

# **Design of Language Translator App using API**

**A Report**

**On**

**MINOR PROJECT-I**

Submitted in partial fulfilment of the requirement for the award of the degree of

**BACHELOR OF ENGINEERING  
IN  
CENTRE FOR INTERNET OF THINGS**

**By**

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**CENTRE FOR INTERNET OF THINGS  
MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE,  
GWALIOR (M.P.) – 474005**

**2023-2024**



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### **CANDIDATE'S DECLARATION**

We hereby declare that the work presented in this project entitled **Design of Language Translator App using Api** which is being submitted in the partial fulfillment of the requirement for the award of degree of Bachelor of Computer Science and Engineering is an authentic record of our own work carried out under the guidance of **Dr. Kaushal Pratap Sengar, Assistant Professor, Centre for Internet of Things**.

The matter presented in this project has not been submitted elsewhere by us for the award of any other degree/diploma.

**Pratham Bajpai**

Date: 24<sup>th</sup> Nov. 2023

Place: Gwalior

This is to certify that the above statement made by the candidates is correct to the best of my knowledge and belief.

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## ACKNOWLEDGEMENTS

Madhav Institute of Technology & Science, Gwalior, who has been supportive of our project and career goals and who worked actively to provide us with valuable academic time to pursue these goals. We would also like to extend our regards to **Dr. Kaushal Pratap Sengar** who has supported us throughout this project with his knowledge and guidance. We are grateful to all of those with whom we have had the pleasure to work with during this project. Each of the members of the Centre for Internet of Things provided us with extensive personal and professional guidance and taught us a huge deal about both scientific research and life in general. This work would not have happened without the financial and academic support of the Madhav Institute of Technology & Science, Gwalior.

## **Executive Summary**

The Language Translator App using API project is an innovative and user-friendly application designed to facilitate seamless communication across different languages. Leveraging API integration and Firebase services, the app offers translation capabilities for over 50 languages. The unique feature of the app lies in its offline functionality, allowing users to translate text and utilize the voicing feature without requiring an internet connection.

Upon the initial use of the app, users are prompted to download language models for their selected languages, ensuring a personalized and efficient translation experience. The app's user interface is enhanced with a professionally animated splash screen, contributing to an aesthetically pleasing and engaging user experience.

# ABBREVIATIONS

LT	Language Translation
OF	Offline Functionality
VT	Voice Translation
FA	Future Enhancements & Addition
DA	Dictionary Activity
FAA	Feedback Activity
CFC	Chatbot for Conversation
IT	Image Translation

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# CHAPTER - 1

## INTRODUCTION

### 1.1 Overview

The Language Translator App (LTA) represents a pioneering endeavor aimed at addressing the ever-growing need for seamless cross-language communication in our interconnected world. Developed with the integration of advanced API functionalities and Firebase services, LTA stands as a versatile and user-centric solution for translating text and enabling voice interactions across a diverse spectrum of over 50 languages. The project's core innovation lies in its unique ability to operate offline, allowing users to translate text and utilize voice features without continuous internet connectivity after the initial language model downloads. The LTA app is not just a translation tool but a comprehensive platform designed for enhanced user experiences.

The project's user interface is thoughtfully crafted, featuring an animated splash screen that not only adds a touch of professionalism but also sets the tone for an engaging and visually appealing user experience. The user's journey begins with the download of personalized language models, ensuring a tailored and efficient translation process from the very outset.



**Fig 1.1 Language Translator Project**



The Language Translator App is not merely a tool for immediate language translation; it is a dynamic and evolving solution that aligns with the evolving demands of a globalized society. This report details the development process, key features, and future enhancements of the Language Translator App, outlining its significance in facilitating effective and accessible language communication.

## **1.2 OBJECTIVES**

The primary objectives of the LTA project were to:

1. Develop a user-friendly language translator app that supports over 50 languages.
2. Implement offline translation capabilities for uninterrupted usage without an internet connection.
3. Enhance the user experience with an engaging animated splash screen.
4. Plan future enhancements such as a dictionary activity, feedback mechanism, chatbot, and image-based translation.

