

Independent University of Bangladesh



E-Commerce Mobile Application for Android Operating System at Robo Tech Valley

Undergraduate Internship Report Submitted By

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Submitted to:

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Attestation

This is to certify that report titled “Android E-Commerce Application for Robo Tech Valley” is completed by me, Ahmed Nafiu Noman (1630458), submitted in fulfillment of the requirement for the Degree of Computer Science and Engineering from Independent University, Bangladesh (IUB).

I express my deep gratefulness to my supervisor Mr. Bijoy Rahman Arif, Lecturer, Department of Computer Science and Engineering, for his invaluable instructions, continuous guidance, constructive criticisms, and thoughtful advice during pursuing this internship and preparation of this report.

I also certify that all my work is original which I have learned during my Internship. All the sources of information used in this project and report have been duly acknowledged in it.

Signature

Name: Ahmed Nafiu Noman

Date:

Acknowledgement

First, I want to thank Almighty Allah for giving me the chance and the courage to work hard even in this great pandemic. It is my privilege to have the opportunity to do an internship in Robo Tech Valley.

I would like to express my deep appreciation to my internal supervisor, Bijoy Rahman Arif Sir, Lecturer, School of Engineering, Technology and Science, Independent University, Bangladesh (IUB), for his invaluable directions, edifications, constructive criticism and insightful advice while pursuing this internship and preparing this paper.

I also extend my deep gratitude to MD Shovon Islam (Project Team Leader, Android Application Developer) my external supervisor who always support in any sort of problem in this project.

Letter of Transmittal

June 05, 2021

Mr. Bijoy Rahman Arif

Lecturer

Department of Computer Science and Engineering

Independent University, Bangladesh.

Subject: Submission of Internship report on "Android e-commerce application" Autumn, 2020.

Dear sir,

It is a great pleasure and honor to submit my Internship report on "Android e-commerce application for Robo tech valley" under your guidance. I have tried to present my project work, my experiences, and achievements in this report.

During the internship period, I have served in Robo tech valley where I have not only gained real-life work experience but understood the process of the department and its various aspects. This report includes all the project works, experiences, and learning that I have achieved during this internship.

I would like to thank you for your immense support, guidance, and kindness. I have tried to complete this with the utmost honesty and sincerity. I hope and pray that this report fulfills all the requirements and is up to your expectations.

Sincerely,

Ahmed Nafiu Noman

Id - 1630458

Evaluation Committee

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Convener

Abstract

Online business has grown in popularity in recent years. Bangladesh is slowly but steadily adopting an e-commerce culture. Furthermore, there has been a smooth transition to utilizing mobile devices for shopping. As a result, “Robo Tech Valley,” a robotics and IT-based firm situated in Mirpur 2 Rupnagar, Dhaka, wanted to extend their company by launching an e-commerce mobile application. This would attract new customers from around Bangladesh to utilize their system.

This project began with the creation of a more complex database with a web application that was synced with the database of the mobile application to be executed. The online purchasing platform was then turned into a mobile application. The goal of this project is to create a comprehensive, efficient, and innovative e-commerce system that will provide value to the firm.

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Chapter 1

Introduction

Smartphone use has dramatically changed the retail landscape and customer behavior. Mobile devices, particularly apps, now account for a major portion of internet purchases. Global app usage nearly doubled in 2018, up 45 percent over 2016, with a 70 percent growth in the United States. And the trend is just going to get worse from here. On a global scale, mobile transactions are expected to treble by 2021, accounting for 75 percent of total ecommerce revenues.

Mobile has developed into the major method for consumers to engage with their favorite brands, surpassing desktop and in-store interactions. By offering an intimate, direct route to customers, mobile has developed into the major method for consumers to engage with their favorite brands. This is a huge potential for companies to connect with, influence, and convert customers.

The development of mobile applications is one of the most important drivers of mobile commerce growth. The average consumer spends 3 hours per day on their phone, with the majority of that time spent in applications. We live in the age of mobile apps, and smartphones are playing an increasingly essential part in the purchasing experience of consumers. As the popularity of mobile shopping grows, businesses are turning to apps to improve the whole consumer experience and promote corporate development.

1.1 Overview/Background of the Work

This project's system is a full e-commerce system that includes a database, online and mobile applications for customers, and a desktop software for the administrator. However, the main focus of in this application is to sell robotics component and drones. In the mobile application there will be user and admin login panel. Where admin can manage all the product and user can view and purchase products can also take their invoices.

1.2 Scope

- Registration (all user)
- login (all user)
- change password (Admin, user)
- create/update/delete (Admin)
- Invoice (View, Download)
- Online payment
- Logout

Chapter 2

Literature review

2.1 Relationship with undergraduate studies

2.1.1 Object Oriented Programming (CSE213)

With a basis in the procedural paradigm, this course exposes us to the ideas of object-oriented programming. In object-oriented programming, the design concepts and patterns of modularity and abstraction are examined in depth. We learnt about objects, classes, constructors, destructors, abstract data types, composition, inheritance, polymorphism, overloading, function chaining, and many other advanced subjects after successfully completing the course. Java was used in this course.

2.1.2 Database Management (CSE303)

This is a beginner's course on database design and database management systems. The development process, database design concepts, relational algebra, and SQL Server are all covered in depth in this course. Other key database topics covered are data modelling (E-R model, relational data model, normalization, object-oriented data modelling), database security, administration and distributed systems.

This course helps me a lot while making database structures in Google Firebase for the app.

2.1.3 Mobile Application development (CSE464)

It's an introduction course to mobile android application development with Java. We have learned so many components of android such as Activity, XML, List view, Rest API, Fragment, different kind of Widget and many more. This course encourages me to build my carrier in mobile application development.

2.2 Related work

There are so many companies in Bangladesh like Daraz, Evaly and Chal-Dal have their own E-commerce application to showcase all of their services and products. We are also working with same vision to make app an e-commerce app like them for Robo Tech Valley to sell robotics components, sensors, Drones. We have took some ideas from Daraz application.

