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Talk O Matic (A Prompt Chatbot)

Ankur Kr. Singh*, Ravi Gupta, Anjali Vishwkarma,
Manvi Tiwari, Atin Sharma, Anurag Yadav,
Md. Gufran, Riya Singh

Abstract

This study represents the investigation, evolution and implementation of a prompt-based chat-bot that is developed by using Gaianet.ai and the Llama API that give the answer until we say exit. The main goal of this research work is to create and develop a conversational agent capability of answering a suitable and humane base array of user questions with accuracy and material list. In an era, where automated communication are becoming more and more vital, this chat-bot goals to increase user interaction in a very interesting and intelligent manner and also enhances the communication skills of the user in different languages. The methodology goes through several aspects. Initially, the unification of the public node of Gaianet.ai is confirmed, which gives the service as the foundation for the natural language capabilities of the chat-bot so that it can communicate with people in a structural and interesting way. This implementation is necessary, as it allows the chat-bot to support Gaianet.ai's advanced algorithms to understand and respond to user questions interestingly and effectively.

Keywords: Artificial intelligence, chatbot technology, natural language processing (NLP), gaianet.ai, ethical AI principles

INTRODUCTION

we built a chatbot that does not only answer the questions but talks back at you using Gaianet.ai and the LLaMA API. It was absolutely awesome and fun to do, and want to break it down that how it work using requests and the Gaianet API to send and receive messages from the chatbot. This is what links the input from the user to the chat engine so that this bot knows exactly what a user wants it to know so that it can respond accordingly. In short, essentially the API is just that bridge with the help of which our chatbot can communicate properly with the server's model [1].

We used JSON because it would allow us to clearly structure the messages, so that the chatbot would know exactly how to interpret its questions. JSON makes passing data back and forth between the chatbot and the API clearer and well-organized. One of the key things that we have worked on was ensuring the smooth handling of error situations by chatbot. For example, if the network connection or the SSL certificate becomes problematic, the program does not crash. Instead, it has a knowledge base on how to handle it and to move on [2].

This allows the chatbot to work smoothly and function efficiently even when something unexpected comes along. To make the chatbot more engaging, we added a voice element using pyttsx3. After the chatbot creates a response, it does not simply show the answer. It talks back! This is definitely an edge when users prefer to hear responses instead of reading them [3].

***Author For Correspondence**
Ankur Kr. Singh
E-mail: ankursinghsingh.456@gmail.com

Student, Department of Computer Science, Bansal Institute of Engineering & Technology, Lucknow, Uttar Pradesh, India

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GUIDING PRINCIPLES FOR RESPONSIBLE PROMPTING

Principle 1: Protect Sensitive Data in Responsible Chatbot Prompting

Responsible prompt design and deployment depend on the protection of sensitive information. Chatbots are increasingly integrated into domains such as healthcare, banking, education, and services offered to customers, exposing them to large quantities of sensitive information regarding the users. They contain user's private identification information, financial details, health records, and confidential business information that can leak or even be illegitimately used for malicious reasons due to weak prompting systems. This means the designers and developers of chatbots will have to use some solid methods that will protect the privacy and security of their data [1].

1. *Personally Identifiable Information (PII):* Names, addresses, telephone numbers, electronic mail addresses, social security numbers, and others like that.
2. *Financial Data:* Probably also financial account numbers in financial services, credit-card information, or transaction history, regarding chatbots using financial service-related data.
3. *Health Information:* Patient records, diagnostic data, and health-related queries fall under sensitive categories in the case of medical chatbots.

Best Practices for Protecting Sensitive Data

1. *Minimization of Data Collection:* The primary principle of using a chatbot responsibly is minimizing data collection. The data a chatbot collects should be only relevant to its purpose. A calendar reminder chatbot does not need to ask users their home address or details about financial matters while it intends to remind them of their schedule. Thus, the scope of potential in unwanted transfer of sensitive information decreases.
2. *Data Encryption and Secure Storage:* Once sensitive information is accessed, they should be encrypted in motion and at rest to not be accessed without permission. There should be communication protocols for secure transfer between the user and system, for instance, use of TLS (Transport Layer Security) by the chatbots. Sensitive information that is captured and kept by the chatbot should be held in databases having more secure access control systems. Proper prompting will, therefore, be able to remind a user that his or her data is being handled in this way, thereby building more confidence in the system.
3. *Anonymization and Pseudonymization:* Another effective practice is anonymization or pseudonymization of sensitive data through which a user can interact with the chatbot. Anonymization refers to removing all identifiable elements from data, whereas pseudonymization replaces them with a pseudonym, masking the identity of the user. Chats should not request nor store sensitive personal identifiers unless they are absolutely necessary by chatbot prompts, and anonymization techniques should be used wherever possible.
4. *User Consent and Transparency:* In case data is stored with chatbot prompting, informed consent and transparency must be established. At every point, users must know what data is being collected, how it will be used, and how well it is going to be protected. The prompts must therefore be created in a manner that provides a clear and understandable way of conveying data policies.
5. *Data Retention and Deletion Policies:* The programs the chatbots use should have policies that indicate retention time for sensitive data as well as deletion policies. Such prompts should be designed to ensure users understand their rights under the new regulation to request deletion of data or withdrawal of consent at any time [1].