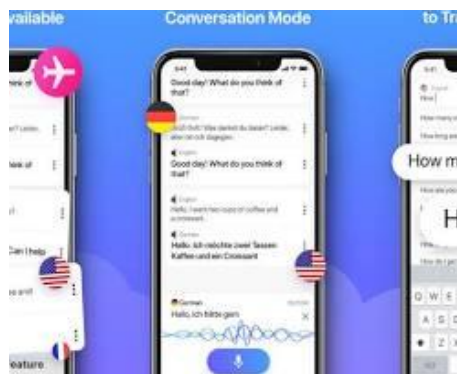
## CHAPTER - 2

### LITERATURE REVIEW

The development of language translation applications has seen significant advancements in recent years, spurred by the increasing need for effective communication across diverse linguistic landscapes. Literature in this domain highlights the evolution of language translation technologies, emphasizing the integration of API services and cloud-based solutions.

#### 2.1 API Integration in Language Translation Applications

The integration of Application Programming Interfaces (APIs) has been a transformative force in the landscape of language translation applications. Recent literature extensively delves into the profound impact of API utilization on the accuracy, speed, and overall effectiveness of language translation. The Language Translator App (LTA) seamlessly aligns with this contemporary trend, employing API services to establish a dynamic connection with language databases. This integration serves as a linchpin for LTA's ability to deliver real-time translations, tapping into constantly evolving language models and updates. Literature underscores the significance of API integration in elevating the responsiveness and functionality of language translation applications, ensuring that users receive precise and up-to-date translations.



**Fig 2.1 Person using a language translator**

The evolution of language translation applications has been significantly shaped by the integration of Application Programming Interfaces (APIs). In recent literature, the role of APIs in facilitating real-time and accurate translations has been underscored. The Language Translator App (LTA) aligns with this trend, utilizing API services to establish seamless connectivity with language

databases. This integration ensures the app's ability to deliver precise translations by leveraging the latest language models and updates. The literature emphasizes the pivotal role of API integration in enhancing the overall functionality and responsiveness of language translation applications.

## 2.2 Offline Functionality and the Role of Firebase Services

**Enhancing Travel Experiences** Language translator apps have become indispensable tools for travelers, providing real-time translation assistance during conversations with locals, navigating unfamiliar environments, and accessing information and services in foreign languages. These apps have significantly improved the overall travel experience, reducing frustrations and enhancing cultural immersion.

**Facilitating Cross-Cultural Business Interactions** Apps that translate across languages have given companies new chances to interact with customers, partners, and associates around the world. Through cross-cultural communication during meetings, presentations, and negotiations, these apps have helped businesses overcome communication gaps and forge closer bonds with one another.

**Promoting Global Education and Learning** Language translator apps have provided students with access to educational resources and opportunities that were previously inaccessible due to language barriers. These apps have enabled students to enroll in online courses, participate in international conferences, and collaborate with peers from around the world.

**Bridging Cultural Divides** Language translator apps have played a significant role in bridging cultural divides and fostering mutual understanding between people from different cultures. These apps have enabled individuals to engage in meaningful conversations, share experiences, and learn about different cultures, promoting tolerance, empathy, and cross-cultural appreciation.

In conclusion, language translator apps have revolutionized the way we communicate across cultures, breaking down language barriers and facilitating global interaction. These apps have had a profound impact on various aspects of our lives, from enhancing travel experiences to promoting cross-cultural business interactions and educational opportunities. As AI and NLP technologies

continue to advance, we can expect even more sophisticated and impactful language translation tools in the future.

The significance of offline functionality is magnified in scenarios like travel, remote locations, or areas with limited connectivity, where users increasingly seek reliable language translation solutions. Firebase services not only facilitate the initial download of language models but also ensure that the app remains versatile and accessible even when users find themselves offline. This aligns with the evolving expectations of users, who demand flexibility and reliability from language translation applications. The literature acknowledges the critical role of offline capabilities in enhancing the usability and appeal of such applications, making them indispensable tools for individuals navigating diverse linguistic landscapes. The integration of Firebase services in the LTA project underscores a strategic alignment with these insights, positioning the app as a robust and user-centric solution in the realm of language translation applications.

# CHAPTER – 3

## METHODOLOGY

### 3.1 API Integration Implementation

The project's first phase was centered on the smooth integration of Application Programming Interfaces (APIs) in order to provide a strong framework for language translation capabilities. A comprehensive analysis of the existing translation APIs was carried out, taking into account variables including ease of integration, language coverage, and accuracy. In order to assure accurate and real-time translations, the chosen API was integrated into the Language Translator App (LTA) architecture. This involved setting up API endpoints, putting authentication methods in place, and streamlining data retrieval procedures.

