

RAYVEN: ENHANCING B2C COMMUNICATION THROUGH CHAT

A PROJECT REPORT

submitted by

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to

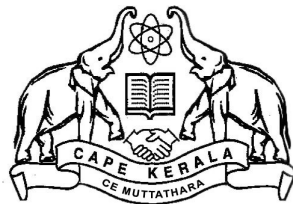
the APJ Abdul Kalam Technological University
in partial fulfillment of the requirements for the award of the Degree

of

Bachelor of Technology

in

Computer Science and Engineering



Department of Computer Science and Engineering

College of Engineering Muttathara

Thiruvananthapuram

JUNE 2023

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
COLLEGE OF ENGINEERING MUTTATHARA
THIRUVANATHAPURAM**



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- Promote research-based projects in the emerging areas of Computer Science and Engineering.
- Empowering the youth in rural communities with computer education.
- Inculcating professional behaviour, leadership qualities, team spirit, skills on problem solving, critical thinking, and ethical responsibilities.

DECLARATION

We undersigned hereby declare that the Project report **RAYVEN: ENHANCING B2C COMMUNICATION THROUGH CHAT**, submitted for partial fulfillment of the requirements for the award of degree of Bachelor of Technology of the APJ Abdul Kalam Technological University, Kerala is a bonafide work done by Anjana M S, Nandana S Nair, Sambath S, Vishnu Charan P under supervision of Mrs.Rekha V R, Assistant Professor, Dept of CSE, CEM . This submission represents our ideas in our own words and where ideas or words of others have been included, We have adequately and accurately cited and referenced the original sources. We also declare that We have adhered to ethics of academic honesty and integrity and have not misrepresented or fabricated any data or idea or fact or source in our submission. We understand that any violation of the above will be a cause for disciplinary action by the institute and the university and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been obtained. This report has not been previously formed the basis for the award of any degree, diploma or similar title of any other University.

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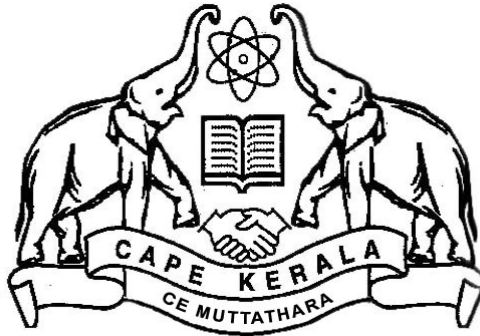
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CERTIFICATE

This is to certify that the report entitled **Rayven: Enhancing B2C Communication Through Chat** submitted by **Anjana M S, Nandana S Nair, Sambath S, Vishnu Charan P**, to the APJ Abdul Kalam Technological University in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Computer Science And Engineering is a bonafide record of the project work carried out by them under our guidance and supervision. This report in any form has not been submitted to any other University or Institute for any purpose.

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ACKNOWLEDGEMENT

We take this opportunity to express our deep sense of gratitude and sincere thanks to all who helped us to complete the project report successfully. Firstly, we would like to express our sincere gratitude and admiration to our guide Mrs. Rekha V R, Assistant Professor, Department of Computer Science and Engineering, CEM for her best guidance, positive criticism and valuable comments. We are greatly thankful to our Project Coordinators Dr. Bejoy Abraham, Associate Professor, Department of Computer Science and Engineering, CEM and Mrs. Devi Dath, Assistant Professor, Department of Computer Science and Engineering, CEM for their support and cooperation. Finally, we thank our parents and friends, near and dear ones who directly and indirectly contributed to the successful completion of our report.

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ABSTRACT

A Proper transparency between the customer and the producer is the key factor in a Customer Relationship Management for growing businesses. Many Digital CRM tools are unorganised, decentralized and provide lacklustre customer services. Rayven is a free text messaging service which provides support for businesses everywhere in the world. Here we assist businesses by making their relationship with the customer easier to handle and provide them with a customizable workspace for their team. In this project, we are enthusiastic to study, analyse and learn the needs and requirements for the personnels and enterprises in the business and economic fields, and create an online platform where they can interact, communicate and access various tools and features that will be in a most efficient way for them to utilize it. For the customer side, our web app provides them with an ease of communication with the businesses such as auto completion and language translation of text messages. Rayven is beginner friendly such that, it is easily understandable and has better UI/UX. It uses Deep Learning and Natural Language Processing to aid businesses with increasing their throughput and create a systematic work flow. We feel motivated to create a platform with SaaS CRM technology as our intermediate goal, to provide the users a free and efficient access to communicate in order to enhance their businesses.

Contents

LIST OF FIGURES	ix
1 INTRODUCTION	1
1.1 OBJECTIVE	1
1.2 MOTIVATION	2
1.3 EXISTING SYSTEM	2
1.4 PROBLEM STATEMENT	2
2 LITERATURE SURVEY	3
2.1 LITERATURE REVIEW	3
2.1.1 AI-based chatbots in customer service and their effects on user compliance	3
2.1.2 The Use of Chatbots in Digital Business Transformation: A Systematic Literature Review	5
2.1.3 Developing human/AI interactions for chat-based customer services: lessons learned from the Norwegian government	6
2.1.4 Social media marketing gains importance after Covid-19	8
2.1.5 Speech to text conversion and summarization for effective understanding and documentation	9
3 METHODOLOGY	12
3.1 Software	12
3.1.1 Front-End	12
3.1.2 Back-End	18
3.2 System Architecture	21

4	PROPOSED SYSTEM	24
4.1	SYSTEM MODULE DESCRIPTION	24
5	RESULT AND DISCUSSION	30
5.1	Key Features and Functionality	30
5.2	Comparison with other platform	31
5.3	Implications and Benefits	32
5.4	Limitations	32
5.5	Future Directions	32
5.6	Summary	33
6	Conclusion	35
7	References	36

List of Figures

3.1	HTML code section	14
3.2	CSS code section	14
3.3	JS code section	15
3.4	Django code section	18
3.5	Django code section	19
3.6	WebSocket Architecture	19
3.7	System Architecture	22
3.8	Data Flow Diagrams	23
4.1	Sign-up page	24
4.2	Login page	25
4.3	Image Selection and User information	25
4.4	Re-sizable Chat-bot and Product Catalogs	26
4.5	Chat-bot	27
4.6	Draggable Divs:-1	28
4.7	Draggable Divs:-2	29
4.8	Chat Section	29
5.1	Performance Metric	31

ABBREVIATIONS

B2C : Business to Communication
GDP: Gross Domestic Product
UI : User Interface
UX : User Experience
HTML: Hyper Text Markup Language
CSS : Cascading Style Sheets
XML : Extensible Markup Language
NLP : Natural Language Processing
SVG : Scalable Vector Graphics
DOM : Document Object Model
JIT : Just In Time
DBMS : Data Base Management System
RDBMS : Relational Data Base Management System
ACID : Atomicity Consistency Integrity Durability
API : Application Programming Interface
PaaS : Platform as a Service
SaaS : Software as a Service
DT: Data Transmission
IS : Information System
CRM : Customer Relationship Management

CHAPTER 1

INTRODUCTION

A Proper Transparency between the customer and the producer is the key factor in a customer relationship management for growing businesses. It is a free text messaging service which provides support for businesses everywhere in the world. In this project, we are enthusiastic to study, analyse and learn the needs and requirements for the personnel's and enterprises in the business and economic fields, and create an online platform where they can interact, communicate and access various tools and features that will be in a most efficient way for them to utilise it. It is beginner friendly such that It is easily understandable and has better UI/UX. It uses Deep Learning and Natural Language Processing to aid businesses with increasing their throughput and create a systematic workflow.

1.1 OBJECTIVE

- Creation of an AI-based Customer Relationship Management App that helps automate various business-related task.
- Provide efficient communication between customers and businesses.
- Makes marketing easy to do.
- Strengthens key elements of the business.
- Can increase your market share.
- Builds better business relationships.
- Can promote better cost control and budgeting.

1.2 MOTIVATION

Businesses and brands need a tool to communicate with their customers in an efficient and profitable manner, Growing businesses also need a marketing tool to promote their products. The small Business sector often makes up a considerable sector of a country's economy and toward the overall GDP growth, one of the primary causes of inflation is the failure of small businesses. Helping Businesses can also help us conduct an unofficial survey of the business industry. This data can be provided to the government or other investors which will look for various sectors to invest in.