Principle 2: Prompt the Model to Succeed: The Purpose of Effective Prompting

The "Prompt the Model to Succeed" principle has it that one is supposed to make those prompts which are best to activate the ability of the chatbot to produce more accurate, coherent and contextually relevant responses. With larger and increasingly sophisticated AI models, especially large language models, the quality of these prompts has become more indicative of the performance.

The Purpose of Effective Prompting in Chatbots

In fact, the goal of prompting in chatbot systems lies in steering the AI model toward making responses that will be expected by the users, fulfill the task assigned, and contain no possible pitfalls in

them regarding such issues as ambiguity, irrelevance, or bias. Proper prompting will guarantee that the model understands the context, processes the input in proper way, and produces output consistent with the user's intent.

Framing the Model's Understanding of the Task

Effective prompting starts with helping the model understand the task or query that needs to be addressed. Without proper prompting, a chatbot simply does not understand the intent behind what a user wants. In some cases, vague prompts lead to generic or unrelated responses.

Managing Ambiguity

To Control and minimize ambiguity is the other important challenge the model needs to win. Ambiguity can pose significant problems in natural language processing, where one phrase might have more than one interpretation. A poorly posed question can lead the model to interpret queries from the user in a manner that is unintended, and, hence, yield irrelevant or even incorrect answers.

Ensuring Contextual Coherence

In many cases, chatbot conversations rely on the model to continue and keep things in context. Many multi-turn interactions rely on understanding the user's intent, which may be split between a number of exchanges. One of the reasons effective prompting is important has to do with the model's ability to remember that context and return coherent responses in the light of this preceding conversation.

For example, if you talk to a model about booking a hotel room and a user asks in the course of a conversation, "Do you have Wi-Fi?" the model would recall that the user was referring to a hotel amenity. The next turn might be: "Would you like to know more about the room amenities?" Keeping a conversation on topic and relevant to the original question is the key to success.

Directing the Model Towards Desired Outcomes

The governing process of this chatbot should ensure that the responses produced fit in with the brand, the context, and the user's needs. For instance, when hitting a command prompted from a customer who looks for the kind of product to buy, a good prompt might look something like: "Would you prefer an in-depth comparison of products, or would you like a quick suggestion based on preferences?

This prompt helps guide the model towards either a detailed or brief response, depending on the user's preference. Proper orientation with instructions will ensure that the chatbot actually achieves the purpose by delivering the desired outcome, be it bringing out substantial information, solving a problem quickly, or engaging the user in any meaningful way [4].

Principle 3: Validate and Debias Output by Consulting Experts and Other Sources

While developing and deploying chatbots based on the large language models, especially, the output generated by these AI systems is as likely to be both accurate and free from injurious biasing. These AI systems are trained on a set of huge data mined from the internet and are liable to reflect and even amplify the bias present in that data, thus leading to skewed and sometimes dangerous responses. The fundamental principle is to "Validate and Debias Output by Consulting Experts and Other Sources", ensuring that a chatbot's generated outcomes are reviewed with reliable external sources such as expert knowledge so as to minimize misinformation and bias.

The Need for Validation and Debiasing

Validating and debiasing is essential because no matter how advanced chatbots become, they are not inherently immune to distinguishing facts from fictions and anti-bias attributes. Instead, the models are statistical engines providing replies based on observed patterns of data they have been trained on, inadvertently creating outputs that reflect societal bias, misinformation, and lack of information. Thus, without adequate oversight, chatbots may institutionalize these biases and unintentionally harm individuals, particularly in sensitive areas such as healthcare, education, or law advice [2].

Steps for Validating and Debiasing Chatbot Outputs

1. *Consulting Domain Experts:* Most valid and unbiased responses from the chatbot elicit domain-specific experts. This is because, as the nature of the project develops whether it is healthcare, legal assistance or customer support, experts would be able to critically analyze responses from the chatbot system to ensure that their responses are valid and apt.
2. For example, the medical consulting chatbot should not be trained on general training data alone but must include reviewed expert medical knowledge so that the advice rendered will be sound and safe. A legal guidance-generating chatbot can cross-reference the legal professionals or use legal databases for verification of being correctly legally valid and free of misinterpretation.

Techniques for Bias Mitigation

- *Data Auditing:* The data sets should be audited first for imbalances or biases before training chatbots. Pre-processing of data would decrease the presence of biased language or skewed representations.
- *Post-Processing:* After the chatbot generates the output, generated responses may be subjected to bias analysis. This might include filtering or debiasing algorithms flagging potentially biased content.
- *Prompt Engineering:* Another approach is called prompt engineering; prompts that are designed in ways to minimize and even get rid of biased responses. Instead of asking, "Why are women better at multitasking than men?", a more neutral question could be drafted and prompted to the chatbot, such as, "What are the factors that affect multitasking ability across individuals?
- *Example:* an application chatbot might subtly discriminate against female applicants against their male counterparts because of biases in the training data. In that regard, the system could mark any response that clearly states a preference based on gender to be brought to the attention of reviewers. Some expert input can be allocated to diversity and inclusion specialists to help detect and correct bias [5].

