Reality in the e-commerce sector

The use of augmented reality in e-commerce web design creates an immersive experience for consumers, allowing them to interact with items in real-time while remaining in their

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location. Augmented reality (AR) helps customers bridge the divide between in-store and online buying experiences.

Augmented reality (AR) helps customers narrow the gap between in-store and online buying experiences. A gap that has grown even larger as a result of the Covid-19 outbreak, which has forced retailers to close, preventing people from entering stores and physically handling things.

According to PwC's Global Consumer Insights study, prior to the pandemic, people preferred to purchase in-store for non-food products, with 47% preferring this approach over purchasing via mobile phone.

Since the epidemic began, the percentage of people shopping online through mobile phones has climbed to 45%, according to PwC's analysis[10], as has the percentage of people shopping online via PCs and tablets. Consumer behavior has shifted as a result of the Covid-19 epidemic, with PwC stating that "global disruption has accelerated the acceleration of a more digital way of life."

This notion is bolstered by a recent Office for National Statistics study on retail sales in the United Kingdom. According to the ONS, February 2021 saw the greatest level of internet purchasing on record, with 36.1 percent of retail sales being spent online. This is a significant rise above pre-pandemic retail sales, with 20% of online retail sales recorded by ONS in February 2020[11].

Therefore, with Covid-19 regulations preventing customers from purchasing in-store and consumers increasingly dependent on online shopping channels, here are some ways that augmented reality technology might assist e-commerce.

Ikea is another store that is dominating the augmented reality e-commerce space. They created an augmented reality version of their catalog in 2014. Additionally, a group of

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students developed a function that enabled users to search for recipes using the ingredients currently on their Ikea kitchen table.
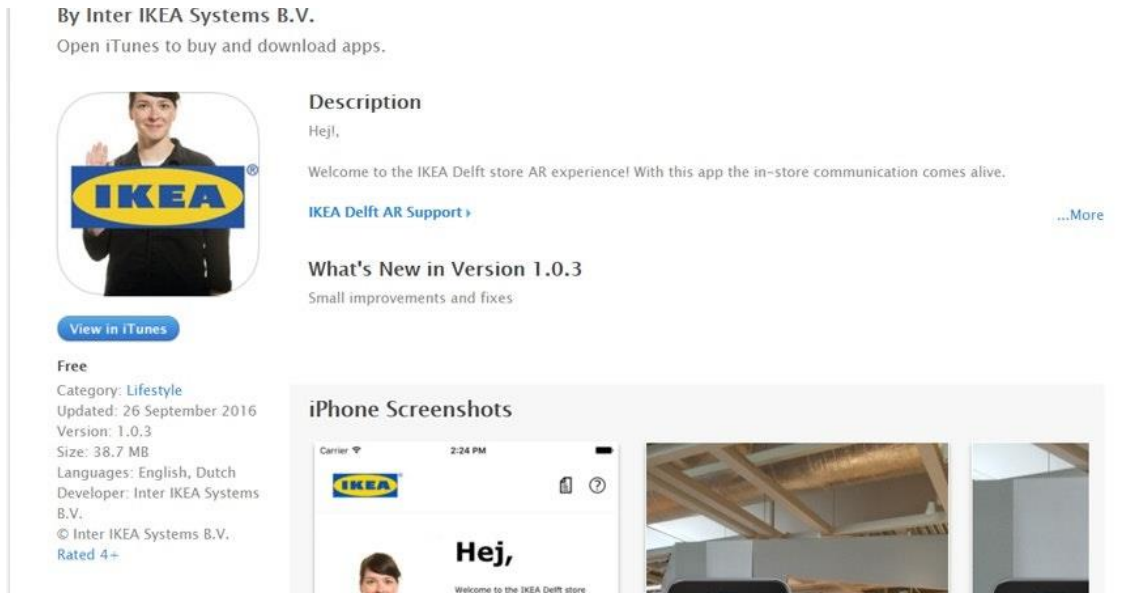
Figure 2.7 IKEA using Augmented Reality in their app

2.5 Augmented Reality in the travel & vacation industry

Augmented reality has made significant strides in the last few years as a result of advancements in smartphone technology. It has developed as a valuable tool for organizations and marketers, in particular, allowing them to influence how customers perceive their environment. This has proved especially advantageous for individuals in the tourism business since they frequently market experiences or physical settings that may be enhanced via augmented reality. This essay delves deeper into the influence of augmented reality on the tourism sector.

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The travel and tourism industry is a well-researched sector. Customers in the tourism sector always plan their journeys, stays, and culinary destinations meticulously. Even after consumers arrive at their desired trip location, their chase of facts and knowledge continues. Additionally, all of this information is accessed via various mobile devices.

When viewed through a certain gadget, augmented reality, or AR, alters a person's experience of their physical environment. While the technology is comparable to virtual reality, it augments the real-world environment by superimposing digital components.

Perhaps the most well-known example of an augmented reality application to date is Pokemon Go. However, technology has expanded beyond the realm of games and into the realm of marketing. Typically, marketers will utilize augmented reality to augment an environment viewed through a suitable device with images or relevant information.

In most cases, augmented reality is accessed via a smartphone, tablet, or other comparable devices. As a result, it is more affordable for the customer than the majority of virtual reality headsets or gadgets. In many situations, augmented reality is used in conjunction with other mobile technology, such as cameras and GPS tracking.

Figure 2.8 How Augmented Reality revolutionizing the traveller's experience

People travel for a variety of reasons, including to recharge their batteries, renew their bodies, and revitalize their brains. Tourism enables people to discover and appreciate new experiences and sites inside their own country or abroad. Tourism is a big sector, and augmented reality is an incredible weapon in the hands of a marketer. These two factors may be combined to create a spectacular experience for passengers.

CHAPTER 3
USED SOFTWARE

E-commerce is a significant business, and it's regularly increasing. To transform an e-commerce idea into Reality, we had to go through particular processes and employ serval tools to construct a prototype. In this project, we have utilized several software throughout the process, and we will explain those in this chapter. Our idea is built on e-commerce and how we can incorporate Augmented Reality. We have created our app in such a manner that Augmented Reality can alleviate numerous challenges that's every e-commerce platform presently experiencing. We have done our job in four phases. Those are:

A. Research Phase
B. Sketch and Wireframe
C. Main UI Design
D. User Testing and Journey Map

3.1 Research phase

User research should always come before UX strategy since it assists in the elimination of erroneous assumptions throughout the design process. Additionally, it assists you in identifying the proper personnel to help you advance your product, make essential modifications, and continue iterating on your product design.

We conducted research in several phases. To begin, we conducted a personal interview with a select sample of individuals. After that, we analyzed the data and proceeded to the following steps. The following stage was to design a survey form. We made use of an internet tool called Typeform. Because it was simple to collect a large amount of data at once and to analyze it.

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3.1.1 Typeform

Typeform is an attractive online survey program that enables small company owners to develop and deliver surveys to relevant audiences. Typeform is a survey software tool that enables you to construct distinctive and memorable online questionnaires. It is fully web-based and provides two plans: the free basic package and the PRO plan, which includes features tailored to small company owners' requirements [12]. This survey software tool excels at integrating design concepts and question-building processes to maximize the effectiveness of each survey. The support team is available and eager to assist you in developing the finest online surveys possible.

Figure 3.1 Typeform logo

They are fascinating and enjoyable to complete since they are beautifully designed and ask one question at a time, similar to a genuine discussion. This combination leads to high completion rates for Typeform, which means you can obtain better and more results.

The platform was used to produce and share the form. It's an excellent tool for creating this type of survey.
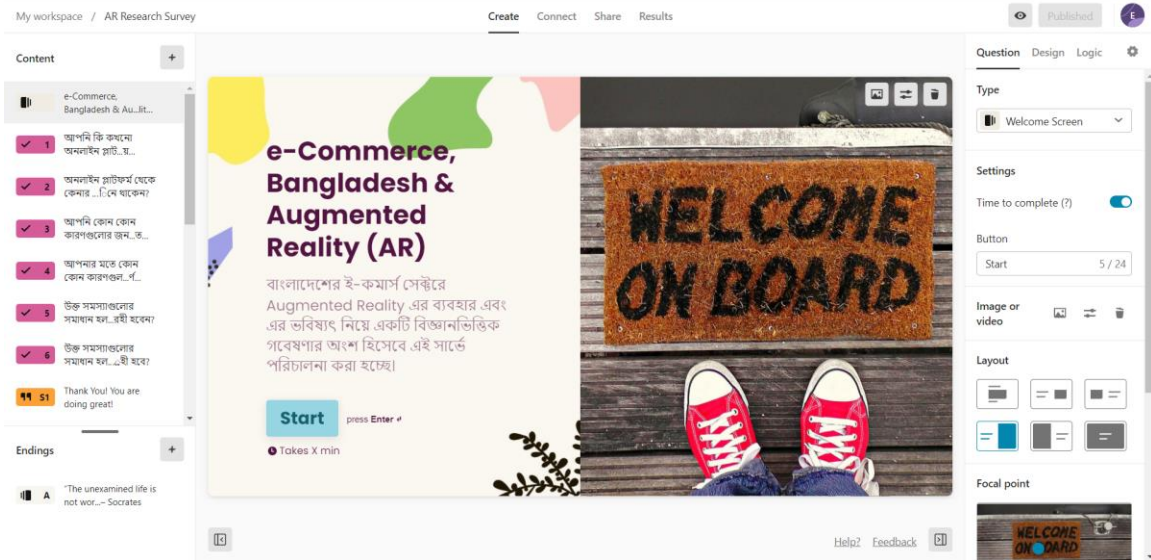
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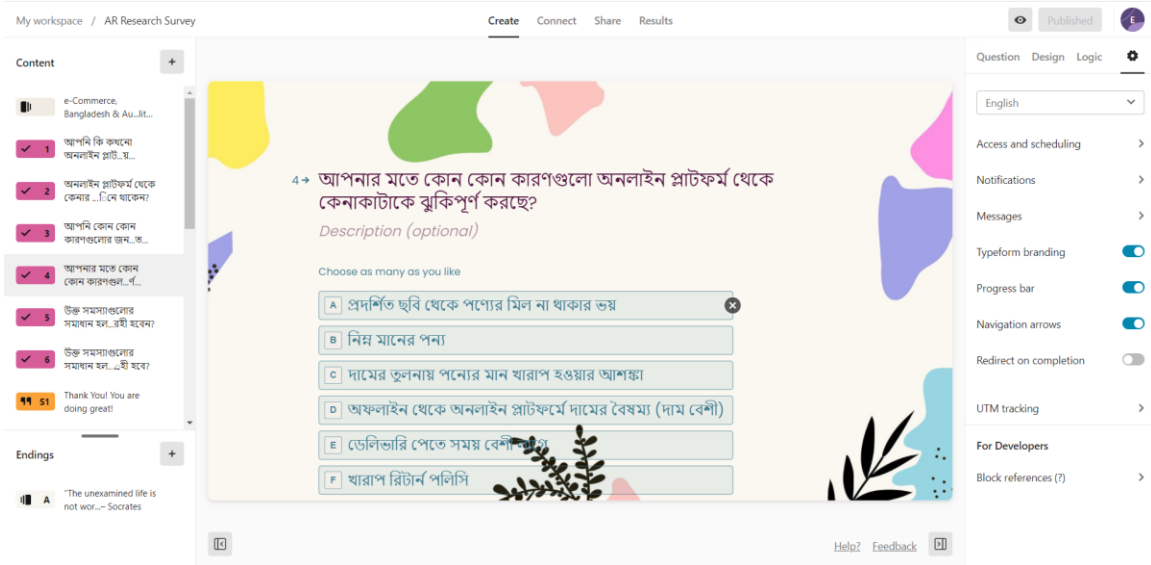Figure 3.2 Creating questioner for the survey in Typeform

