AI Chat Assistant With Generic Enhanced Management Component

Project Id: 23-267

Final Report

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Methodology

One of the primary objectives is to train the NLU model with intents and entities that are relevant to the needs of differently abled individuals. This will involve gathering and labeling data to create a high-quality training dataset that accurately reflects the types of inputs and queries that users are likely to make. By incorporating this data into our NLU model, we can ensure that the chatbot can accurately understand and respond to diverse inputs, including sign language.

In addition to training our NLU model, we also need to incorporate specific responses generated by the sign language detection component into the chatbot's response generation process. This will enable the chatbot to communicate effectively with users who rely on sign language for communication. By seamlessly integrating sign language detection into our chatbot system, we can ensure that all users can access the information and support they need.

Another critical objective is to train our dialogue management component with a new framework that can handle dialogues in a more efficient manner. This will involve designing and implementing a set of rules and dialogues that the chatbot can use to interact with users in a natural and intuitive way. By focusing on efficiency and ease of use, we can create a chatbot system that can provide quick and accurate responses to users, even when handling complex dialogues.

To achieve this, we need to build a machine learning algorithm that can identify the best response and next action based on the inputs received from the user. This algorithm should be able to learn from the user's behavior and preferences to provide a personalized experience. By tailoring responses to meet the unique needs and preferences of each user, we can create a more engaging and effective chatbot system. Finally, we need to test and refine our chatbot system to ensure that it is easy to use, inclusive, and accessible to all users. This will involve conducting extensive user testing and gathering feedback from users to identify areas for improvement. By continuously refining and improving our chatbot system, we can create a more user-friendly and effective solution that meets the needs of differently abled individuals.