1.3 EXISTING SYSTEM

WhatsApp Business was built with the idea of small business owner in mind. It is intended to feel and work just like WhatsApp Messenger. Some of the features we currently offer in the app include: Business profile to list important information, such as a company's address, email and website. Labels to organize and easily find your chats and messages. Messaging tools to quickly respond to customers. WhatsApp Business app users can easily showcase and share their products and services with customers by creating catalogues.

1.4 PROBLEM STATEMENT

WhatsApp Business provides Premium features which has more tools and are available only with paid subscription. They themselves prohibit multitude business use. The account may be terminated at any time. No options to mark favorites on products. No reviews about the product from customers. It mixes private and business communication. It is missing a professional desktop and tablet client.

CHAPTER 2

LITERATURE SURVEY

2.1 LITERATURE REVIEW

2.1.1 AI-based chatbots in customer service and their effects on user compliance

Communicating with customers through live chat interfaces has become an increasingly popular means to provide real-time customer service in many e-commerce settings. Today, human chat service agents are frequently replaced by conversational software agents or chatbots, which are systems designed to communicate with human users by means of natural language often based on artificial intelligence (AI). Though cost- and time-saving opportunities triggered a widespread implementation of AI-based chatbots, they still frequently fail to meet customer expectations, potentially resulting in users being less inclined to comply with requests made by the chatbot. Drawing on social response and commitment-consistency theory, we empirically examine through a randomized online experiment how verbal anthropomorphic design cues and the foot-in-the-door technique affect user request compliance. Our results demonstrate that both anthropomorphism as well as the need to stay consistent significantly increase the likelihood that users comply with a chatbot's request for service feedback. Moreover, the results show that social presence mediates the effect of anthropomorphic design cues on user compliance.

Communicating with customers through live chat interfaces has become an increasingly popular means to provide realtime customer service in e-commerce settings. Customers use these chat services to obtain information (e.g., product details) or assistance (e.g., solving technical problems). The real-time nature of chat services has transformed customer service into a two-way communication with significant effects on trust, satisfaction, and repurchase as well as WOM intentions (Mero 2018). Over the last decade, chat services have become the preferred option to obtain customer support (Charlton 2013). More recently, and fueled by technological advances in artificial intelligence (AI), human chat service agents are frequently replaced by conversational software agents (CAs) such as chatbots, which are systems such as chatbots designed to communicate with human users by means of natural language.

Our empirical results provide contributions for both research and practice. First, this study extends prior research by showing that the computers-are-social-actors (CASA) paradigm extends to disembodied CAs that predominantly use verbal cues in their interactions with users. Second, we show that humans acknowledge CAs as a source of persuasive messages and that the degree to which humans comply with the artificial social agents depends on the techniques applied during the human-chatbot communication. For platform providers and online marketers, especially for those who consider employing AI-based CAs in customer self-service, we offer two recommendations. Rather, the focus should be on employing strategies to achieve greater human likeness through anthropomorphism, which we have shown to have a positive effect on user compliance. Second, providers should design CA dialogs as carefully as they design the user interface. Our results highlight that the dialog design can be a decisive factor for user compliance with a chatbot's request.

2.1.2 The Use of Chatbots in Digital Business Transformation: A Systematic Literature Review

The research on chatbots has gained momentum over the past few years. Academics and practitioners investigate how these tools for communication with customers or internal team can be improved in terms of their performance, acceptance, and deployment. Although there is a plethora of recent studies available, not all of them deal with the digital business transformation implications of chatbots. The main aim of the research presented in this paper was to conduct a systematic literature review of high-quality journal research papers in order to summarise the current state of research on chatbots, identify their role in digital business transformation and suggest the areas warranting further attention. 74 papers were included in the research. Topical (focus and applications), methodological (methods used, sample size, sample type, and countries studied) and bibliometric (publication outlet, citations, and Altmetric Attention Score) aspects are evaluated and described. Scholars and practitioners can use the results to identify topics, areas, and applications that are intensely discussed in the literature and require further attention, select a methodology for their research that is well established in the field or is emerging, identify the most influential publications not to be missed in their research or identify publication outlets for publishing their research on chatbots.

We are currently witnessing an immense technological development, resulting in the need for organisations to adopt new technologies and information systems. The technologies disrupt organisations' business processes, and trigger the need for digital transformation. The need for DT has been reflected across all industries, including manufacturing (industry 4.0), retail, logistics, and services. One category of IS with increasing capabilities are artificial intelligence (AI)-powered systems. Such systems have many potential applications in decision making support, production automation, learning, communication, etc. The communication between online users and organisations is shifting towards interactions with AI-driven systems. A chatbot is one example of technology that is used in computer-mediated communication where AI agents increasingly occupy roles once served

by humans.

For external communication, standalone chatbots can also represent an alternative to branded websites. They have been deployed to provide services in many areas such as customer relationships management (CRM), customer service or sales and marketing. Chatbots are used to make product or service recommendations regarding shopping, Financial or health related decisions, . Researchers are, amongst others, focusing on investigating how to build better social bots for interaction in business or commercial environments, how to improve services with chatbots, which factors affect user perceptions of chatbots or how to encourage repetitive use of chatbots.

2.1.3 Developing human/AI interactions for chat-based customer services: lessons learned from the Norwegian government

Advancements in human/AI interactions led to smartification of public services via the use of chatbots. Here, we present findings from a clinical inquiry research project in a key public service organisation in Norway. In this project, researchers and practitioners worked together to generate insights on the action possibilities offered to human service agents by chatbots and the potential for creating hybrid human/AI service teams. The project sensitised service agents to discover affordances based on their actual practices, rather than on the predefined use of chatbots. The different affordances identified can be useful for practitioners who design and deploy chatbot-based services. The action possibilities afforded by chatbots provide new ways for service agents and chatbots to work as a team addressing citizens' needs. Drawing from the whole research process, we offer three lessons learned from the Norwegian Government on human/AI partnerships, theory-based interventions, and institutionalised collaborative research that can be useful for researchers that want to engage with practice and organisations that want to evolve their technology use, stimulate innovation, and engage with research.

Public service organisations experience an increase in digitally mediated requests from citizens (e.g., via webpages, social media, or service apps), which have risen steeply during social distancing. Effectively addressing this surge requires recombining available resources in new ways moving beyond established service delivery models. Chatbots are exemplary artificial intelligence (AI) applications that have been extensively employed to address surges in service requests undertaking communication tasks that used to be performed by humans. However, while certain aspects of good customer service align well with chatbots' capabilities (e.g., speed, availability, scalability), others correspond better with human competencies (e.g., empathy, judgement, critical assessment). The existence of several unresolved challenges creates opportunities for service tasks to be performed through novel human–AI interactions.

To explore new forms of human–AI interactions for handling citizen requests we sought to sensitise service agents for discovering new action possibilities based on their actual practices and needs, rather than based on chatbots' intended use. Sensitising service agents means making them sensitive to what they can do with the chatbots. To achieve this, we designed an intervention, which leverages agents' experiences, and guides them in a shared and reflective discovery process. When emerging technologies afford new actions, seasoned practitioners can draw from experience for flexibly recombining technologies to generate new practices with transformative effects. Stemming from software engineering, refactoring is a change process that does not alter external behaviours of a system while improving its inner workings (Fowler, 2018). There are significant performance improvements to be reaped by having humans and AI join forces (Raisch Krakowski, 2021; Wilson Daugherty, 2018). Nevertheless, most research and practice efforts have focused on traditional chatbot use for task substitution (i.e., chatbots automatically responding to citizen inquiries). The time is right for bringing attention to human augmentation and to the potential of hybrid service teams where humans collaborate closely with machines to perform a task.

2.1.4 Social media marketing gains importance after Covid-19

This exploratory research examines how the COVID-19 pandemic led to increases in consumers' social media marketing behaviors in the United States (U.S.). Previous research on the impact of a pandemic has focused on behavior for preventive health, however, little attention has been given to the impact of a pandemic on consumer behaviors. To bridge this gap, the Consumer Decision- Making Model was used as a framework to investigate changes in consumers' social media behaviors as they perform various consumer decision-making processes. More specifically, a questionnaire was used to collect survey data from 327 U.S. consumers. Analysis of Variance tests were performed to examine mean differences in consumers' use of social media as a consumer decision-making tool. The findings showed that consumers have increased their utilization of social media as a tool for identifying products, collecting information on products, evaluating products, and making product purchases. Thus, the findings demonstrate the growing importance of social media marketing since the COVID-19 pandemic began. Given that the COVID-19 pandemic is a global phenomenon, the findings likely can be extrapolated across many nations. Suggestions are provided to help businesses adopt to changes in consumers' social media behaviors as they relate to the consumer decision-making processes.