Addressing Ethical Concerns and Building User Trust

Chatbot output validation and debiasing are required for building trust with users. Users rely on chatbots to provide them with useful, unbiased, and accurate information. Failure in these systems can cause harm or erode the confidence in the system. The fact that developers will involve active consultation with experts and integrate trustworthy sources will alleviate the ethical concern about issues like misinformation and bias.

Further, the idea of transparency with respect to the generation and validation of the outputs would give more confidence to users. Thus, a chatbot could inform the user that "This information has been validated by medical experts", or "This response is based on data from {trusted source}". In this manner, they come to understand what the strengths and weaknesses of the system are [5].

Principle 4: Disclose Chatbot Use: Ensuring Transparency and Ethical AI Interactions

The principle of "Disclose Chatbot Use" highlights the need to be transparent with users about the fact that they are conversing with a chatbot and not with a human being. Given the level of interaction through AI, especially in the manner of more human-like responses of chatbots, it is important that the user knows about the nature of the conversation partner he or she will be talking to. This principle promotes trust-building, informed consent, and avoiding deception during an AI-assisted interaction.

The movement for chatbots in all walks of life, from customer service to healthcare, e-commerce, and education, thus requires clear disclosure for the ethical requirement of upholding standards of openness between the user and the AI system.

The Importance of Disclosure

Revealing Use of the Chatbot Serves Diverse Ethical and Practical Purposes

1. *Transparency and Trust:* Transparency is at the heart of ethical AI deployment. Users knowing that they are communicating with a machine grounds the trust as it assures them that the

interaction has not been based on any deception. Users should always know whether their interaction is human or machine to give concrete expectations and put in proper perspective where the capabilities and limitations of the chatbot lie.

2. *Informed Consent:* Informed consent is an ingredient of ethics AI. It makes the users know who they are conversing with, that is, a chatbot, they can then make decisions on the nature of the interaction. Some users might be comfortable sharing their personal details with the human and not with the AI system, and this right should be bestowed on them with full knowledge of the interaction.
3. *User Experience and Expectations:* Clearly disclosing chatbot use sets proper expectations for the user. It helps prevent frustration or confusion if the chatbot fails to meet expectations that might be held for a human agent. If users expect human-level intuition or understanding, they may be disappointed when the chatbot fails to grasp subtle emotional cues or complex nuances in language. However, if users believe they are actually dealing with a machine, they will also do so accordingly [3].

Best Practices for Disclosing Chatbot Use

1. *Clear and Early Disclosure:* Disclosure of Chatbots to the user at the very outset of the conversation as soon as the user interacts with the system would allow users to decide well before they share their personal information or move forward with the interaction. The disclosure shall be framed in as simple and non-technical language as possible, accessible to all users.
2. *Context-Specific Disclosure:* Different use cases may call for levels of disclosure which might be different. For instance, a chatbot that performs sensitive tasks, such as completing financial transactions or healthcare consultations, may need a more explicit form of disclosure than a simple information-providing chatbot which gives information on a website.
3. *Accessible Disclosure:* The disclosures of the chatbot shall be accessible for persons with disabilities. This may involve making disclosures appear in more than one format, such as text, audio, or visual cues, dependent on the platform or context of operation.
4. *Ongoing Reminders During Extended Interactions:* For extended dialogue and multiple-turn interactions, users might forget that they are interacting with a chatbot. Periodic reminders could well turn out to be active in complex conversations in which users get confused over the human agent and the responses of the chatbot due to fluency.
5. *Providing an Option to Escalate to a Human Agent:* This also has to do with disclosure of use of a chatbot, a feature that actually presents an option to escalate the interaction to a human agent if necessary. This is communicated clearly to users so that they may have an option to switch to a human if the chatbot cannot satisfy their need appropriately.
6. *Avoiding Misleading Designs:* Avoid names, avatars, or language that could be used to solicit "humanness" from the user. It may, for instance, be inappropriate to give a chatbot a human name or a profile picture that would lead the user astray into thinking that they are talking to a human while violating transparency.
7. *Clarifying the Role and Limitations of the Chatbot:* In addition to indicating that what the user interacts with is a chatbot, one has to say what can be done by it and what cannot be done. This is to control user expectations; inform the user about what the chatbot cannot do, especially in complex decision-making or high-stakes tasks.