System Architecture

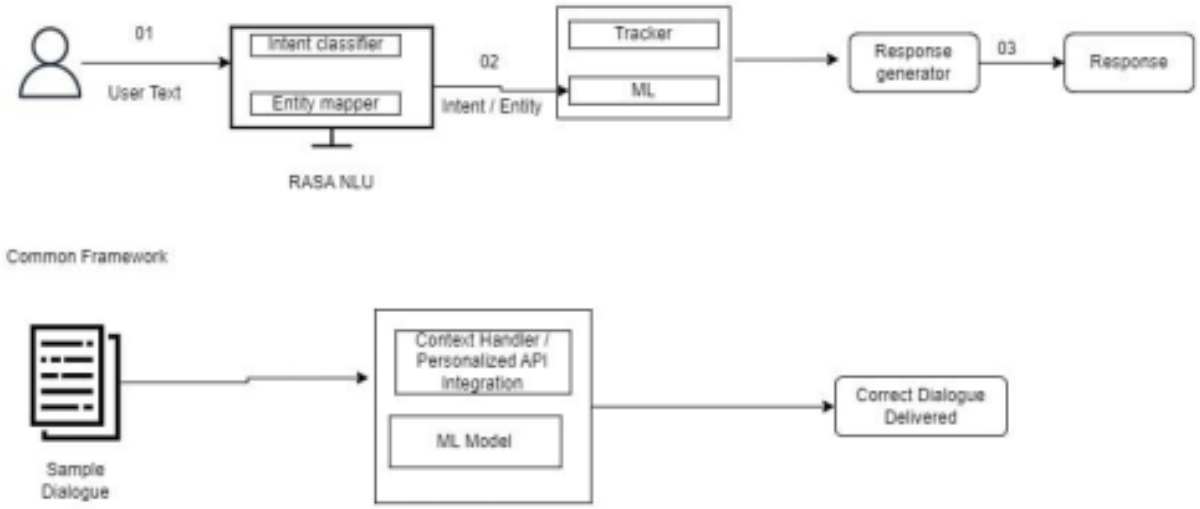


Figure 1:System Architecture

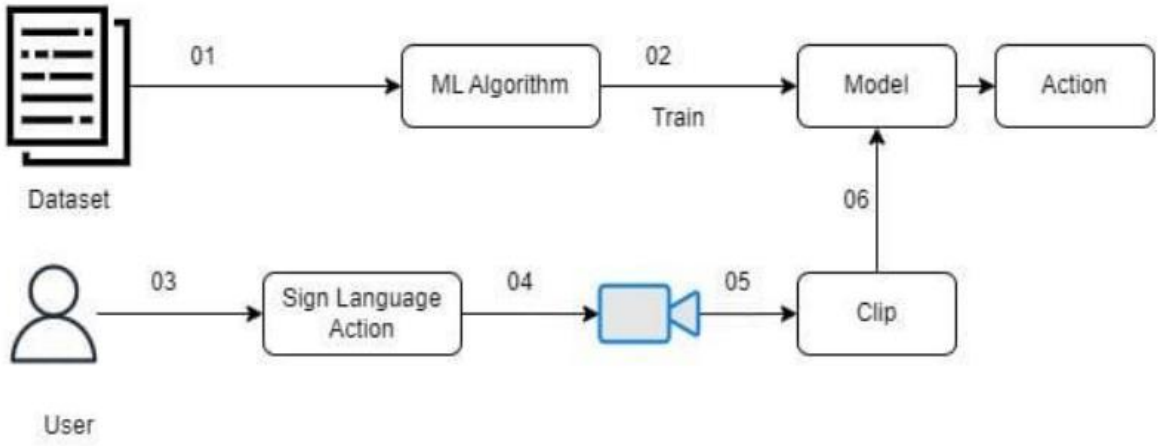


Figure 2:System Architecture 2

Rasa core

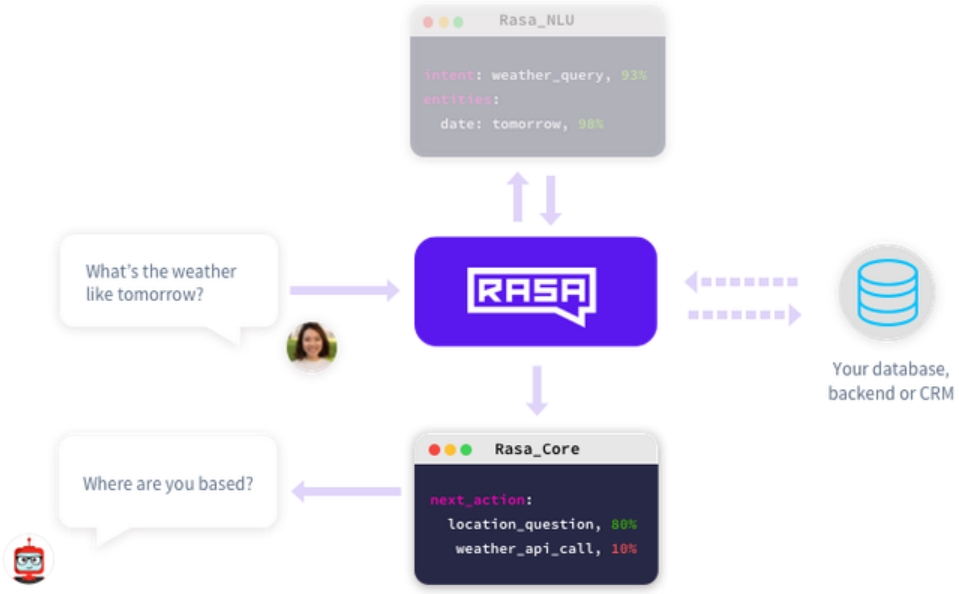


Figure 3:Rasa core [8]