Chapter 3

Project Management & Financing

3.1 Work Breakdown Structure

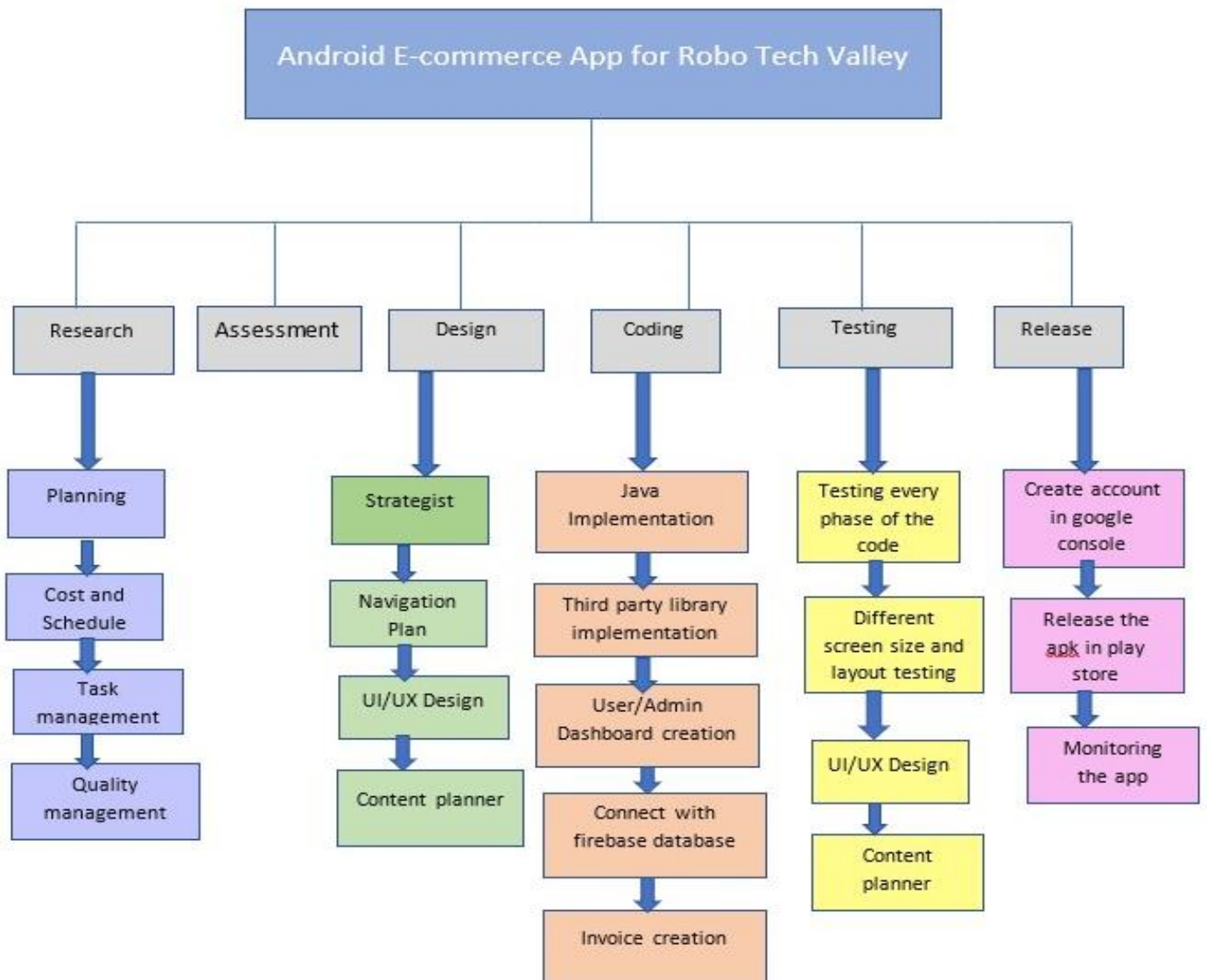


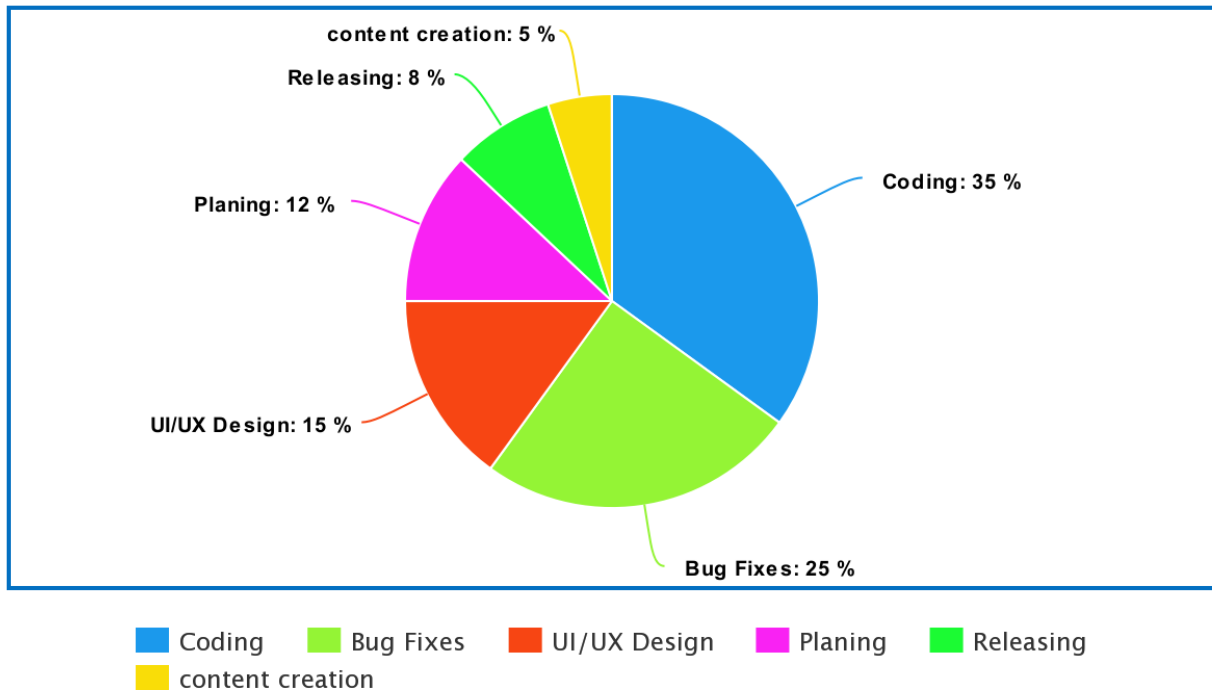
Figure 3.1: Work break down structure.

