UTM

UNIVERSITI TEKNOLOGI MALAYSIA

MALAYSIA-JAPAN INTERNATIONAL INSTITUTE OF TECHNOLOGY

(MJIIT)

TECHNOLOGY & INFORMATION SYSTEM

(SECP1513-15,16)

DESIGN THINKING (20%)

MEMBERS:

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1. Introduction

Conversational Agents are relatively useful for everyday use back when it was hard coded with no machine learning technology, this has been further amplified recently however when our world was bombarded with Artificial Intelligence tools and unveiled the possibility of complete self-improving automation that can be easily be used with API keys and tokens. It is a matter of time before everything is intelligently automated from a simple customer service to the complicated processes of healthcare. The very purpose of this project is to tip the balance of evolution with a slight push so that it can jump start a new beginning.

Over the years Artificial Intelligence has evolved exponentially to the point that it can store terabytes of data. This project is to take this opportunity to show the world that personal AI-powered assistant is possible not by thousands of miles but just a few steps away. Our chatbots also have a Knowledge Base where it can access a private data whilst creating a new personality of a machine with the touch of GPT API. The possibility of this chance to further evolve is vast. Basically, every online business can use this chatbot easily with a clear instruction on how to act and response.

This report is to give a detailed subscription of what is the problem that could we potentially solve ,A detailed illustration of the solution and the processes done in Design Thinking which include Empathy, Define, Ideate prototype and test.

2. Detailed Description

2.1 Problem Statement

Airbnb owners usually do their business on the side to ensure a cash flow. However, profits are limited to staff expenses and time wastage for listings management. This problem defeats the fundamental essence of side incomes where one would just focus on the main job and let the side income be a constant self-made salary. Usually, the wage of the staff could take more than 40% of the profit per listing and the staff would manage the listings to save the headache of the owner, one staff could take up to 8 listings at the maximum. Henceforth, one question arises, how about the owners that wants to make 1000 listings? They would surely need a handful of staffs. This is what we call a scaling problem where one must have an enormous capital to add staffs not disregarding to even buy new listings.

2.2 Problem Solving

To know the solution of this problem one must unravel the very core of this hindrance which is just a scaling problem. This can be done by the automation of customer service using a conversational agent to response with the aid of private data about the room as a Knowledge Base. This will not only reduce capital investments but also increases the efficiency of customer services comparing to the staffs. This is due to the fact that this chatbot can operate in 24 hours where as normal staff cannot. So even if the owners wanted to add thousands of new properties in the listings it would not be a problem as the chatbot will manage it.

3. Design Thinking

3.1 Empatize

To win a war one must be in the state of the enemy's mind, Sun Tzu Art of War. This strategy is vital to determine one's problem and ultimately forming a solution for its demise. We as developers must think as consumers at which the problems can be tackled systematically. This strategy is crucial not only for identifying problems bit also for devising effective solutions. As, developers, adopting a consumer-centric perspective is important to systematically address challenges. The crucial step involves embracing a well-structed design thinking approach. At its core is empathy, the foundational phase where we identify the primary target or audience of the project. By understanding the client's needs and insights, we can tailor solutions to meet their requirements, ensuring the successful execution of a project that optimizes client satisfaction.

Based on our experiences with booking systems like Airbnb and direct conversations with property owners managing multiple houses, we've identified challenges where owners resort to hiring staff to handle customer inquiries. To address this, we propose leveraging AI technology to enhance the system, making it more user-friendly and capable of providing quick responses. Our research, including insights from YouTube, underscores the potential of AI in this context. However, the project poses challenges, and to ensure its relevance, we've consulted individuals with firsthand experience in managing Airbnb accounts, gaining valuable insights to tailor our solution to the specific needs of property owners. This approach, grounded in practical experiences and user feedback, guides the development of our AI-powered solution.

3.2 Define

In the Define stage, we make a clear problem statement. After collecting information in the empathy stage, developers analyze to find the main issue. After empathy, we review insights from the google form. In our discussion, we found challenges for Airbnb hosts, especially those with many listings. Owners with properties in different places often get many customer inquiries. Usually, hosts hire staff to manage each location and answer questions. However, with our conversational AI project, hosts can handle customer questions without hiring more people. This project works with apps like WhatsApp, Telegram, or Airbnb's website. Customers can easily ask questions within the app. The AI can answer simple questions. If a question needs a personal touch, it goes to the property owner. By using this project, Airbnb hosts can make customer interactions more efficient, cutting costs. This helps hosts and makes customers happier, providing a budget-friendly solution for everyone.

3.3 Ideate

During the ideate stage, we discussed in a face to face meeting in Kolej Siswa Jaya as shown in the picture below on 22nd of January so we understand more about what to do for our job scope and brainstorming more ideas about the Conversational Artificial Intelligence Agents to generate new solutions for upcoming problems. Because of the face to face meeting, it was more easier for us to ask questions if we don't understand something and get the answers immediately. As we distributed the different suggestions, we sorted and reduced them down to choose the most effective way to solve the issues about the Conversational A.I. Agents.

Figure 3.1 Face to Face Meeting

3.4 Prototype

In this stage we have already finalized our ideas and commence the Prototype-Creation phase. We created this prototype using a block-based coding bot-builder website which is Botpress. The reason why we chose this website is due to the myriad choice of features we have got despite it being free, note that this prototype is not the final product at which all features are polished, for that we must use a more powerful tool such as StackAI. In this website there are also integration of language model GPT4 turbo clocked by openAI. We made use of this default integration by implementing personality agent and Knowledge agent for our bot so that it will response in a more humane way all the more fitting the description we've painted upon it. We've made use of the "Intents" feature that will train the bot to accept a great number of customer response. In the process of making this prototype we have also learned a specific Botpress command to return a response from agents like Personality agent and Knowledge agent.