Addressing Ethical Concerns and User Trust

Another important reason to disclose chatbot usage is to meet the ethical imperatives of AI-driven interactions. Users have a right to know with whom they are communicating; thus, this is one method of disclosure that fosters trust between users and organizations rolling out such systems. If informed that chatbots are in use, then users will freely and positively use the system, knowing how much the chatbot can and cannot do. This lack of transparency can quickly turn into mistrust when a user is exploited or deceived by a system it had perceived as human, and especially in sensitive domains such as healthcare, mental health support or legal advice, the user will require aid while keeping the accuracy

and privacy of the information provided. Transparency may also assuage users' privacy concerns about data. Thus, if the users know that they are operating with a machine, most users will be very careful about making public their personal or sensitive information, when users become conscious of how their data is used, stored, and protected.

Legal and Regulatory Compliance

Other jurisdictions have requirements for companies to disclose usage of the chatbot. For instance, the GDPR says firms need to specify where and when automated decision-making occurs, that is, where a chatbot operates. Like California, this "Bolstering Online Transparency Act" requires firms to declare when a user interacts with an automated system, especially when a commercial transaction is involved.

Failure to adhere to such laws may attract legal consequences and affect the reputation of the organization. Thus, developers of the chatbot should keep themselves up-to-date on such laws and ensure that use of this chatbot is disclosed appropriately with the demands of the law [3].

Principle 5: Continuous Training in Latest Developments in Ethical Use of Chatbot Technology

Continuous education in new developments in the ethical use of chatbots is a precept that provides continuous education and update in the field of AI and chatbot technology. As technology improves in the development of chatbots embedded in day-to-day living, developers, data scientists, AI ethics specialists, and organizations must continually be updated with best practices in ethical use and new emerging challenges and innovations in the field of technology.

Developers committed to continuous learning ensure that chatbot systems remain aligned with and responsive to new risks related to ethics, as well as capable of navigating sophisticated societal and technological landscapes.

The Necessity of Continuous Training in Ethical AI

The ethical considerations here include development and deployment as more related to privacy, data security, transparency, bias, and fairness. The same concerns are dynamic: both technology and societal expectations keep getting updated. Continuous training provides developers and organizations with knowledge to address the challenges for better design, implementation, and maintenance of responsibly released chatbots [6].

Key Aspects of Continuous Training

1. *Staying Updated on Regulatory and Legal Requirements:* The legal aspects of AI, coupled with data privacy issues, are constantly changing. Currently, European countries have announced the General Data Protection Regulation (GDPR), California Consumer Privacy Act (CCPA), and various other AI legislations being passed in countries worldwide. These issues of regulatory compliance directly affect the way chatbots collect data and interact with the users or provide information to a user. Developers must be trained on updating changes in these legal standards.
2. *Keeping Abreast of Ethical AI Frameworks and Guidelines:* Other than complying with legal mandates, associations like IEEE, AI Now, and the Partnership on AI all publish guidelines and ethical frameworks governing the use of responsible AI. These frameworks are updated to deal with challenges that arise, such as algorithmic bias, misuse of AI in surveillance, or even the ethics of automating sensitive tasks such as giving legal or medical advice. Continuous training of the chatbot developers makes them aware and implement the new best practices that evolve.
3. *Learning About Advances in Bias Detection and Mitigation:* Development of biases within AI systems is another problem that continuously develops, and so does bias detection and mitigation. With continued training and updates, developers are updated on the latest research and methods regarding the detection and mitigation of biases within the outputs produced by a chatbot. As the same values change, and as its context changes, so do new biases emerge into existence.

4. *Integrating Emerging Technologies for Improved Ethical Standard:* Constant emergent technologies incorporate better ethically oriented competencies within AI systems. Some of the recent tools include differential privacy, federated learning, and also the concept of explainability that would improve privacy, enhance model fairness, and also make AI decisions transparent. Such training enables the integration of emergent technologies in chatbot systems to enhance ethical standards.

Implementing Continuous Training Programs

1. *Workshops and Seminars on AI Ethics:* Organization should spend the incessant time engaging in workshops, seminars, and training devoted to AI ethics by experts from academy, industry, and regulatory bodies. Discussion topics would range from data privacy to bias mitigation, from transparency issues to potential legal compliance challenges, with a training program to keep developers and ethicists abreast of the current practices and challenges.
2. *Ethics Committees and AI Oversight Boards:* Dedicated ethics committee or board can be constituted to oversee the ethical use of AI by organizations. They can be made sure that the company's chatbots are assessed properly against the evolving standards of ethics. Members should be subjected to ongoing education on AI ethics, attend conferences, and seek advice from external experts [7].
3. *Collaborating with External Experts:* The AI development teams must collaborate with external experts that include ethicists, legal scholars and cultural studies researchers to provide their inputs on the new emergent ethical issues which may not be apparent to the technical teams. Continuous engagement with these experts assures chatbot systems are designed with an informed understanding of the broader ethical landscape.

