

**BARI CHAI – ONLINE TO-LET SYSTEM USING IMAGE PROCESSING**

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This Report Presented in Partial Fulfillment of the Requirements for the  
Degree of Bachelor of Science in Computer Science and Engineering

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**DAFFODIL INTERNATIONAL UNIVERSITY**

**DHAKA, BANGLADESH**

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## APPROVAL

This Project titled “**Bari Chai – Online To – Let System Using Image Processing**”, submitted by **Runa Akter, Sherin Tasnim Mukta** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on **1<sup>st</sup> June 2021**

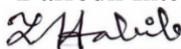
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## DECLARATION

We hereby declare that this project has been done by us under the supervision of **Lamia Rukhsara, Lecturer, Department of CSE** Daffodil International University. We 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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## **ABSTRACT**

In our Dhaka city finding a house for rent is a difficult task. Especially finding a house for a bachelor is more difficult. There is the only way to find the house is for a person have to look into the to-let posters on the street wall. Then the person has to contact the owner of the to-let posters. After contacting the owner, he may go to see the room, after seeing the room or house he may or may not choose the house for rent. Then he has to continue his searches on the street to the street. It is very difficult for a person. He might have to spend the whole day time searching for the house for rent. And it also difficult for the person who wants to give his house as rent. He or she has to stick their posters of the to-let street to the street at many places. It also a difficult task for them. Here comes our online system called Bari Chai to solve this problem. In our system owner who wants to give rent their house, they can upload their poster image of to-let advertising in our Bari chai system. Our system will extract text from the image by using image processing technology and will post it as text on the platform. Then the user of this platform can see those advertising posts of rent and can contact the owner for the rent. By using this platform both owner and tenant have to do less work. They do not need to go street to street for searching for a house for rent.

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# CHAPTER 01

## Introduction

### 1.1 Introduction

The changes of the world are rapid with technology. We are living in a modern world now. Everything we use in our daily life is heavily connected with technology. Finding a house for rent with from advertising poster is an old method. Why not a digital platform for us to let processing. Bari Chai is a web-based online platform that will help us to find a house for rent. It will modernize our current to-let system into a modern system.

### 1.2 Motivation

If we walk in the street of Dhaka, we will notice there are so many advertising posters are stick on the wall of the building. Most of the posters are advertise of to-let for the house. This is the common method in Dhaka for renting a house. But we notice there are some problems and disadvantages of using this poster method. First of all, it is difficult to use this method for both owners of the house and also for tenants. They have to spend more time and effort to advertise the to-let and finding a house for rent. There also another problem with this poster method, for lots of posters are sticking on the wall, it is destroying our beautifulness of the street around us. For solving these problems, we get an idea to build an online system for to-let advertises. This will solve both of these problems. If every owner and tenant use this system, they have to do less work and there will be no poster on the wall.



### **1.3 Objectives**

The objectives of Bari Chai – Online To-Let System using Image Processing:

- Convert the current analog poster method to a digital web-based method.
- Reduce the hard-working of both house owner and tenant in renting process
- Restore the beautifulness of the wall of the street by removing these to-let advertise posters.

### **1.4 Expected Outcome**

From this Bari Chai – Online To-Let system using Image Processing we expected these outcomes:

- Beautiful, simple, and easy to use user interface for this web-based platform
- Easy for both house owner and tenants to rent house
- No more spending extra money to print the poster for the to-let advertise
- No more ugliness on the street wall

## **1.5 Necessity**

Bari Chai is an online platform that has a goal to convert the current to-let system to a modern platform. This platform is for the owner of the house who wants to give their house as rent and for the tenant who wants to take a rent house. But why we need an online to-let platform for finding a house for rent.

In our Dhaka city tenants have to find a house for rent by going street to street by looking up the posters of to-let advertise. Also, the owner has to stick many posters on many walls. This procedure kills both of the times for owner and tenant. To optimize time and effort for both owner and tenant we have developed a web-based platform called Bari Chai.

Bari Chai provides an advertisement of a to-let poster from the image. The owner can upload an image of their to-let poster on this platform. The Bari Chai platform will extract from the images as text and will create a post with those texts. Then tenants who will use our Bari Chai platform can see the post of to-let. Then they will be able to contact the owner for their desired house for rent.

For Image Processing to extract text from images we have used a technique called Optical Character Recognition in short form called OCR. OCR changes over pictures of composed, written by hand, or printed text into machine-coded text. By using this OCR, we can extract text from the uploaded images.

## **1.6 Layout of the Report**

The Report of Bari Chai is appropriated into 5 sections. Every part will talk about the various parts of the "Bari Chai". Each segment has various parts explaining every one of the fragments in detail.

## **Chapter 1: Introduction**

This part talks about the fundamental theoretical considerations driving our undertaking. Here comparably examine our undertaking inspiration, targets, and anticipated outcomes.

## **Chapter 2: Optical Character Recognition**

This section discusses about the OCR (Optical Character Recognition). From this section we will know about optical character recognition, how it is beneficial for the extracting text from images, how it is helpful for our developed system.

## **Chapter 3: Background**

This segment discusses related stages and what issue those stages are tackling. Additionally, discusses their inconveniences. What's more, how our undertaking is settling those issues.

## **Chapter 4: Requirements Description**

This section talks about requirements to develop Bari Chai web application. This section includes the diagram of each component that is used to develop Bari Chai.

## **Chapter 5: Design Description**

This section talks about Front-End, Back-End design for the Bari Chai application.

## **Chapter 6: Implementation**

This section talks about implementation and testing our application.

## **Chapter 7: Closure and Prospect Scope**

This part discusses the end and Prospect degree of our project.

## Chapter 02

### Optical Character Recognition

#### 2.1 What is Optical Character Recognition

Let's talk about OCR or Optical Character Recognition it's a type of technology that allows us to extract information off of a document and turn it into searchable and editable data. Whether our documents are coming in as physical pieces of paper that need to be scanned in or something a non-searchable PDF, OCR is going to allow us to digitize that information.

And once we have extracted the information off of a document, we can pass it along to other systems, like an ERP or a content management platform for process management down the line. Common examples of where OCR is used are things like invoice processing, Human Resources, and legal document searchability, transcript, or sales order processing. When we add in elements of AI and Machine Learning into the process, we can further minimize human intervention that is needed and recognize more varieties of document types and languages and even mimic the way that the human brain recognizes patterns and context.