Despite using all this features, what distinguishes our bot to the other chatbots is the fact that we have used a Knowledge Base as base of reference with the help of GPT to scan through the information and ultimately propagate a fitted response. To describe our prototype chatbot we must first know the processes happening in it, first customer must engage a conversation with the bot by simply greet them. Then, the Bot will ask the customer a question on whether they have checked in or not, depending on the answer the Bot will access the specified Knowledge Base by a separation of nodes. If the customer said yes or any synonym meaning, the Bot will give House Rules in the form of PDF and traverse itself to FAQ knowledge base, preparing itself to answer the customer's question. However, if the customer said no then the bot will access the Check In questions Knowledge Base.

3.5 Testing

In this stage we have already finished the construction of our prototype and we have tested it using an emulator provided by the Botpress website to find a flaw that is to be solved. All this testing action have been recorded and compiled in a video.

4. Design Thinking Assesment

During the design thinking process, our focus revolves around addressing challenges related to managing multiple Airbnb properties effectively. To initiate the empathize stage, we identified the primary problem statement as issues faced during property management on Airbnb. To gain insights into these challenges, we create a google form to experienced Airbnb hosts, seeking their perspectives on the problems encountered.

Moving into the define phase, we meticulously analyzed the problem statements provided by the Airbnb hosts during the empathize stage. Further research allowed us to categorize and document these challenges comprehensively.

Transitioning to the ideate phase, we engaged in brainstorming sessions to generate creative ideas and potential solutions for the identified problems. Here, the assessment aspect played a crucial role, helping us filter out impractical or unrelated ideas. By the end of this phase, a consensus was reached on selecting the most viable solution.

In the prototype phase, we translated the chosen solution from the ideate phase into a tangible form. In our case, the solution materialized as a conversational agent powered by AI. This prototype functions as a tool for Airbnb hosts, facilitating seamless communication with guests, handling inquiries, and streamlining property management tasks. Our paramount objective is to ensure that the prototype aligns with the initial problem statement identified during the define phase, providing an effective solution for Airbnb hosts managing multiple properties.

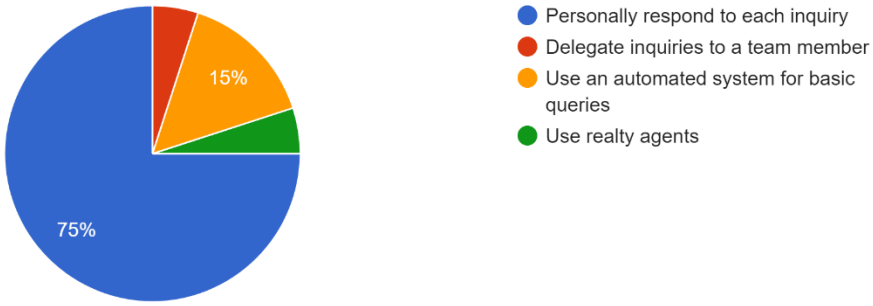
5. Design Thinking Evidence

5.1 Empathy

To kick off our project, we begin by reaching out to Airbnb property owners through a Google Form. Our goal is to understand their perspectives on what works well and what doesn't in handling customer inquiries effectively. The questions aim to gather practical insights that can help improve their productivity in managing customer interactions.

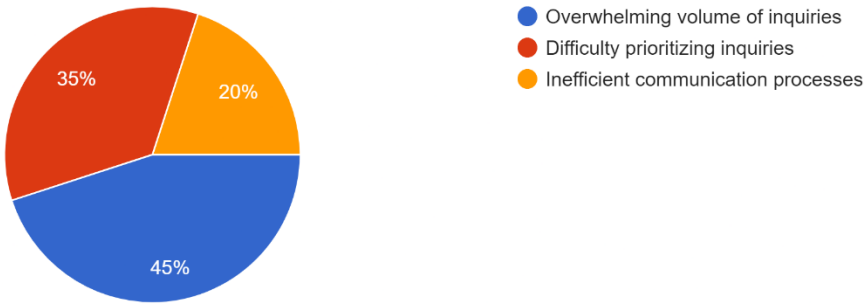
Question 1: As a house owner managing multiple rental properties, how do you currently handle guest inquiries when they express interest in renting one of your houses?

20 responses



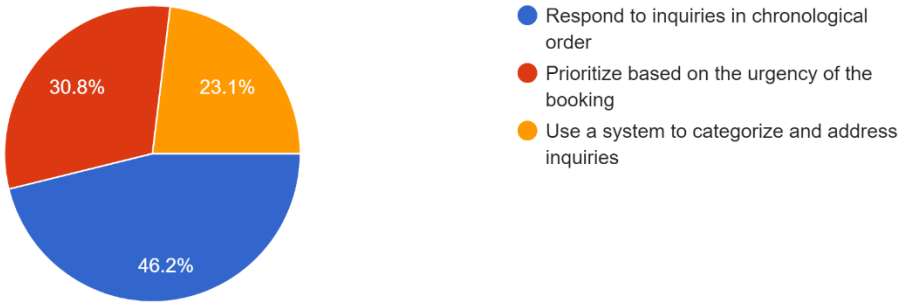
Question 2: Can you describe the challenges you face in managing guest inquiries when you have multiple houses available for rent?

20 responses



Question 3: In cases where different guests inquire about different houses simultaneously, how do you prioritize and manage their questions effectively?

13 responses



Question 4: Are there specific communication challenges that arise when handling inquiries for multiple houses, and how do you navigate these challenges?

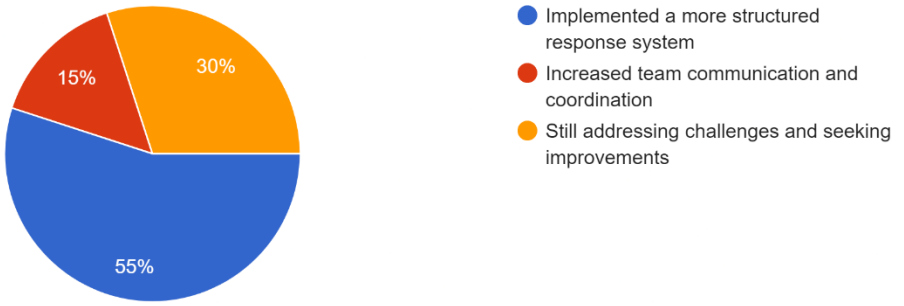
20 responses

Question 5: How do you currently organize information about each house to ensure accurate and efficient responses to guest inquiries?