Early in 2020, the U.S. began to experience a healthcare pandemic from a novel coronavirus commonly known as COVID-19. Previous research on the impact of a pandemic has focused on behavior for preventive health, however, little attention has been given to the impact of a pandemic on consumer behaviors. To bridge this gap, the Consumer Decision-Making Model was used as a framework to investigate changes in consumers' social media behaviors that have occurred since the COVID-19 pandemic was declared. Investigating the impact of this pandemic on consumers' social media marketing behaviors is important because recent findings indicate that the pandemic is having significant and structural impacts on consumers' purchase behaviors (Mason, In Press), as well as their decision-making processes (Mason et al., in press), which could result in significant changes in marketing practices. More specifically, Mason et al., in press

analyzed changes in U.S. consumer decision-making behaviors since the start of the COVID-19 pandemic and found that the COVID-19 pandemic altered consumers' product needs, shopping and purchasing behaviors, and post-purchase satisfaction levels. With public healthcare concerns and governmental COVID-19 pandemic mitigation policies, the role and impact of social media as a marketing tool stands to increase in importance because, at a time when social distancing is a common practice, social media offers avenues for consumers to interact with others without having physical contact. As such, COVID-19 will likely also result in shifts in consumers' use of social media during consumer behaviors. Therefore, businesses may find new opportunities to gain competitive advantage through their use of effective social media marketing strategies.

While research is sorely needed to understand the healthcare and macro-economic implications of COVID-19, marketing research is also needed to examine the impacts of COVID-19 on consumers' behaviors. For example, with restrictions on personal contact and other pandemic mitigation policies, consumers may alter their decision-making behaviors, such as behaviors related to shopping and product acquisition, as well as their post-purchase behaviors. COVID-19 is a recent phenomenon, therefore, little has been published of its impact on social media marketing behavior in the U.S. This paper explores the role that social media plays in the consumer decision-making process. The authors hypothesize that social media marketing behaviors have shifted due to the COVID-19 pandemic. The current research focused on the U.S. economy because it is the largest consumer spending economy in the world and the COVID-19 pandemic has significantly impacted U.S. healthcare.

2.1.5 Speech to text conversion and summarization for effective understanding and documentation

Speech, is the most powerful way of communication with which human beings express their thoughts and feelings through different languages. The features of speech differs with each language. However, even while communicating in the

same language, the pace and the dialect varies with each person. This creates difficulty in understanding the conveyed message for some people. Sometimes lengthy speeches are also quite difficult to follow due to reasons such as different pronunciation, pace and so on. Speech recognition which is an inter disciplinary field of computational linguistics aids in developing technologies that empowers the recognition and translation of speech into text. Text summarization extracts the utmost important information from a source which is a text and provides the adequate summary of the same. The research work presented in this paper describes an easy and effective method for speech recognition. The speech is converted to the corresponding text and produces summarized text. This has various applications like lecture notes creation, summarizing catalogues for lengthy documents and so on. Extensive experimentation is performed to validate the efficiency of the proposed method.

Speech is the most important part of communication between human beings. Though there are different means to express our thoughts and feeling, speech is considered as the main medium for communication. Speech recognition is the process of making a machine recognize the speech of different people based on certain words or phrases. Variations in the pronunciation are quite evident in each individual's speech. The original form of the speech is a signal, and a signal is processed such that all the information present in the signal is converted into the text format. The feature extraction is the process of taking a signal and converting it to the required format with certain logic. Even though speech is the easiest way of communication, there exist some problems with speech recognition like the fluency, pronunciation, broken words, stuttering issues etc. All these have to be addressed while processing a speech. Text summarization is one of the major concepts used in the field of documentation. Lengthy documents are difficult to read and understand as it consumes a lot of time. Text summarization solves this problem by providing a shortened summary of it with semantics.

In the proposed work a combination of speech to text conversion and text summarisation is implemented. This hybrid method will aid applications that require brief summary of lengthy speeches which is quite useful for documentation.

The flow diagram of the proposed approach is mentioned in Figure 1, in which the speech recognition and text summarization is given as two different modules. The combination of these two modules aids any application in which summarization is required. The first and foremost step to work with NLP (Natural Language Processing) is to extract the features from the speech which has some values. If a word or a sentence is recognized as meaningless, then it becomes an obstacle to summarization process. Even the punctuation plays a vital role in summarization as semantics is important while summarising the text.

Speech recognition and text summarization are two vast areas to be explored. The proposed research work aims to reduce the time and effort of manual documentation of lengthy speeches in an event. Speech recognition and text summarization can ease the work of documentation. Even for the verification of the summarized content, the system can be automated to read out the summarised content with the help of text to speech conversion. As of now, speech summarization for sentences terminating with a full stop or containing a small pause shown by comma is experimented. The future work is to include all punctuation marks in the recognized speech which helps in improving the text summarization performance. This model can be used where ever there is a requirement of summarising lengthy lectures into precise documents as the automated system will convert the speech to text and also summarise the content. It can be of great help for students to archive lecture notes from classes, conferences or seminars.

CHAPTER 3

METHODOLOGY

3.1 Software

Our B2C Business Communication platform has both front-end and back-end software to create a dynamic working system, to manage the users and data-flow as well as other existing features by resolving common problems faced in this field.

In the development of our messaging application, we have utilized various programming languages and frameworks induced technologies to create a robust and user-friendly platform. The following is an overview of how each technology was used:

3.1.1 Front-End

HTML and CSS

The HyperText Markup Language or HTML is the standard markup language for documents designed to be displayed in a web browser. Web browsers receive HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. HTML elements are delineated by tags, written using angle brackets.

It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.

Cascading Style Sheets (CSS) is a style sheet language used for describing the presentation of a document written in a markup language such as HTML or XML (including XML dialects such as SVG, MathML or XHTML). CSS is a cornerstone technology of the World Wide Web, alongside HTML and JavaScript.

CSS is designed to enable the separation of presentation and content, including layout, colors, and fonts. This separation can improve content accessibility; provide more flexibility and control in the specification of presentation characteristics; enable multiple web pages to share formatting by specifying the relevant CSS in a separate .css file, which reduces complexity and repetition in the structural content; and enable the .css file to be cached to improve the page load speed between the pages that share the file and its formatting.

Separation of formatting and content also makes it feasible to present the same markup page in different styles for different rendering methods, such as on-screen, in print, by voice (via speech-based browser or screen reader), and on Braille-based tactile devices. CSS also has rules for alternate formatting if the content is accessed on a mobile device.

As you can see in Fig. 3.1 and Fig. 3.2, HTML and CSS played a crucial role in designing the front-end of our application. HTML provided the structural foundation for our web pages, allowing us to define the layout and elements required for the user interface. CSS, on the other hand, enabled us to style and customize the appearance of our application, ensuring a visually appealing and consistent user experience. We leveraged HTML and CSS to create responsive designs, implement user-friendly forms, and optimize the overall visual presentation of our messaging app.

```

client > public > index.html > html > head
1 <!DOCTYPE html>
2 <html lang="en">
3   <head>
4     <meta charset="utf-8" />
5     <link rel="icon" href="%PUBLIC_URL%/favicon.ico" />
6     <meta name="viewport" content="width=device-width, initial-scale=1" />
7     <meta name="theme-color" content="#000000" />
8     <meta
9       name="description"
10      content="Web site created using create-react-app"
11    />
12    <link rel="apple-touch-icon" href="%PUBLIC_URL%/logo192.png" />
13    <!--
14      manifest.json provides metadata used when your web app is installed on a
15      user's mobile device or desktop. See https://developers.google.com/web/fundamentals/web-app-manifest/
16    -->
17    <link rel="manifest" href="%PUBLIC_URL%/manifest.json" />
18
19    <link
20      href="https://cdn.jsdelivr.net/npm/bootstrap@4.5.0/dist/css/bootstrap.min.css"
21      rel="stylesheet"
22    />
23    <link
24      rel="stylesheet"
25      href="https://cdnjs.cloudflare.com/ajax/libs/font-awesome/5.15.3/css/all.min.css"
26      integrity="sha512-1BDx68fW90u+1nuK4uylZ63h25lN1u9ByY8N00hYb5X3+VMYgEAQzIuAy0wYtfzPA"
27      crossorigin="anonymous"
28      referrerpolicy="no-referrer"
29    />
30    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/css/bootstrap.min.css" rel="stylesheet" integrity="sha384-Glhh"
31    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0-alpha1/dist/js/bootstrap.bundle.min.js" integrity="sha384-w76AqP"
32    <script src="https://code.jquery.com/jquery-3.3.1.slim.min.js"></script>
33    <script src="https://cdnjs.cloudflare.com/ajax/libs/popper.js/1.14.7/umd/popper.min.js"></script>
34    <script src="https://stackpath.bootstrapcdn.com/bootstrap/4.3.1/js/bootstrap.min.js"></script>
35
36    <title>Rayven</title>
37  </head>