As OCR represents optical character recognition, OCR innovation manages the issue of perceiving a wide range of various characters. Both manually written and printed characters can be perceived and changed over into a machine-decipherable, computerized information design.

Think about any sort of chronic number or code comprising numbers and letters that we need digitized. By utilizing OCR, we can change these codes into a computerized yield. The innovation utilizes various methods. Set forth plainly, the picture taken is handled, the characters extricated, and are then perceived.

What OCR doesn't do is consider the genuine idea of the item that we need to filter. It just "investigates" the characters that we expect to change into an advanced arrangement. For instance, in the event that we check a word it will learn and perceive the letters, however not the significance of the word.

We realize it's quite simple to take words on our PC screen and put them on an actual piece of paper simply click print and except if we have neglected to fork out a coercion level measure of cash for another cartridge. We will have new warm fulfilling archives only a couple minutes after the fact. However, going the other way checking dead tree data into our PC is significantly trickier. I mean sure flatbed scanners aren't too hard to work in essence yet a considerable lot of them are simply snapping a photo of the report and saving it onto our PC. Which means not exclusively will it likely not look extremely fresh yet because of record pressure and small amounts of residue in our scanner. Be that as it may, we can't alter a perfect duplicate of our record in our number one-word processor in light of the fact that the scanner will not perceive each character. Luckily, there are a few gadgets out there that empower optical character recognition or OCR where each character on a page is filtered exclusively. Thus, our papers are transferred as real content records rather than muddled JPEGs. Yet, how precisely does that work and would one say one is somewhat optical scanner better than another well?

Since the entire idea of making an interpretation of the content into the electronic sign is quite wide there have been heaps of various executions of OCR throughout the long term. One of the soonest electric OCR gadgets the octophone was created back in 1914. This strange looking contraption depended on the uncommon conduct of selenium which conducts power contrastingly in light and obscurity. As it checked the words on a page the octophone recognized the dull ink of text and lighter. Clear spaces creating tones that relate to various letters making it workable for dazzle individuals to peruse with some training later in 1931.

A machine was built up that could change printed text over to Telegraph code. One of the principal advances to make an interpretation of printed characters to electrical motivations as opposed to sounds yet it wasn't until the 1960s and 70s. That OCR started to take a more comfortable present-day structure with postal administrations utilizing OCR to understand addresses and programming that could perceive a wide range of textual styles. In this way, back to the current day when we examine a report how precisely does the product understand what it's taking a gander at well.

The initial step is to remove antiques so our OCR program can focus on the content and that's it. In this way, it endeavors to eliminate dust and other different illustrations adjust the content appropriately and convert any tones or shades of dim in the picture to high contrast. Just making the actual words simpler to perceive.

The subsequent stage is to sort out what characters are on the page fewer complex types of OCR think about each filtered letter pixel by pixel to a known information base of text styles and settle on the nearest match. More brilliant OCR anyway makes this stride farther by separating each character into constituent components like bends and corners and searching for coordinating with actual highlights and genuine letters.

We can think about the contrasts between these two methodologies like the distinction among raster and vector pictures. OCR programming can likewise utilize a word reference so it will not incidentally let out gibberish words because of incorrect filtering. For instance, if our scanner sees this [dog] letter yet it can't exactly tell whether the center letter is an O or A. It can check its word reference to conclude that the word is canine and not gag. Giving OCR programming situational data can additionally eliminate mistakes, for example, advising it to just attempt to coordinate with numbers.

On the off chance that it's perusing postal divisions on an envelope even with these stunts anyway OCR isn't amazing which we have most likely seen with our own eyes in the event that we have at any point utilized it yet with more noteworthy handling force and AI methods that permit the product to perceive more inconspicuous examples after some time. OCR has gotten adaptable enough to perceive more enthusiastically to-peruse typefaces in reliably printed material and in any event, penmanship. Furthermore, free OCR cloud handling administrations like Google Drive which has significantly more AI capacity than our home PC. For which we trust are genuinely clear reasons have made OCR more available than her no word

## **2.2 How Optical Character Recognition – OCR works**

A normal scanner or copier makes what is known as a raster picture, or an assortment of highly contrasting or shaded specks. To take and repurpose information from camera pictures or picture just PDFs, you need OCR programming that will take the letters from those pictures to make words, at that point sentences, to get to and alter the first substance on the page. This is done through taking a gander at each line of the picture, with the OCR scanner sorting out if the highly contrasting dabs address a specific letter or number.

## 2.3 Benefits of using Optical Character Recognition

By consolidating an OCR into your business interaction, the executives (BPM), you can digitize and join records in your work processes. Amazon Textract is an illustration of an OCR scanner that incorporates well with a canny work process arrangement. Some useful uses of OCR include:

1. **Print records.** To start with, you'll need the best printout variant of your current report. This generally includes copying to build the difference between the page and the print. Things like grimy stamps, creases, and ink blotches will improve the probability of error and mistaken word recognition.
2. **Checking.** Utilizing a flatbed scanner expects you to check all that individually. With an OCR scanner, by and large, the scanners will filter the following page consequently.
3. **Shading.** OCRs just read what is there and what isn't. The initial step is examining a picture in high contrast of the first, at that point checking in shading. On the off chance that something like a stain appears on the first, the OCR can recognize the distinction in the shading variant through changes in lighting on the highly contrasting adaptation. Without this basic initial step, OCRs don't work as expected in recognizing shading patches, stains, or different quarrels.
4. **Editing.** While not as extensive as a human supervisor, OCR scanners can help wipe out human mistake related with composing. Utilizing innovation like Microsoft Word, an OCR scanner can make ideas that will assist you with thinking of you make new reports.
5. **Formats.** An extraordinary OCR scanner will naturally distinguish different sections of text, tables, and pictures. Those pictures are then transformed into illustrations, tables move effectively, and the sections are isolated the correct way.

6. Computerized work processes. OCRs can be utilized to improve business measure the board programming. A decent OCR will help fuse and expand an association's report-based information into their advanced cycles. No information from heritage arrangements is lost all the while however rather moved into new advanced arrangements, similar to an astute BPM, to make information assortment and capacity more precise and simpler to carry out pushing ahead.

## **2.4 Why OCR Matters**

OCR turns authoritative reports that couldn't be looked for text into accessible records, permitting lawful experts to look through the whole substance of the archive.

