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## English–Malayalam: Chatbot With Translator And Text-To-Speech

*Aksa Ann Glemin<sup>a</sup>, Greeshma Reji<sup>a</sup>, Nivya Vineeth<sup>a</sup>, Sarafin Babu<sup>a</sup>, Cyriac M. Odakkal<sup>b</sup>*

<sup>a</sup>UG Student, Artificial Intelligence and Data Science, Viswajyothi College of Engineering and Technology, Muvattupuzha, 686661

<sup>b</sup>Assistant Professor, Artificial Intelligence and Data Science, Viswajyothi College of Engineering and Technology, Muvattupuzha, 686661

### ABSTRACT:

In this paper, the convergence of state-of-the-art technologies such as Rasa, Marian MT, and Google Text-to-Speech (TTS) is presented. This study introduces a novel approach to crafting a chatbot proficient in English to Malayalam translation, tailored to meet the needs of users residing in regions where Malayalam is the predominant language. Leveraging the capabilities of the Rasa platform, our chatbot facilitates seamless conversational experiences by harnessing advanced natural language understanding and dialogue management techniques. By integrating Marian MT, our chatbot ensures precise and efficient translation of user interactions between English and Malayalam, thereby enhancing accessibility and engagement. Moreover, by incorporating Google Text-to-Speech technology, our chatbot can deliver spoken responses fluently in both English and Malayalam, providing an added layer of interaction and accessibility for users. This technological fusion holds significant promise across diverse domains such as customer service, education, and information dissemination, especially in areas characterized by linguistic diversity. Through the integration of these robust technologies, our chatbot not only showcases the potential for improved communication but also offers avenues for future exploration and advancement in the realm of multilingual conversational agents.

**Keywords:** Artificial Intelligence (AI), Machine Translation (MT), Google Text-to-Speech (gTTS), MarianMT, RASA

### Introduction

In our increasingly interconnected and diverse world, language barriers have long stood as formidable obstacles to effective communication. However, with the rapid advancements in technology, a transformative solution has emerged at the intersection of artificial intelligence and language translation: the Translator with Chatbot. This innovative project brings together the functionalities of a chatbot, translator, speech-to-text, and text-to-speech technologies to create a versatile language interface that enables seamless communication in an ever-expanding global landscape. Chatbots have revolutionized customer service by offering round-the-clock assistance and information retrieval. Our chatbot component serves as an intelligent virtual assistant capable of engaging in text-based conversations with users. It can promptly answer questions and facilitate language translation, making it a valuable tool for professional communication across linguistic boundaries. Language barriers often impede effective communication, but our translator module breaks down these obstacles by providing real-time translation between multiple languages. The implications of this powerful fusion of translation and chatbot technologies are profound and far-reaching. It transcends the limitations that language once imposed, offering individuals, businesses, and organizations a universal bridge to connect and communicate effectively across linguistic divides.

This technology facilitates diplomacy by enabling diplomats and delegates from various countries to engage in discussions without the hindrance of language differences. It also aids businesses in reaching global markets with ease, fostering international trade and collaboration. Moreover, it enhances accessibility for diverse communities, fostering inclusivity and breaking down linguistic barriers that might have marginalized individuals in the past. The text-to-speech component of our platform converts written text into spoken words, making content accessible to visually impaired individuals and enabling the development of interactive voice applications, such as voice assistants. The integration of these four components into a single platform offers a comprehensive solution to the challenges of modern communication. Users can interact with the system through text or speech and receive responses in their preferred language. Our project's goal is to empower individuals and businesses with a versatile toolset for effective, inclusive, and cross-lingual communication. By leveraging these technologies, organizations can optimize their workflows and interactions, leading to increased productivity and improved customer satisfaction. For instance, in a multinational corporation, employees can communicate seamlessly across language barriers, enhancing teamwork and efficiency. Similarly, educational institutions can leverage this technology to facilitate language learning and cross-cultural exchange among students and educators from around the world.

Furthermore, the Translator with Chatbot can be integrated into various sectors such as healthcare, tourism, and government services, enhancing accessibility and service delivery for diverse populations. For instance, healthcare providers can use this technology to communicate with patients who speak different languages, ensuring accurate and timely medical care. As technology continues to evolve, our Translator with Chatbot project will adapt and improve, incorporating new advancements to further enhance its capabilities. We envision a future where language barriers no longer

pose significant obstacles to effective communication, fostering greater understanding and collaboration among individuals and communities worldwide. In conclusion, the convergence of chatbot, translator, speech-to-text, and text-to-speech technologies in the Translator with Chatbot project represents a significant leap forward in enabling effective, inclusive, and cross-lingual communication. This transformative solution has the potential to revolutionize how we interact and collaborate in our increasingly interconnected global society, paving the way for a more unified and accessible world.