Figure 3.3 Organizing question in Typeform

3.1.2 Google Sheets

Google Sheets is included with the Google Docs Editors suite of free web-based applications, offers spreadsheets functionality. Google Docs, Google Slides, Google Drawings, Google Forms, Google Sites, and Google Keep are also included in the service. Google Sheets is accessible online as a mobile application for Android, iOS, Windows, and BlackBerry and a desktop program for Google's Chrome OS. Microsoft Excel file types are supported by the program. People may create and modify files online while working in real-time with other users. Each user's edits are monitored, and a revision history illustrates the changes. The position of an editor is indicated by a custom color and cursor, and a permissions system controls what users may do. Updates include new machine learning-based capabilities, such as "Explore," which provides responses to natural language inquiries in a spreadsheet.

Figure 3.4 Google sheets logo

We collected data using Typeform and organized it into separate spreadsheets in Google Sheets. Thus, we can have a deeper understanding of our percipient insight. Additionally, we developed a graphic based on the data from the form.

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Figure 3.5 Data collection in Google Sheets

3.2 Sketch and Wireframe

The objective of a wireframe is to express and explore the concepts that emerge from sketching—that is, the notions that you want to pursue further throughout user interface design. Wireframing enables us to define the fundamental structure and flow of a Web site and to explore alternative ideas from our designs.

3.2.1 Sketch

Bill Buxton, an expert in human-computer interaction and a principal designer at Microsoft Research, believes that software development needs a "design process" that enables user experience (UX) designers to achieve clarity about their design choices before developing a system[13]. With this in mind, Buxton and his colleagues wrote Sketching User Experience: Getting the Design Right and Sketching User Experiences: The Workbook to assist UX designers in rediscovering sketching as a time-tested tool in

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the design of digital technology experiences. For the busy designer, we've distilled the core principles from both books to help you (re)discover how to better your everyday job via sketching.

Sketching is a unique kind of sketching that we utilize as designers to propose, explore, revise, and express our ideas. As a UX designer, you can also use sketching as a first line of defense while attempting to solve a design challenge.

We have done our sketch with pen and pencil. We also used a whiteboard to finalize our sketch.
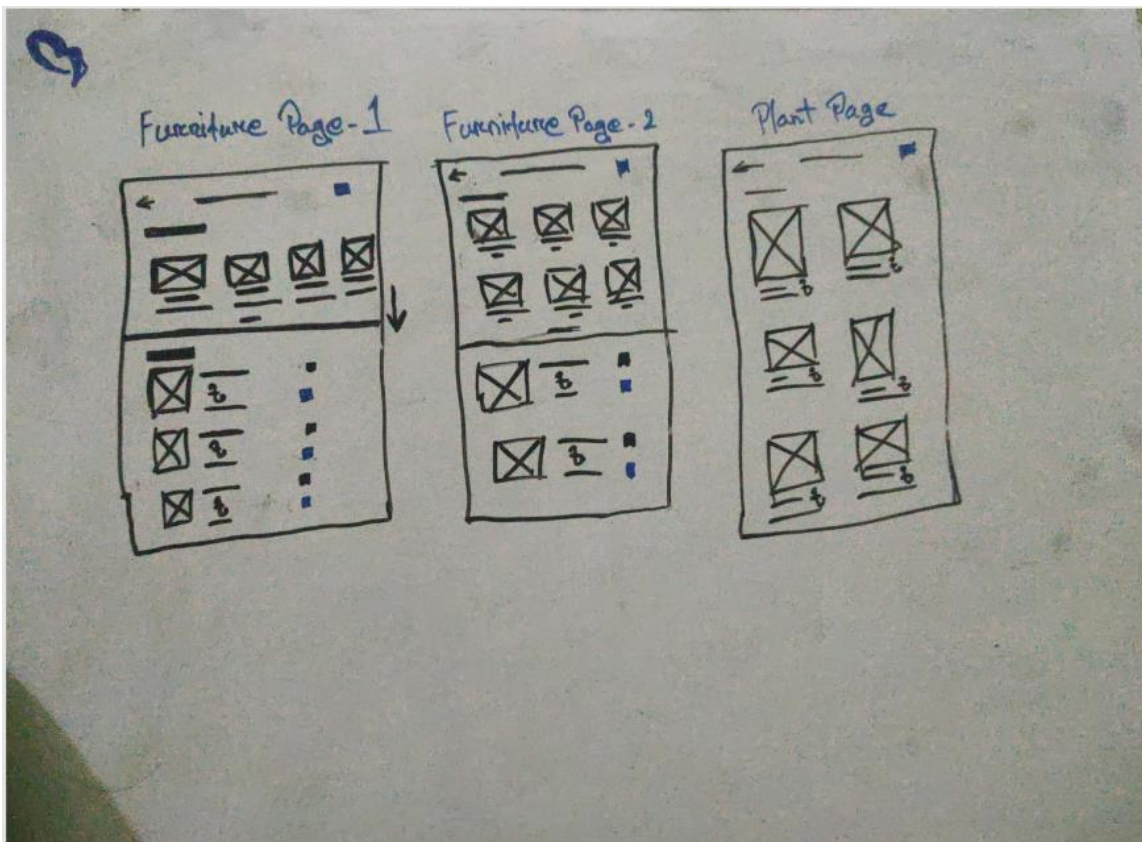
Figure 3.6 Our sketch process
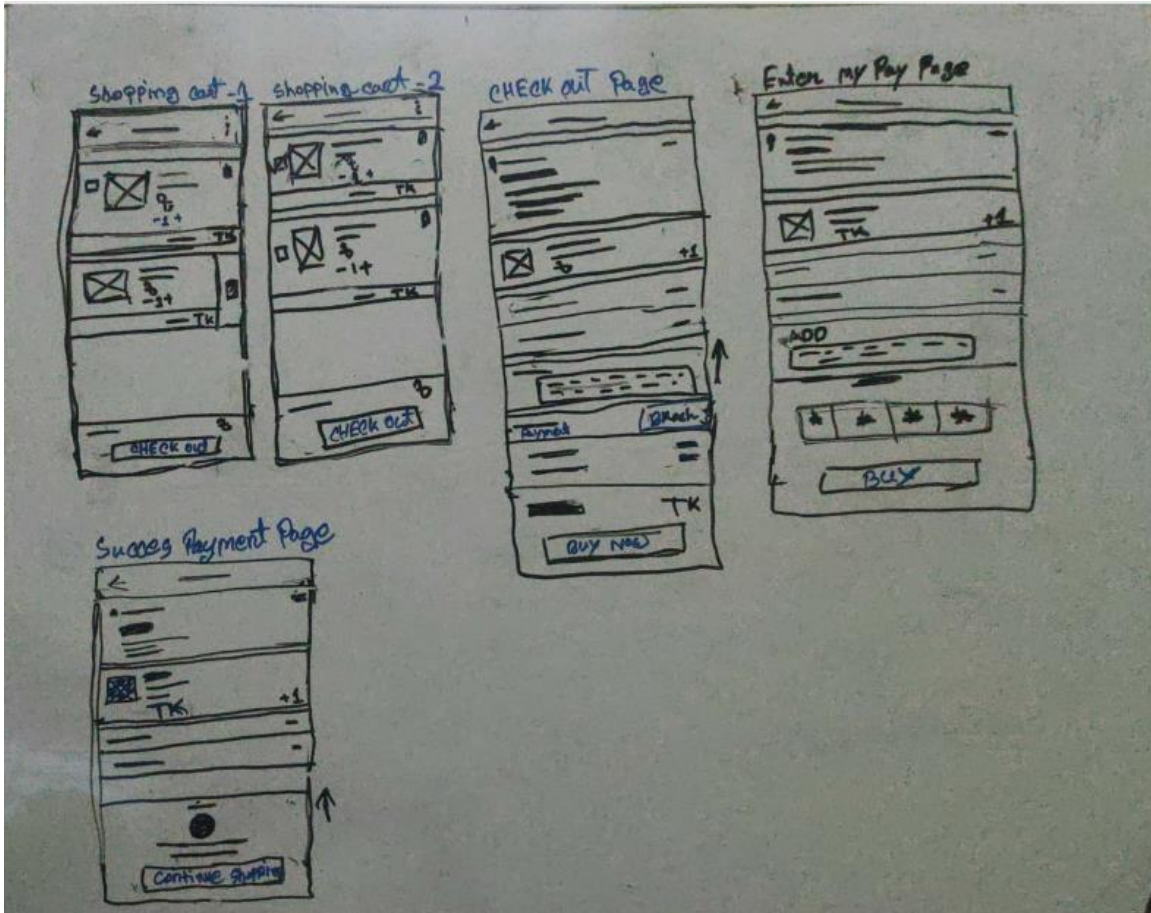
Figure 3.7 Our main page sketch process

3.2.2 Balsamiq

Designers use wireframing to create overviews of interactive products in order to determine the structure and flow of potential design solutions. These diagrams are based on user and business requirements. Wireframes, whether drawn on paper or in software, aid teams and stakeholders in developing optimum, user-focused prototypes and products.