```

Figure 3.1: HTML code section

```

client > src > components > chatbody > # chatBodyStyle.css > input[id="chat-message-input"]:focus
1 *{
2   color: white;
3 }
4
5
6 #chat-message-input {
7   margin-right: -5px;
8 }
9
10 textarea{
11   color: white;
12 }
13
14 .chat-messages {
15   display: flex;
16   flex-direction: column;
17   height: calc(100vh - 138px);
18   overflow-y: scroll;
19   scroll-behavior: smooth;
20   transition: all 0.5s;
21 }
22
23 .chat-message-left,
24 .chat-message-right {
25   display: flex;
26   flex-shrink: 0;
27 }
28
29 .chat-message-left {
30   margin-right: auto;
31 }
32
33 .chat-message-right {
34   flex-direction: row-reverse;
35   margin-left: auto;
36 }
37
38 /* typing bubble */
39 .chat-bubble {
40   background-color: #9077EA;
41   padding: 16px 28px;
42   -webkit-border-radius: 20px;

```

Figure 3.2: CSS code section

JavaScript (JS)

JavaScript, often abbreviated as JS, is a programming language that is one of the core technologies of the World Wide Web, alongside HTML and CSS.

It has dynamic typing, prototype-based object-orientation, and first-class functions. It is multi-paradigm, supporting event-driven, functional, and imperative programming styles. It has application programming interfaces (APIs) for working with text, dates, regular expressions, standard data structures, and the Document Object Model (DOM).

JavaScript engines were originally used only in web browsers, but are now core components of some servers and a variety of applications. The most popular runtime system for this usage is Node.js. Although Java and JavaScript are similar in name, syntax, and respective standard libraries, the two languages are distinct and differ greatly in design.

JS was extensively utilized to enhance the interactivity and functionality of our messaging app. With JS, we implemented dynamic features such as real-time updates, flexible UI, and client-side data manipulation. It allowed us to create a seamless user experience by enabling asynchronous communication with the backend and handling user events effectively. JS also facilitated the integration of third-party libraries and frameworks, enabling us to leverage pre-built components and streamline development processes.

```
const getUserDetails = async () => {
  const accessToken = sessionStorage.getItem('access')
  console.warn(CommonUtil.getUserId());
  try {
    console.log(accessToken)
    const response = await axios.post(
      "http://127.0.0.1:8000/api/v1/getUserProfile",
      {
        'user_id': `${CommonUtil.getUserId()}`
      }
    );
    console.log(response)
    setUserInfo(response?.data?.User)
  } catch (error) {
    console.error(error);
  }
};
const getProducts = async () => {
  console.warn(CommonUtil.getUserId());
  try {
```

Figure 3.3: JS code section

ReactJS

During the requirement analysis phase, key functionalities such as user registration, message sending and receiving, and user profile management were identified for the messaging app. To achieve a modular and maintainable codebase, React, a JavaScript library, was employed to implement a component-based architecture.

React enabled the development of reusable UI components, each encapsulating a specific functionality or visual element of the app. For example, separate components were created for the header, footer, navigation, message input, chat display, and user profile sections. This componentized approach facilitated better organization of code and allowed for easy reusability across different parts of the application.

By breaking down the user interface into smaller, self-contained components, React promoted code modularity and separation of concerns. This modular structure improved code maintainability, as changes made to one component did not affect the functionality or appearance of other components.

The communication and data flow between components were managed efficiently through React's props and state mechanisms. Data and functions were passed between parent and child components using props, enabling data sharing and event handling. State, managed within individual components, enabled dynamic data updates and re-rendering of components when necessary.

React's virtual DOM (Document Object Model) concept played a crucial role in optimizing the app's performance. The virtual DOM allowed React to efficiently track and update only the necessary parts of the UI, reducing the overall rendering time and enhancing the app's responsiveness.

Furthermore, React's vast ecosystem of libraries and tools provided additional benefits during the development process. React Router facilitated client-side routing, allowing seamless navigation between different sections of the app. Testing frameworks such as Jest and Enzyme aided in writing unit tests for individual React components, ensuring their functionality and reliability.

```
import React from "react";
import { BrowserRouter as Router, Routes, Route } from "react-router-dom";
import HomeScreen from "../screens/home/HomeScreen";
import LoginScreen from "../screens/auth/login/LoginScreen";
import SignupScreen from "../screens/auth/signup/SignupScreen";
import AppPaths from "../lib/appPaths";
import ProductsPage from "../components/chatbody/ProductsPage";
import PaymentPage from "../components/chatbody/PaymentPage";
import Success from "../components/chatbody/Success";
export default function MyRoutes() {
  return (
    <Router>
      <Routes>
        <Route path={AppPaths.HOME} element={<HomeScreen />} />
        <Route path={AppPaths.CHAT_ROOM} element={<HomeScreen />} />
        <Route path={AppPaths.LOGIN} element={<LoginScreen />} />
        <Route path={AppPaths.SIGN_UP} element={<SignupScreen />} />
        <Route path={AppPaths.PRODUCTS_PAGE} element={<ProductsPage/>} />
        <Route path={AppPaths.PAYMENT_PAGE} element={<PaymentPage/>} />
        <Route path={AppPaths.SUCCESS} element={<Success/>} />
      </Routes>
    </Router>
  );
}
```

The component-based approach with React provided several advantages, including code reusability, modularity, easy maintenance, and improved performance. It enabled developers to create a scalable and interactive messaging app with a smooth user experience.

3.1.2 Back-End

Django

The development of the web-based messaging app involved utilizing Django, a Python web framework, to handle various aspects of the application, including authentication, web sockets, and other Django-related functionalities. The methodology began with a requirement analysis to identify key functionalities such as user registration, authentication, real-time messaging with web sockets, and user profile management. A Django project was set up, including the installation and configuration of necessary packages and dependencies. Django's built-in authentication system or third-party libraries like Django Rest Framework (DRF) were utilized to handle user registration, login, and user profile management, with secure access control ensured through the implementation of authentication views, forms, and templates.

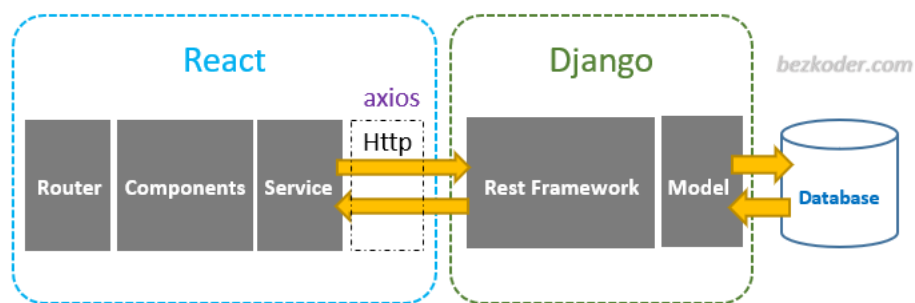


Figure 3.4: Django code section

The database structure was designed using Django's Object-Relational Mapping (ORM), defining tables for users, messages, and user profiles, and establishing relationships between models for data integrity. Django views and URL routing were implemented to handle HTTP requests and responses, including user registration, authentication and message handling. Integration of web sockets was achieved using Django Channels or similar libraries, enabling real-time communication and instant message delivery. Business logic specific to the messaging app was implemented using Django, including message sending and receiving, user authentication and authorization, and user profile management.