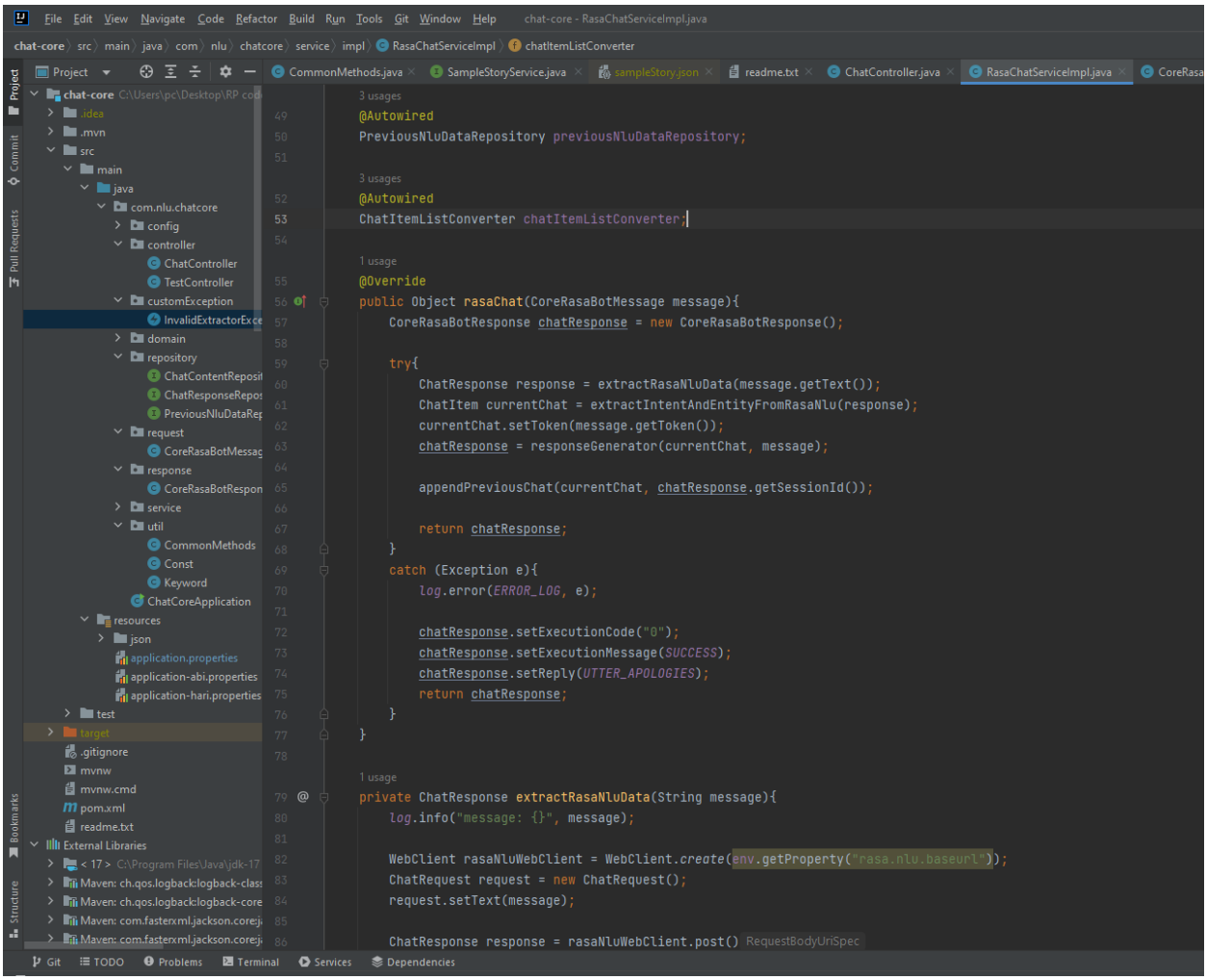
Rasa core is an open-source dialogue management framework that provides a robust and flexible platform for building conversational AI systems. Its purpose in this AI assistant system is to enable efficient handling of dialogues between the chatbot and users, allowing for a more natural and intuitive conversation flow.

One of the key benefits of using Rasa core in this system is its ability to handle complex dialogue scenarios with ease. By incorporating Rasa core, the chatbot can understand the context of a conversation and respond appropriately. Rasa core uses a machine learning algorithm to predict the best response and next action based on the user's input and the context of the conversation. Another advantage of using Rasa core is its ability to provide a personalized experience for each user. By incorporating user profiles and learning from user behavior, Rasa core can tailor the chatbot's responses to meet the user's specific needs and preferences.

In addition, Rasa core offers a flexible and modular architecture, allowing for easy integration with other components of the AI assistant system. This modularity also allows for easy maintenance and updates to the system. Moreover, using Rasa core in this system enables efficient dialogue management, personalized experiences, and a flexible and modular architecture. These benefits

make Rasa core a valuable component in developing a comprehensive and effective AI assistant system that caters to the needs of differently abled individuals.

We want to improve the dialogue handling process to make the proposed AI chat assistant system more effective at meeting the demands of persons with impairments. Contextual awareness, which involves teaching the system to comprehend the conversation's context and the user's intent, is one method for achieving this. This will improve the user experience by enabling the system to respond to the user's enquiries in a more accurate and pertinent manner. To help the system learn from user interactions and modify its replies, interactive learning can also be used. Supporting different languages, interacting with knowledge bases, and utilizing machine learning algorithms can all help the system respond to user questions more accurately and successfully. By putting these upgrades into practice.