3.2 Process/Activity wise Time Distribution

This aids in the development of a project schedule that can be met as well as the establishment of a procedure to guarantee that the schedule is fulfilled. The most significant challenge in correctly designing an application is time and time management. So, first and foremost, the content must be fixed, and development must be based on this context.

The technique of planning and regulating how much time to spend on various tasks is known as time management. Good time management allows an individual to do more in less time, reduces stress, and leads to professional success. The Construction Management Guide suggests using a "rule of thumb" of 10% of the project's projected hours for the project manager's job. You may then extrapolate how many tasks he or she can tackle based on that.

TIME DISTRIBUTION



meta-chart.com

Figure 3.2: Pie chart of activity wise time distribution.

3.3 Gantt Chart

Gantt charts are helpful for project planning and scheduling. They assist us in determining how long a project should take, determining the resources required, and planning the sequence in which activities will be completed. They're also useful for keeping track of job dependencies.

Gantt charts provide the following advantages:

- Know what's going on in your projects
- Improved communication and team cohesiveness
- Measure project progress

- Experience more clarity
- Practice better time management
- See overlapping activities and task dependencies. [3]

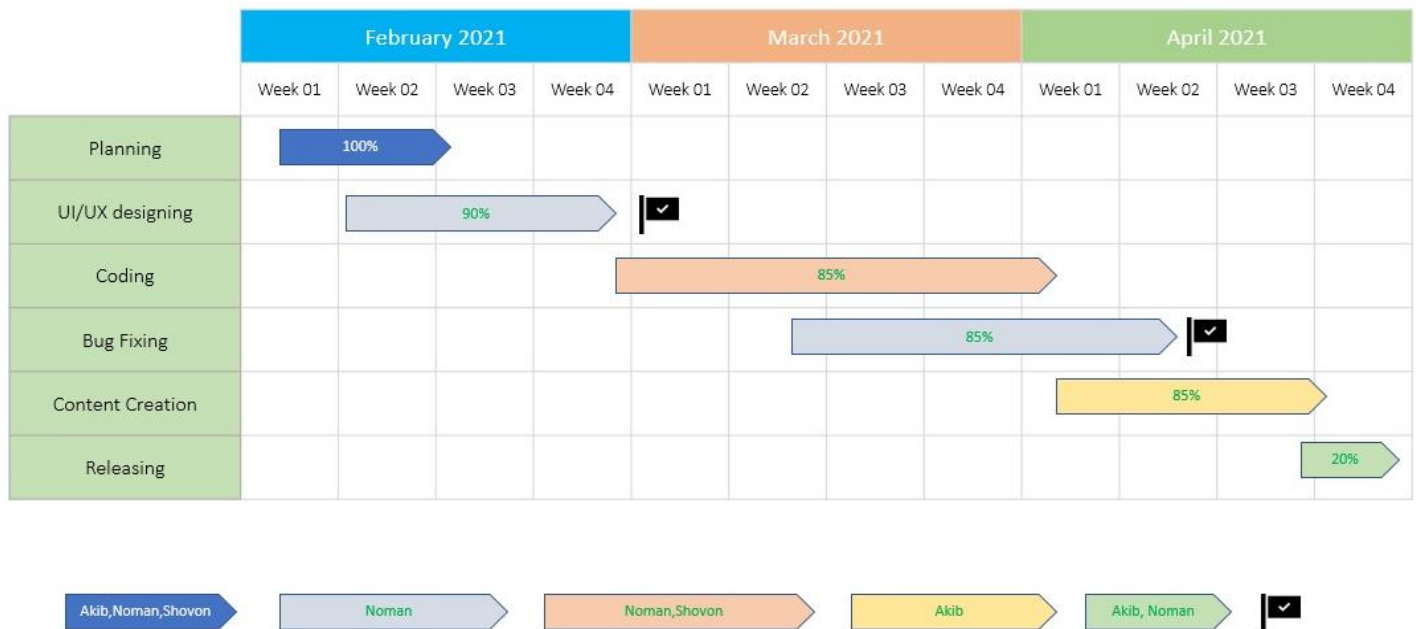


Figure 3.3: Gantt Chart

Chapter 4

Methodology

Software development approaches come in a variety of forms. For instance:

- Agile
- Waterfall
- Prototyping
- Iterative and incremental development
- Spiral development
- Rapid application development
- Dynamic system development model
- Extreme programming

The agile technique was adopted for this project.

It's a product development concept in which the time-consuming process is broken down into several development cycles. This method simplifies the creation of mobile apps, allowing them to be more versatile.

The Agile methodology allows solutions and requirements to progress as a result of a collaborative effort between the customer and the development team. It encourages evolutionary growth, adaptable planning, continual improvement, and timely delivery. In complicated projects where the customer's wants and requirements change often, this flexible and iterative approach may be obtained.

This whole process necessitates a high level of customer interaction in order to meet the customers' needs at each phase and receive their particular feedback after each one. It's especially useful in projects if clients agree to participate in connected articulation on a regular basis. [1]

Benefits of choosing agile methodology

The agile technique allows for the addition of features and various sorts of updates to the application at any point throughout the development process.

1. The Agile methodology is one of the most frequent and suitable tasks to relate to the small projects that cater to the clients whose requirements might be highly variable or moderate.
2. The agile technique is one of the most common and appropriate assignments for small projects that cater to clients with highly changeable or modest requirements.
3. Testing is possible at any level or stage of development.
4. Better outcomes and partnerships arise from continuous engagement between the user and the developer.

Chapter 5

Body of the Project

5.1 Work Description

Robo Tech Valley's e-commerce application offers an effortless way to buy robotics products online. A user can create an account using their profile picture, email password, and address. After registration google firebase will authenticate the user with the help of the firebase authentication system. Then the system goes directed to the user's dashboard. Now the user can buy the product, view the product, take courses, and many more.