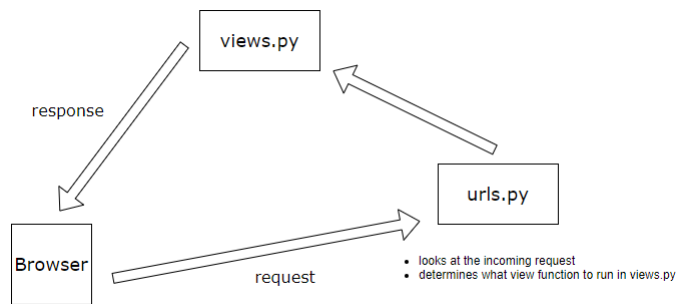


Figure 3.5: Django code section

Web Sockets

To enable real-time communication and instant message delivery, we implemented Web Sockets technology. Web Sockets facilitated bidirectional, full-duplex communication between the client and the server, allowing us to push real-time updates and notifications to users. By utilizing Web Sockets, we ensured that users could receive messages instantly, participate in real-time chats, and experience a fluid and responsive messaging experience.

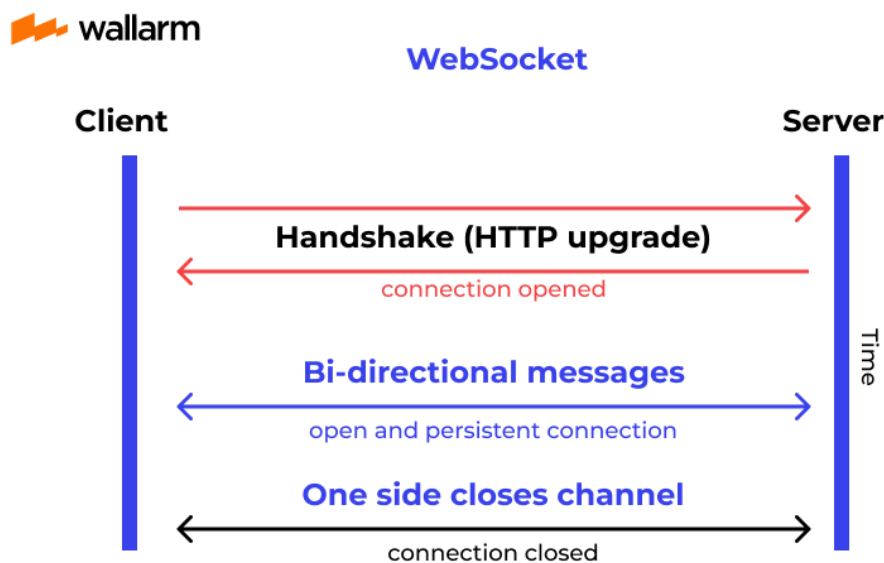


Figure 3.6: WebSocket Architecture

{Implementation of WebSockets

To incorporate WebSockets into the messaging app, a technology such as Django Channels or a similar library was employed. These tools facilitate the integration of WebSockets with the Django framework, enabling bidirectional communication channels between the server and the clients.

The first step in implementing WebSockets involved setting up the necessary server-side infrastructure. The WebSocket server was configured to handle incoming WebSocket connections and manage communication between connected clients. This involved defining routing patterns and establishing WebSocket consumers that handle specific events or actions.

On the client-side, ReactJS was utilized to establish a WebSocket connection between the web browser and the server. JavaScript WebSocket APIs were leveraged within React components to enable real-time communication. The WebSocket connection facilitated the exchange of messages and data in real-time, ensuring seamless and responsive interactions. By subscribing to specific WebSocket events, React components could listen for incoming messages and update the user interface accordingly. The WebSocket connection remained active as long as the user was actively using the app, ensuring uninterrupted real-time communication throughout the user's session.

Chatbot Implementation

In my project, the web-based messaging app, I integrated the OpenAI API to implement a chatbot feature. The OpenAI API provides powerful natural language processing capabilities that enable the chatbot to understand and respond to user messages in a conversational manner.

The implementation of the chatbot involved the following steps:

- **Integration with OpenAI API:** We incorporated the OpenAI API into the backend server of the messaging app. This integration allowed the server to communicate with the OpenAI API and utilize its natural language processing capabilities.

-
- **Message Parsing:** When a user sends a message to the chatbot, the backend server receives the message and performs initial parsing and preprocessing. This step involves cleaning the input, extracting relevant information, and preparing it for further processing by the OpenAI API.
 - **Requesting Response from OpenAI API:** The preprocessed user message is sent to the OpenAI API for generating a response. The backend server makes an API call to the OpenAI endpoint, passing the user message as input.
 - **Natural Language Processing:** The OpenAI API processes the user message using advanced natural language processing techniques. It analyzes the context, semantics, and intent of the message to generate an appropriate response.
 - **Response Handling:** Once the OpenAI API returns a response, the backend server receives it and performs additional processing if needed. This may involve post-processing the response to ensure coherence, filtering or modifying the response based on application-specific rules, or extracting relevant information from the generated response.
 - **Sending Response to User:** Finally, the backend server sends the processed response back to the user through the appropriate channel, such as a Web-Socket connection or an HTTP response. The user receives the response on their client interface, creating a conversational interaction with the chatbot.

3.2 System Architecture

In our project, the web-based messaging app, the system architecture follows a client-server model. The clients, which include mobile, desktop, web, and app interfaces, interact with the main backend systems:

- When a client sends an HTTP request, such as sending a message or retrieving user data, the backend server processes the request, validates it,

and performs the necessary actions. It interacts with the database to store and retrieve data, ensuring data integrity and persistence.

- To enable real-time communication, the backend server integrates WebSockets technology. Clients establish WebSocket connections with the server, allowing bidirectional communication. This WebSocket connection remains open as long as the user is active on the app, enabling continuous real-time communication.
- When a new message is sent by a client, the backend server receives the message, stores it in the database, and broadcasts it to the connected clients over the WebSocket connection. This ensures instant message delivery and synchronized updates across multiple clients, creating a seamless real-time messaging experience.