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Our low-fidelity wireframe was created using the Balsamiq program. Our wireframe was constructed based on our sketch. The wireframe clarifies our concept, however, it is not the final design.
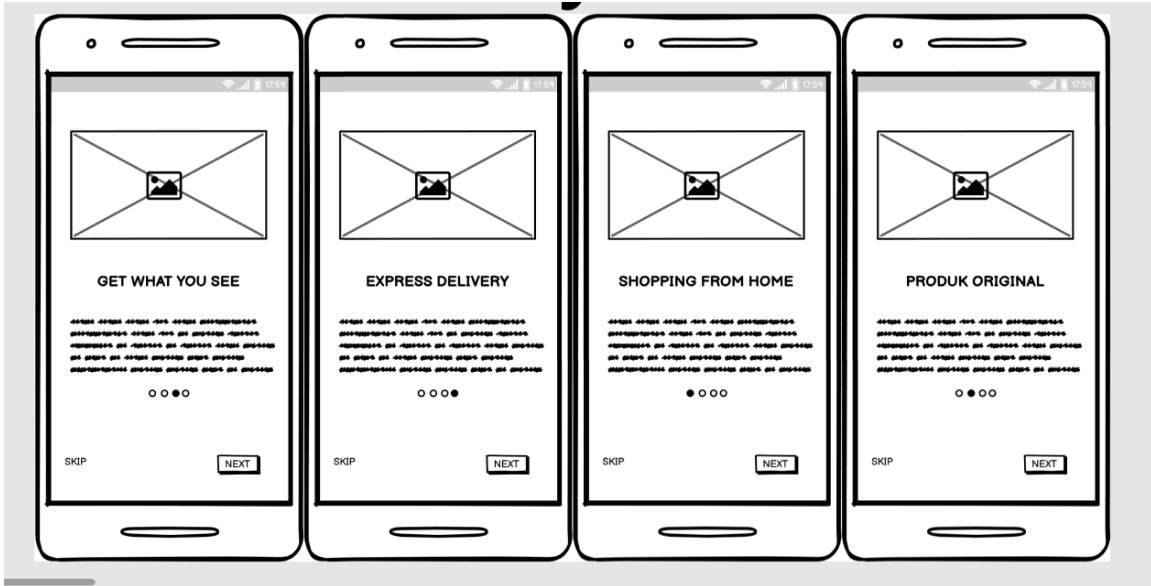
Figure 3.8 Wireframe creation in Balsamiq
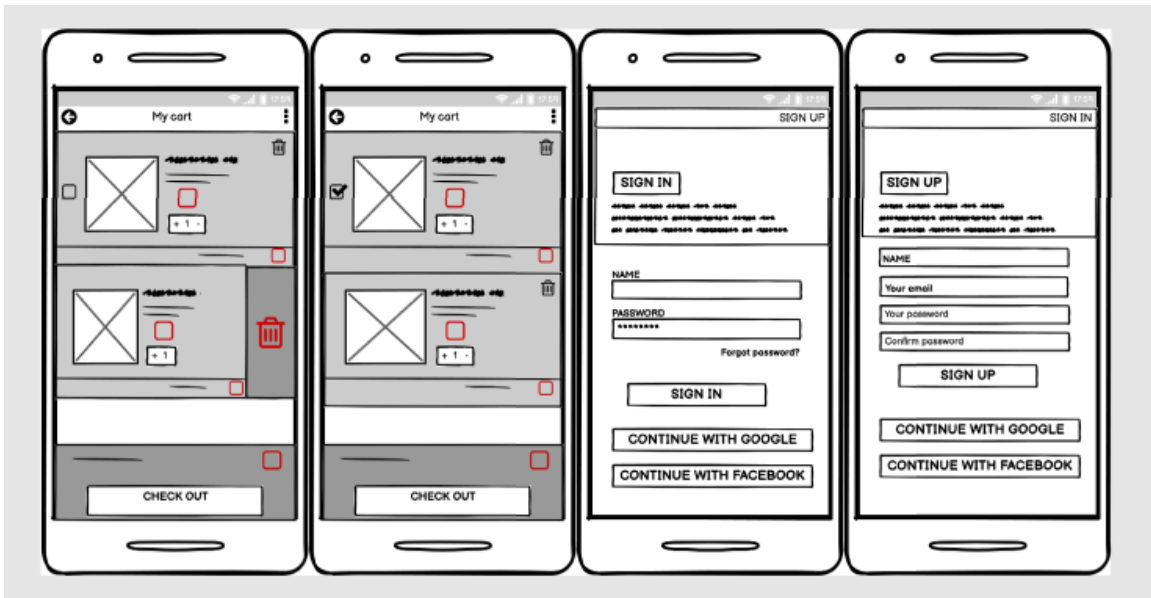
Figure 3.9 Wireframe creation process

3.3 Main UI Design

The design of user interfaces for equipment and software, such as computers, home appliances, mobile devices, and other electronic devices, with the goal of optimizing usability and the user experience, is known as user interface design. We used Figma as our main UI design software.

3.3.1 Figma

Figma is a vector graphics editor and prototype tool that is mostly web-based, with desktop apps for macOS and Windows enabling extra offline functionality. Figma prototypes may be viewed and interacted with in real-time on mobile devices using the Figma mobile app for Android and iOS.

Another reason designers like Figma is that it has a generous free plan that allows you to create and save three active projects at once. Learning, experimenting, and working on modest projects is more than enough for you.

Figure 3.10 Design process in Figma
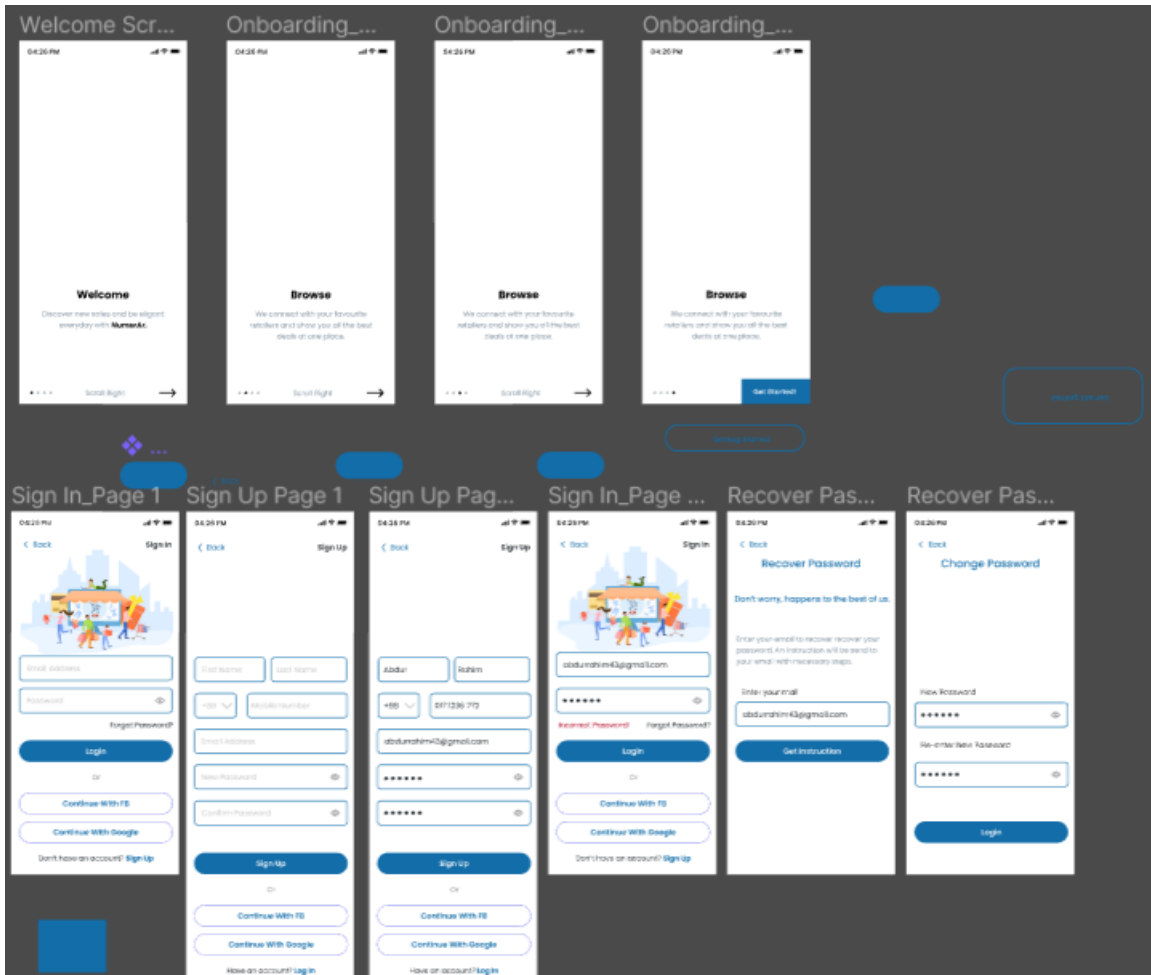
Figure 3.11 UI design process in Figma

3.4 User Testing and Journey Map

Usability testing is a user-centered interaction design approach for evaluating a product by putting it to the test on real people[14]. This is an essential usability strategy since it provides immediate feedback on how real users interact with the system.

A user journey map (also known as a customer journey map) is a graphic that shows how users move around your site, starting with initial contact or discovery and progressing through the engagement process to long-term loyalty and advocacy.