Users can see the description of all the products, users rating, give comments on the service. The payment system is very secure. Users can also get the invoice in pdf form that will save automatically in the gallery. If any user wants to be a campus ambassador that can also be done from the drawer layout option.

Users can also make his or her Wishlist for future use.

Admin can manage all products, give a reply to any user comment, take action on any user by deactivating the user.

In the future, we will add a notification system for the user to give them update on our new product.

5.2 System Analysis

In this part we have to analysis our system. System analysis is the process of gathering data, comprehending the processes involved, detecting issues, and making practical recommendations for enhancing the system's operations. This entails researching the business process, acquiring operational data, comprehending the information flow, identifying bottlenecks, and implementing solutions to overcome

the system's flaws in order to meet the organization's objectives. Subdividing complicated operations encompassing the whole system, as well as identifying data stores and manual operations, are all part of system analysis. [2]

System Design: This is the most essential stage of a system's development. System analysis yields a logical system design, which is then translated into a physical system design.

General Design: The new system's features are outlined in the overall design. The cost of adopting such features, as well as the value that would be gained, are both estimated. We proceed to the detailed design phases if the project is still regarded feasible.

Details Design: Computer-oriented work begins in earnest at this level of detail design. The system's design gets more organized at this point. Structure design is a blueprint for a computer system that solves a specific problem using the same components and inter-relationships as the original issues. There are numerous approaches and methodologies for describing the system design.

These tools and techniques are

- Flow chart
- Data Flow Diagram
- Design Table
- Design Tree

Implementation: Following user acceptance of the newly created system, the implementation phase commenced. The stage of a project during which theory is turned into practice is known as implementation.

1. Code: To make the system practical, the system design must be executed. This necessitates the conversion of design into a computer-readable language, such as a programming language. The programmer translates the program specifications into computer instructions in this step, which is also known as the programming phase.

2. Testing: Before putting the new system into action, it was put through a test run to see if there were any issues. It is a critical stage in the development of a successful system. After creating the whole system's programs, a test plan should be created and performed on a set of test data. The test run's output should match the intended outcome.

3. Maintenance: During the system's lifetime, mistakes must be eliminated, and the system must be tuned to any changes in its working environment. It has been observed that certain flaws in the system are always discovered and repaired.

5.2.1 Six Element Analysis

PROCESS	HUMAN	NON-COMPUTING HARDWARE	COMPUTING HARDWARE	OPERATING SYSTEM	DATABASE	NETWORK & COMMUNICATION
DOWNLOAD THE APP	ALL USERS	N/A	ANDROID PHONE	ANDROID OS	FIREBASE(REALTIME)	WIFI/MOBILE DATA
SIGNUP/SIGININ	ALL USERS	N/A	ANDROID PHONE	ANDROID OS	FIREBASE(REALTIME)	WIFI/MOBILE DATA
USER DASHBOARD	ALL USERS	N/A	ANDROID PHONE	ANDROID OS	FIREBASE(REALTIME)	WIFI/MOBILE DATA
ADMIN DASHBOARD	ALL ADMIN	N/A	ANDROID PHONE	ANDROID OS	FIREBASE(REALTIME)	WIFI/MOBILE DATA
ADD TO CART	ALL USERS	N/A	ANDROID PHONE	ANDROID OS	FIREBASE(REALTIME)	WIFI/MOBILE DATA
USER HISTORY	ALL USERS	N/A	ANDROID PHONE	ANDROID OS	FIREBASE(REALTIME)	WIFI/MOBILE DATA
PAYMENT PROCEDURE	ALL USERS	N/A	ANDROID PHONE	ANDROID OS	FIREBASE(REALTIME)	WIFI/MOBILE DATA
INVOICE DOWNLOAD	ALL USERS	N/A	ANDROID PHONE	ANDROID OS	FIREBASE(REALTIME)	WIFI/MOBILE DATA

Figure 5.2.1: Six element analysis

5.2.2 Feasibility Analysis

In this section, I'll talk about my project's feasibility study. The most crucial step in determining the economic value and cost of my project is to do a feasibility study. Feasibility studies the economic, operational, and technological viability of a project.

Economic feasibility: The economic feasibility analysis reveals the cost-effective advantages compared to the costs of constructing the system. The economic feasibility study is divided into two components.

Economic Benefits:

- It will reduce man power. So that employee assignment cost will be much lower.
- It will reduce paper work.

Economical Costs: When building a new system, cost is also a major consideration. A few expenses must be incurred in order to install the system.

- As this is a android application so we buy an account in google play console by 25 dollar.
- All other third-party API is free of cost.

Operational Feasibility:

The operational feasibility of a proposed system is determined by how well it solves issues and meets system requirements defined during the scope definition and problem analysis phases. It is based on the project's human resources and entails predicting whether the system will be used once it has been designed and installed.

Event book has been developed in such a way that it can be conducted very easily. People will accept it without any doubt. It is a well-planned system. People of all ages will be benefited from here. It reduces physical and technical hardships. Users do not need to have a lot of technical knowledge to run this system. Every instruction is very clear to the users. We hope this system will be able to fulfill the requirements of the users.

5.2.3 Problem Solution Analysis

1. Problems: Every work has some problems. Our software has very few like -

- **Eye strain:** As harmful radiations are emitted from the mobile screens then it may cause some eye strain problems while using it for a long time.
- **Internet:** As this software will require stable internet connection once it is launched. So, during adding product to the cart or downloading invoice it will show error to the user.
- **Load shedding:** If anyone uses WIFI routers then load shedding may create problems while using this system.

2. Solutions: While there is a problem, there is solution also. Now I am going to discuss about the solutions of the problems mentioned above-

- **Eye strain solution:** We will add dark mode of our application in future or user can maintains the brightness of the screen while using this system.

- **Solution to the internet problem:** Nowadays internet data is not so costly that we cannot afford that. So, users can purchase data when they will appear for any event created. Our application will not consume a lot of data as well.

- **Load shedding solution:** For avoiding this user must have to buy internet data.
[3]

5.2.4 Effect and Constraints Analysis

Robo tech valley's e-commerce mobile application will play a great role in the business sectors. It will save costs, minimize physical hardships, and it will make lives easier than before for users.