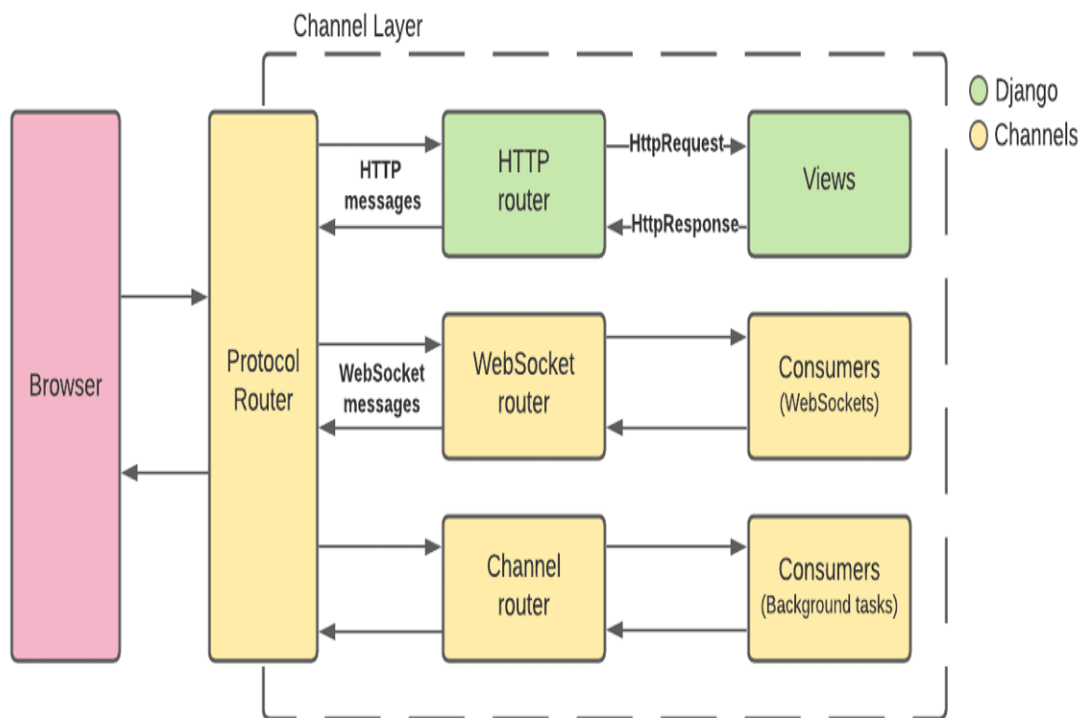


Figure 3.7: System Architecture

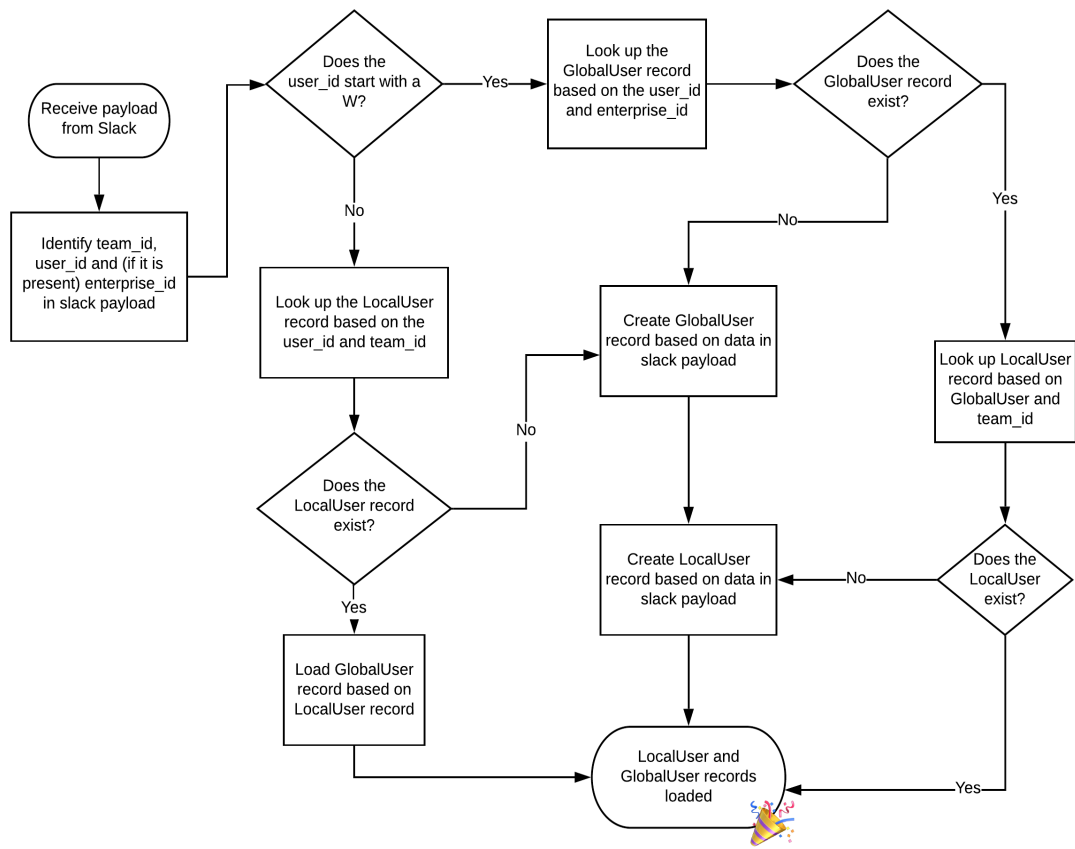


Figure 3.8: Data Flow Diagrams

CHAPTER 4

PROPOSED SYSTEM

4.1 SYSTEM MODULE DESCRIPTION

Our project mainly aims at providing or including new aspects to enhance the easy communication between business and customers. The ideal solutions to the present day chat applications faced issues and shortcomings will be dealt with the development of our platform.

Figure 4.1: Sign-up page

Any new user has the choice to sign-up as either a customer or a business owner to access the different modules in as their respective roles, using their e-mails for account registration (Fig. 4.1).

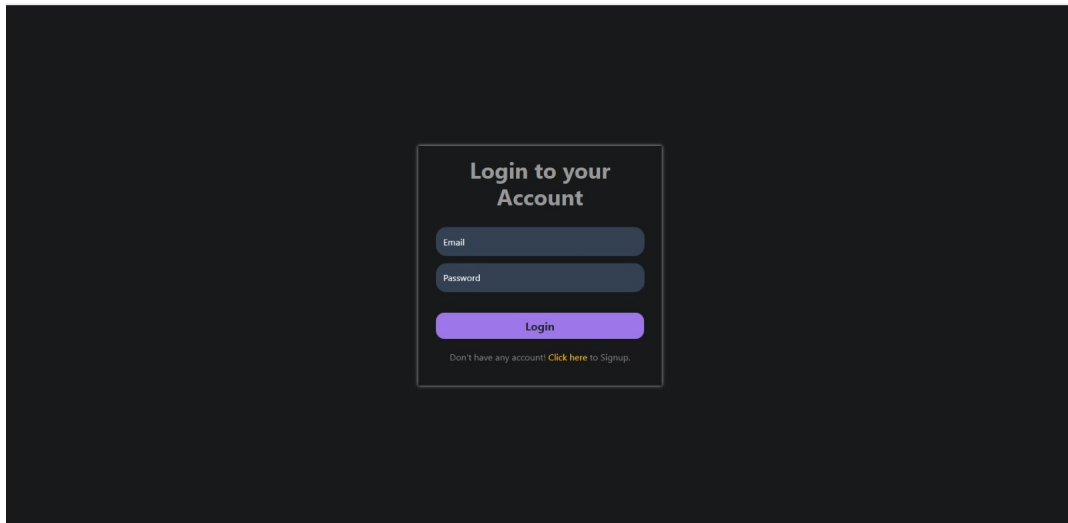


Figure 4.2: Login page

Business owners can create a profile that describes their business portfolio for customers to have an insight whilst their communication to navigate the orders (Fig. 4.3).

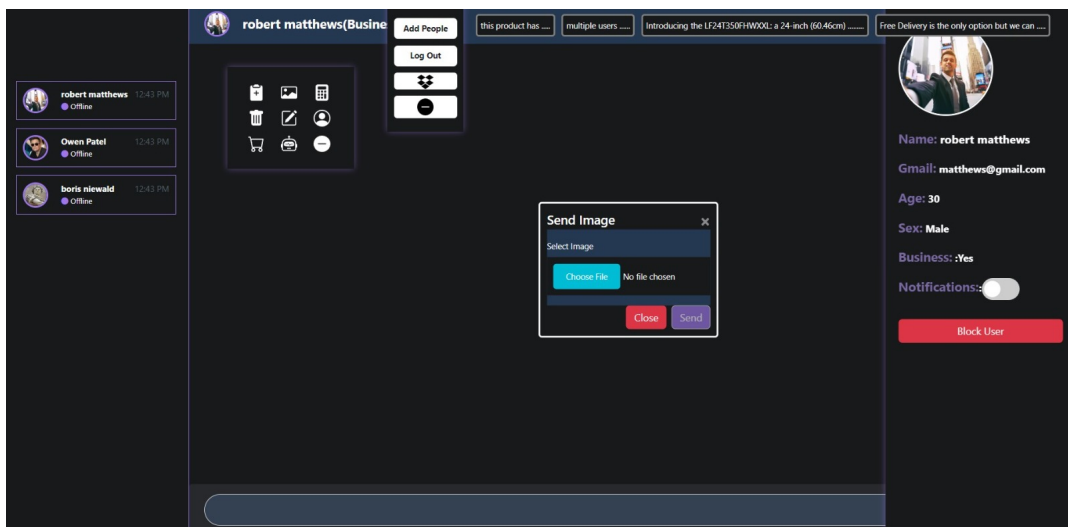


Figure 4.3: Image Selection and User information

Business owners can send their catalogue through the chat with customising options for the product image additions and price descriptions (Fig. 4.3 & Fig. 4.4). It allows a quick trade with direct-chat in dealings between the two parties, against the multiple and complex steps practised in other large commercial web-sites.