We used Figma to create our user journey maps and conducted in-person interviews for user testing.
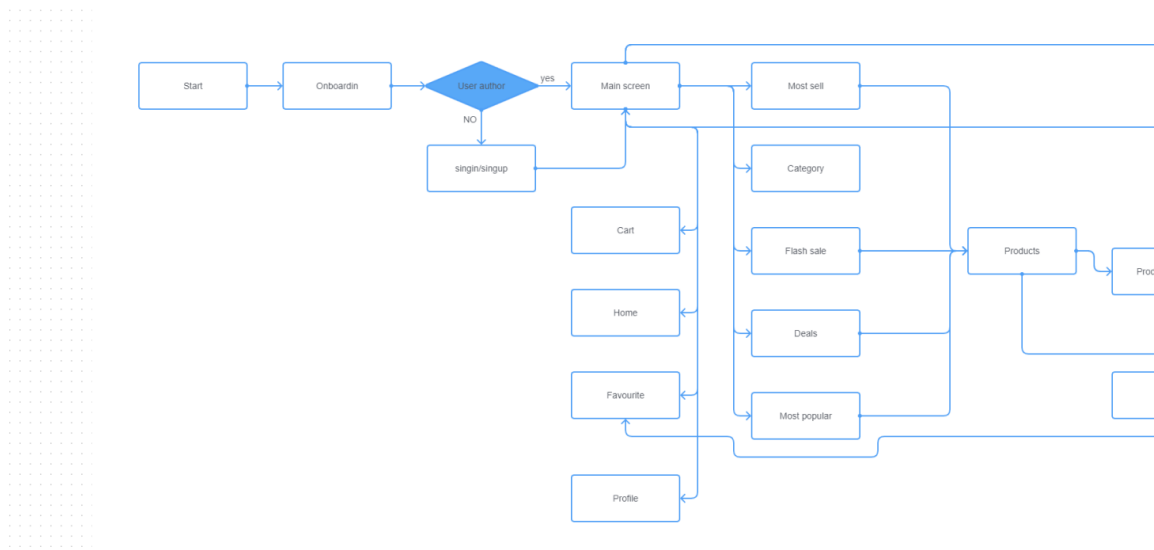
Figure 3.12 User Journey Map creation process

CHAPTER 4
METHOD OF DEVELOPMENT

This is a thoroughly studied project. To begin, we conducted a SWOT analysis to have a better understanding of e-commerce in Bangladesh. Then we begin the process of user experience research. Our user experience research followed a rigorous methodology. They are as follows:

1. SWOT Analysis
2. User Understanding
3. Interview
4. Usergroup or Focus group
5. Survey
6. User Persona
7. User Journey Map
8. Wireframe
9. Main UI Design
10. User Testing

4.1 SWOT Analysis

SWOT analysis is a strategic planning and management approach that assists individuals and organizations in identifying their strengths, weaknesses, opportunities, and threats in relation to company competitiveness or project planning[15]. Occasionally, it is referred to as situational evaluation or situational analysis. We conducted our investigation in order to have a better understanding of the market and its potential in Bangladesh. Our

objective was to gain an understanding of how Augmented Reality may be used and developed within an e-commerce platform.

Figure 4.1 SWOT analysis findings

Our detailed analysis revealed that there is a sizable possibility for an e-commerce platform in Bangladesh. Additionally, there are significant hurdles ahead for e-commerce businesses. The majority of the obstacles it is now encountering are related to a lack of infrastructure. Many people lack complete faith in e-commerce. The primary reason is that they believe the thing they are viewing will not be identical to what they receive.

And there is a solution for this. A more engaging user interface or product experience has the potential to influence these sentiments. And if we can create genuine emotions in customers using augmented reality, they will be less distrustful of the product. Because they are more invested in the goods, they will be more receptive to purchasing them.

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4.2 User Understanding

Prior to embarking on any project, it is necessary to establish the fundamentals. This requires a grasp of two critical components.

1. User
2. Brand

The term "user experience" refers to the unique collection of emotions — convenience, ease, happiness, and so on – associated with a user's interaction with our shop. A positive user experience is one that satisfies a customer's need. The goal of user experience optimization is to maximize happiness and usability. Because user experience design is all about alleviating our users' pain spots, we must first address the following question: What is their problem? What are we attempting to accomplish for your user? What is the issue that we are attempting to address? When we understand our users' challenges and are able to formulate the questions that need to be answered, we can develop a design approach that will succeed.

4.3 Interviews

A user interview is a UX research technique in which a researcher questions a single user about a topic of interest (e.g., system usage, behaviors, and habits) in order to get knowledge about that issue. In contrast to focus groups, which consist of several users, user interviews are one-on-one meetings (although occasionally several facilitators may take turns asking questions).

Because UX interviews are a quick and straightforward approach to get user input, they are frequently employed, particularly in Lean and Agile organizations. They are strongly similar to journalistic interviews and to the little more restricted and formal HCI

methodology known as the critical incident technique, which John Flanagan proposed in 1954[16].

While doing a UX user interview may appear to be simple and straightforward, there is more to a successful interview than many people know. I've distilled a few of the best practices here.

To begin, see an interview as a sort of research, not a sales session or casual discussion. Then, utilize the following guidelines to ensure that your interviews are as productive as possible.

Inquire of stakeholders what they wish to understand about the product. Determine the primary aim based on their aspirations, ensuring that it is feasible. A purpose that is too broad, such as learning about users, is likely to result in failed interviews since it will not lead your questions in a way appropriate to your design goals. A succinct, defined aim relating to a single component of the users' behavior or attitudes may unite the team and influence how the interview will be constructed.

4.4 Usergroup or Focus group

Focus group discussion is an effective method of bringing together people with comparable backgrounds or experiences to explore a certain subject. A moderator (or group facilitator) guides the group of participants by introducing discussion topics and assisting them in having a vibrant and natural dialogue among themselves.

Figure 4.2 Focused group discussion illustration

4.5 Survey

Conducting user research is critical when building or upgrading a product or service. There is no way to be flawless while building a UX survey. There will always be opportunities for growth and improvement.

We ran an online survey. We utilized both closed-ended and open-ended questions to get more precise data.

4.5.1 Purpose of the survey

    A. The survey's primary objective is to ascertain how individuals perceive augmented reality on e-commerce platforms.

    B. If they have any technical experience,

        a. Did their encounters occur when purchasing things online?

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    b. If so, how do they benefit from those encounters?

4.5.2 Main purpose of the questionnaire

A. To learn more about how well-informed the public is regarding Augmented Reality (AR)
B. Respondents' ages
C. Their educational history
D. Their readiness to embrace AR
E. Any prior experience with augmented reality
F. How frequently do they make purchases using e-commerce websites?
G. Will they take part in our upcoming survey?

4.5.3 What precisely are we trying to understand?

A. Bangladesh's current AR technology prospects
B. How successfully can individuals use augmented reality in an online store?
C. What are the ages of those who are willing to use augmented reality?

4.5.4 What purpose will the data serve

A. The data will be utilized to construct an augmented reality system for our e-commerce platform and to ascertain the public's knowledge of high-tech functions.
B. How well people will accept augmented reality?

4.6 User Persona

A persona is a fictitious figure produced in user-centred design and marketing to represent a user type who would use a site, brand, or product in a similar way. Personas may be used in conjunction with market segmentation, where qualitative personas are created to represent distinct categories.

User personas are highly helpful in growing and enhancing a business because they reveal the many ways individuals look for, buy, and use products, allowing you to concentrate your efforts on improving the experience for actual people and use cases.

Our key goal was to figure out what the user's pain point was and how they were dealing with it. What is their primary concern? What do they expect from an e-commerce platform that is similar to theirs? How do people respond when they have a terrible shopping experience?

Engaging personas can be goal- or role-directed, as well as more standard comprehensive personas. These engaging personalities are created with the intention of increasing the designers' engagement with them. The goal is to generate a three-dimensional representation of a user through the usage of personas. The more people connect with the persona and regard them as real, the more probable it is that they will be considered throughout process design and that they will want to provide them with the greatest result. These personas investigate the user's emotions, psychology, and past in order to make them relevant to the work at hand. The approach emphasizes the importance of narratives in engaging and bringing people to life. Lene Nielsen is one of the proponents of this viewpoint.

Now that we know who our users and customers are and what they're attempting to achieve, we need to figure out what's keeping them from buying or using your product more frequently.

User Persona Two

Nusrat Islam Irana
Audience segment:

Age: 28
Marital status: Married
Children: 1
Undergraduate study: BBA In Marketing
Occupation: Call Center Executive
Location: Dhaka
Income: 25k to 35k

"The true secret of happiness lies in taking a genuine interest in all the details of daily life"

Bio

To pursue a highly rewarding career, seek a job in a challenging and healthy work environment where I can utilize my skills and knowledge efficiently for organizational growth. To work hard with full determination and dedication to achieve organizational as well as personal goals.

Goals / Needs

- Wish to get authentic product
- Size and color match as expected
- How it looks in real
- Easy return policies
- Pricing indifference between online and offline
- Physical store availability

Ideal experience

- Make color and sizing more accurate
- Less time to select the right product
- More organize experience

Pain points

- Absence of Relevant Information
- Poor filtering process
- Initial feeling buy or not based on previous experience

Technology & Information Sources

- Daily usage of computer
- Lack of complicated software usage

Favourite brands

Figure 4.3 User persona One

User Persona One

Shibli Zaman Aman
Audience segment:

Age: 32
Marital status: Married
Children: 1
Undergraduate study: BSc in Software Engineering
Occupation: Chief Executive Officer
Location: Dhaka
Income: 50k to 60k

"The true secret of happiness lies in taking a genuine interest in all the details of daily life"

Bio

Completing the graduation B.Sc in Software Engineering from Daffodil International University. I started my career in the education sector for rendering my contribution to the greater benefit of the training department & skill human resources. Our business is divided into three areas; developing skill manpower, animation-related services & IT-related services.