20 responses

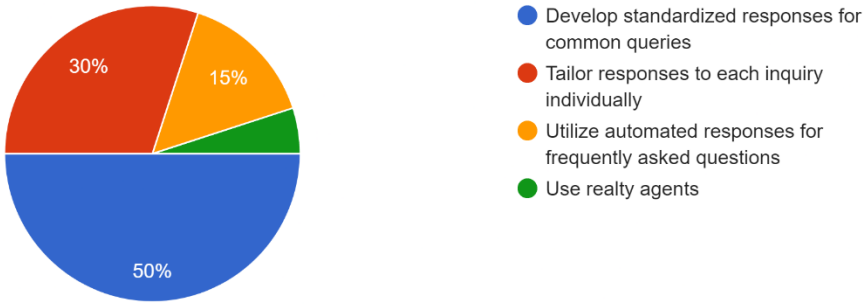
Question 6: Have you experienced instances where simultaneous inquiries for different houses led to confusion or delays in your response? If so, how did you address these situations?

20 responses



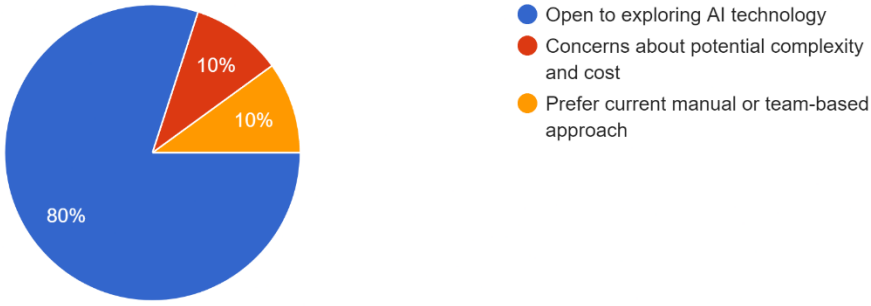
Question 7: When handling inquiries for multiple houses, do you find any common themes or recurring questions from guests? How do you currently address these patterns?

20 responses



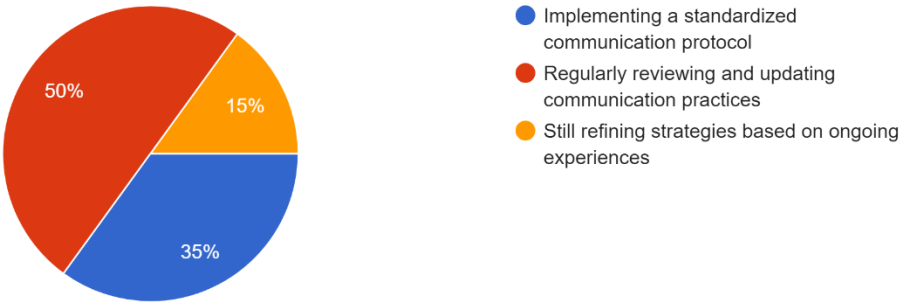
Question 8: Have you considered using technology, such as AI, to assist in managing and responding to inquiries for multiple houses? What ...reservations about incorporating such technology?

20 responses



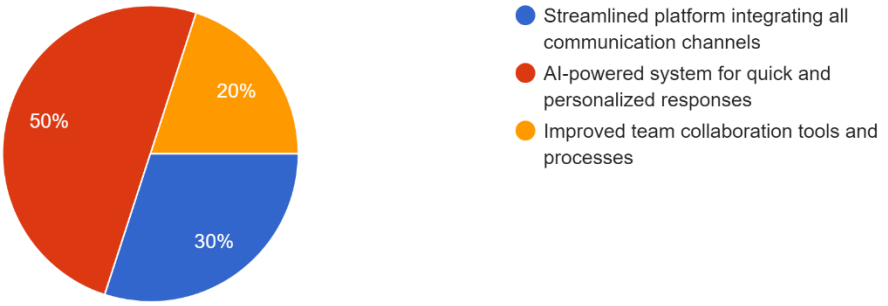
Question 9: Can you share any specific strategies or best practices you've developed over time to ensure a smooth communication process with guests interested in renting different houses?

20 responses



Question 10: In your ideal scenario, how would you envision a tool or system assisting you in managing guest inquiries for multiple houses simul...ously, ensuring a seamless and efficient process?

20 responses



Based in the form we can conclude that the respondents overwhelmingly favor personally responding to guest inquiries, but acknowledge challenges due to high volumes and the need for chronological responses. Communication hurdles related to guest preferences and response timeliness are apparent. The prevalent approach to organize information involves manual record-keeping. Despite openness to AI technology, there is a clear preference for an AI-powered system in the ideal scenario to manage inquiries efficiently. Respondents recognize that AI can play a significant role in improving the overall process. Strategies employed include standardized communication protocols and regular reviews, emphasizing the potential of AI to enhance efficiency.

5.2 Define

In the Define stage, a precise problem statement is meticulously crafted. Following the comprehensive gathering of information from both clients and experts in the empathy stage, developers under take a through analysis and observation process to pinpoint the core issue at hand. Following the empathizing stage, we collaboratively review the insights collected from the google form. During our discussion, we identified challenges that may confront Airbnb hosts, particularly those managing multiple listings.

Owners with properties in various locations often contend with a multitude of inquiries from customers. To address this, hosts typically need to hire staff to manage each location and respond to customer queries. However, through our conversational AI project, hosts can efficiently handle customer questions without the need for additional hires. This innovative project seamlessly integrates with popular messaging applications such as WhatsApp, Telegram, or the Airbnb website. Customers can easily pose their queries about Airbnb directly within the application.