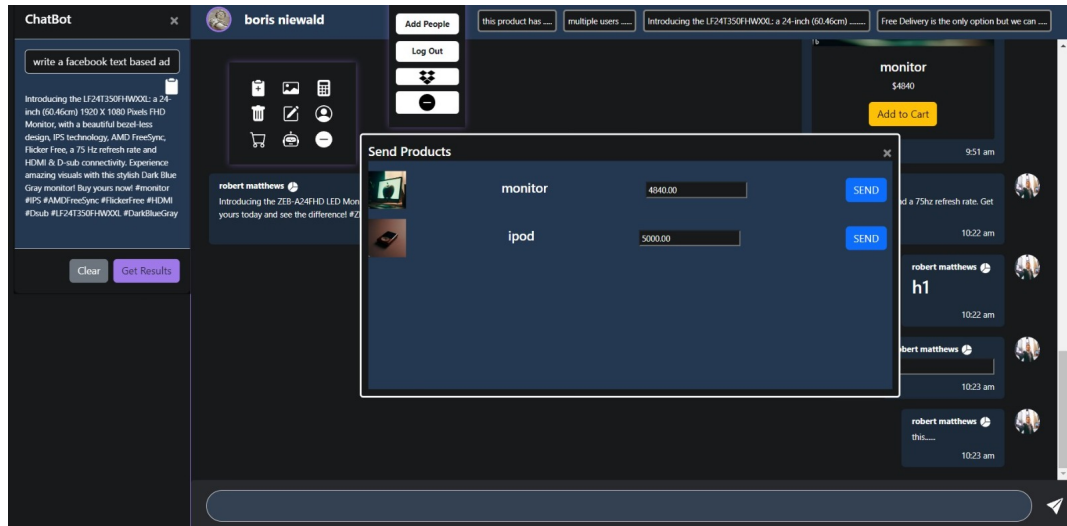


Figure 4.4: Re-sizable Chat-bot and Product Catalogs

Two of the prominent and common features for both business owner module and customer module are the floating toolbox and chat-list bar. They can be dragged and the multiple features from the toolbox can be handled with re-sizable function as per the users discretion.

The toolbox consists of the following functions,

- Addition and removal of snippets. (A small piece of brief extract)
- Personal information settings
- Calculator
- AI chat-bot

The chat-bot powered by AI assists the user to get reliable answers from search engines, not necessarily needing to leave the platform momentarily for little queries (Fig. 4.5).

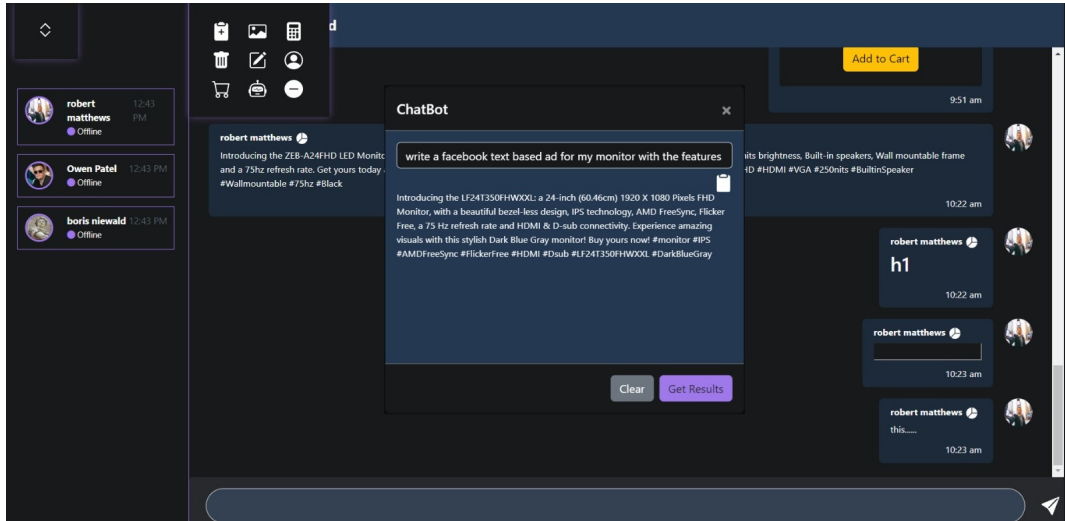


Figure 4.5: Chat-bot

The draggable divs let users to drag and place the toolbox and account action-box anywhere as they place. It is made in such idea that it keeps the interface live upfront and potentially uncommon from other prominent chat applications (Fig. 4.6 & Fig. 4.7).

The primary interface-the chatting section/region (Fig. 4.8) contains the 82% covered chatting area/box where the current user (login-user) will have their text sent on right-side and the user from the other end of the chat will have their texts displayed on left.

The chat section contains various features including,

- Snippets
- Automatic spell checker
- HTML tag supportive/friendly

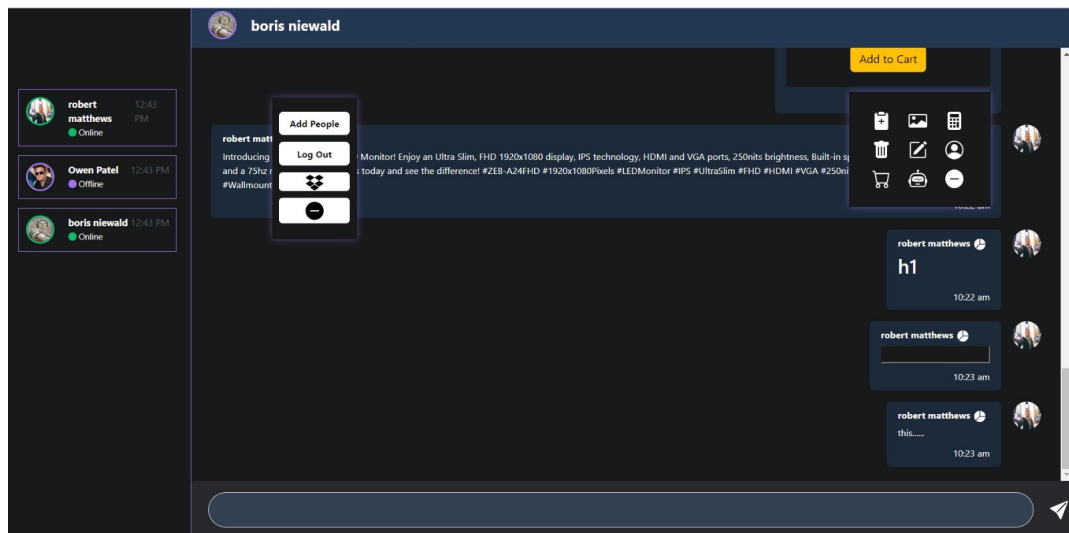


Figure 4.6: Draggable Divs:-1

- Product-order message
- Text-box message

The snippets function enables user to add and save some words or phrases that might be used repetitively in a conversation, which will be visible on the top of the user-chat page. And, it can be reused and deleted from that location manually for use and clear purposes respectively.

The one-one chatting platform lets the booming businesses to have an active communication with the customers and they can do the most of the parts we do while we have a face-to-face dealing conversation but in digital chatting mode.