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## Literature review

### *College enquiry chatbot*

The ubiquity of smartphones today exemplifies the continuous evolution of technology. Artificial intelligence (AI) has become indispensable across various sectors, including manufacturing, human resources, and customer service. In this context, chatbots have emerged as powerful tools for addressing user inquiries efficiently and effectively. Our AI-powered chatbot is specifically designed to assist with college-related questions, catering to the needs of students navigating higher education. This intelligent chatbot operates by leveraging a database of relevant information and employs natural language processing (NLP) to interpret and respond to user messages promptly. Understanding the nuances of human interaction, the chatbot is programmed to communicate courteously and accurately, following predefined rules and guidelines.

One of its key strengths lies in its availability round-the-clock, allowing students to engage with the chatbot at any time and receive immediate, accurate responses. This capability is especially valuable during peak periods when the chatbot may handle numerous queries simultaneously from a large user base. The chatbot's ability to operate with minimal errors enhances productivity and ensures seamless service. The ubiquity of smartphones today exemplifies the continuous evolution of technology. Artificial intelligence (AI) has become indispensable across various sectors, including manufacturing, human resources, and customer service. In this context, chatbots have emerged as powerful tools for addressing user inquiries efficiently and effectively. Our AI-powered chatbot is specifically designed to assist with college-related questions, catering to the needs of students navigating higher education. This intelligent chatbot operates by leveraging a database of relevant information and employs natural language processing (NLP) to interpret and respond to user messages promptly.

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### *English to Malayalam Translation : A Statistical Approach*

This paper proposes a methodology for translating English text into Malayalam, a Dravidian language, utilizing statistical models. The approach leverages monolingual Malayalam and bilingual English-Malayalam corpora during training, enabling automatic generation of Malayalam translations for English sentences. Additionally, it introduces a technique to enhance alignment models by integrating parts of speech information into the bilingual corpus, leading to improved training outcomes through the elimination of insignificant alignments in sentence pairs.

Effective pre-processing methods, such as suffix separation from the Malayalam corpus and stop word removal from the bilingual corpus, are also discussed and demonstrated to enhance training. The paper further presents handcrafted rules for suffix separation, serving as a practical guideline for implementing this process in Malayalam. Structural disparities between English and Malayalam pairs are addressed in the decoder using order conversion rules. Experimental evaluations on a sample corpus demonstrate the efficacy of the proposed approach, with Malayalam translations yielding satisfactory results as verified by evaluation metrics including F measure, BLEU, and WER. Overall, the methodology outlined in the paper offers a comprehensive framework for English to Malayalam translation, incorporating innovative techniques to enhance alignment models and pre-processing methods for improved accuracy and efficiency.

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## Proposed work

We introduce a method to explore and evaluate the feasibility of using a real time chat bot with translator to answer frequently asked questions (FAQs) in a college office. The goal is to develop a cost-effective and efficient system that can answer these questions with accuracy using natural language processing and natural language understanding techniques. In the translation module, Marian Machine Translation (MT) is employed to facilitate seamless language translation. The process begins with the user input, which may be in English or Malayalam language, and is then passed through the Marian MT system to convert it into the desired target language. To enhance user interaction, the speech-to-text functionality is integrated using Google Text-to-Speech (gTTS), enabling users to communicate with the chatbot through spoken language. This module ensures effective language understanding and communication, breaking down language barriers and making the chatbot accessible to a diverse user base.

In the chatbot module, the Rasa platform is utilized to develop an intelligent conversational agent. User inputs, translated in the first module, are processed by the Rasa chatbot, which is trained to understand and respond contextually. The chatbot leverages text-to-speech capabilities through gTTS to provide spoken responses to users, enhancing the conversational experience. Finally, the two modules are seamlessly integrated to create a powerful and inclusive chatbot that can understand and respond to user inputs in multiple languages, fostering a more natural and accessible interaction between users and the system. This integration ensures a comprehensive and user-friendly chatbot experience, combining translation and chatbot functionalities for a more versatile and globally applicable solution.