The conversational AI, capable of discerning logical from illogical questions, autonomously responds to straightforward inquiries. In cases where questions require a more understanding or personal touch, they are seamlessly redirected to the property owner. By leveraging this project, Airbnb hosts can streamline their customer interaction processes, significantly reducing the need for additional personnel and ultimately cutting costs. This not only simplifies the experience for hosts but also enhances customer satisfaction, offering a more efficient and budget-friendly solution for all stakeholders involved.

5.3 Ideate

Following the ideation stage at Kolej Siswa Jaya, our team seamlessly transitioned into the execution phase. Assigning specific tasks to each member, we focused on compiling a comprehensive report to document our progress. The face-to-face meeting on January 22nd facilitated direct communication, enabling immediate clarification of any uncertainties. This collaborative environment persisted, allowing us to efficiently sift through and refine our ideated solutions for Conversational Artificial Intelligence Agents.

We also do requent virtual meetings to made sure there was constant feedback and communication, which encouraged a happy and productive environment. We have accomplished a significant milestone with the conclusion of the report. Now that we have a clear plan in place, we can go on with the project's implementation and overcome obstacles by coming up with creative answers.

5.4 Prototype

Below are all necessary evidences which also including all the crucial features we used and the workspace we operate on. Figure 5.1 is the workspace we have conducted on to make this protype. Figure 5.2 shows all of our agents that we use in order to make the bot more responsive. In Figure 5.3 and 5.4, we provided the 'intents' features at which we train the bot to understand synonyms. Lastly, we provide our knowledge Bases where we store .txt file of possible questions and specific answers in Figure 5.5 and 5.6.

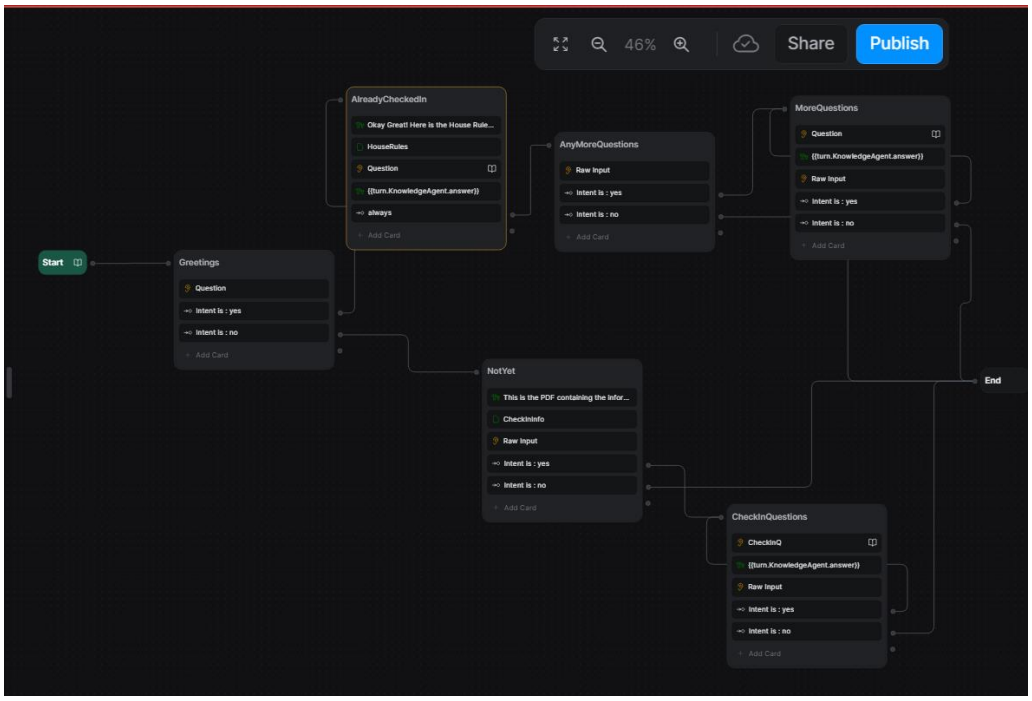


Figure 5.1 The image of workshop

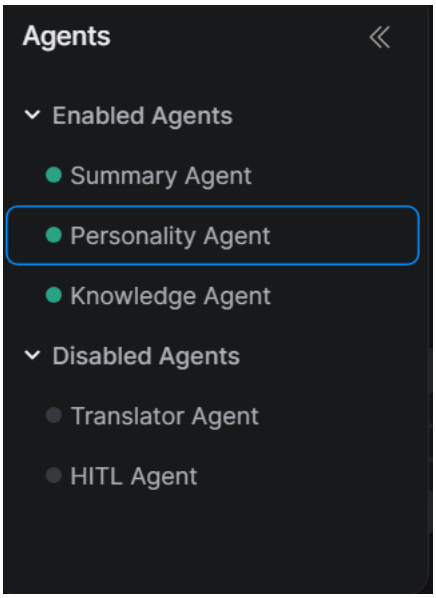


Figure 5.2 The image of personality agent and the demonstration of it.