When this interaction has been applied to an archive, peruses can scan that report for words or expressions by composing Ctrl+F (Cmd+F on Mac PCs). Unexpectedly it's that simple to jump further into a record's better focuses.

Prior to OCR, the lone alternative accessible for digitizing printed paper records was to physically re-type the content, a strategy that end up being incredibly tedious just as inclined to mistakes.

Presently, when a filtered paper report goes through OCR preparing, the record's content can be effectively altered and looked inside a word handling programming like Microsoft Word or in Google Docs.

## **2.5 How Business can be benefited using Optical Character Recognition**

### **Digitizing Paper Documents:**

Digitizing paper records helps organizations past saving paper. These records are presently ready to be chronicled, arranged, looked and openly moved. This outcomes in new degrees of insight and versatility for some organizations. One difficult undertaking that OCR can dispose of is physically entering contacts assembled at an expo or gathering into a contact the executive's framework or CRM. Utilizing an OCR application fit for perusing business cards, contacts can be converted into a computerized structure quickly. This fills in as a stage to associate with new business openings. OCR can likewise help at whatever point an endeavor is gathering information in an organized, repeatable organization with a high exchange recurrence.

### **Managing Documents:**

For any business that manages an ordinary stream of fluctuated archives, the capacity to sort them is totally critical. While arranging was done physically before, OCR applications have various benefits over manual arranging. OCR frameworks can deal with both written by hand and printed text. They can likewise recognize record types and parse information as per complex business rules.

### **Offering Assistive Solutions:**

Workers or clients with a visual disability frequently require a way to change over paper records to computerized text. OCR can convey an answer that feeds composed content into a book to-discourse application.

### **Digitizing record of Historical and Cultural Documents:**

For organizations like exhibitions and galleries, chronicled records can traverse many years and even hundreds of years. Digitizing these records is crucial to saving them since put down accounts can be handily harmed by fire or water or can corrupt over the long run. OCR innovation can empower the protection of socially significant archives and take into account snappy looking. OCR empowers you to share these records everywhere on the world through the web.

### **Providing Secure Access:**

From driver's licenses and international IDs to protection authentications and auto plate numbers, OCR arrangements can rapidly and productively handle every one of the fluctuated types of individual recognizable proof. This permits business and municipal establishments, including police offices and air terminals, to handle individual information with at least blunder because of manual preparing issues. OCR innovation can naturally check client characters progressively.

### **Translating Between Languages:**

OCR innovation recognizes text content in a picture and concentrates the distinguished content into a machine-lucid character stream, simultaneously identifying the language. The innovation can be applied to road signs or manually written writings utilizing the Google Translate portable application. Working immediately, it utilizes a portable camera as a scanner. The OCR-based application is fit for working with in excess of 100 dialects.

## 2.6 Technologies That Use in OCR

OCR depends on Machine Learning procedures that restrict text in a picture and comprehend what it says.

In the first place, Convolutional Neural Networks (CNN) catch a picture and distinguish graphical examples for additional recognition and progress into text.

From that point onward, OCR calculations recognize every one of the letters named by CNN in the primary stage.

At long last, Natural Language Processing (NLP) calculations articulate sentences by uncovering the consistent construction and association between words. This delivers a record a human can comprehend.

There are a few open-source and business OCR arrangements accessible available today. The most basic factor for an OCR framework is recognition exactness.

When utilizing OCR for ID archives recognition, for instance, the accompanying OCR motors have been assessed by means of exploration, and the outcomes have been summed up as beneath:

As the table illustrates, Google Vision ended up being the most powerful and exact answer for text recognition from ID reports.

## **2.7 Makes Business more Efficient by using OCR**

To effectively carry out OCR innovation in your product item, it's essential to distinguish business objectives, assess information accessible from both open sources and your own datasets, and choose if extra safety efforts are expected to back up an OCR motor precision disappointment.

Furthermore, making an association with a valid AI specialist can possibly accomplish achievable undertaking objectives and benchmarks. They can likewise help you select the OCR design, devices, and administrations generally proper for your individual business case.

In Optical Character Recognition applications, customers can either watch the virtual things or help out them zoom, rotate, move if the possibility of the application requires it.

## CHAPTER 03

### Background

#### 3.1 Introduction

Bari Chai – an online to-let system using image processing is an online platform to make house owner and tenants easier to post and find rent in this platform. This chapter described the detailed work, related work, and their advantages and disadvantages, and how Bari Chai is solving the issue.

#### 3.2 Related Work

There are some web platforms for to-let on the web. These platforms are also pretty good. That is an advantage of these platforms. But there is a disadvantage that makes these platforms useless for my goal to develop this Bari Chai – Online To-let system. These platforms do not use Optical Character Recognition. They have used static media in their web platform. Also, they do not solve the problem of having so many to-lets advertisements on the wall of the street or building.

Also, these platforms sometimes charge an amount of money as their commission. Also, some of them have complex User Interfaces for that every type of user cannot use their web platform very easily.

In case our platform Bari Chai uses a very simple user interface so that every type of user can use that.

Some related online to-let platform is written below:

- BdTo-Let
- My Rent BD
- Bd Housing

## CHAPTER 04

### Requirements Description

#### 4.1 List of Used Software's

I have used following software's to build the Bari Chai Website.

- OS: Windows
- Application Design: Figma
- Language: HTML, JavaScript
- Style: CSS, Tailwindcss
- Front-End Framework: Reactjs
- Back-End Framework: Nextjs
- Tools: Visual Studio Code, Git, GitHub

List of Used Software's to run the application:

- Operating System: Any modern OS
- Browser: Any web browser like Firefox, Google Chrome, Safari etc.
- Network: Wi-Fi or Cellular Data

## 4.2 User Diagram and Description

User of Bari Chai platform can perform the below operation in Bari Chai web application:

- I. Owner of House who wants to give their house they can upload they're to-let advertisement image in this platform then it will extract text from that image and upload it in the platform.
- II. Tenant user can see all the post in their news feed.
- III. Tenant can contact with the owner of houses through the chat room

## 4.3 User Diagram

This is a simple user diagram. For the Bari Chai the main users are owner of houses and tenant. Both users can access all the content of the Bari Chai content. This below diagram will represent how the application works, how owner of houses and tenant are connected.