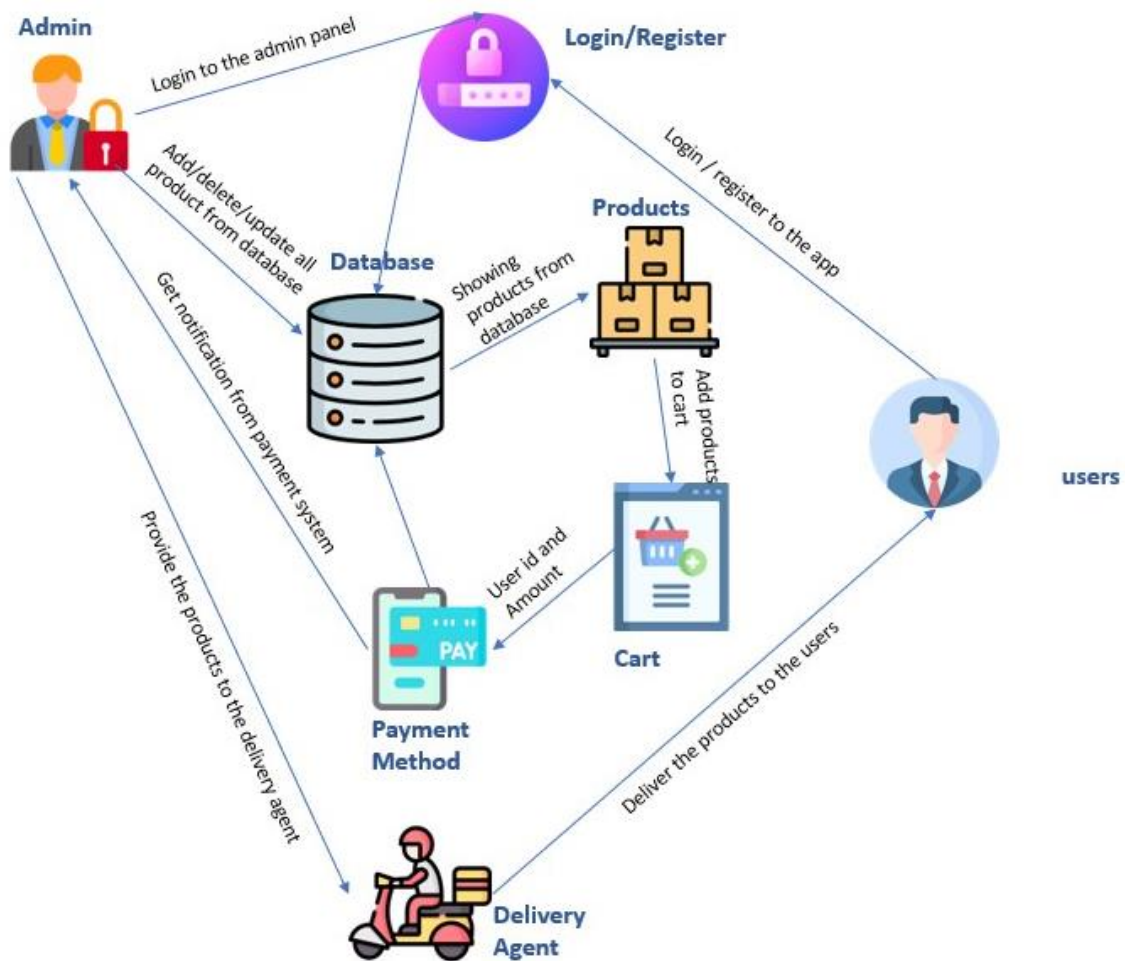
As discussed earlier, our system has some constraints in the future will add dark mode in the app also will make an easier way to bill payment and will show some articles of science.

As it is a big project that is why we are planning to add those features.

5.3 System Design

5.3.1 Rich Picture

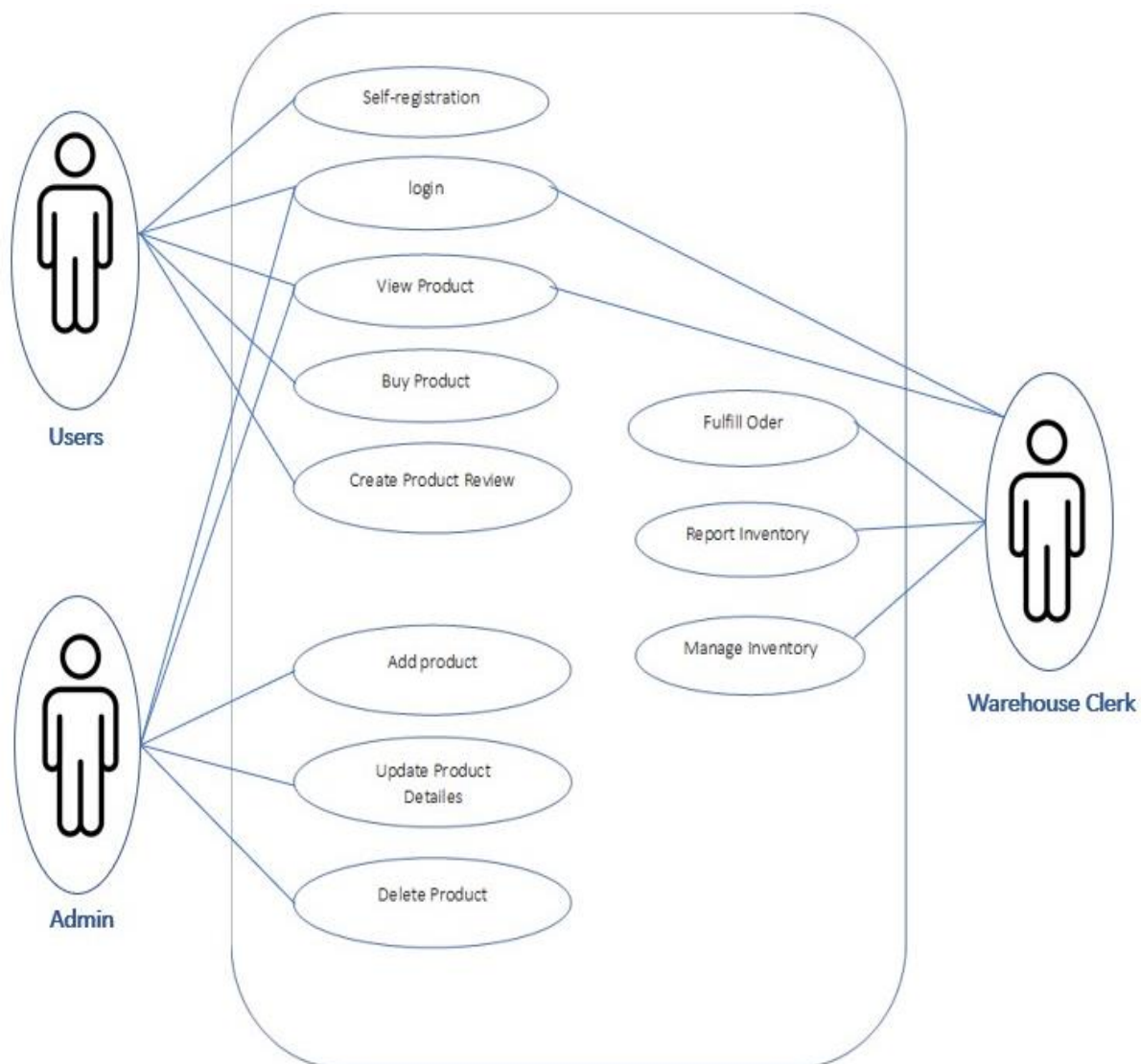
When seeking to act in order to bring about some improvement, a rich picture is a depiction of the issue that depicts the essential aspects and relationships that must be examined. It is made up of images, text, symbols, and icons that are all utilized to illustrate the issue graphically. [9]