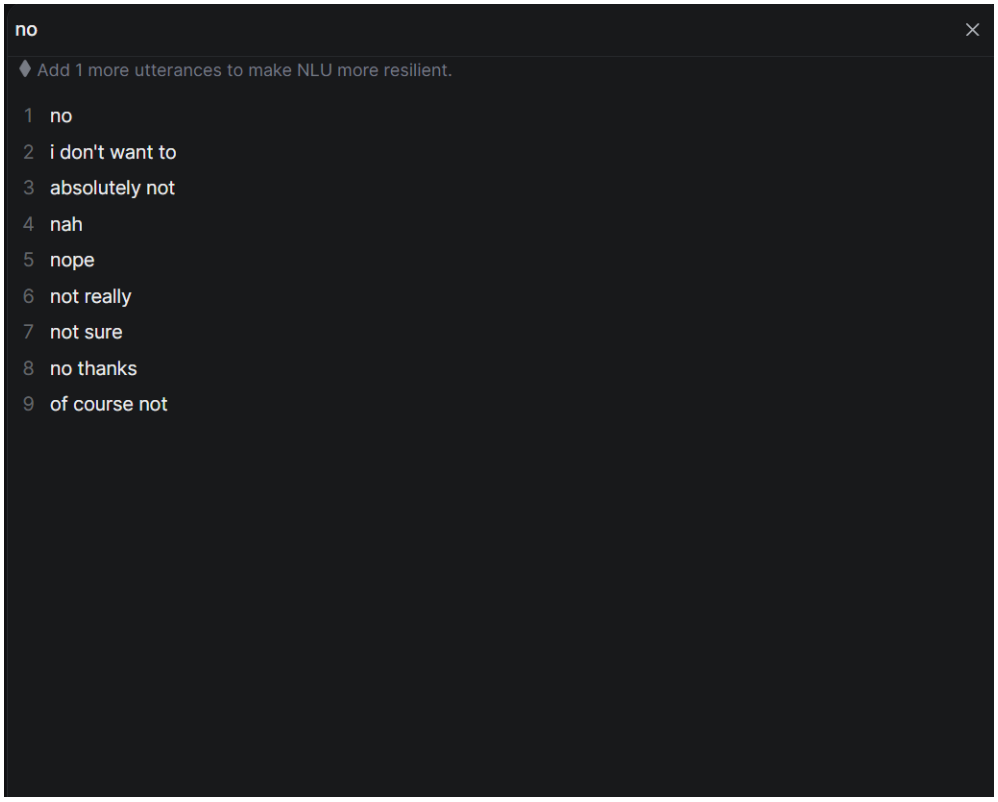


Figure 5.3 The image of Intents

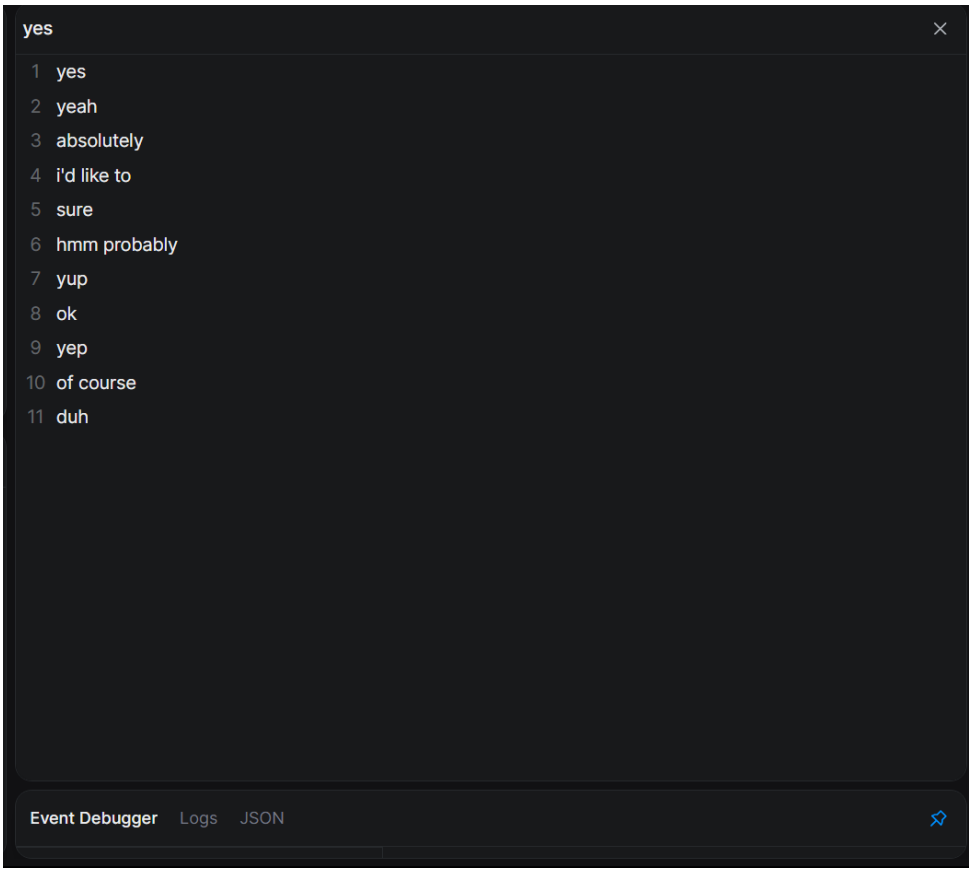


Figure 5.4 The image of Intents