The Benefits of Continuous Training

1. *Enhanced User Trust:* Organizations that are open to continuous improvement in ethics earn the trust of the users. On-going training ensures the chatbot provides equal, accurate, and respectful interactions with customers, further increasing user confidence in AI systems.
2. *Proactive Risk Management:* Organizations will stay informed about all the latest changes in ethics and regulations that may help to anticipate risks and then take preventive measures rather than reacting when the issues have arisen. Such a proactive approach minimizes the possibility of harm as well as legal liabilities.
3. *Long-Term Sustainability:* The AI systems that are developed with ethical principles and maintained sustain long term. Continuous training helps the chatbot systems remain in the long run as they align with new technological, legal, and societal advancements [7].

EFFECTIVE PROMPTS FOR CHATBOT

Open-Ended Prompts

When predefined responses may not be sufficient or may introduce bias, open-ended questions are essential for gathering valuable and detailed data. Open-ended questions, in contrast to closed-ended questions, allow respondents to freely respond in their own words. Closed-ended questions limit responses to specific options. With this flexibility, insights that might otherwise be missed are captured [8].

Closed-Ended Prompts

The differentiation response index, which looks for "satisfying" (the tendency to select the same response repeatedly without much thought), was not used in this study to evaluate the quality of Closed-Ended Questions (Closed-EQs). In broad surveys, such as those assessing internet usage or course satisfaction, these metrics are typically used to evaluate seriousness and attentiveness. A mental health survey, in our opinion, takes place in a different setting than these more typical ones. Rather than being motivated by an external reward or obligation, participants in mental health assessments frequently have a personal desire to gain a better understanding of their mental health [9–11].

Task-Oriented (Actionable) Prompts

Users are increasingly turning to task-oriented chatbots to assist them in meeting specific requirements, such as banking or customer service tasks. In any case, there has been restricted examination into how clients handle circumstances where discussions with these chatbots do not advance true to form, known as conversational "non-progress" (NP). To better comprehend these issues, we conducted a study in which we analyzed three months' worth of conversation data between 1,685 users and a task-oriented banking chatbot [12].

CHATBOT: AN EFFECTIVE COMMUNICATION

The Importance of AI and Data for Chatbots

The effectiveness of chatbots hinges on the quality of their AI and the data they use. AI excels at handling repetitive tasks, but may struggle with complex issues. Developers often include features that allow for smooth transitions between chatbots and live agents when needed. Data quality is also crucial. High-quality data enables chatbots to function well, while poor data can limit their effectiveness. Ultimately, a chatbot's performance depends on the robustness of its AI and the accuracy of its training data. Conversational marketing allows you to engage with customers in their preferred environments. Whether they are browsing your website, interacting with digital ads, using mobile apps, or visiting social media, you can connect with them through various channels like SMS, phone calls, or in-store kiosks. This omnichannel strategy ensures you meet customers where they feel most at ease, enhancing their experience and increasing engagement [13].

Limitations of Chatbots in Communication

1. *Limited understanding of the context:* Chatbots may fail to understand the nuances of a conversation or any specific nuances, thereby providing less relevant or incorrect answers.
2. *Complex problem solving:* For complex problems or questions, a chatbot may not be in a position to provide quality answers because it cannot handle complex information.
3. *Dependency on existing data:* The quality of answers generated by a chatbot will depend on the data or information available in its database. Data limits reduce the quality of chatbot answers.
4. *Lack of Human Contact:* The inability to interpret the emotions or nuances of a particular conversation sometimes dilutes the quality of interaction in some situations.

MYTHS AND FACTS ABOUT CHATBOT

What areas are chatbots continuously improving in?

- *Context awareness:* They are getting better at understanding the flow of conversations and remembering context, making their responses more coherent over time.
- *Multimodal capabilities:* Beyond text, they are improving in understanding and generating responses that combine visuals, sound, and language, allowing for richer interactions.
- *Emotional intelligence:* Though still limited, there is progress in recognizing emotions through text and tailoring responses to be more empathetic or appropriate for sensitive situations.
- *Human-like interaction:* As they evolve, chatbots are becoming more conversational and fluid, mimicking natural human conversation more closely.
- *Language proficiency:* They are continuously expanding their vocabulary, language understanding, and ability to converse in multiple languages fluently.

Some Common Myths About Chatbot

Myth 1: Chatbots will Replace Humans

The fear that chatbots will replace humans and lead to widespread unemployment is a common concern in organizations. However, rather than completely replacing humans, chatbots actually complement human efforts by automating mundane tasks. This automation can enhance productivity both at the individual and organizational levels.

Contrary to the belief that AI will eliminate jobs, studies, like the one by Gartner, suggest that while AI may displace some roles, it will also create new job opportunities. For example, Gartner predicts the elimination of 1.8 million jobs alongside the creation of 2.3 million new jobs.

Chatbots are unlikely to replace humans entirely; instead, they are designed to assist by easing workloads and freeing up human employees. They excel at handling repetitive tasks such as answering FAQs, processing requests, and generating leads. Research from PwC indicates that AI is particularly effective in reducing tasks such as paperwork (82%), scheduling (79%), and timesheets (78%), thereby allowing employees to shift their focus to more strategic, innovative, and creative endeavors [14].