Goals / Needs
- To avoid return when buying from eCommerce
- Authentic products from eCommerce
- Easy process to order
- Color choice as shown on the product page

Ideal experience
What would be the perfect outcome for this person?
- Order fast
- Authentic color
- How the product looks in real life

Pain points
What frustrates them?
- Color difference as shown on page
- Expectation vs Reality
- Initial feeling buy or not based on previous experience

Technology & Information Sources
What technology are they familiar and comfortable with? Where do they get their information?
- Daraz mobile app
- Basic software usages
- Daily usage of computer

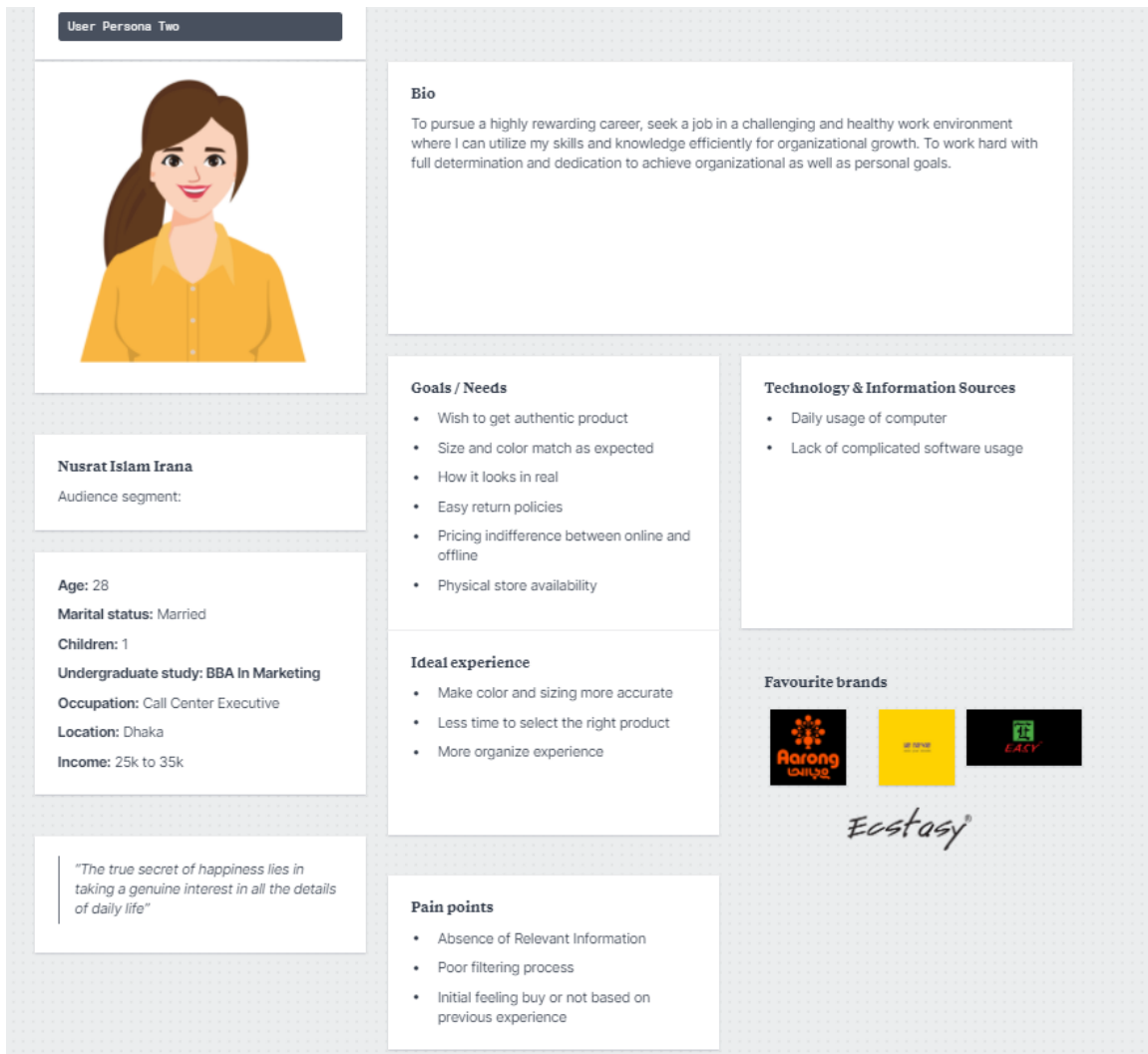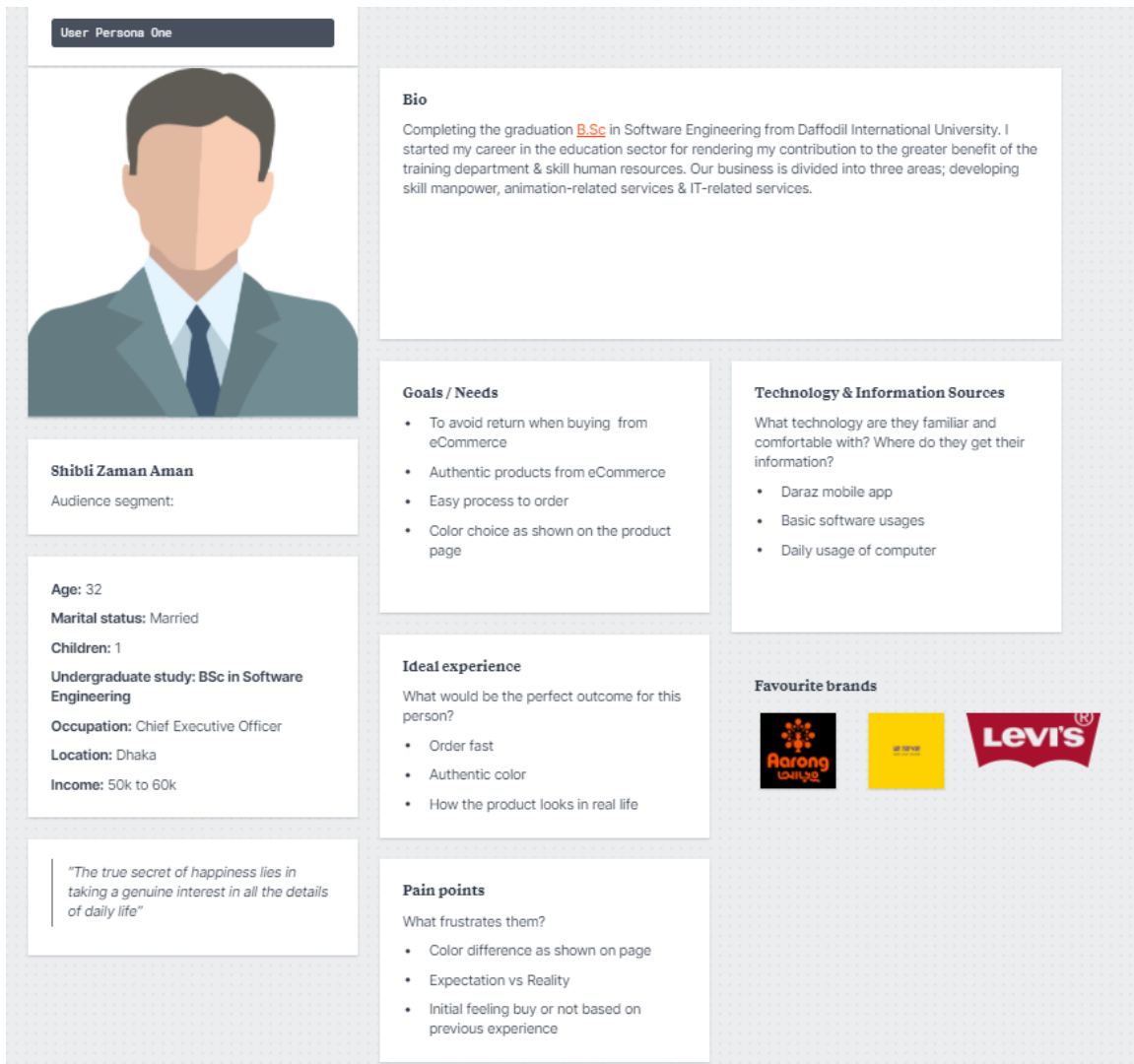**Favourite brands**

Figure 4.4 User persona two

4.7 Wireframe and Main UI Design

We created a wireframe and user interface based on our observations. We attempted to address the issues that individuals are now dealing with. We wanted to provide our users with a better user experience. And we provide a compelling reason to first inform our users about Augmented Reality and its applications.

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4.8 User Testing

User testing is referred to by a variety of names, including product testing, design testing, usability testing, and other ones. This entire approach revolves around the critical step of putting your thoughts to the test with real individuals in real-world scenarios. When you have a deep grasp of user complaints and usability issues, you will be more effective at fixing them.

User testing, which is a component of the user-centred design philosophy, is the most powerful component of a designer's job. It's not only about the visually appealing aesthetics (the surface). What matters is that you are effective in resolving a problem, which can only be accomplished through rigorous testing and design modifications. It's an excellent method for discovering what works and what doesn't.

CHAPTER 5
MY CONTRIBUTION

The workplace has evolved. Most of us used to work as part of a process, whether on an assembly line, managing customer contacts, or any of a thousand different procedures. Processes are continuous, repetitive, and never end. However, in today's world, collaboration is required. Because the project we completed was complex, we decided to work on it as a group. And because our final project is complete, we are successful in this procedure. As a member of the project, I also contributed in a variety of areas.

5.1 Project Proposal

My involvement began with the creation of a project proposal. I produced a project proposal with the goal of determining how we would accomplish our project and how long it will take. What is the best way to distribute our time among the other members? How well do we communicate with our supervisors, and so on?

5.2 Creating Survey Questioniar

Our project would not have been complete without the survey. This was accomplished through research. My primary objective is to build a more interesting and user-friendly quiz. That is why I decided to conduct the poll using the Typeform platform. Creating those questions was quite an experience for me. After developing the initial set of questions, I conducted two interviews to ascertain how participants responded to them. Additionally, what they are thinking and how they are understanding those queries. Additionally, I updated some questions based on their feedback. I placed a higher premium on closed-ended questions. Due to the fact that closed-ended questions are simple to answer and entertaining.