BOW Algorithm (bag-of-words model)

The Bag-of-Words (BoW) algorithm can be used in the proposed AI chat assistant system to improve dialogue handling. The BoW algorithm is a text representation technique that converts a sentence or document into a bag of its constituent words, ignoring grammar and word order but keeping track of the frequency of each word. This technique can be applied to the user's queries to extract relevant keywords that can be used to identify the user's intent and provide appropriate responses. In the proposed system, the BoW algorithm can be used in combination with machine learning algorithms such as Naive Bayes or Support Vector Machines to classify user queries based on their intent. The BoW algorithm can also be used to extract keywords from the user's queries and match them with relevant product or service descriptions in the system's database, enabling the system to provide more accurate and relevant recommendations. Moreover, the BoW algorithm can be used to improve the system's response generation by identifying the most relevant keywords in the user's query and generating responses that include those keywords. This can make the responses more personalized and relevant to the user's needs.

NLP - Natural language processing

Natural Language Processing (NLP) is a critical component of the AI assistant system, as it enables the chatbot to understand and respond to user inputs in a natural and intuitive way.

Tokenization: The first step in the NLP process is to tokenize the user's input. This involves breaking the input text into individual words or tokens.

Stop word removal: Stop words are common words that do not add much meaning to the text. In this step, stop words are removed from the tokenized input to reduce noise in the data.

Lemmatization/Stemming: This step involves reducing words to their base form, either by lemmatization or stemming. Lemmatization involves converting words to their base form based on their part of speech, while stemming involves simply removing suffixes from words.

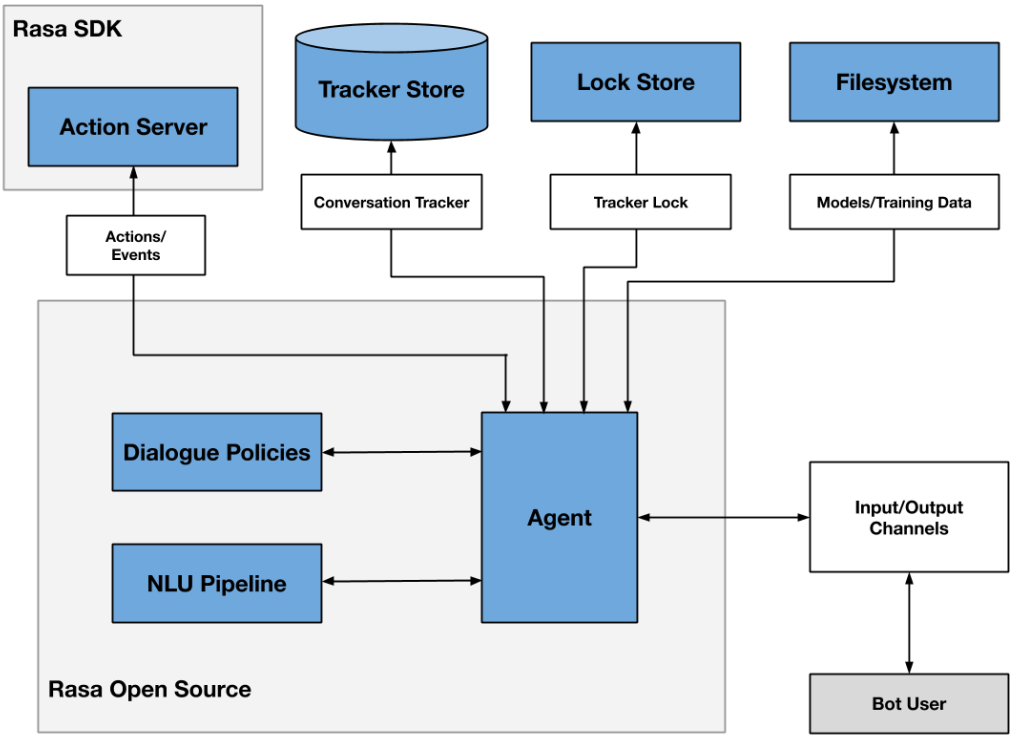
Named Entity Recognition (NER): In this step, named entities such as names, places, and dates are identified in the text. This is important for understanding the context of the input.