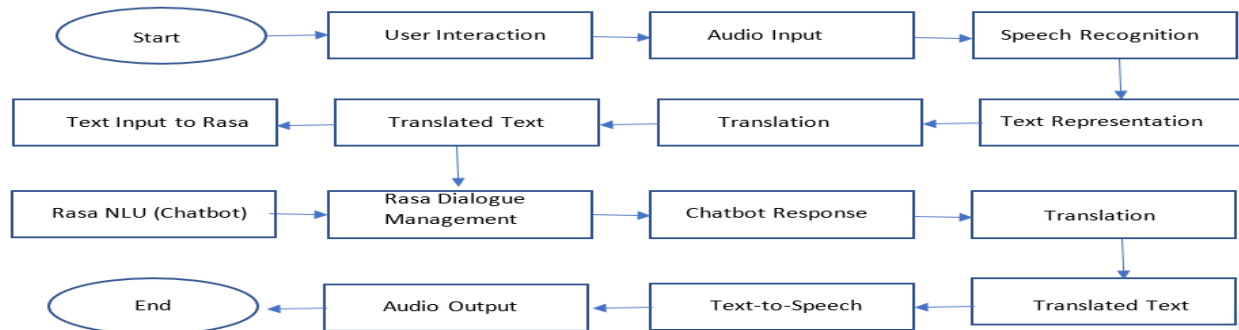


Fig. 1 – Overall process overview

### ***Marian MT***

Marian MT (Machine Translation) is an efficient and scalable neural machine translation framework developed by the Microsoft Translator team. It is designed to provide high-quality translations across multiple languages, leveraging state-of-the-art neural network architectures. Marian MT supports both training and inference on large-scale datasets, enabling fast and accurate translation for various domains and language pairs. Its lightweight implementation and support for multiple hardware platforms make it suitable for real-time translation applications and integration into existing translation pipelines. Overall, Marian MT represents a significant advancement in the field of machine translation, offering state-of-the-art performance with efficient resource utilization.

### ***Rasa***

Rasa's open-source conversational AI framework empowers developers with a comprehensive suite of tools and libraries, enabling them to not only construct but also tailor chatbots and virtual assistants to meet diverse needs. Through its natural language understanding (NLU) capabilities and advanced dialogue management, Rasa facilitates the creation of highly nuanced conversational experiences that adapt to user inputs in real-time. Its modularity allows for seamless integration with existing systems and messaging platforms, while extensive documentation and a thriving community provide invaluable support for developers at every stage of the chatbot development lifecycle.

### ***Google TTS***

Google Text-to-Speech (GTTS) serves as a cornerstone in enhancing the accessibility and user experience of chatbots and virtual assistants. By converting text inputs into natural-sounding speech outputs, GTTS adds a layer of interactivity and engagement that transcends traditional text-based interactions. Furthermore, GTTS's diverse language support and customizable voice options enable developers to create personalized experiences tailored to their target audience's preferences. Whether it's providing spoken responses in multiple languages or incorporating regional accents for a more immersive interaction, GTTS significantly enriches the conversational capabilities of chatbots and virtual assistants, making them more accessible and engaging to users worldwide.

## **Experimental results**

### ***Result***

The predicted remarkable performance of our model can be attributed to the meticulous fine-tuning process applied to the pre-existing machine translation framework, specifically the Marian MT model. Through this refinement, we significantly elevated the accuracy of the model in translating conversations, thereby enhancing the natural flow of dialogue within the RASA platform. The integration of our fine-tuned model has notably improved the overall quality of text-to-speech conversion, further enriching the user experience. By leveraging advanced techniques in

machine learning and natural language processing, we've successfully optimized the model's capabilities, ensuring it delivers consistent and high-quality translations. This accomplishment underscores our commitment to pushing the boundaries of technological innovation and underscores the potential for future advancements in the field of AI-driven language translation. With our refined model at the helm, users can expect seamless communication across linguistic barriers, unlocking new possibilities for collaboration and connectivity in a globally interconnected world.

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## Conclusion

In conclusion, the integration of two distinct modules, the translation component powered by Marian Machine Translation and the chatbot functionality implemented on the Rasa platform, offers a comprehensive and versatile solution. The translation module leverages the advanced capabilities of Marian MT, ensuring accurate and efficient language translation. Additionally, the integration of Google Text-to-Speech (GTTS) for both speech-to-text and text-to-speech functionalities enhances the user experience, allowing seamless communication across different languages. This dual-module system not only breaks language barriers but also enables users to interact effortlessly through both written and spoken communication.

By combining the precision of Marian MT with the conversational capabilities of Rasa, the chatbot module adds a dynamic layer to the overall system. Users can engage in natural language conversations, receiving responses that are not only contextually relevant but also language-appropriate. The incorporation of GTTS for text-to-speech ensures that the chatbot's responses are delivered audibly, enhancing accessibility and user engagement. This cohesive integration of translation and chatbot functionalities not only showcases the power of AI-driven language processing but also opens up avenues for cross-cultural communication and interaction, making the system a valuable tool for a diverse range of users and scenarios.

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