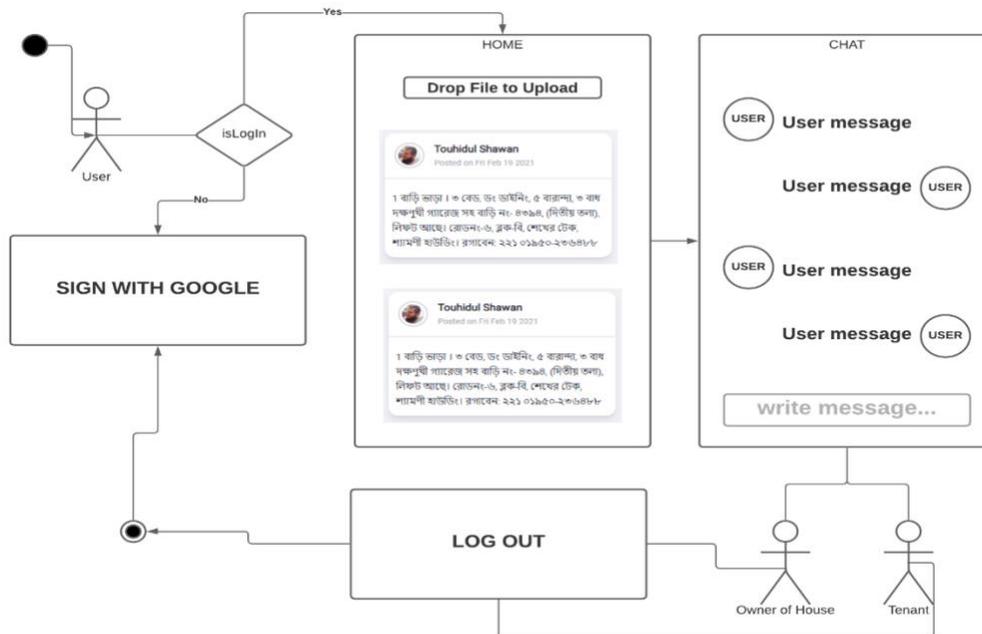


Figure 4.1: User Diagram

## CHAPTER 05

### Design Description

#### 5.1 Design of Front-End

The root part of a website is front-end part. This is the first attraction of an application to user. We designed a beautiful and user-friendly front-end for Bari Chai.

#### 5.2 Wireframe of Application

This Figure is showing the Formation of the home Component before user logged in. There are only 1 component in the home Component. Now days every person have a Gmail account. So, we use this simple login process so that user can easily sign in the platform by clicking only one button.

1. A Sign in Button that will be used to sign in the Bari Chai platform.

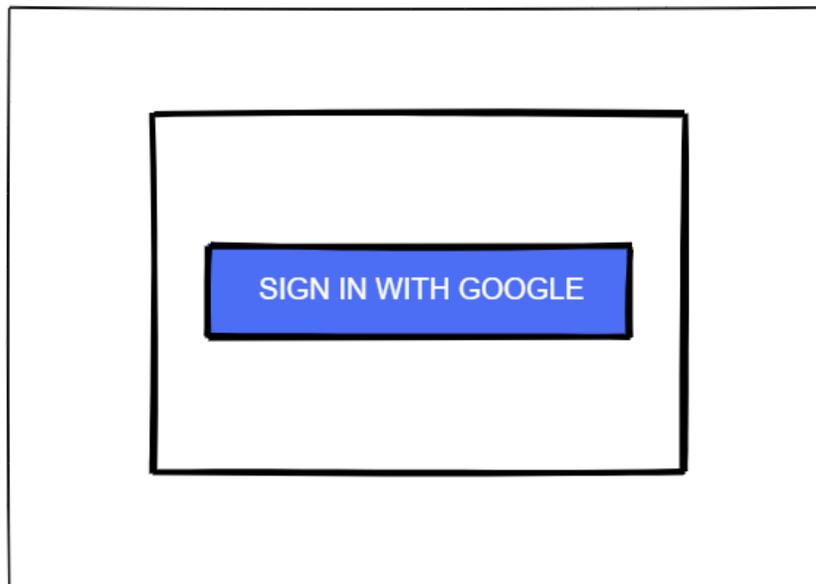


Figure 5.1: Formation of Home Component before logIn

Below Figure is formation of the home component after a user is logged in. In this page there are many components.

- A Chat link that will help user to go to chatroom page for chatting with others user
- A SIGN OUT button to sign out from the app
- A section to drop user file or select file that user/owner of house want to upload
- And below that a postcard component with user name, time of upload photo and the extracted text from the photo

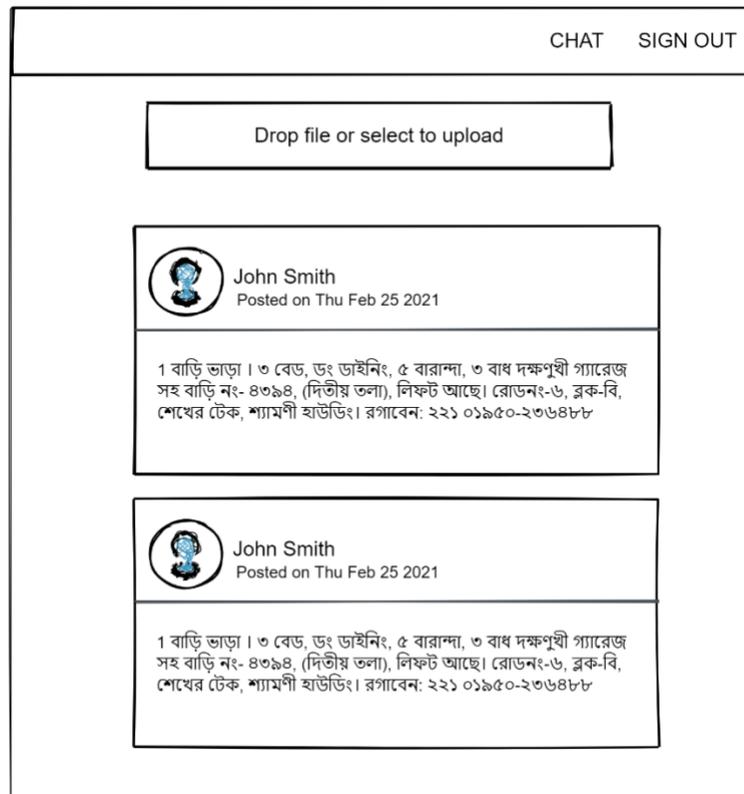


Figure 5.2: Formation of Home Component after logIn

This figure is for postcard component. Here are 4 elements in the postcard component.