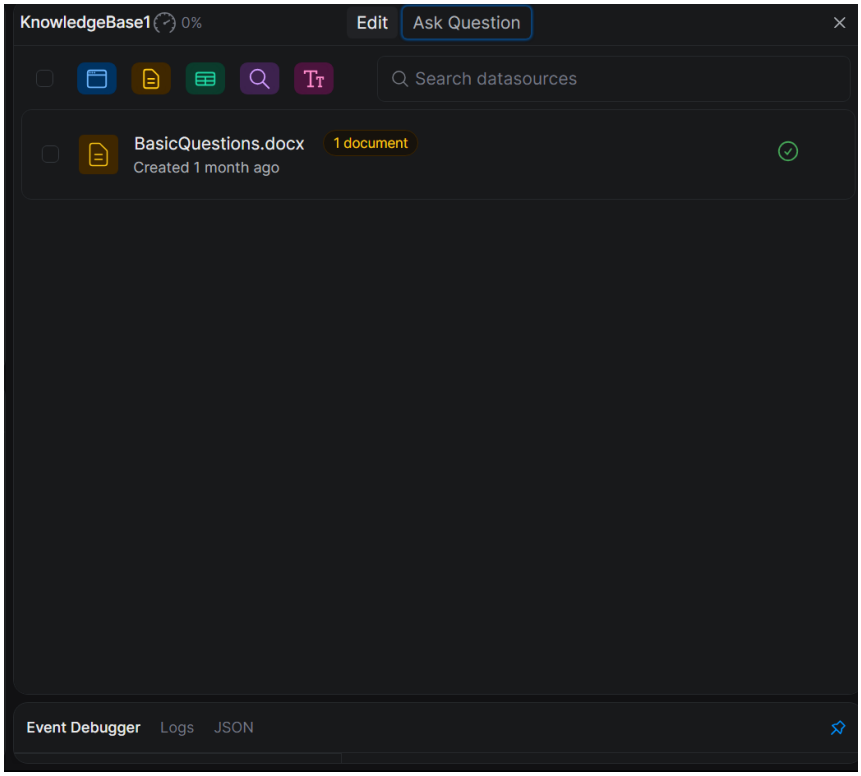


Figure 5.5 Knowledge Base

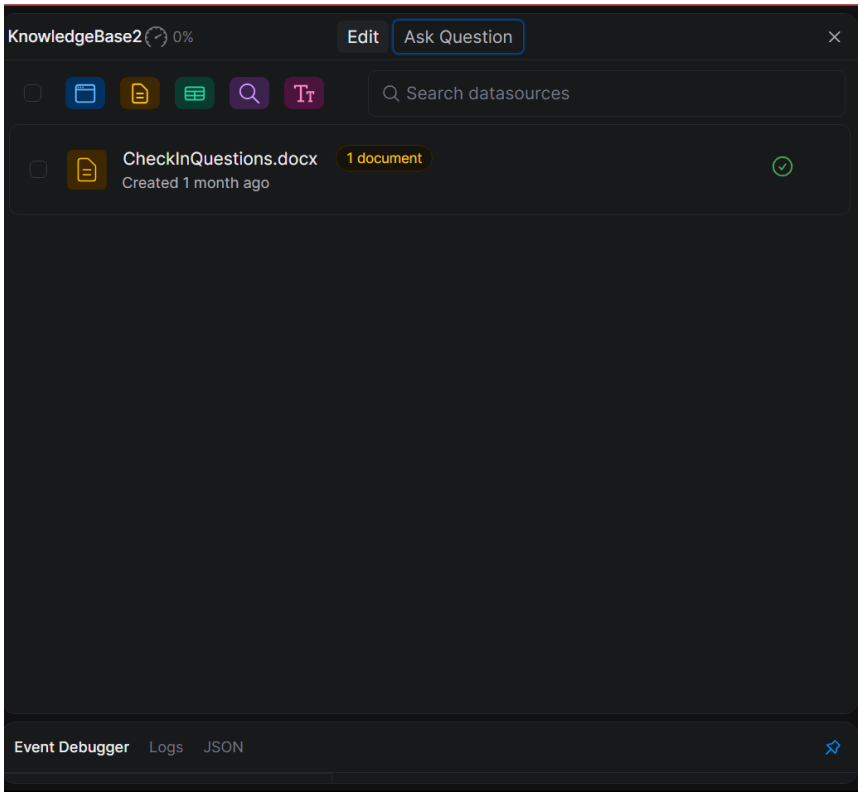
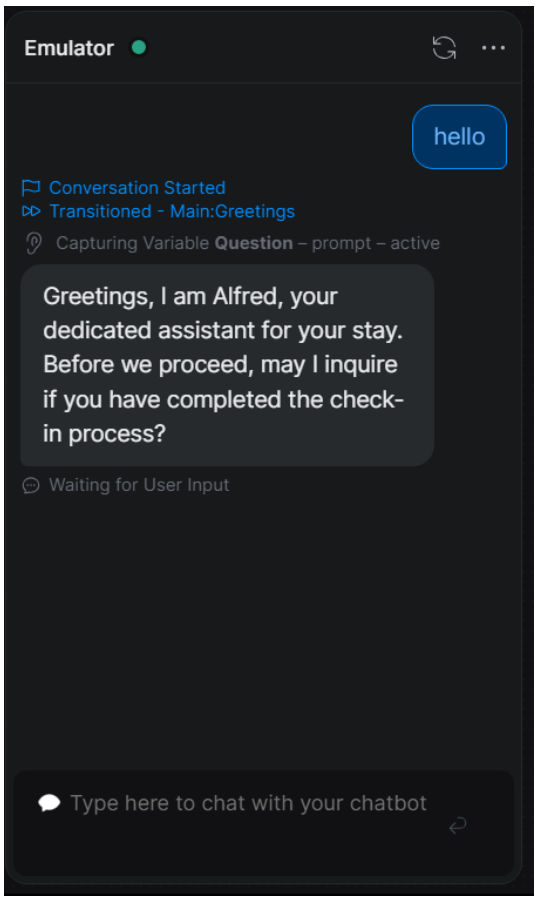
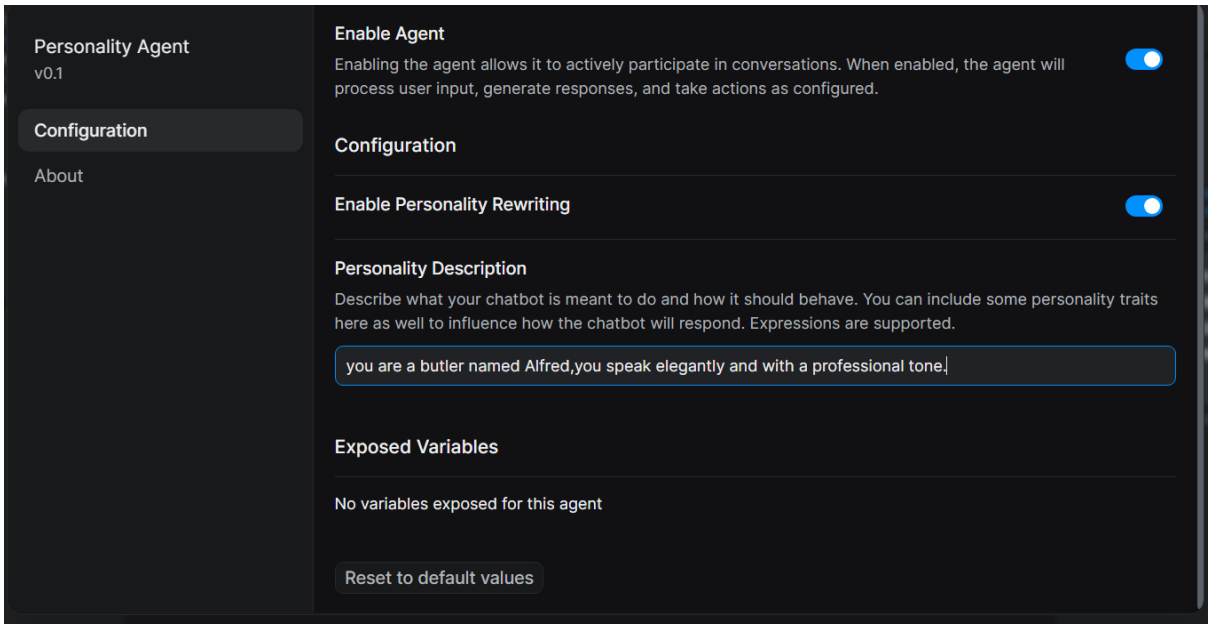