Myth 2: The Ease of Building Chatbots

The ease of constructing chatbots can be both true and false. While they can be simple to create and implement with a robust enterprise chatbot platform and skilled personnel proficient in AI and Conversational UX, there are also significant challenges. Developers must comprehend the chatbots' purpose, design effective chatbot conversations, establish rules, convert information into conversational flowcharts, develop suitable platforms or frameworks, integrate them with business applications, and ensure alignment with business objectives. For organizations intending to develop chatbots internally, it is crucial to recognize the substantial amount of effort required. Successful deployment demands thorough planning and preliminary research [14].

Myth 3: Chatbots Are Going to Take Over Mobile Applications

Have tablets made smartphones obsolete? Probably, not. Likewise, bots and mobile applications will function side by side. Take for instance Uber; a ride-hailing company whose customers can book a cab using a mobile phone application or through the companies Facebook messenger bot. Therefore, it is not right to say that chatbots will entirely replace applications.

In addition, both bots and applications can be applied by companies to promote their business. In addition, chatbots are always reliant on messaging applications or channels like Facebook, Skype for Business, or Slack in order to create the talking interaction experience. Mobile applications enhance the experience of chatbots by adding an interaction feature to them.

Myth 4: Chatbots Never Get the Context

The prevailing myth surrounding chatbots is that they do not understand a user's intent and might not provide the desired response to the user every time. This holds a truth about traditional chatbots. But with advancements in AI technologies like Natural Language Processing and Machine Learning, better processing of user intent and adaptation of jargon allow more contextual, personalized, and relevant responses with a wide range of vocabulary [14].

Myth 5: Chatbots are Only Suitable for Big Organizations

While the AI trend is spreading widely, many small and mid-sized organizations have taken for granted AI technology only to large tech-savvy organizations. It is a big mistake to think that only large companies benefit from the rise of chatbots as shown in Figure 1.

Figure 1. Chatbots are suitable for big organizations.

Recent reports show that startups are increasingly using AI technology to add chatbots for guaranteed success. During the forecast period, mid-sized companies are expected to grow the fastest. Chatbots and AI can be considered as a modified channel to streamline operations in small and mid-sized companies. They can be taken to the maximum extent of delivering responsiveness and efficiency within the organization [15].

AMAZING FACTS ABOUT CHATBOT

Fact 1: Nature vs. Utility

A chatbot with a charming personality might be fun, but it will not matter if it cannot solve the user's problem. At the end of the day, what people really want is a chatbot that gets the job done. In fact, a Live Person study found that nearly half of users (48%) prefer chatbots that are effective problem-solvers over anything else.

But let us not forget about speed! According to a study by Aspect, users like chatbots that are friendly and easy to use, but they also care a lot about how fast they get answers. In fact, speed is valued even more than perfect accuracy or having an enjoyable interaction.

To give you a sense of how widespread chatbots are, there were already over 30,000 active on Facebook alone. So, while personality can be a nice bonus, usability and quick responses should always come first [7].

Fact 2: ELIZA is the First Chatbot to hit the Stage

This was created at MIT by scientist Joseph Weizenbaum during the 1960s. ELIZA had a certain way of "interacting" with individuals akin to that of a psychotherapist. It thus became one of the first programs to attempt the Turing test, which checks whether a machine could demonstrate intelligence, a simplistic way of measuring intelligence in a machine [16].

Fact 3: Chatbots are Always There to Help People Solve Problems

And according to a survey by HubSpot, 40% of respondents do not care who or what assists them. Brands and companies are investing in chatbots to enhance customer service. They employ bots to relay information, schedule appointments, troubleshoot, and conduct transactions.

Fact 4: Consumers Are Ready to Use Chatbots for Shopping

Chatbots are becoming a bigger part of how people shop. According to a survey by DigitasLBi, 37% of Americans say they are open to making purchases directly through a chatbot [17]. In the UK, a study by Mintel found that 33% of people would prefer to buy essentials like clothing, shoes, and food from retailers if chatbots were available to help with the process. This shows that more and more consumers are ready to trust chatbots for everyday shopping needs.

Fact 5: Customers Are Open to Chatbot Recommendations

More and more people are warming up to the idea of chatbots making personalized recommendations. In fact, 37% of customers overall, and a notable 48% of millennials, are open to chatbots suggesting things based on their preferences.

When you break it down, customers are most interested in recommendations for products from shops (22%), lodging (21%), travel (17%), pharmacy items (12%), and fashion or style advice (12%). While these numbers might seem small now, they are likely to grow as chatbots continue to improve and become more common in everyday shopping experiences [18].

THE RISE OF CHATBOT TECHNOLOGY

"The 2024 World Economic Forum in Davos marked a significant departure from previous years, as discussions cantered on the rapid rise of artificial intelligence, exemplified by the text generator ChatGPT."