Intent Classification: Once the input has been preprocessed, the next step is to classify the user's intent. This involves identifying the purpose or goal of the user's input.

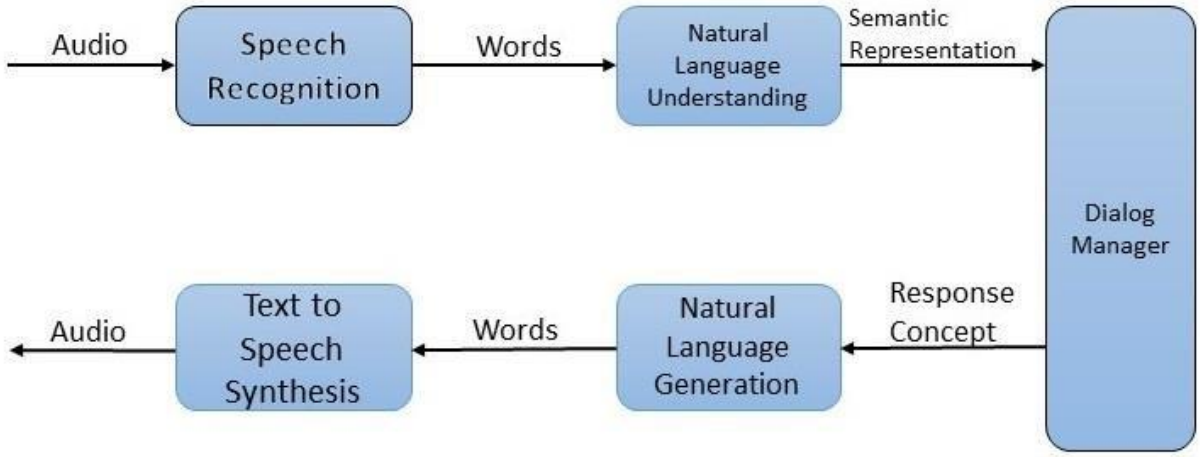
Entity Extraction: In this step, relevant entities are extracted from the user's input. This is important for generating accurate and relevant responses.

Response Generation: Finally, based on the intent and extracted entities, the chatbot generates an appropriate response.