5.3.1figure: Rich Picture of Robo Tech Valley E-Commerce App.

5.3.2 UML Diagrams

USE CASE: In the use case diagram we tried to show the basic example roles of the user, admin, and warehouse clerk in the use of this software, as what the purpose of the software was made in the first place. A UML diagram (Unified Modeling Language) is a visual representation of a system's major operations, artifacts, or classes allowing non-technical people to better understand, edit, manage, or document system information. [4]



5.3.2Figure: UML USE case diagram of Robo Tech Valley E-Commerce App.

5.3.3 Functional and Non-Functional Requirement (CSE303)

Function	Input	Process	Output
Registration	Input Admin/User Information Details	Store In Firebase with unique id	Successful submission confirmation toast
Login	Input Admin/User Username & Password	Authenticate In Firebase & fetching all data	Give access to user dashboard
Invoice	Add to cart & pay the bill	Process the bill & Generating the invoice	Downloadable invoice in pdf version & confirmation toast
Manage Contents	Input Admin Username & Password	Match with registered Username & Password	Dashboard appears to upload/manage contents
Manage Moderators (by Admin)	Input Admin Username & Password	Match with registered Username & Password	Dashboard appears to create/delete/update moderators

5.3.3Figure: Functional requirement.

Non-Functional Requirements

Non-Functional Requirements are what define an application's quality. Its behavior will be defined by a functional need, but the NFR will determine how well it will show that behavior.

A well-defined set of Non-Functional Requirements will have the following benefits:

- Improved code quality
- Improved security
- Lower total cost of ownership
- Improved user experience
- Less bugs
- Improved speed and efficiency
- Improved uptime [5]

1.Security – In our application, we have validated and authenticated every user by firebase authentication so the security level is very high.

2.Quality – We created the code to a high-quality standard because even the greatest e-commerce platforms might be misused.

3.Data integrity and retention – It refers to how long data should be kept and how data integrity should be maintained. For two years, all user data will be stored in Google Firebase's real-time database. To lengthen the time, we will work on this section in the near future. [6]

4.Testing – It is the method through which unit testing will be integrated into the solution. In the future, we'll test our code with Espresso for Android.

5.Performance and Scalability: This defines how fast the system returns results and how much it performs with the change of higher workloads. After launching our system, we will work on the optimization as per our plans. [7]

As this system will be used by many users at a time, so there is a possibility that the load time of data might slow down due to traffic. Considering all these things we are planning to improve the speed of the system. [6]


5.4 Product Features

5.4.1 Input and Output

For developing any system, we can say product these things are mandatory.
What are the inputs and what are the output?

Input: our system has inputs like email, password and while the user registers for the first time he/she has to input his phone number, current address, age to create his or her profile.

In this login activity user have to provide an email id and password to enter his or her dashboard. There is also an option to register if anyone is using it for the first time.




The image shows a login interface for 'Robo Tech Valley'. At the top is a logo featuring a stylized blue robot head above the word 'ROBO' in large blue letters, with 'TECH' and 'VALLEY' in smaller blue letters below it. The background is a light blue textured pattern. Below the logo, there are two input fields: the first is labeled 'Email' and the second is labeled 'Your Password'. Both labels are in blue text. Below the password field is a large blue button with the word 'LOGIN' in white capital letters. At the bottom, there are two links: 'ForgetPassword' and 'Register', both in blue text.

Figure 5.4.1: Log in activity.

This is the registration activity layout where new users have to give all profile picture, email, full name, age, gender, and address also everything will be saved in the firebase Realtime database except his profile image it will save in firebase but in the storage location

100% 9:52 am



Ahmed Nafiu Noman

nafiunoman@gmail.com

REGISTER

Figure 5.4.2: Registration activity.

This is the user dashboard with drawer layout, user can navigate from here to Robo Tech Valley blog, take courses, view all the tutorials from YouTube from our channel, can get all the information about our company, and also get to connect with all the campus ambassador all over Bangladesh.