I followed completely to the scientific questionnaire format. We collected no personally identifiable information about our participants. I also presented a system for rewarding our participants based on a random pick from among them. As a present, we awarded 10 participants 1 GB of mobile data and another 10 people 100 mb of mobile data.
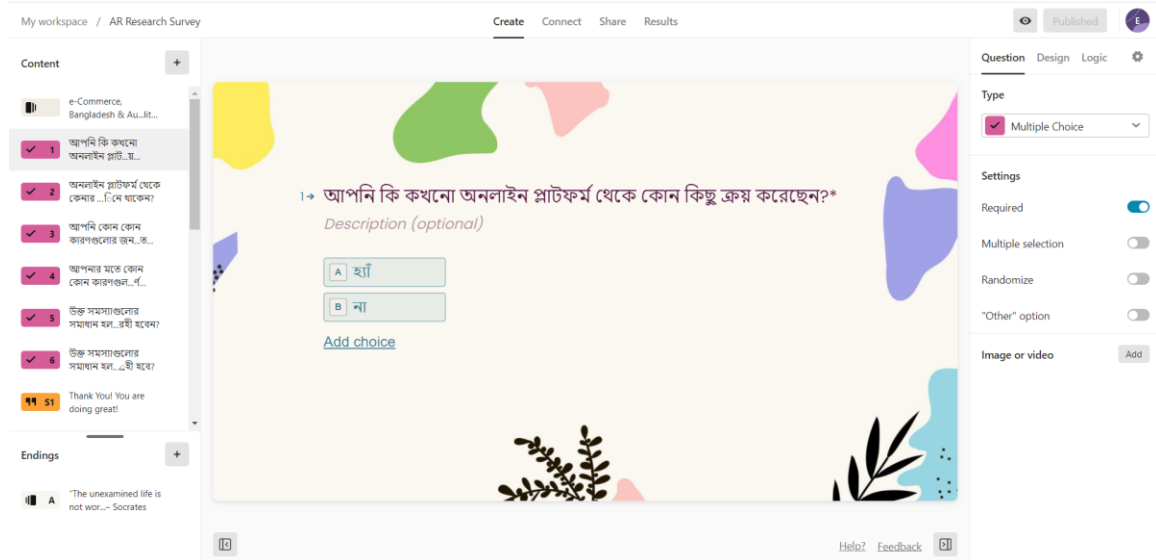

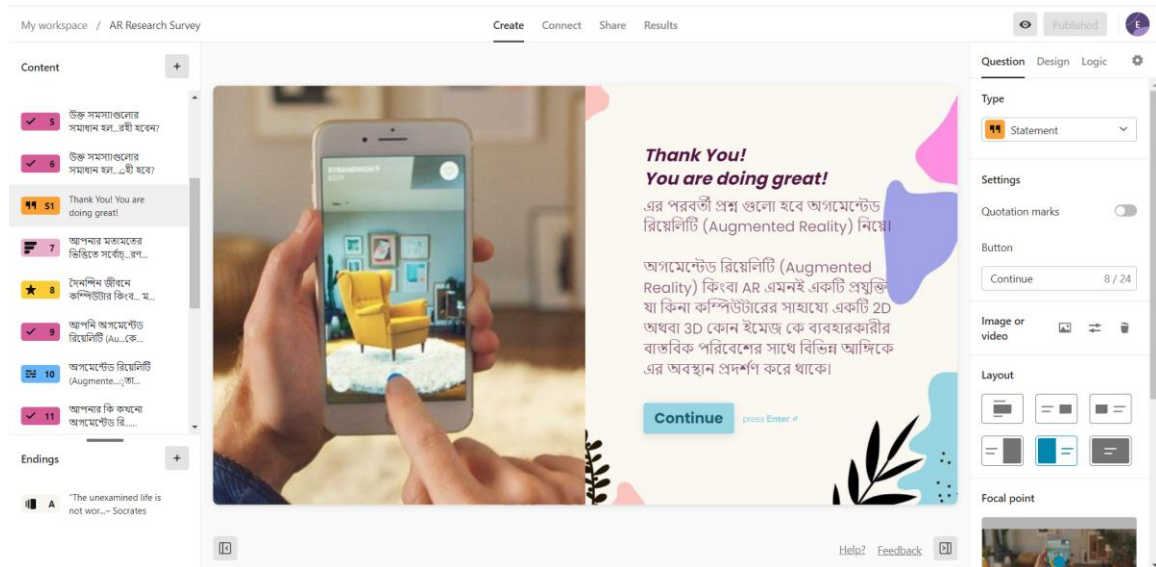Figure 5.1 Creating open ended question in Typeform

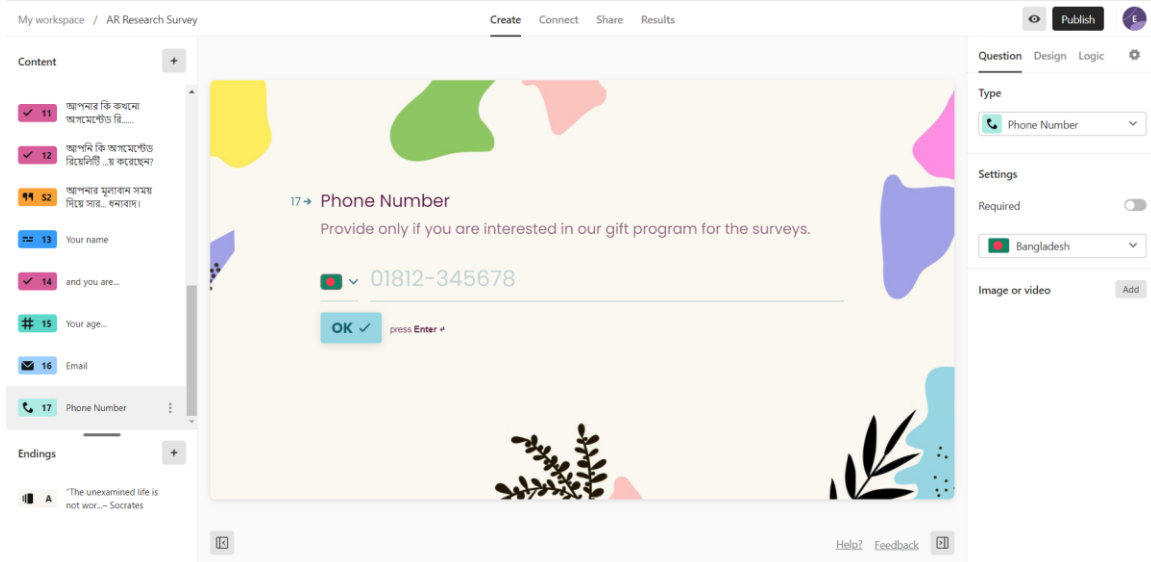Figure 5.2 Give explanation through our survey

Figure 5.3 Clear instruction on what we do with numbers

5.3 User Persona Creation

A user persona is a critical component of any UX project. Additionally, it will aid in the development of a more interesting and dynamic user interface. I contributed to this aspect of the project as well. Prior to completing this section, I gathered data from my team members. Following that, I began developing user personas. I generated two user personas and a pain point for each. And what are their expectations of an e-commerce platform? Following the creation of the user persona, we began our primary UI design process.

5.4 Main UI Design

I did the UI part of our project. I started crating the ui in Figma software. First I opened the Figma software.
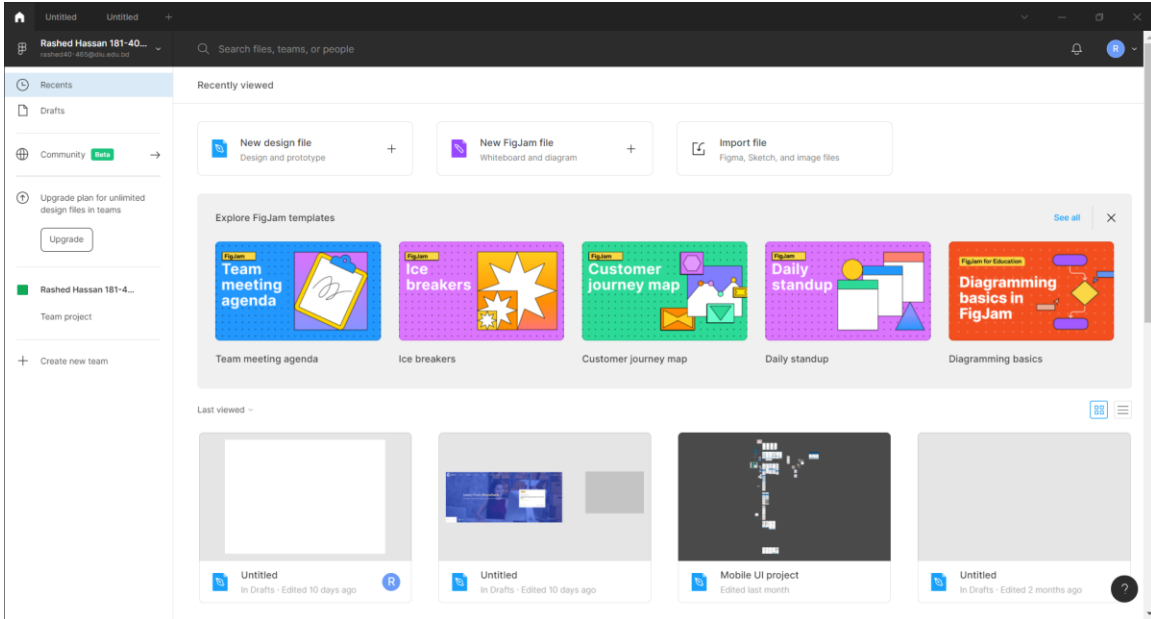
Figure 5.4 Figma workboard