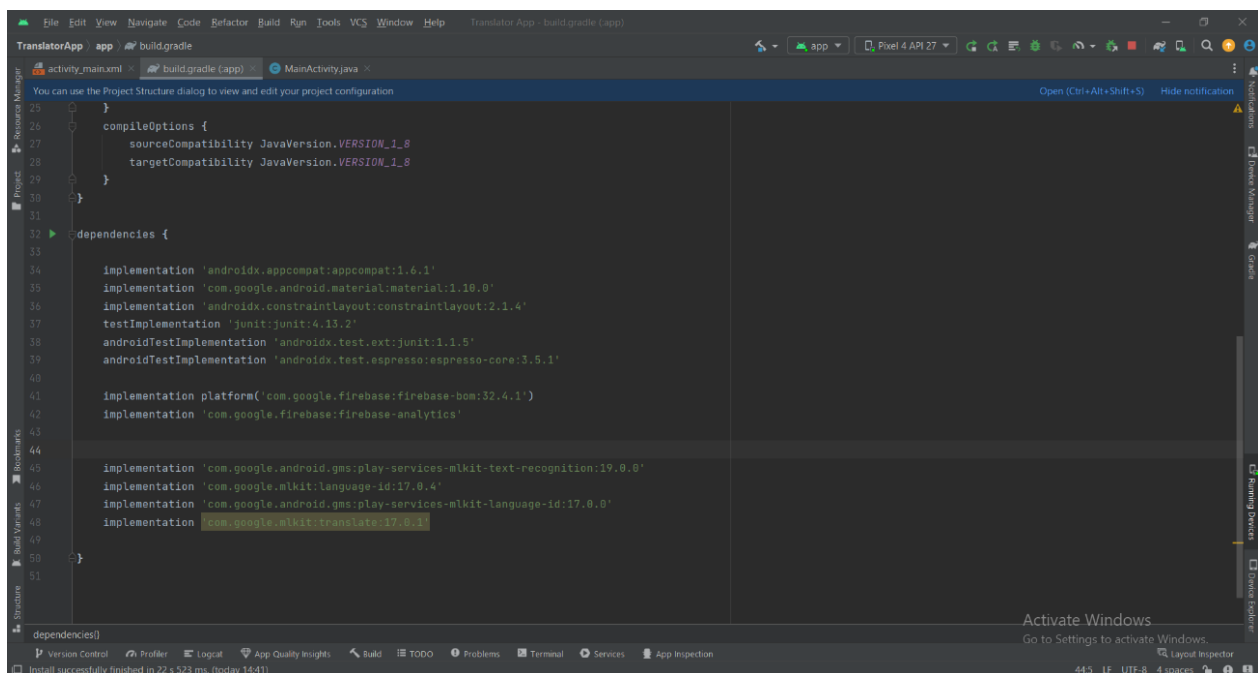
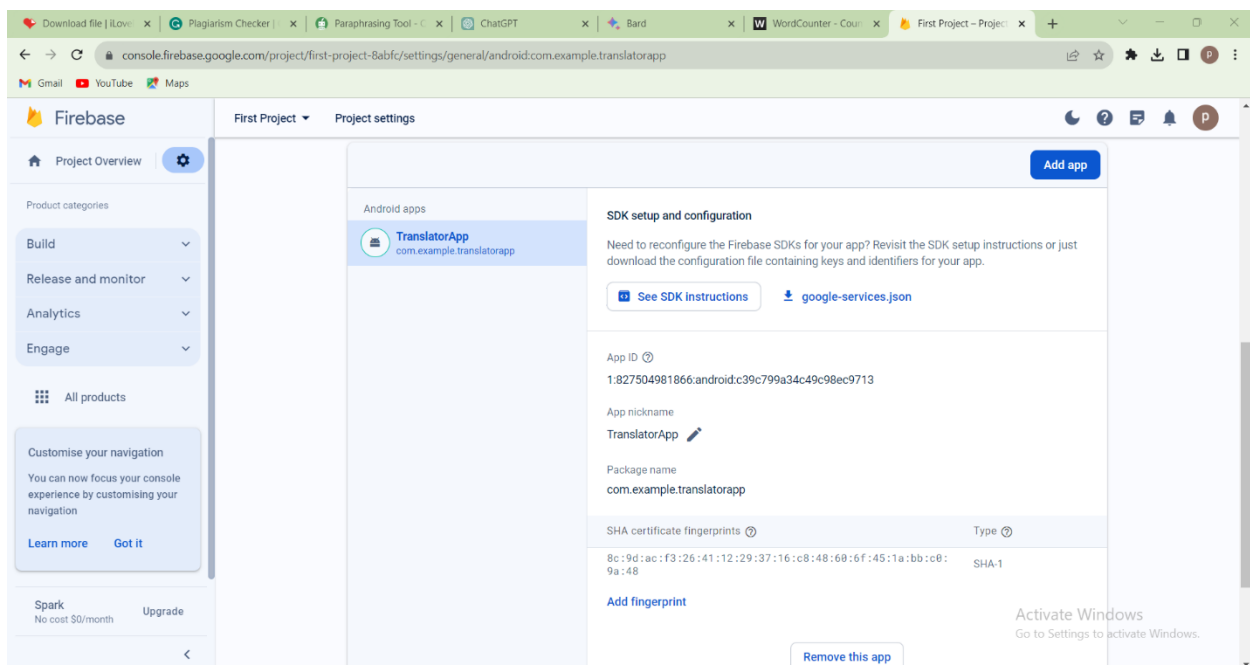