- **Image of user:** When user use his email to login in our app, our app automatically fetches user image from their Gmail account and use here.
- **Username:** This user name is also fetching from user Gmail account.
- **Posted Date:** This is generated by our database of Bari Chai application. When a user uploads an image then OCR extract the image and collect the text and send to database. That time database generates this time.
- **Extracted Text:** When a user uploads an image then OCR extract the image and collect the text and send to database. Our Database store those text with all necessary information. Then our app automatically fetches latest changes from the database and show this below postcard component.

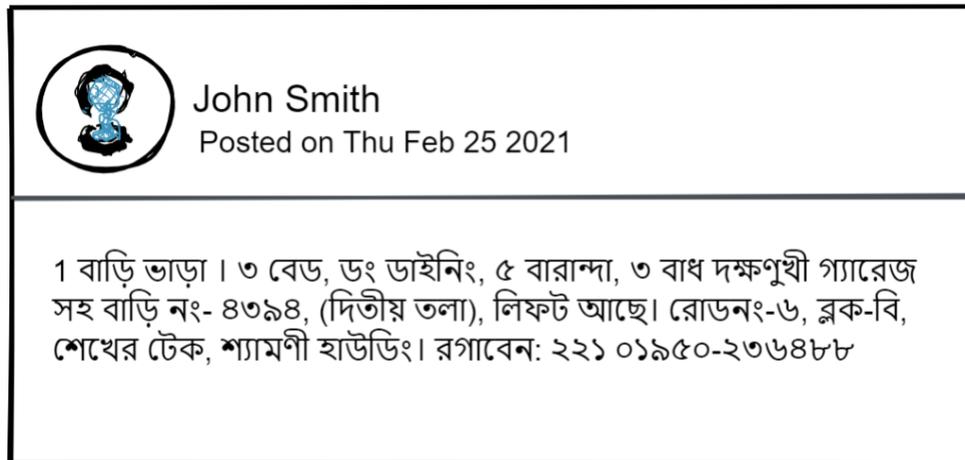


Figure 5.3: Formation of PostCard Component

Below Figure is about the chat component of the Bari Chai application. In this chat page user can chat with other users. A tenant can message an owner of house who post about rent easily through this chat feature.

Left side is for receive messages and right side is for sender messages. And also, there is a textbox and a send button. In text box user can type their messages and send it by clicking the send button.

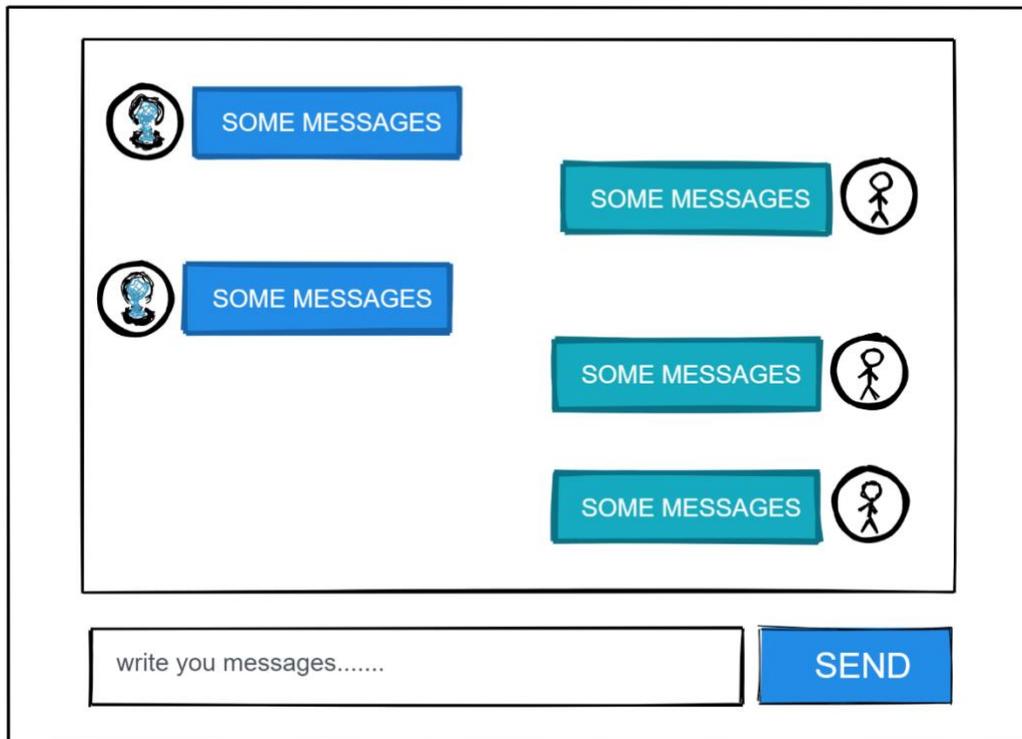


Figure 5.4: Formation of Chat Page

Below Figure is about the how the Optical Character Recognition – OCR is working. After a successful login user can drop or select a file into a file field. After upload a file Bari Chai app will start OCR and will extract text from the image. After successful extraction of text, it will upload text data to our database. After change in database Bari Chai app will be update in real time.