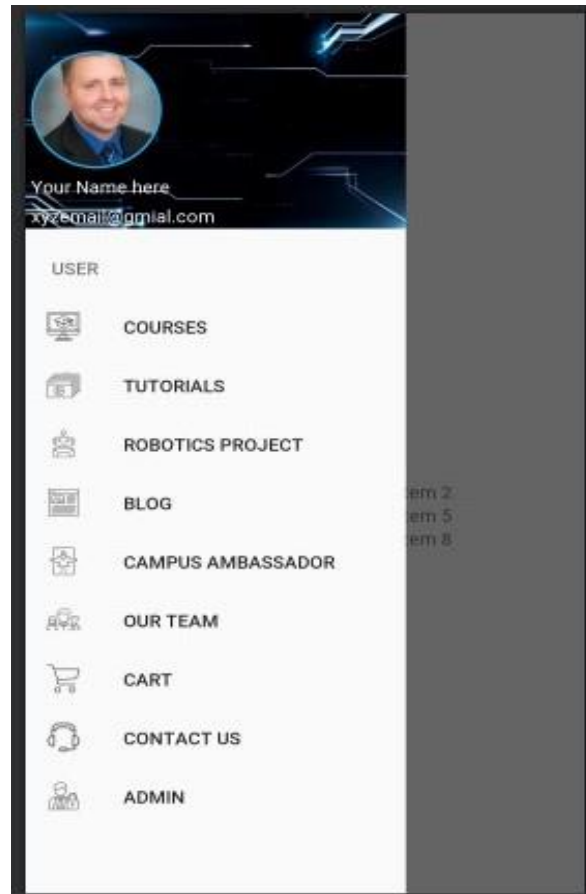


Figure 5.4.3: User dashboard activity.

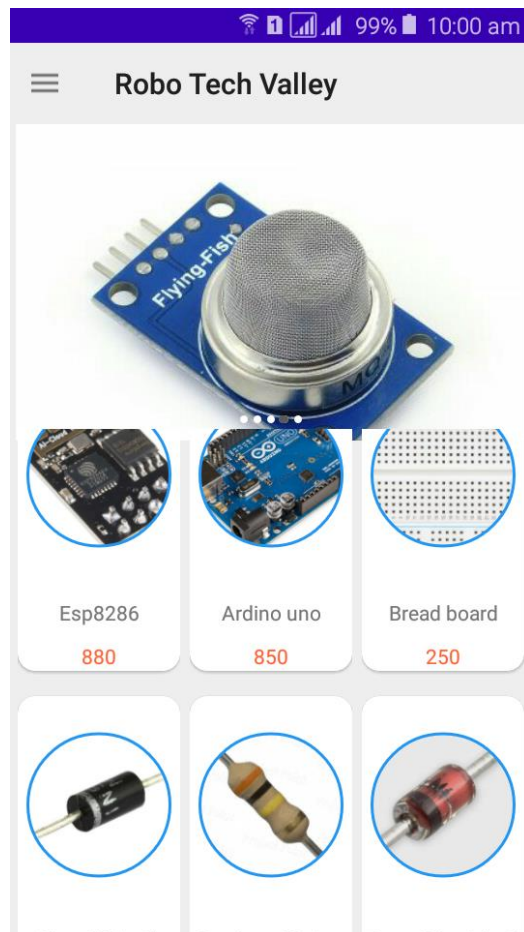


Figure 5.4.4: All products are shown in recyclerView.

This portion of the code is used to take permission from the users to allow the application to get access to the storage of the phone. If the user gives permission, it will open the gallery of the phone to select the photo. It is a third-party library Dexter which is used to take permission in the android phone.

```

public void ImageViewClicked(View view) {

    Dexter.withContext(Act_InputUserDetails.this)
        .withPermission(Manifest.permission.READ_EXTERNAL_STORAGE)
        .withListener(new PermissionListener() {
            @Override
            public void onPermissionGranted(PermissionGrantedResponse permissionGrantedResponse) {

                Intent intent = new Intent(Intent.ACTION_PICK);
                intent.setType("image/*");

                startActivityForResult(Intent.createChooser(intent, "please select the app"), requestCode: 1);

            }

            @Override
            public void onPermissionDenied(PermissionDeniedResponse permissionDeniedResponse) {

            }

            @Override
            public void onPermissionRationaleShouldBeShown(PermissionRequest permissionRequest, PermissionToken permissionToken) {

            }

        })
}

```

Figure 5.4.3: Code for gallery permission in android

Output: This activity shows the details of the selected product with its description, user rating, delivery time, service, and price.



Figure 5.4.4: product details layout

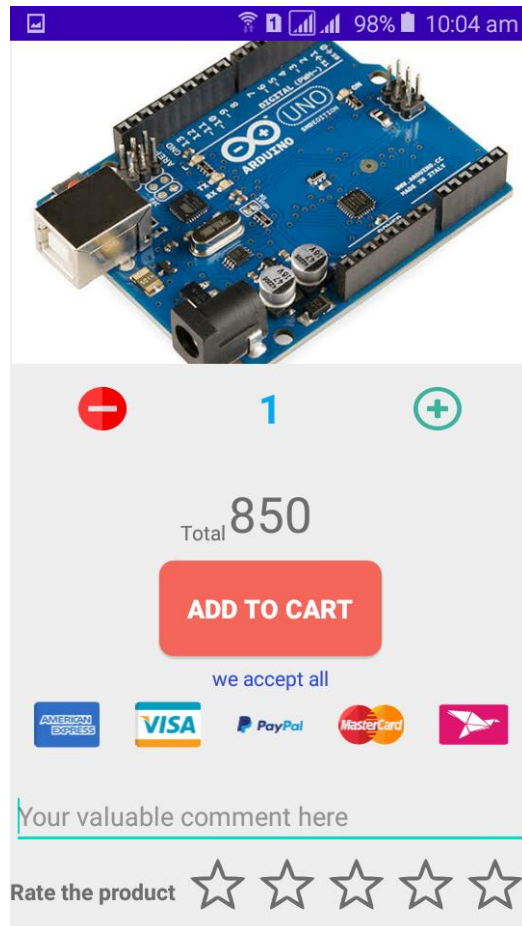


Figure 5.4.5: Add cart layout.

This activity (Figure 5.4.5) is used for adding the product to the cart. Users can select the quantity of the product and the price will automatically be added.