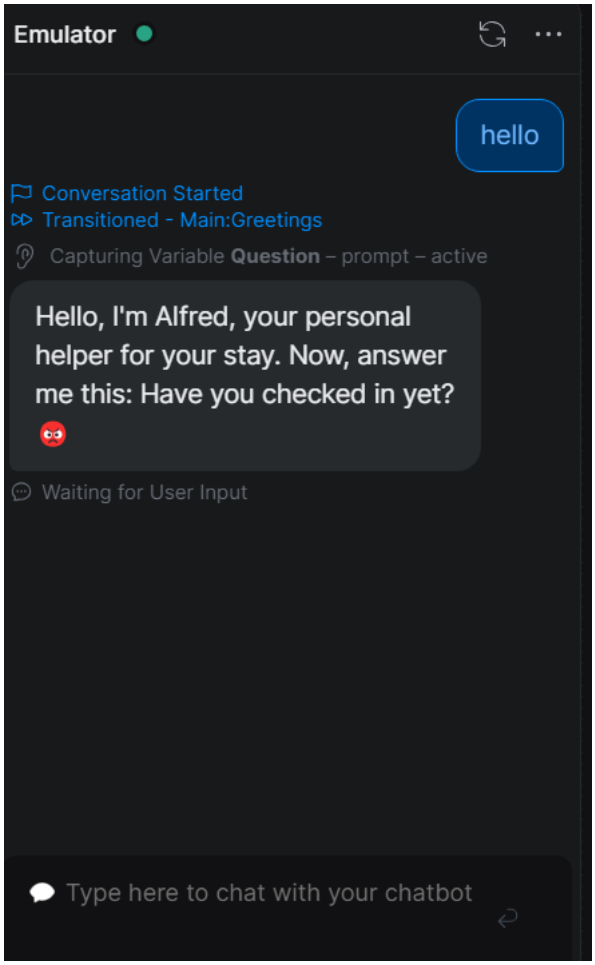
Figure 5. 6 Knowledge Base

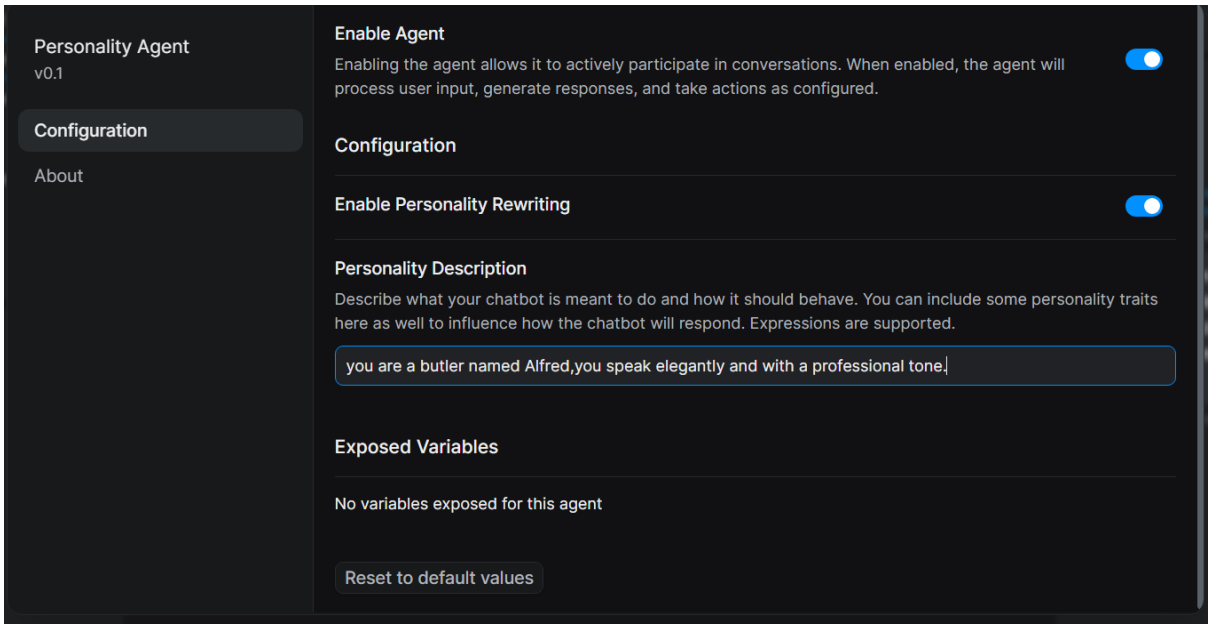
5.5 Testing

For the test, I will provide the evidences that prove the response of our chatbots and the change of personality agents configurations will affect how the bot responses.