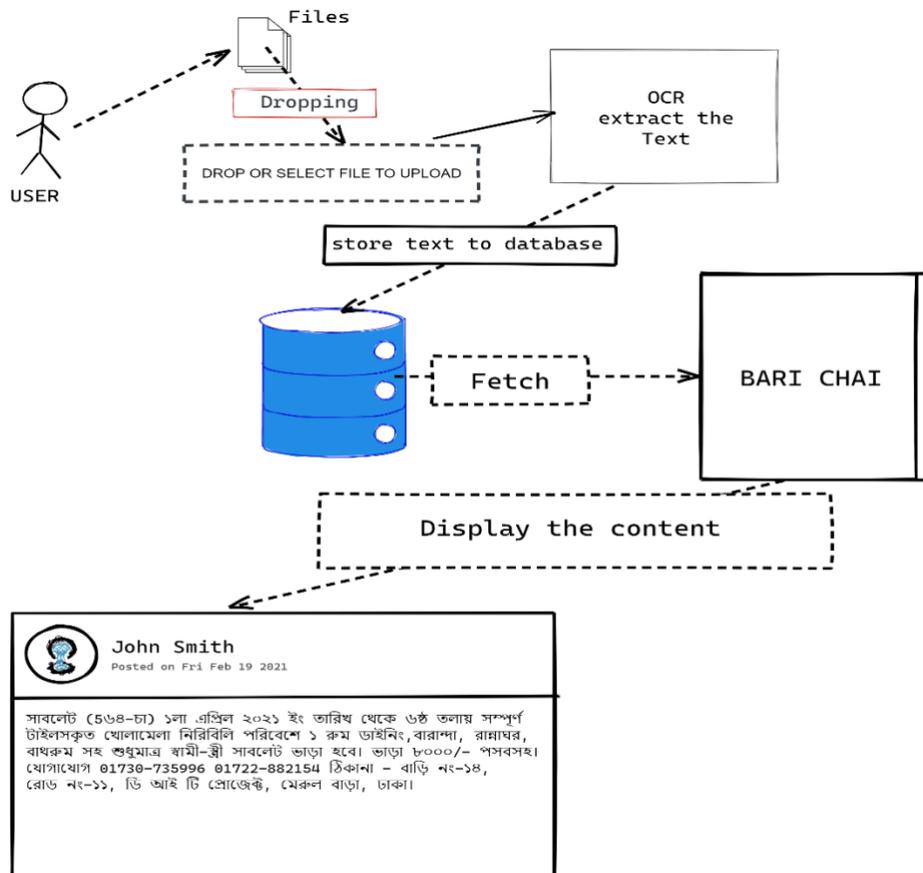


Figure 5.5: Formation of How It Works

### 5.3 Database Design

The below figure represents the Entity Relation (ER) Diagram of our Database for Bari Chai application.

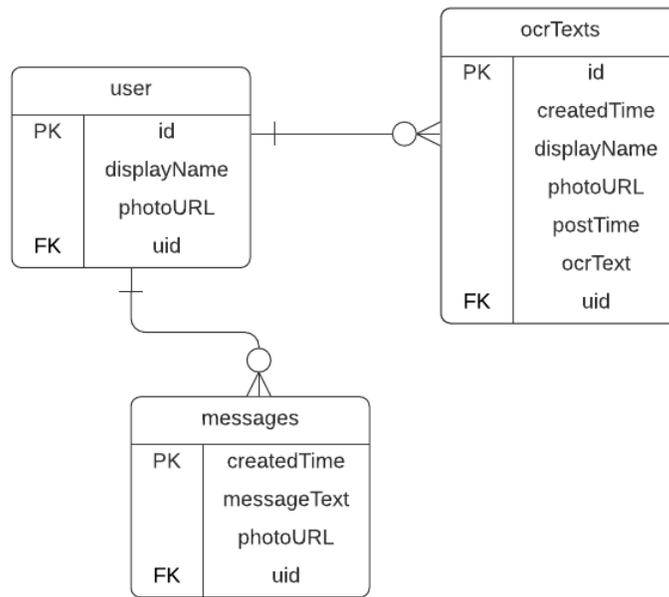


Figure 5.6: Database design of Entity Relation (ER) Diagram

## **5.4: Back-End Design**

For our Bari Chai web application, we have used Reactjs to develop our front-end of the application. But for back-end we need a database. To store our user information data, extracted ocrText data we have to have a database. So, we have used Firebase cloud storage. Firebase is a google service to store data for a small application. Since our application is now small so we have used this database. When application will grow then we will move to another database so our database can handle all those of traffics of web application.

Application store extracted text data to database. Also, the application updated its UI when database got changes in real time. That's because of using Reactjs. This change is updated without reloading our entire website. That's the power of Reactjs

# CHAPTER 06

## Implementation

### 6.1 Implementation of Front-End

For execution of front-end I have utilized reactjs. Reactjs is a JavaScript library to construct web parts. It makes a web application more versatile, quick to stack. Along these lines, site will give a superior client experience to our client.

#### 6.1.1 Application Formation

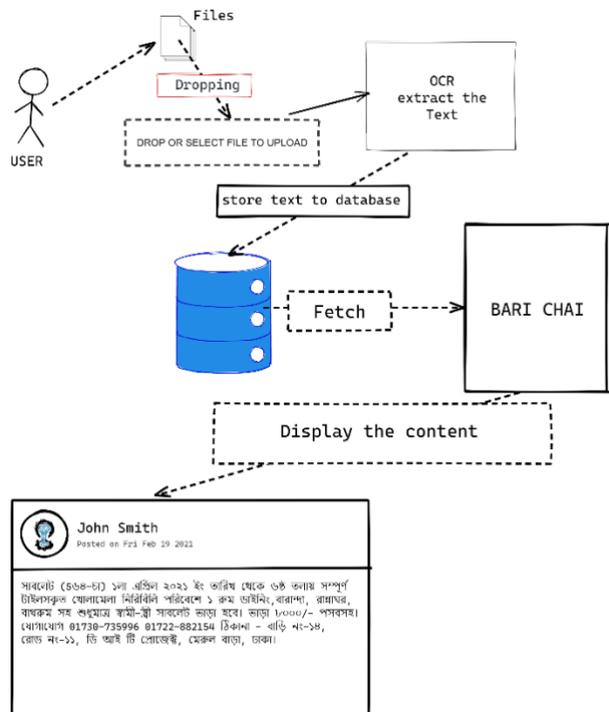


Figure 6.1: Application Formation

## 6.2 Home Component

This is the Home Component of the Bari Chai before login. There is an image and a sign with google button to login in our application