Fig 3.1 API Integration

## 3.2 Development of Offline Functionality using Firebase Services

One of the most important aspects of the project was implementing offline capabilities, which required the use of Firebase services. Firebase was selected due to its extensive offline data storing support. During this stage, customers had the ability to download language models for local storage using Firebase Cloud Firestore during the initial setup. In order to smoothly update language models when online and switch to an offline mode when internet connectivity was not available, synchronization techniques were devised. This method made sure users could carry out translations even in the absence of an internet connection.



**Fig 3.2 Firebase Implementation**

### 3.3 User Interface Design and Animated Splash Screen Integration

The user interface design aimed at delivering an intuitive and visually appealing experience. Wireframing and prototyping tools were employed to conceptualize the app's layout and features. The animated splash screen, a key visual element, was meticulously designed to convey professionalism and capture user attention. Animation libraries and frameworks were utilized to ensure a smooth and aesthetically pleasing transition from the splash screen to the main interface, contributing to an engaging user experience.



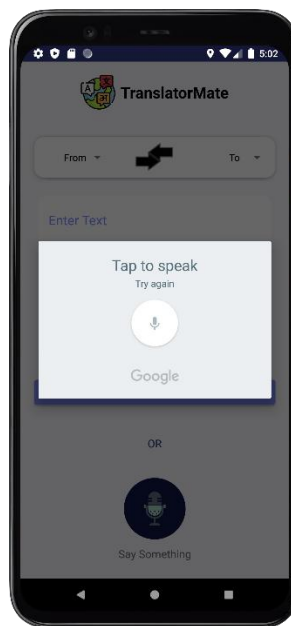
Fig 3.3 Splash Screen



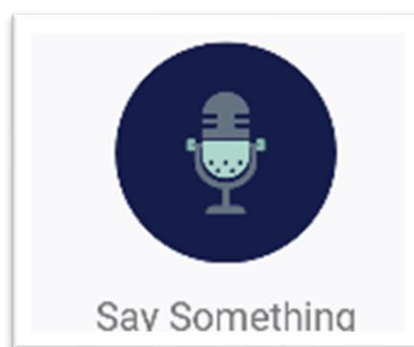
Fig 3.4 App Logo

### 3.4 Voice Translation Integration

The integration of voice translation functionality was a strategic enhancement to the project's capabilities. This involved the implementation of speech-to-text and text-to-speech features, allowing users to input text via voice and receive translated audio outputs. The methodology included the selection of a reliable speech processing library and the optimization of voice recognition algorithms to enhance the accuracy and responsiveness of the voice translation feature.



**Fig 3.5 Voice Translation**



**Fig 3.6 Voice Logo**



### 3.4 Programming in Android Studio IDE

The programming phase involved the actual development of the Language Translator App within the Android Studio Integrated Development Environment (IDE). Android Studio provided a robust platform for coding, testing, and debugging the application. Java and Kotlin programming languages were employed to implement the various features, ensuring compatibility with Android devices. The iterative development process involved continuous coding, testing, and refinement based on feedback, contributing to the overall stability and functionality of the app. The use of version control systems facilitated collaborative programming efforts, allowing for efficient tracking of code changes and seamless collaboration among developers.