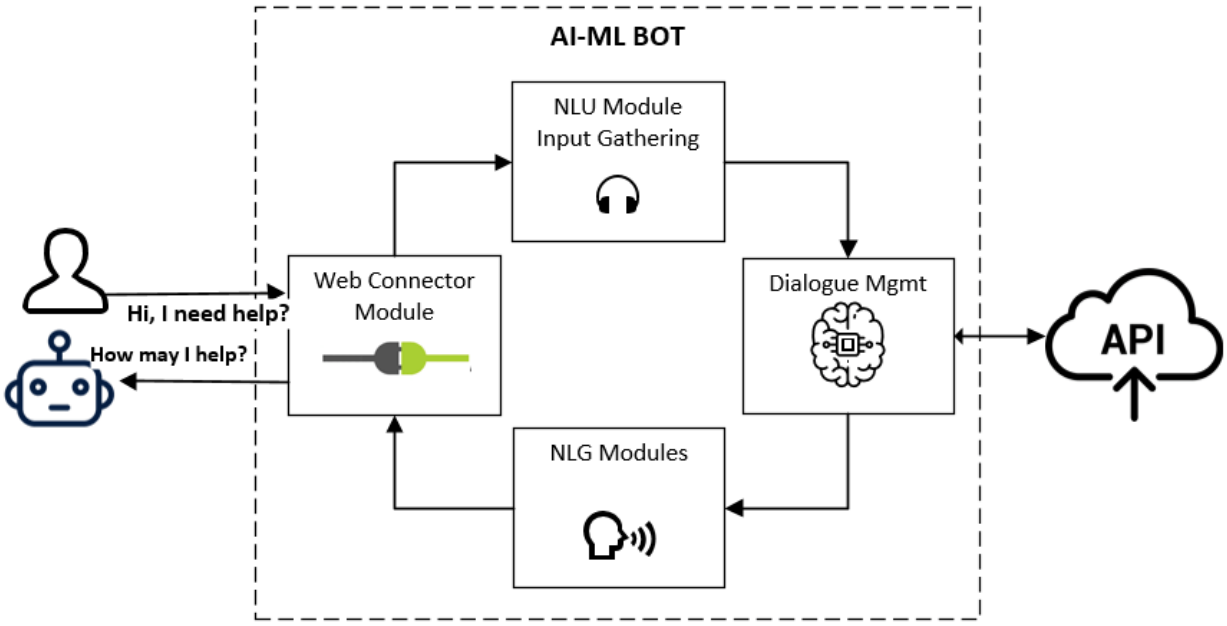
Diagrams



Rasa Frame work

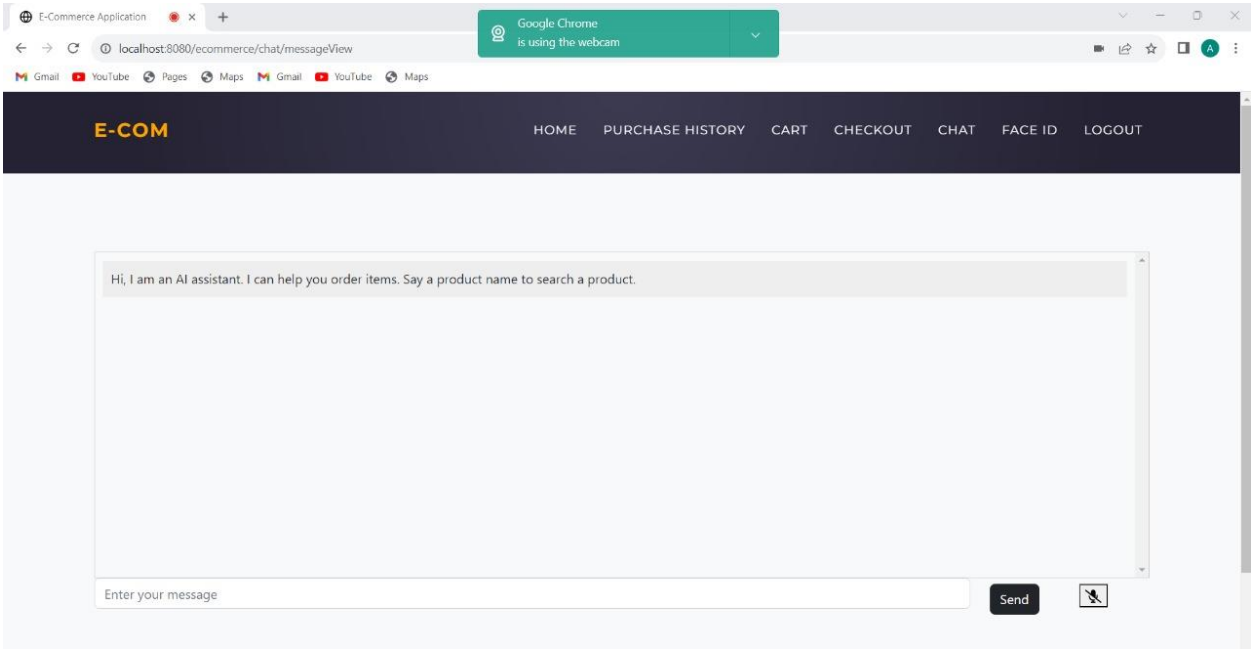