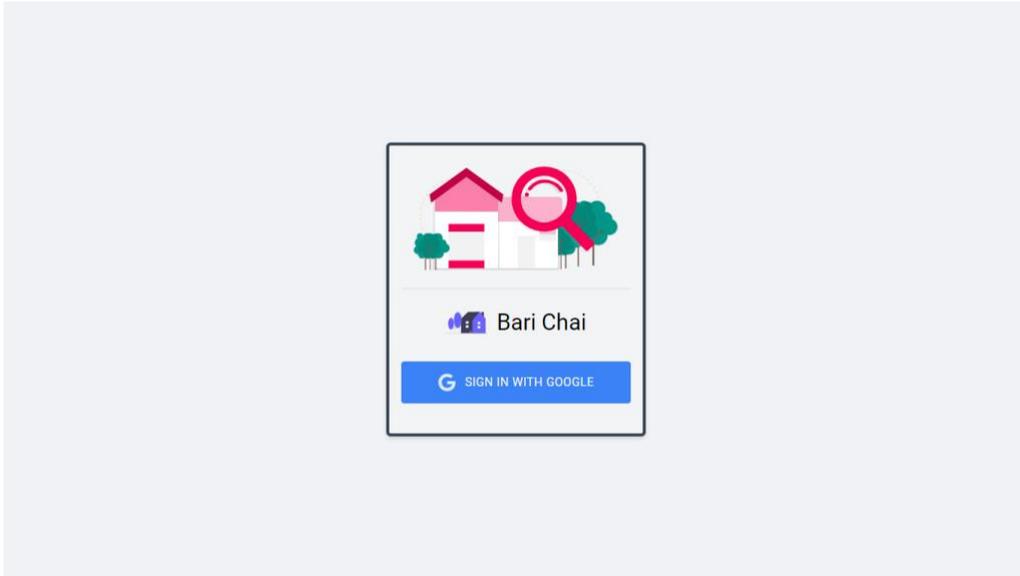


Figure 6.2: Home Component

## 6.3 Home Component

This is the Home Component after a successful login of the Bari Chai application.

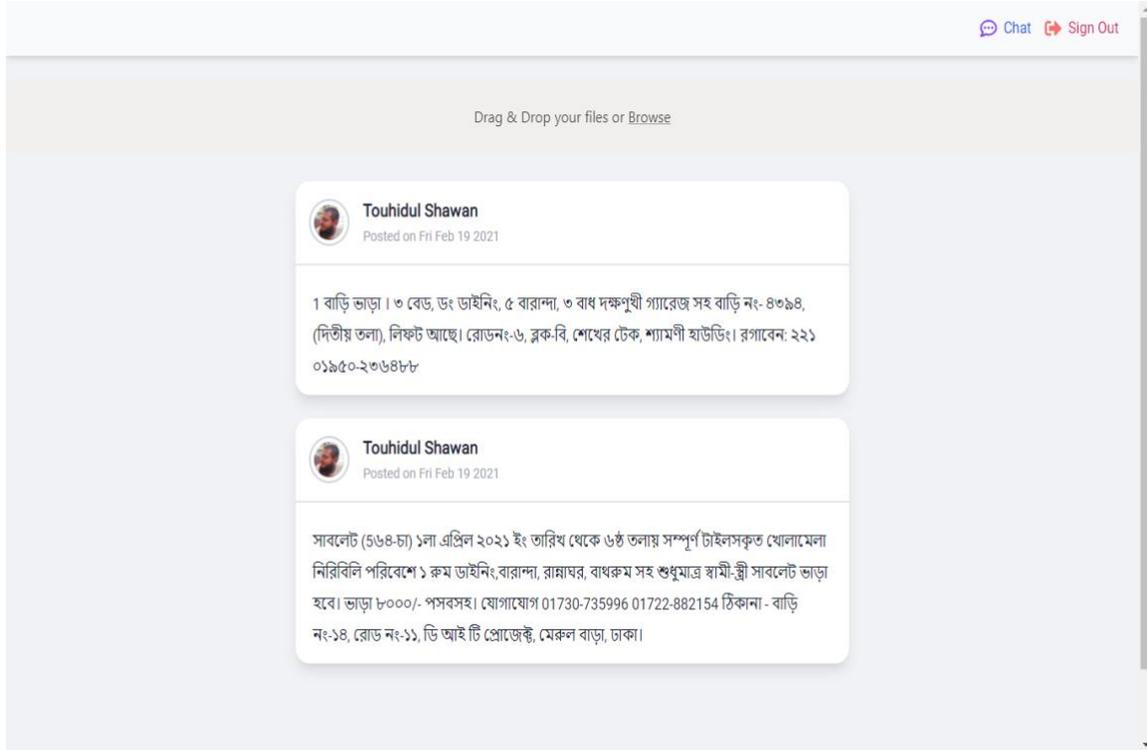


Figure 6.3: Home Component after Login

## 6.4 Drag a file onto file field to upload

This is the interface when a file is being selected to upload. Here we can see after select a file our application starts the OCR. We can verify that by looking on the yellow background component. It displays that Processing Image: 52.86%