Emulator
hello
Conversation Started
Transitioned - Main:Greetings
Capturing Variable Question – prompt – active
Hello, I'm Alfred, your personal helper for your stay. Now, answer me this: Have you checked in yet?
Waiting for User Input
Type here to chat with your chatbot


Personality Agent
v0.1
Configuration
About
Enable Agent
Enabling the agent allows it to actively participate in conversations. When enabled, the agent will process user input, generate responses, and take actions as configured.
Configuration
Enable Personality Rewriting
Personality Description
Describe what your chatbot is meant to do and how it should behave. You can include some personality traits here as well to influence how the chatbot will respond. Expressions are supported.
you are a butler named Alfred,you speak elegantly and with a professional tone.
Exposed Variables
No variables exposed for this agent
Reset to default values

6 Project Scope

MUHAMMAD SAFWAN BIN RABE

Responsible on the ideate part of the project. Organize a meeting each of us to discuss on how can we improvise and solve the project problem statement.

AHMAD AZFAR BIN AZMI

Responsible on emphaty part of the report and create the google form. Plus, incharge in contacting with the responded to get details informations about the problem.

MUHAMMAD AMSYAR BIN MOHD AZMI

Building the prototype using botpress emulator and do testing for the project. Incharge on the protype and testing part of the report.

TENGKU ZAQWAN HAIDAR BIN TENGKU AWISQOURNI

Responsible in defining the project overall function. Plus, inchanrge on the define part of the report.

7 Reflection

7.1 MUHAMMAD SAFWAN BIN RABE

As a student at Universiti Teknologi Malaysia, engaging in a project that employs Design Thinking holds additional significance. The academic environment at UTM, known for its focus on technological innovation and problem-solving, likely complements the approach outlined in the project. The utilization of Design Thinking, with its stages of Empathy, Define, Ideate, Prototype, and Test, aligns with the university's commitment to fostering a holistic and user-centered mindset.

The exposure to Design Thinking at Technology & Information System may have equipped me with a structured and empathetic approach to problem-solving, fostering a deep understanding of end-users' needs and expectations. This methodology, beyond its application in the current project, likely enhances my overall ability to approach challenges in a systematic and creative manner. Moreover, the project's integration of Design Thinking reflects the practical skills gained during my studies, demonstrating the real-world applicability of the academic concepts learned at UTM.

This alignment between academic knowledge and project implementation showcases the university's commitment to preparing students for impactful contributions in the field of technology and innovation. In summary, being a student at Universiti Teknologi Malaysia likely enhances my capacity to grasp and apply Design Thinking principles, making the current project not only a practical application of my academic learning but also a testament to the university's role in shaping innovative problem-solvers. The project's incorporation of Design Thinking becomes a testament to the holistic education provided at UTM, contributing to my proficiency in addressing complex challenges with a user-centric approach.

7.2 AHMAD AZFAR BIN AZMI

I've set ambitious goals for this course, aiming to become a renowned Embedded Software Engineer. To achieve this, I recognize the crucial need for proficiency in languages like C and C++, a comprehensive understanding of embedded systems, and familiarity with microcontrollers. I envision gaining hands-on experience with leading local IoT companies, such as Aerodyne, to deepen my expertise. Looking even further ahead, there's a potential aspiration to establish my own IoT company.

Throughout the design thinking project, collaboration with my supportive team has been invaluable. Our shared ideas not only contributed to the project's success but also played a crucial role in improving my social and teamwork skills. The experience taught me the importance of embracing diverse opinions and ideas, and it was an enriching journey into the realm of AI. To bolster my creativity and competitiveness in the industry, I commit to dedicating myself to expanding my knowledge in both software and IoT domains. This assignment has underscored the significance of high-order logical thinking skills, emphasizing their importance in solving problems efficiently and effectively.

In conclusion, my journey in this course is not only about achieving academic excellence but also about building a foundation for a thriving career in Embedded Software Engineering. The blend of technical expertise, practical experience, and a collaborative mindset is shaping my path toward success in the dynamic field of IoT.

7.3 MUHAMMAD AMSYAR BIN MOHD AZMI

My experience with the Technology & Information System subject at UTM, especially the design thinking assignment, has been insightful. The assignment emphasized the importance of empathy, collaboration, and iteration in software engineering. Understanding end-users' needs and collaborating in diverse teams highlighted the human-centered nature of technology solutions, mirroring real-world scenarios.

The iterative process, akin to agile methodologies, reinforced the idea of continuous improvement. Additionally, staying updated with technological trends was underscored for creating relevant and future-proof solutions. Overall, this experience has contributed to my growth as a more adaptable and well-rounded software engineer.

7.4 TENGKU ZAQWAN HAIDAR BIN TENGKU AWISQOURNI

Before entering Universiti Teknologi Malaysia, I never imagined venturing into information technology or software engineering. Despite warnings about the challenges, I took it as an opportunity to prove my capabilities. My goal in this program is to gather knowledge for my future career establishing a global IT and digital transformation company in Malaysia, focusing on Big Data Analytics and fifth-generation networks.

Engaging in a design thinking assignment has significantly shaped my problem-solving skills, adhering to the five phases: empathize, define, ideate, prototype, and test. This experience will seamlessly integrate into future projects, making me more adaptable in the industry.

To stay competitive, I understand the importance of intensifying efforts in Artificial Intelligence, Big Data Analytics, and coding languages. The assignment emphasized the crucial role of logical thinking, motivating me to further enhance these skills for future challenges and opportunities**.**

Video Presentation

https://youtu.be/S4d0eHYSouk