Figure 5.5 Login page

04:26 PM

Welcome

Discover new sales and be eligant
everyday with **NumerAr.**

• • • •   Scroll Right   →
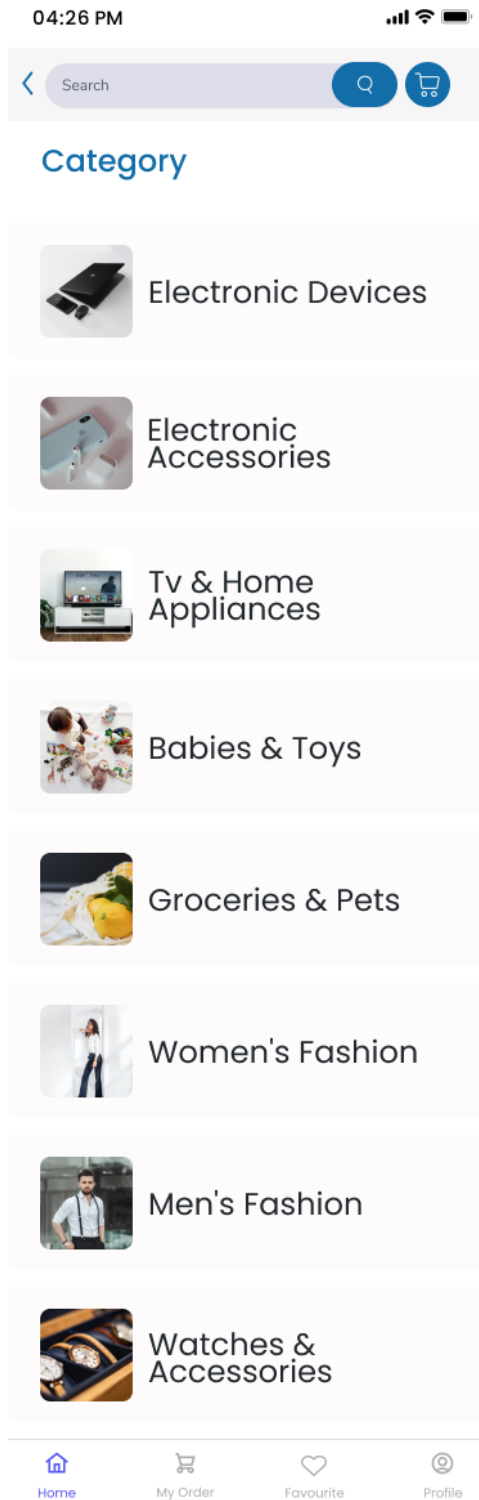
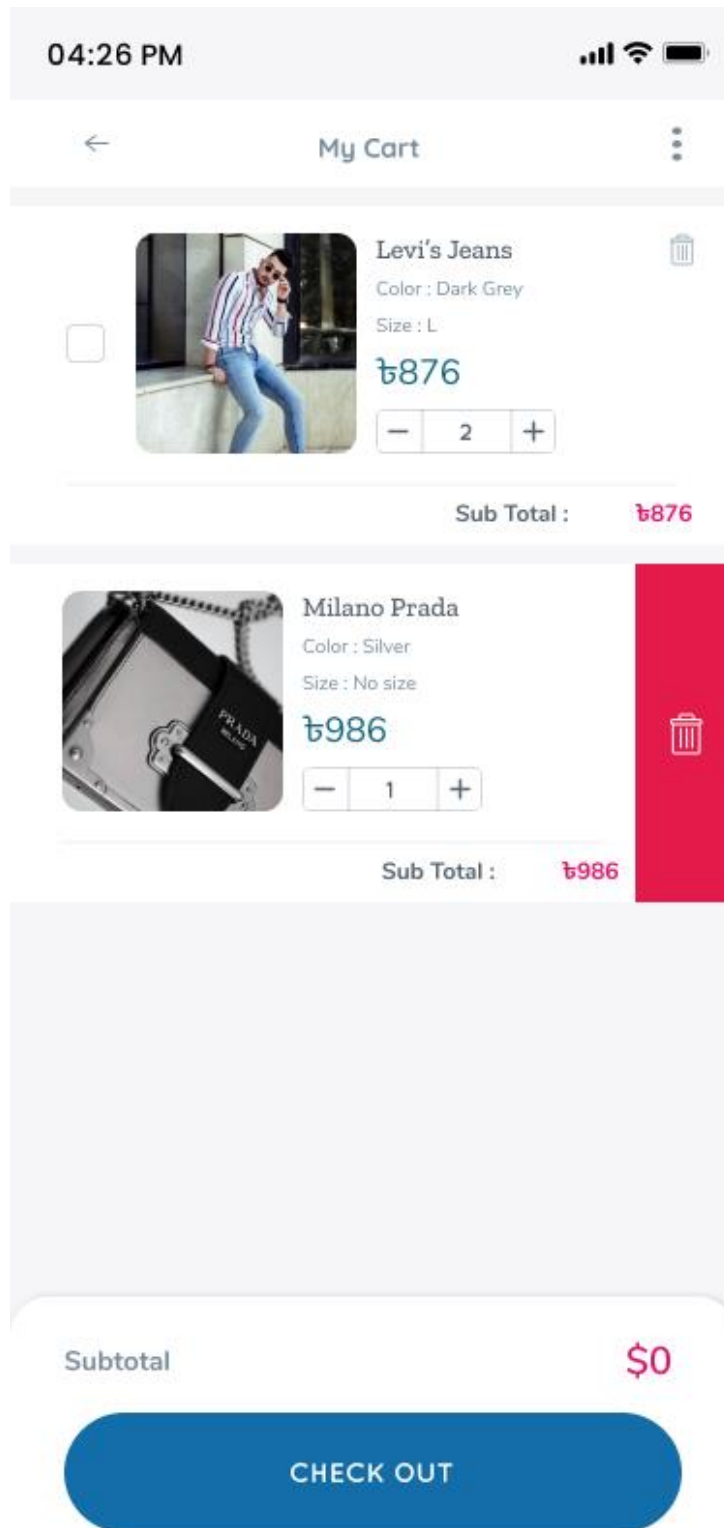Figure 5.6 Introduction page

Figure 5.7 Category page

Figure 5.8 Check out page

CHAPTER 6
RESULTS

We successfully completed our job after much work. We are relieved to see our ordeal come to an end. We learned a great deal throughout the endeavour. We strengthen our collaborative effort. The critical component is that consumers will now enjoy a more engaging e-commerce experience. Augmented Reality will have a significant impact on their lives. It will almost certainly enhance their buying experience. No more monotonous, identical-looking app interfaces. No longer do you need to read lengthy product descriptions to learn about a product. Now, customers will be able to learn more about their items via the use of Augmented Reality. They will get the same real-world experience as they would if they purchased the product at a brick-and-mortar store.
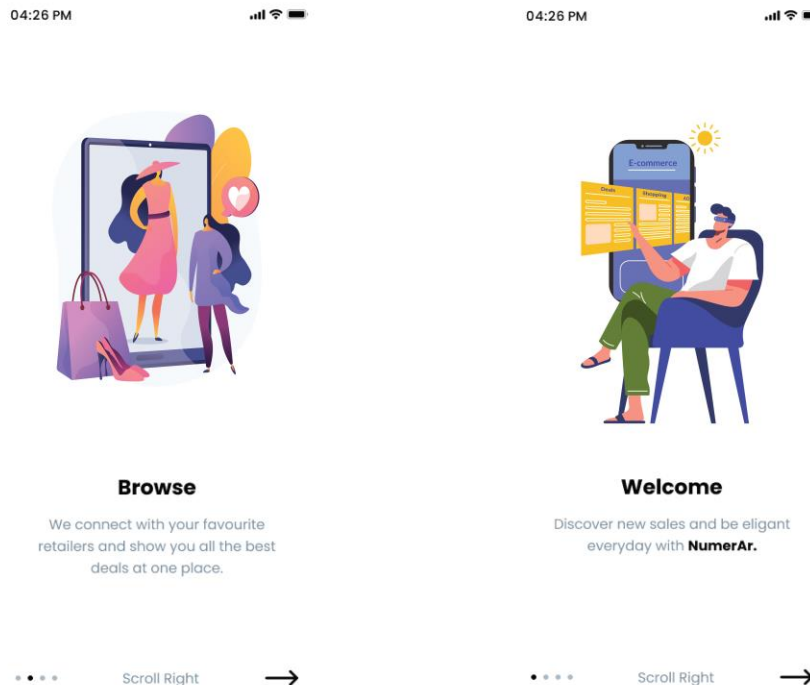

Figure 6.1 Onboarding screen

On this screen, we attempted to convey a comprehensive picture of our project. As we discovered in our study, the majority of individuals are not familiar with Augmented Reality, therefore we attempted to address this by designing an onboarding screen. People will learn about Augmented Reality on this screen, and they will see how to apply it in our application. As a result of our testing, we discovered that after reading the instructions, people are highly capable of using Augmented Reality.
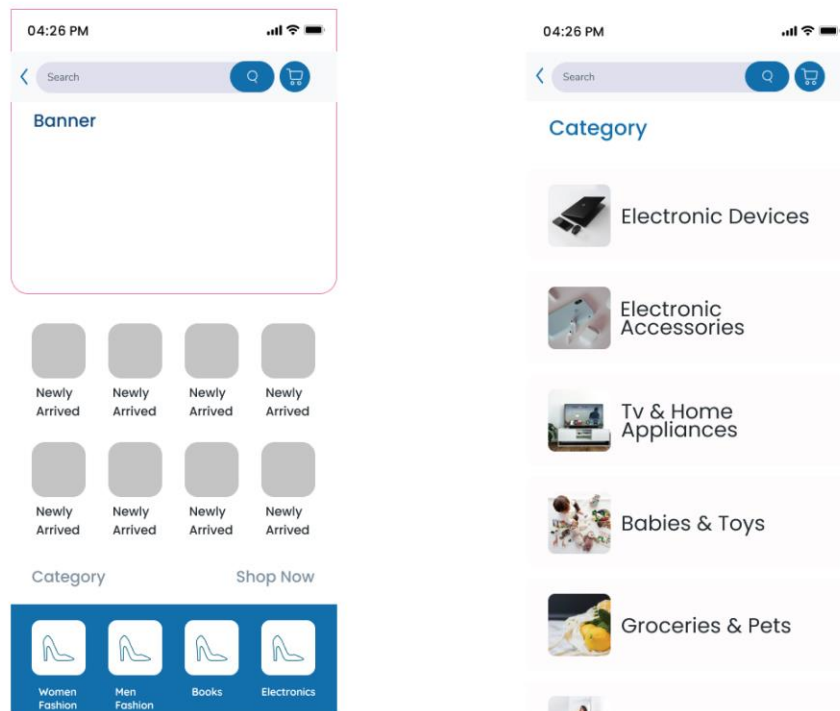