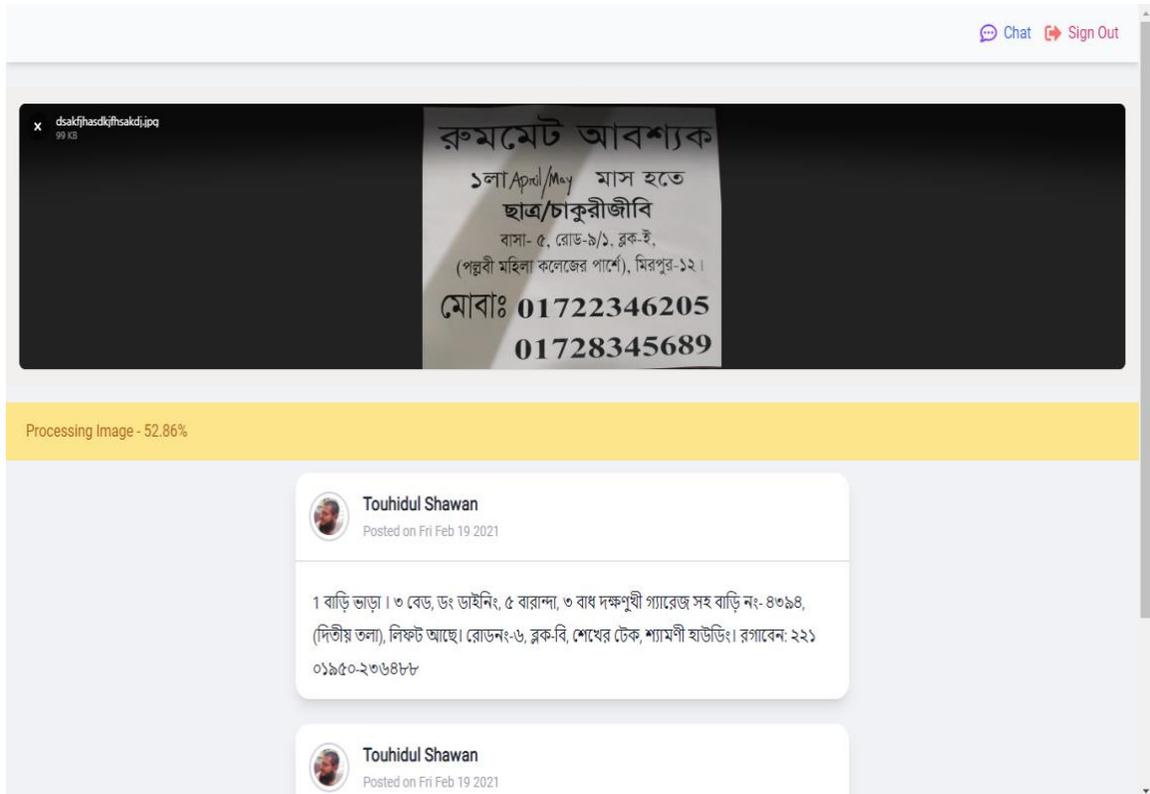


Figure 6.4: Uploading File Component

## 6.5 PostCard Component

This is the PostCard Component of the Bari Chai application. It displays everything about user and text that is extracted from the images. It represents the post of house owner for renting.



Figure 6.5: Post Card Component

## 6.6 Chat Room Component

This is the Chat Room Component of the Bari Chai. This is the place where user can communicate with other user by giving text message.

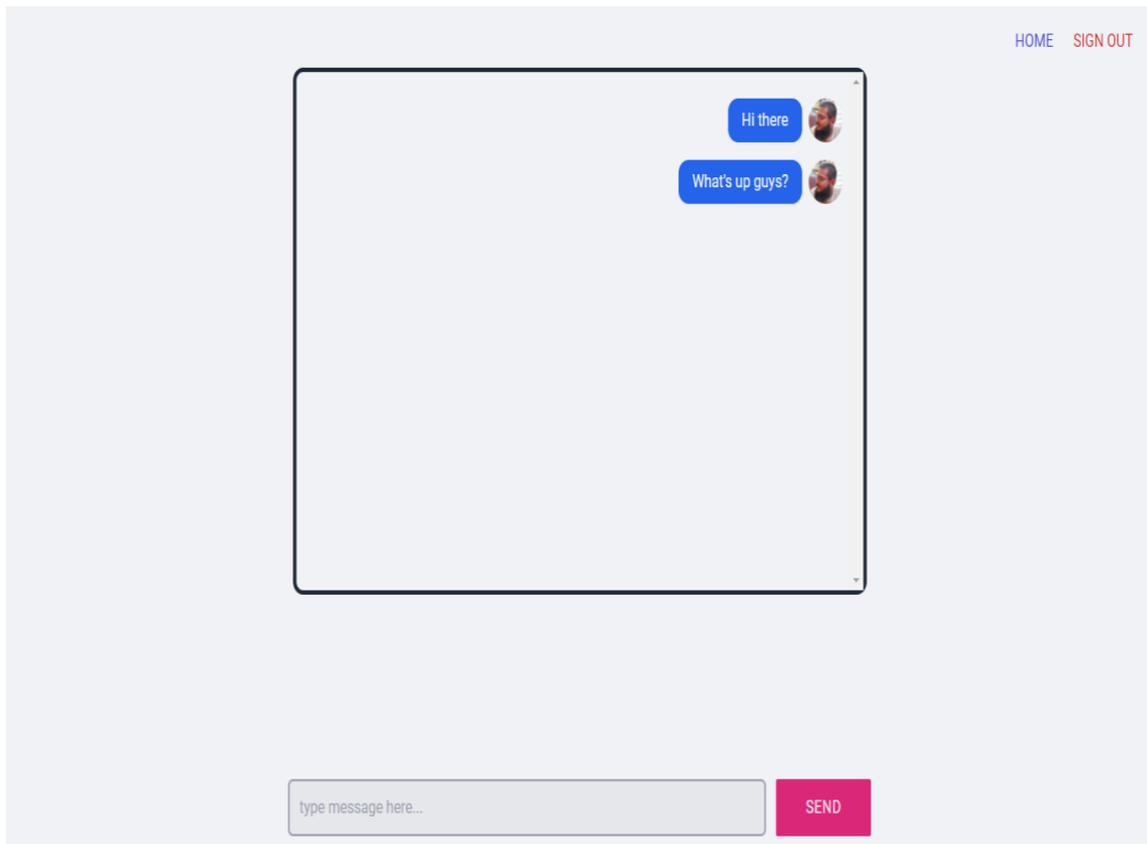


Figure 6.6: Chat Room Component

## **CHAPTER 07**

### **Conclusion and Future Scope**

#### **7.1 Conclusion**

By the grace of Almighty Allah, we have successfully completed our Web Application project called Bari Chai and documentation. After the long-term of thinking, planning, discussion, implementation we are in the last session and happy of completion. Bari Chai is ready to help the owners of house and the tenants.

Until now the owners of the house and the tenants are not familiar with any kind of web platform like Bari Chai to solve their problem. They only find each other benefit through the advertisement. This is the era of science and technology. If they do not keep the knowledge of using modern technology to solve a huge problem efficiently, then they will not be ready to cope up with the modern world. So, it is important to use such a platform that can reduce their large amount of time from wasting. And also solve the problem of the ugliness of the wall.

#### **7.2 Scope for Future Development**

1. Make more Optical Character Recognition content
2. Implement search algorithm by name of the place
3. Add more useful features.

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## APPENDICES

### Appendices: Project Reflection

All through the excursion, since a year ago we have procured a tremendous involvement with our life. When we started the journey, we didn't know about many JavaScript libraries like Reactjs. By developing this Bari Chai platform, we have developed a solid base of our knowledge about these libraries and frameworks.

It was hard for us know the proper steps of developing a web application. But we were not hopeless. Then we analyzed the requirements and made a proper plan that made us even more confident to develop the application. We faced several problems when we developed the work with Database in the project.

After a year of hard work, we have developed our application. We have gathered a lot of ideas about other web applications. When we were exploring other web applications to find out their lacking then we know any information about the web application. Now we have the belief that, if we work hard, everything is possible to do. After all, we are grateful to The Almighty ALLAH and our respectable supervisor **Lamia Rukhsara** for her support and excellent guidance throughout the journey.

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