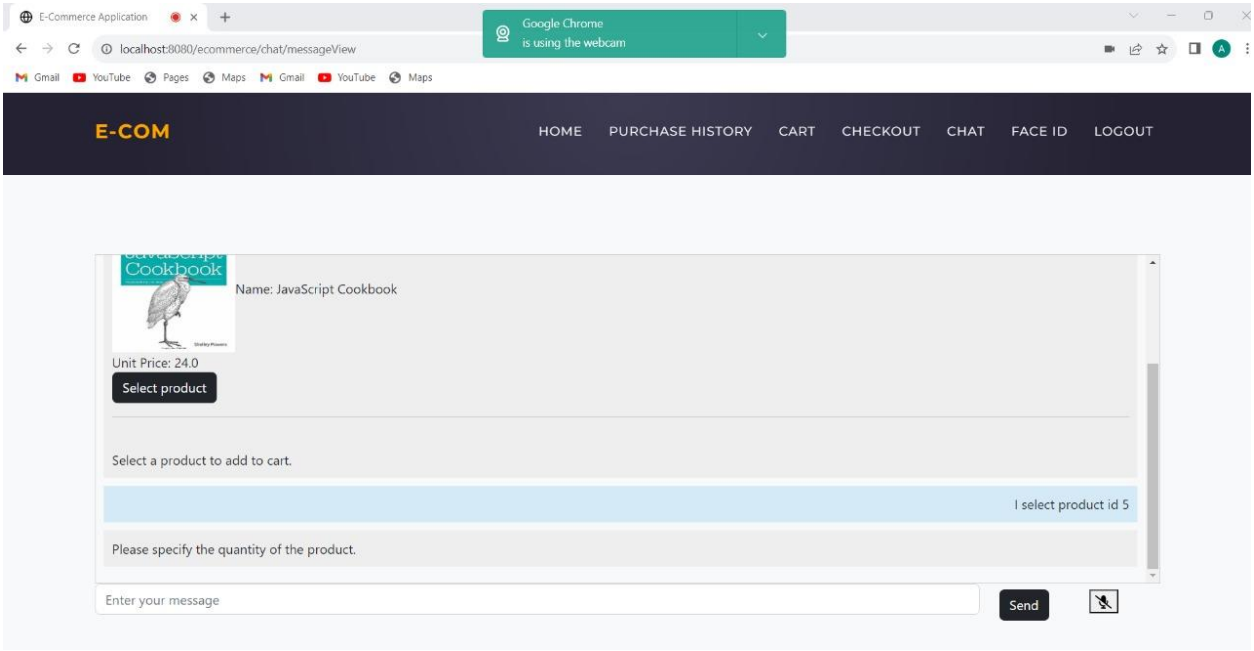
Block Diagram

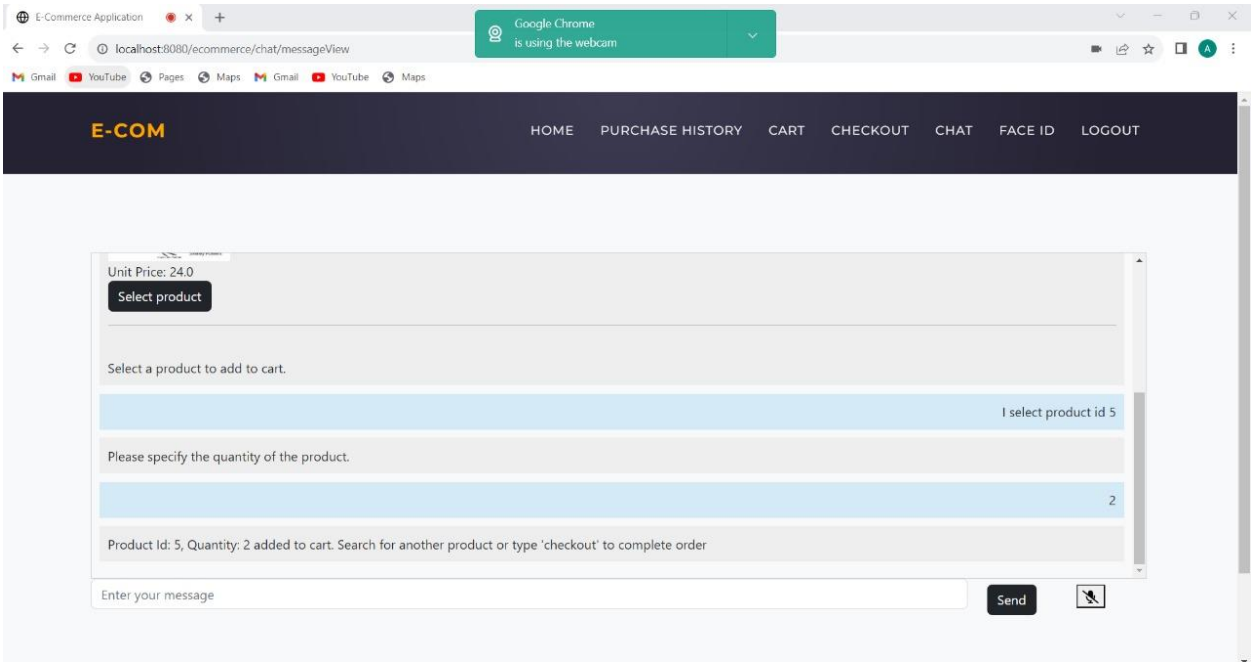


AI Block Diagram

Web application (AI ChatBot)