Figure 6.2 Main page for an e-commerce

We attempted to make this website as interactive as feasible while still keeping it as easy as possible. This website makes it simple for users to accomplish their purchasing since their merchandise is simply accessible. They can also move throughout the entire application with relative ease. They will have an easier time finding their merchandise. We also have a section dedicated to product showcases.
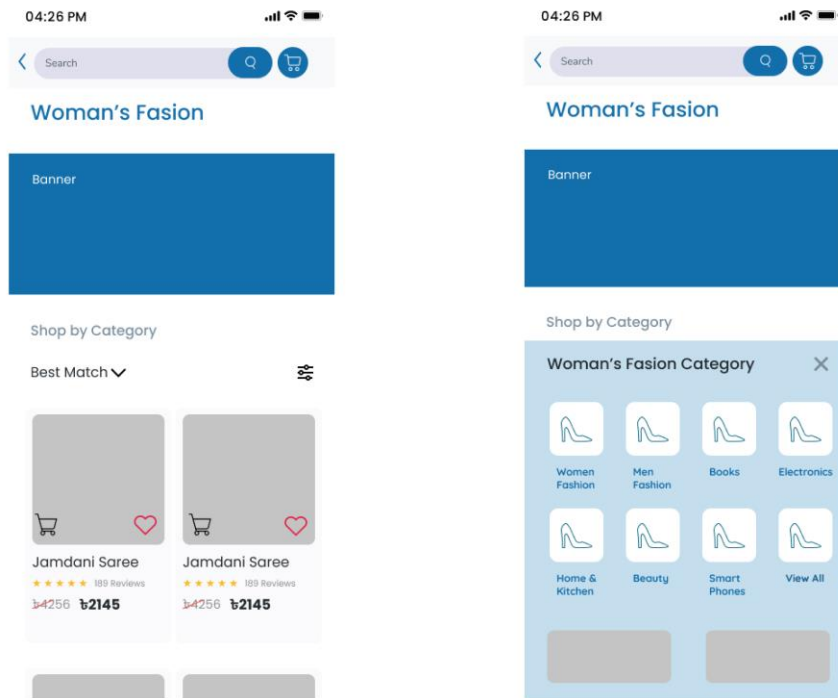
48

Figure 6.3 Product Page

On this page, we place a greater emphasis on the product image as well as the use of Augmented Reality. Users will be able to view items on this page, as well as see them .
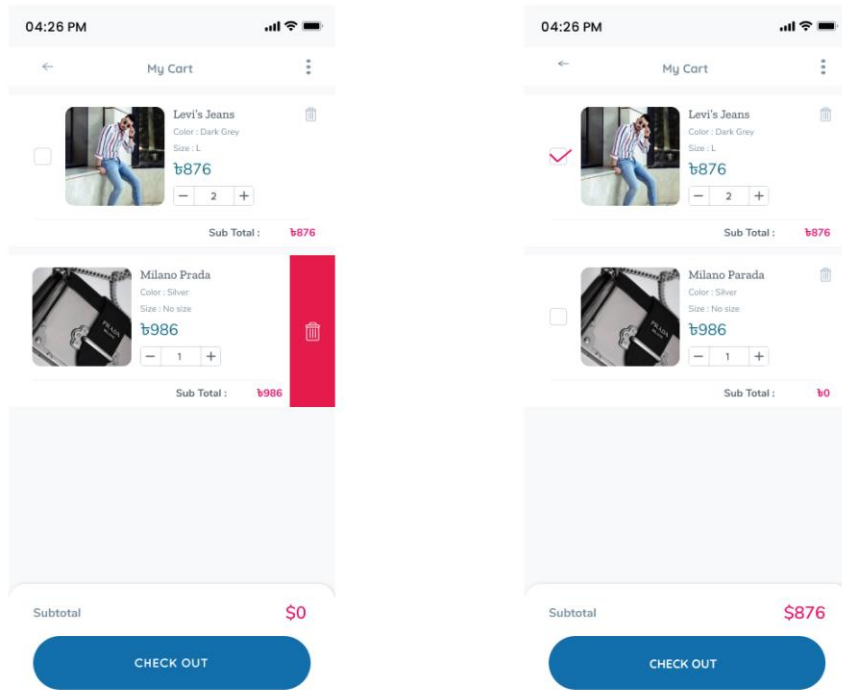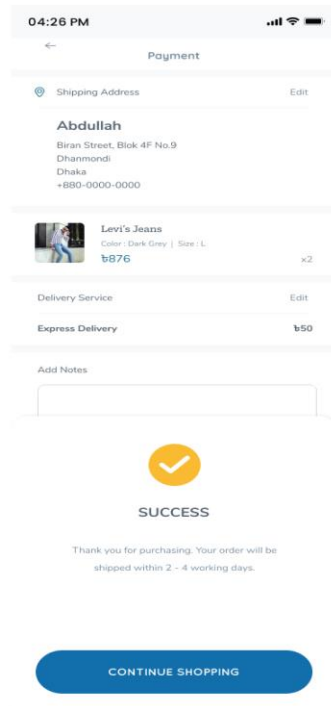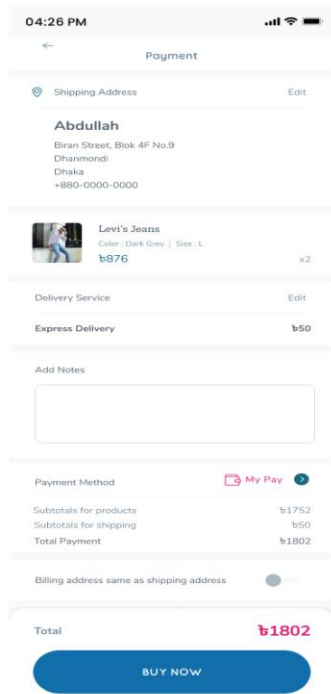
49

Figure 6.4 Check out page

Figure 6.5 Check out page

CHAPTER 7
DISCUSSIONS

First and foremost, users will have a more engaging experience with the app we built as a result of the Augmented Reality features included. Previously, numerous researchers conducted their investigations using an Augmented Reality-based application. Nonetheless, this part will explain their project prospects as well as how we vary from them, and in some cases, how we are better to them.

The Augmented Reality in Mobile Commerce project was one of the most significant. Mr. Lee Guan Soon of the University of Tunku Abdul Rahman in Malaysia created the application. The major goal was to provide the buyer with a complete 360-degree picture of the goods while also introducing Augmented Reality technology into the e-commerce environment. However, in this case, the goal was to provide unique product experiences using augmented reality. While our app is not just limited to physical stores, we also attempted to entice customers to purchase online by providing a fully working e-commerce platform.

Finally, our application provides a user interface that is both aesthetically pleasing and functionally effective. A complex user interface is present in certain apps, such as Flipkart, and their augmented reality features are not available for all of their items. Furthermore, they only give AR for a restricted amount of different things on their website. Our proposed built software includes characteristics that allow AR features to be activated for every device on the market, which we believe is a significant advantage.

CHAPTER 8
FUTURE WORKING OPPORTUNITIES

We did everything we could to include the latest cutting-edge technology, Augmented Reality (AR), into the mobile application so that consumers could purchase products while having access to all of the essential information to appraise the product before purchasing it. Furthermore, we created a user interface that was both visually appealing and functional to facilitate communication between the buyer and the vendor. It was our goal to incorporate AR technology into the Bangladeshi context while also keeping up with the present technological change.

Technology, on the other hand, is constantly advancing at a rate that has never been seen before. Consequently, the quality of our work is also susceptible to scrutiny, and constructive criticism will aid in the further development of the technology itself. Something that future scientists and developers could add to our work in order for the app or technology to function flawlessly could be included in our work.

Our concept for an augmented reality e-commerce platform may be adapted to a variety of different fields and types of applications. This type of advanced technology is in high demand.

After that, we looked at the technology's application, and in our instance, we used Augmented Reality (AR) in the virtual retail complex to make purchases. It might, however, become far more relevant and real if additional cutting-edge technologies were to be implemented. Artificial Intelligence, Virtual Reality, and the Internet of Things are among the other technologies being explored.

In this age of Industry 4.0, we may expect a significant increase in connection through this app in the near future. And there are many more things to be done in this regard, and we are, of course, open to constructive feedback.

CHAPTER 9
CONCLUSION

Today's rapidly changing environment makes it possible to access a wide range of sophisticated technology. The technologies that are fueling today's innovation-based super economy are the most important. With the power of new and contemporary technology, the economy continues to grow on a daily basis. The manner in which people consume goods, as well as the manner in which they buy and sell them, has evolved over time. Physical marketplaces are being phased out in favour of digital internet markets, sometimes known as e-commerce, which is replacing them. Nonetheless, the tremendous rise of e-commerce should spur innovation in this industry; instead, the manner in which people purchase and sell things online has remained virtually the same for the past twenty years, which is disappointing. Furthermore, there is no such chance for buyers to inspect and investigate the product prior to making a purchase decision. Even in today's digital world, classic picture viewing options are still available on retail websites and mobile applications. There is no way to get in touch with the vendor directly on the website. Neither the product 360-degree viewing option nor the booth view option is available for use at this time. A consumer who wants to visit the real pavilion must do so at one of the showroom's physical locations, which may be found virtually everywhere in the world. However, in this day of fast globalization, everyone is so preoccupied that it is almost hard to find time to do so.

Our primary goal was to develop an e-commerce platform that would be able to address a variety of issues that our sector is now dealing with. We attempted to design Augmented Reality in such a way that it would be able to address those issues. The major goal of the project was to ensure that the users were satisfied. We attempted to make our design as simple as possible. According to the results of our poll, individuals dislike complicated user interfaces. They have always appreciated

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