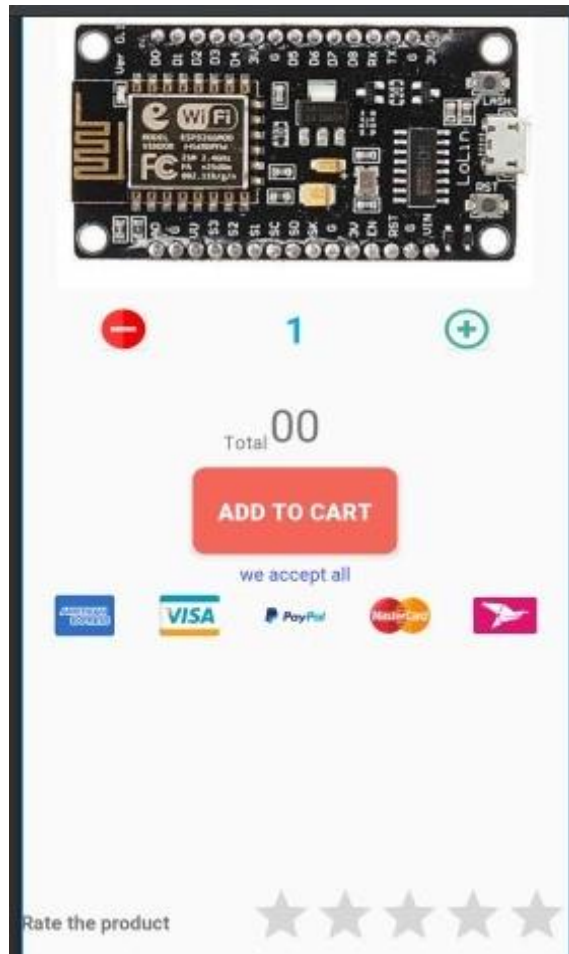


Figure 5.4.5: Add to cart layout

This part of code take input from firebase real-time database and storage to show it in the recyclerview.

```
protected void onBindViewHolder(@NonNull MyFirebaseRecyclerAdapter.MyViewHolder holder, int position, @NonNull ModelClass model) {

    holder.price.setText(model.getPrice());
    holder.productName.setText(model.getProductName());
    Glide.with(holder.productImage.getContext()).load(model.getPicUrl()).into(holder.productImage);

    holder.row.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View view) {
            Intent intent = new Intent(holder.row.getContext(), ProductDeatails.class);

            intent.putExtra( name: "productModel", (Serializable) model);
            holder.row.getContext().startActivity(intent);
        }
    });
}

@NonNull
@Override
public MyViewHolder onCreateViewHolder(@NonNull ViewGroup parent, int viewType) {

    LayoutInflater inflater = LayoutInflater.from(parent.getContext());

    View view = inflater.inflate(R.layout.myrow, parent, attachToRoot: false);

    MyViewHolder myViewHolder = new MyViewHolder(view);
}
```

Figure 5.4.6: Code to display all product in RecyclerView.

Chapter 6

Result & Analysis

Even a simple e-commerce software is difficult to develop. Because of privacy laws and state restrictions, this sort of data must be handled with carefully. We can use analytics functionality to your benefit and build up extra facilities and plans in the proper approach. We may gain many more features after utilizing this program, which makes our job easier. This program will lower our personnel costs, save time, and make our work easier and faster.

E-commerce application for a store is very important at this time. By using this software, we will get high benefit. Management should oversee the stock of goods and other items for sale from the store. This is particularly important for items, which can be checked more regularly. This system is quite user-friendly and it can keep a record of everything important which is certainly, useful for future purchases or other purposes.

After last of all, we have some minor bugs which we will fix soon

Chapter 7

Project as Engineering Problem Analysis

7.1 Sustainability of the Project/Work

The ability of an organization to continue its program or mission far into the later future is called sustainability. Every work or project has to end eventually but the effect and impact should continue to meet the required demands. How the project will act with the changing world has to be analyzed properly to make a sustainable project.

Before starting the work plans have to be very accurate. and transparent to all the workers. We need to take a step back and consider how our project fits into the bigger target's purpose, vision, and values. When any product cannot sustain and fulfill the requirements of the end-users in future times, it becomes a total waste of time, cost, and hard work. Before starting the work plans have to be very accurate and transparent to all the workers.

That is why, before starting a project proper planning and analysis should be done. This e-commerce application is such a project which we have tried to continue working with proper planning so that it exists for a longer period. People are planning to do everything online. We know that our application can fulfill the requirements of the users. In our system users will log in and can buy any product from our store. It is very easy and proper transparency will be there. [10]

7.2 Social and Environmental Effects and Analysis

Every work has some social and environmental effects directly or indirectly. For the sustainability of any project, these two things should be highly maintained. Social effects mean the effects that our works have on the people of society. As a matter of the environment, M-World is highly concerned with the Environment. This automation of the trading system does not possibly harm the environment.

7.3 Addressing Ethics and Ethical Issues

Ethics is such a thing that determines the characters. Projects that are beneficial for the users contain all the things that remain under positive ethics. Our system is secured. All the users' data preserved in such a way that others can't see them. It's protected under a unique key for a unique id. Also, the password can't be decrypted as it is properly encrypted in google firebase user authentication system. As a whole, we can say that our system will work for the welfare of the users maintaining all ethical issues properly.

Chapter 8

Future Work & Conclusion

8.1 Future Works

Here are some future works for this website

- Chat support.
- Provide tutorials.
- User location tracking system for delivery.
- Discount system for Star user.
- Refund system

8.2 Conclusion

Obviously, there is still a lot more work to be done on the mobile application before it can be released to the public. There is also the option of creating an iOS version of the program. This mobile e-commerce site seems intriguing and will undoubtedly help Robo Tech Valley grow.

I think it incredible that I was able to study mobile application development using Android throughout the semester while also designing the app. Throughout the development of the program, I relied on YouTube.com tutorials and solutions from Stack Overflow.

Working on this project also provided me with an excellent opportunity to put the information I've gained over the last four years into practice. However, it revealed some of my flaws and assisted me in transforming them into assets.

I now know how to accumulate information, create software, build it, and test it. In addition, I learnt how to implement the server side, client side, and data side independently of one another.

I also learned how to evaluate a project's social, technological, and economic components in order to get the most out of it.

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