The User Interface Layer: The Chatbox

- *What It Does:* This is where people type their questions or prompts. It can be the chat window in a website, an application, or even a messenger application like WhatsApp [19].
- *Key Features:* It takes user input, sends it to the server, and shows the response that comes back. It also clears up the input so that it is easy to process.

Gateway or the Traffic Controller

- *What It Does:* Think of this as a gatekeeper that routes each user prompt to the right parts of the system. It handles the traffic in order to make sure many users can use TALK-O-MATIC at once without slowing down.
- *Key Features:* Keep things well-organized, secure, and balanced so that all requests get the same fast response times.

Questions Analysis and interpretation (Understanding the Question)

- *What It Does:* This part is the "brain" of the chatbot. It reads and understands the prompt, identifying what the user wants.
- It uses NLP to determine the user intent. For example, when a user types, "What is the weather like in Paris?" it captures this as a weather-related request in Paris. The application also has a capability of context management. It understands when the user wants an answer to a further follow-up question, because the user had previously stated or mentioned a topic, the application would remember this.

Data Retrieval and Server Communication (Pulling the Information)

- *What It Does:* Once the bot knows what the user wants, it communicates with the server to fetch the correct data [20–23].
- *Most Relevant Facts:* This is a request message sent to the server so that information such as today's weather or specific facts may be retrieved. This makes sure that data is fetched efficiently so that responses do not get delayed by it.

Answer Formation or Generating the response

- *What It Does:* After reading in the data, this step converts the data into a response suitable for a natural language.
- *Key Features:* It takes the server's data and puts it in a friendly, human-like way. So, if the server data says, "Paris weather is 15°C", it might respond with, "The current temperature in Paris is 15°C". It also formats responses to fit follow-up questions.

Monitoring and Optimization (Making It Better Over Time)

- *What It Does:* It is the learning and improving part of the bot. It tracks what prompts are asked, how well the bot understood and responded, and areas where it can improve.
- This database would help in enhancing the ability of TALK-O-MATIC to understand an input prompt and then arrive at the appropriate response through the interaction with a user based on the latter's response or reaction.

Security and Compliance: Keeping It Safe and Private

- This will ensure that user data is not leaked and also adheres to the privacy regulations while working with the chatbot.
- *Key Features:* It encrypts data, controls access, and enforces system compliance with data privacy regulations such as GDPR [24].

How TALK-O-MATIC Works in Simple Steps

- *User Types a Prompt:* The user types in a question or command, such as: "Tell me about the Eiffel Tower".

- *Is Routed and Understands:* The gateway sends a prompt to the bot's "brain" to find out what it is the user wants.
  The bot will forward the request to the server and wait for a response from the server for the information it wants.
- *Answer Is Generated:* Response of the server is transformed into a friendly, chatty answer.
  The response provided by the bot is transferred to the chatbox. In the chatbox is where the user can actually see it. It is so direct and accurate that the application can respond directly as shown in Figure 2. That is, it will use real-time data from the server, not by calling a stored database. That is why it was able to understand questions quickly and find data in order to produce a natural response to something. This makes it quick, secure, and able to be improved easily with time [24].

FLOW DIAGRAM OF THE ARCHITECTURE OF THE CHATBOT

Comparison of a standalone System and a Server-based Chatbot

Here is the comparison of a normal chatbot, which is usually a standalone system, and a server-based chatbot like TALK-O-MATIC that fetches information dynamically based on a server. Here, the differences are regarding how they handle information, flexibility, and speed [24].

Information Management

- *Normal Chatbot:* Normally, these chatbots draw information from a local database where all the answers are maintained.
- When a user asks a question, the bot searches this database to find a response.
- The knowledge of this chatbot is fixed up to what has been preloaded; hence the updating of information means updating the database manually.

Flexibility and Adaptability

- *Regular Chatbot:* The content of this type of bot is normally restricted to preloaded responses. This is good for FAQs or simple tasks where information does not frequently change.
- Thus, it can never answer a more advanced question unless told exactly what to do.

Server-Based Chatbot

A server-based chatbot is much more dynamic and flexible. Since it queries a server, it can handle everything under the sun without direct programming for each one of them.