E-Commerce Application
Google Chrome
is using the webcam
localhost:8080/ecommerce/chat/messageView
Gmail
YouTube
Pages
Maps
Gmail
YouTube
Maps
E-COM
HOME
PURCHASE HISTORY
CART
CHECKOUT
CHAT
FACE ID
LOGOUT
Unit Price: 24.0
Select product
Select a product to add to cart.
I select product id 5
Please specify the quantity of the product.
2
Product Id: 5, Quantity: 2 added to cart. Search for another product or type 'checkout' to complete order
Enter your message
Send

References

[1] Liu, Y., & Sun, X. (2020). An exploratory study of chatbots in insurance customer service. Journal of Business Research, 118, 175-186.

[2] Wang, C., Hu, J., Zhang, C., & Liu, H. (2019). Diagnosis of medical conditions using an intelligent chatbot. IEEE Access, 7, 71303-71312.

[3] Fagni, T., Lepri, B., Pianesi, F., & Pucci, G. (2020). A personalized chatbot for financial planning. In Proceedings of the 2020 Conference on Human Information Interaction and Retrieval (pp. 203-207).

[4] Zhang, Y., Li, H., & Li, X. (2020). Towards context-based personalized chatbot. In Proceedings of the 2020 International Conference on Asian Language Processing (pp. 196-201).

[5] Li, X., Wei, W., & Huang, C. (2020). An exploratory study on the implementation of chatbot

[6] G. Aggarwal, A. Garg, and V. Jindal, "A personalized AI chatbot for online education," 2019 IEEE 6th International Conference on Industrial Engineering and Applications (ICIEA), 2019, pp. 72-76, doi: 10.1109/ICIEA.2019.8833947.

[7] S. Alsharif, M. S. Salama, M. A. Alsulaiman and S. S. Alkharashi, "Personalized AI chatbot for healthcare," 2019 1st International Conference on Advanced Technologies in Intelligent Control, Environment, Computing and Communications (ICATICC), 2019, pp. 1-5, doi: 10.1109/ICATICC48084.2019.8989687.

[8] A. N. Ahmed, M. A. H. Mamun and M. T. Islam, "Context-based intelligent chatbot for personalized recommendation," 2019 IEEE Region 10 Symposium (TENSYMP), 2019, pp. 1528-1531, doi: 10.1109/TENSYMP.2019.8973423.

[9] S. C. Hu and T. Y. Chang, "Personalized intelligent chatbot for tourism recommendation," 2018 IEEE International Conference on Systems, Man, and Cybernetics (SMC), 2018, pp. 3349-3354, doi: 10.1109/SMC.2018.00566.

[10] J. Kim, J. Kim, and S. Ryu, "Personalized AI Chatbot for Movie Recommendation Based on Emotion Recognition," 2021 IEEE International Conference on Artificial Intelligence and Virtual Reality (AIVR), 2021, pp. 83-87, doi: 10.1109/AIVR53428.2021.00021.

[11] J. R. Johnivan, “Best Agile Development Methodology & Principles for 2022,” Project-Management.com, Nov. 19, 2022. https://project-management.com/agile-software-development-methodologies/

[12] J. Li, Y. Liu, L. Zhang and W. Gao, "Context-aware chatbots for e-commerce: A review of design and evaluation methods," Journal of Electronic Commerce Research, vol. 22, no. 1, pp. 1-24, 2021.

[13] S. Sharma, V. Verma and R. Singh, "Personalized chatbots in e-commerce: A literature review and research agenda," Journal of Marketing Analytics, vol. 8, no. 3, pp. 131-149, 2020.

[14] X. Wu, Y. Cheng and J. Jiang, "Personalized e-commerce chatbots: A review of design and implementation techniques," Electronic Commerce Research, vol. 20, no. 4, pp. 775-804, 2020.

[15] I. Alonso, A. M. Brouwer and A. I. Cristea, "Context-aware chatbots for personalized e-commerce," in Proceedings of the 10th International Conference on Intelligent Systems (IS'19), Springer, pp. 319-330, 2019.