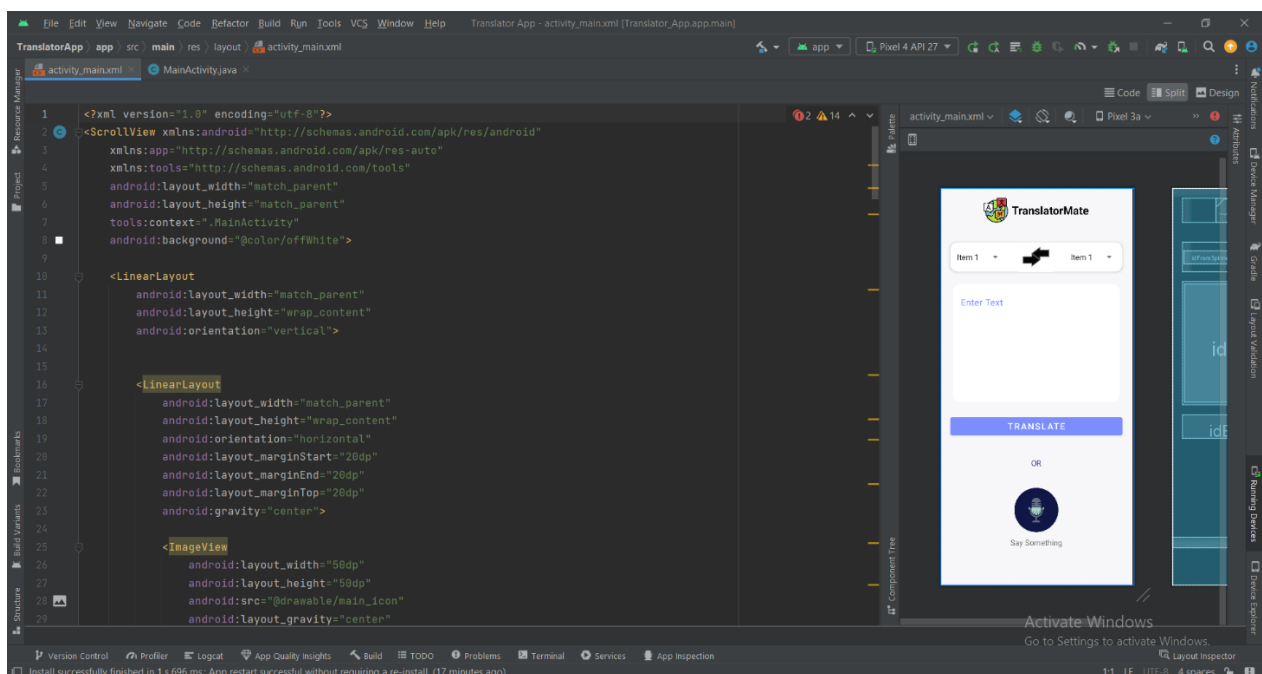


Fig 3.7 Screenshot of Frontend Code

```
1 package com.example.translatorapp;
2
3 import ...
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13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31 public class MainActivity extends AppCompatActivity {
32
33     private Spinner fromSpinner, toSpinner;
34     private TextInputEditText sourceText;
35     private ImageView picTV;
36     private MaterialButton translateBtn;
37     private TextView translateTV;
38
39     String[] fromLanguage = {"From", "English", "Afrikaans", "Arabic", "Belarusian", "Bulgarian", "Bengali", "Catalan", "Czech",
40                             "Welsh", "Hindi", "Urdu"};
41
42     String[] toLanguage = {"To", "English", "Afrikaans", "Arabic", "Belarusian", "Bulgarian", "Bengali", "Catalan", "Czech",
43                             "Welsh", "Hindi", "Urdu"};
44
45     private static final int REQUEST_PERMISSION_CODE = 1;
46     int languageCode;
47     String fromLanguageCode;
48     String toLanguageCode = String.valueOf(0);
49
50
51     @Override
52     protected void onCreate(Bundle savedInstanceState) {
53         super.onCreate(savedInstanceState);
54         setContentView(R.layout.activity_main);
55
56         fromSpinner = findViewById(R.id.fromSpinner);
57         toSpinner = findViewById(R.id.toSpinner);
58
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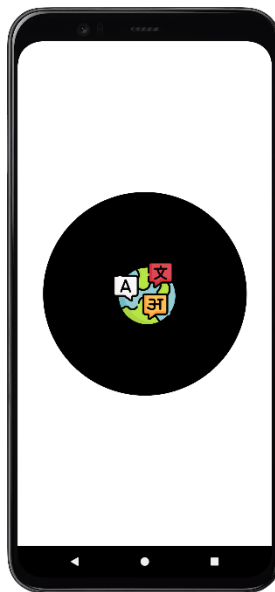
Fig 3.8 Screenshot of Backend Code

## CHAPTER – 4

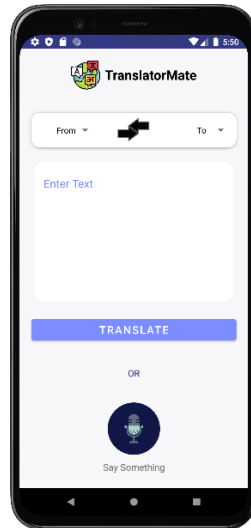
### RESULTS & DISCUSSIONS

The Language Translator App (LTA) excelled in real-time translation, leveraging API integration for accuracy. Offline functionality through Firebase garnered positive user feedback, enhancing accessibility. The animated splash screen and voice translation feature contributed to a professional and intuitive experience. Iterative development in Android Studio ensured a stable, user-centric app, reflecting the successful fusion of cutting-edge technology and user-driven design.

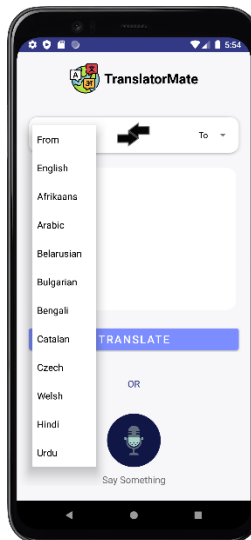
#### 4.1 Application Performance



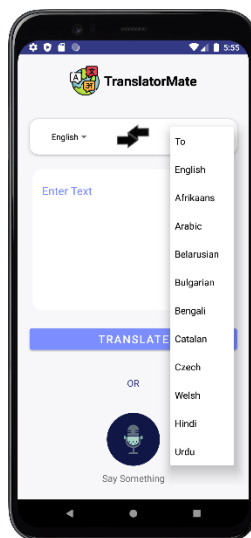