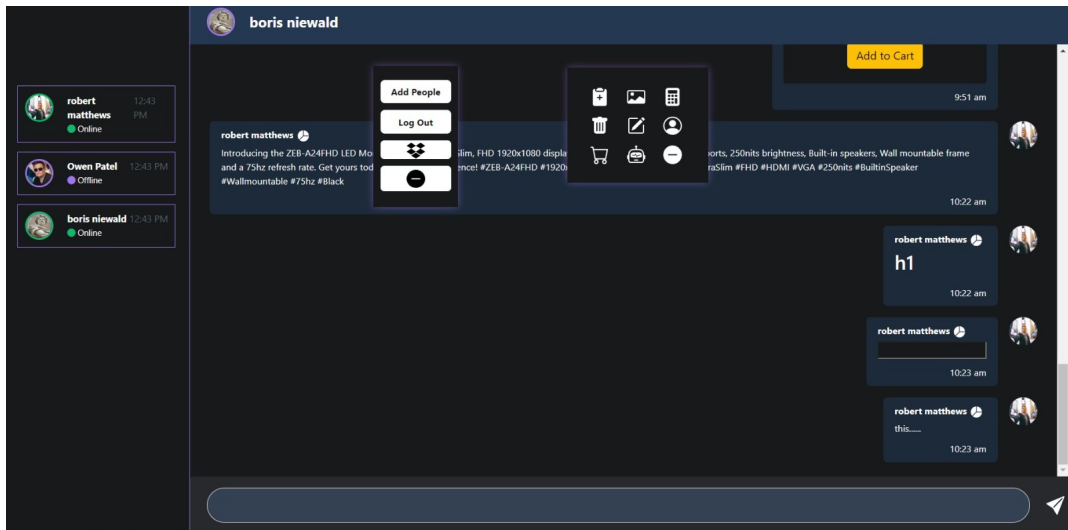


Figure 4.7: Draggable Divs:-2

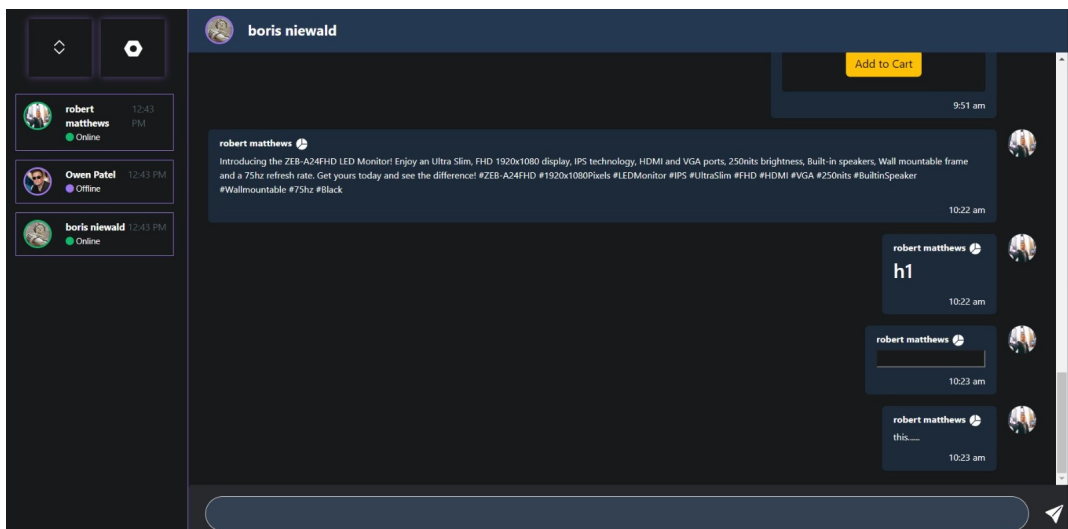


Figure 4.8: Chat Section

CHAPTER 5

RESULT AND DISCUSSION

In this section, we present the results of our study on the development of an application similar to WhatsApp Business. We discuss the key findings and their implications for businesses and users. Additionally, we address the limitations of the existing system and highlight the improvements made in our application.

5.1 Key Features and Functionality

Our developed application, inspired by WhatsApp Business, aimed to provide businesses and brands with an efficient and profitable communication tool. We incorporated various features and functionalities to enhance the user experience and address the limitations identified in the existing system.

Some of the key features included in our application are:

- **Business profile:** The application allows businesses to create a comprehensive business profile, including essential information such as address, email, and website. This enables businesses to present a professional image and enhance customer trust.
- **Customizable UI:** Our application offers a customizable user interface, empowering users to resize and rearrange components through intuitive mouse drag actions. This feature enhances user experience by allowing users to personalize their workspace and optimize productivity.
- **Messaging tools:** Our application provides messaging tools that enable businesses to respond quickly to customer queries. These tools streamline the

communication process, reducing response times and improving customer satisfaction.

- Product catalogues: We implemented a catalog feature that allows businesses to showcase and share their products and services with customers. This feature enhances product visibility and enables businesses to promote their offerings effectively.
- Fig. 5.1 shows the time taken to load the respective system components as a Performance Metric Assessment.

Metric	Average Time (Sec)
Load Time	0.8
First Contentful Paint (FCP)	0.5
Server Response Time	0.7
Time to Interactive (TTI)	0.6
Time to First Byte (TTFB)	0.2
DOM Content Loaded	0.5

Figure 5.1: Performance Metric

5.2 Comparison with other platform

Our application addresses several limitations of WhatsApp Business that were identified during our research. These limitations include:

- Premium features and paid subscriptions: They offer premium features that are only available with a paid subscription, limiting access for small businesses. In contrast, our application provides these features free of charge, ensuring equal opportunities for businesses of all sizes.
- Mixing of private and business communication: It lacks clear separation between private and business communication. This can lead to confusion and privacy concerns. Our application addresses this issue by providing a dedicated platform exclusively for business communication.

-
- Lack of professional desktop and tablet client: It does not offer a professional desktop and tablet client, limiting the accessibility and convenience of its platform. In our application, we developed a professional desktop and tablet client, providing businesses with a seamless multi-device experience.

5.3 Implications and Benefits

The development of our application has significant implications for businesses, customers, and investors. By providing an efficient communication tool for businesses, we contribute to their growth and success. This, in turn, positively impacts the overall economy, as the small business sector plays a vital role in GDP growth.

Furthermore, our application allows for the collection of valuable data about the business industry. This data can be shared with the government and potential investors to identify investment opportunities in various sectors.

5.4 Limitations

While our application addresses several limitations of other platforms, it is important to acknowledge its own limitations. These include:

- Limited scope of study: Our research focused on the development and functionality of the application. Further studies are needed to evaluate its performance, scalability, and user satisfaction in real-world scenarios.
- Technical constraints: The implementation of certain features and functionalities may be subject to technical limitations or dependencies on third-party services. These factors can affect the overall performance and reliability of the application.

5.5 Future Directions

To further enhance our application, several future directions can be considered. These include:

-
- Integration of additional marketing tools: The incorporation of advanced marketing tools such as customer analytics, targeted advertising, and customer relationship management (CRM) functionalities could provide businesses with more comprehensive solutions.
 - Expansion to multiple platforms: Currently, our application primarily focuses on the web and desktop platforms. However, considering the widespread use of mobile devices, future development efforts could be directed towards creating a seamless and user-friendly mobile application.
 - Enhanced security and privacy features: In light of growing concerns regarding data privacy and security, it is essential to prioritize the implementation of robust security measures in our application. This could include end-to-end encryption for messages, secure user authentication mechanisms, and adherence to privacy regulations to ensure the protection of user data.
 - Integration with third-party services: To offer a more comprehensive solution for businesses, future iterations of our application could explore integrating with third-party services such as payment gateways, customer support platforms, and e-commerce platforms. This integration would streamline business operations and provide businesses with a centralized platform for various functions.
 - User feedback and iterative improvements: Collecting user feedback and actively engaging with businesses and users will be crucial in identifying areas for improvement and implementing iterative updates. Regular updates and bug fixes will help maintain a high-quality user experience and address any emerging issues.

5.6 Summary

In conclusion, our study focused on the development of an application similar to WhatsApp Business, aiming to provide businesses with an efficient and profitable communication tool. Through the incorporation of key features and addressing

the limitations of the existing system, our application offers improved functionality and usability. The implications of our research extend to businesses, customers, and potential investors, fostering economic growth and providing valuable data for decision-making. However, it is important to acknowledge the limitations of our study and explore future directions to further enhance the application's capabilities. With continued development and user-focused improvements, our application has the potential to revolutionize business communication and contribute to the success of businesses in the digital era.

CHAPTER 6

Conclusion

The importance of communication among society and individuals is inevitable and imminent for the glorious life purpose and to satisfy its necessities. In this fast-paced era where technology is booming in all fields, communication sector also saw a huge inclination in many aspects. Telecommunication to media-sharing, the need for virtually expressing and communicating signifies the importance for connecting people through an instant and resourceful medium. There emerges—Rayven, a webapp where people can start a business conversation and join for a quick-end requirement with some additional features, that overlooks other platforms for a better user-friendly experience. After multiple levels of testing and updation, the system is finalised under various conditions and requirements. It is developed with utmost care and maintenance on a regular basis, to bring out the maximum efficient usage quota for the users who look for instant messaging for the imminent purpose of communication. In conclusion, Rayven gives you an easy quick-end messaging webapp to those who expect to face variations of anomalies that is faced and overlooked across other systems. It features additional technical functions which gives the users an ease of usage whom everyone faces a major online issue—the network connectivity, range and data balance. We hope to enhance our system and meet the fast-pacing society which is in-compatible with the advancement of technology, by adapting the maximum user-friendly approachable efforts for the users who wish for anything effective in their day-to-day life

CHAPTER 7

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