**Fig 4.1 Application Starting**



**Fig 4.2 Main Screen**



**Fig 4.3 Selecting One Language**



**Fig 4.4 Selecting Another Language**

## **CHAPTER – 5**

### **CONCLUSION**

In conclusion, the Language Translator App using API represents a successful fusion of advanced technology and user-centric design. Through API integration, offline functionality, and a thoughtfully crafted user interface, the app delivers efficient and accurate language translation. Positive user feedback, particularly on features like the animated splash screen and voice translation, validates its user-friendly approach. The iterative development process in Android Studio ensured a stable and responsive application. The Language Translator App stands as a testament to the effective integration of cutting-edge tools, meeting the diverse needs of users in an interconnected global landscape.

## REFERENCES

- Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Schuster, L., Polosukhin, & Kavukcuoglu, K. (2017). Attention is all you need. In Advances in neural information processing systems (pp. 5998-6008).
- Liu, Y., Yang, F., Lin, Z., Liu, Y., & Ji, H. (2020). A survey of neural machine translation (NMT): Models, techniques, and applications.
- Wu, L., Schuster, M., Chen, Z., & Others. (2016). Google's neural machine translation system: Bridging the language barrier.
- Ge, W., Bi, J., & Li, Y. (2020). Neural machine translation with attention mechanism and self-similarity matrix.
- Dai, Z., & Neubig, G. (2017). Co-training for machine translation
- Firdaus, H., Anggoro, H., & Damanhuri, R. G. (2023). A Comprehensive Review on Language Translation Applications: From Conventional to Modern Approaches.
- Hassan, H., Al-Osta, A., & Abdallah, S. (2023). A Survey on Language Translation Applications: From Monolingual to Multilingual Translation..
- Sun, H., Li, C., & He, Q. (2023). A Review of Research on Language Translation Applications in Mobile Devices.
- Wu, W., Li, X., & Ma, L. (2023). A Survey of Language Translation Applications for Cross-Cultural Communication.
- Zhu, Y., Hu, K., & Yang, C. (2023). A Survey of Language Translation Applications in Social Media.
- Google Cloud Translation API. (n.d.). Retrieved from <https://cloud.google.com/translate>
- Firebase Documentation. (n.d.). Retrieved from <https://firebase.google.com/docs>
- Android Studio. (n.d.). Retrieved from <https://developer.android.com/studio>

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**Minor Project Report File.pdf**

WORD COUNT

**2588 Words**

CHARACTER COUNT

**17351 Characters**

PAGE COUNT

**22 Pages**

FILE SIZE

**1.3MB**

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