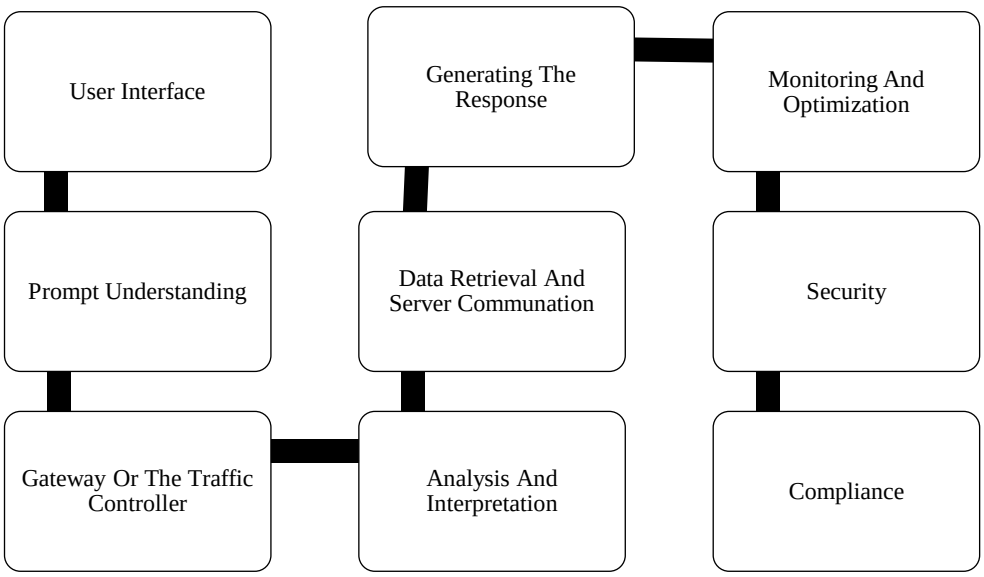

Figure 2. Simple steps for talk-O-matic.

It is best suited to all real-time information-based scenarios, such as when seeking news, weather forecasts, or stock prices: a constantly changing data pool.

Speed and Performance

Normal Chatbot

This type of bot tends to be faster because it is working with a local database; there is no need to connect to an external source. However, the trade-off is that the responses are only as good as the data it holds, which may not be very recent or accurate.

Server-Based Chatbot

Because it depends on the server, there will be slight delays because of the network speed and response time of the server. But this minor delay for the users who need current or real-time data is acceptable due to the fact that this bot provides information that is current.

Scalability and Complexity

Normal Chatbot

This setup is generally simpler to build and maintain. Since it does not interact with external systems, there is no need for complex server management. The one major disadvantage when you are adding new features is that the database of the bot has to be updated manually.

Server Based Chatbot

A server-based chatbot is more complex to develop and maintain since it needs a stable connection to a server and strong handling of requests for data. It is, however, more scalable. Since the server is constantly updated, new information or additional data can be easily accessed without changing the bot's core programming.

Usage Scenarios

Typical Chatbot

It is perfect for dealing with repetitive questions, customer support queries, or pre-defined tasks where information is static, like FAQ bots or bots for closed environments (like school portals).

Server-Based Chatbot

Ideal for scenarios where data is constantly changing or is aggregated from other sources, such as virtual assistants, data-driven customer support, or information/knowledge-intensive question answering by bots [23].

CONCLUSION

This is how a project unifies the functionality of Gaianet API, along with libraries 'requests' and 'pyttsx3', which is then used with the help of Python to give a person an interactive, conversational AI that speaks back to a user. Leveraging Gaianet-enabling capabilities of the LLaMA API, it will respond to the query of the user but present a productive, contextually appropriate response, making the use of the chatbot worthwhile if used for questions on customer support queries or data retrieval or even some casual conversations. This setup is actually one of the proofs for the capabilities of LLMs but also the power of how NLP and speech synthesis can be put together to make digital interaction more intuitive and interesting.

One of its major victories for this project is easy user interaction through it as it allows for natural interaction with the user with regards to the interface, whereas the real time text to speech feedback created through use of `pyttsx3` on it enhanced user experience because results were fed back in such human-to-human ways thus making such results easily relatable as well as intelligible towards the user who would go through them as they take place. More so, if the user possesses some problem with visual organs since speaking could be very invaluable for it, especially such a guy who prefers relying on one's

voice for interpreting inputs rather than going for visualization. This becomes more enhancing for accessibility when going about AI technologies. It can accommodate continuing real-time conversations too; so, it is good for applications requiring a constant ongoing back-and-forth interchange with AI.

REFERENCES

1. Bender EM, Gebru T, McMillan-Major A, Shmitchell S. On the dangers of stochastic parrots: Can language models be too big? In Proceedings of the 2021 ACM conference on fairness, accountability, and transparency. 2021 Mar 3; 610–623.
2. Sun Y, Tang CK, Tai YW. Human instance matting via mutual guidance and multi-instance refinement. In Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition. 2022; 2647–2656.
3. Floridi L, Cowls J. A unified framework of five principles for AI in society. Harvard Data Science Review, 2019; 1(1): 535–45.
4. Weidinger L, Mellor J, Rauh M, Griffin C, Uesato J, Huang PS, Cheng M, Glaese M, Balle B, Kasirzadeh A, Kenton Z. Ethical and social risks of harm from language models. arXiv preprint arXiv:2112.04359. 2021 Dec 8.
5. Brown T, Mann B, Ryder N, Subbiah M, Kaplan JD, Dhariwal P, Neelakantan A, Shyam P, Sastry G, Askell A, Agarwal S. Language models are few-shot learners. Adv Neural Inf Process Syst. 2020; 33: 1877–901.
6. Chen K, Sun S. CP-Rec: contextual prompting for conversational recommender systems. In Proceedings of the AAAI Conference on Artificial Intelligence. 2023 Jun 26; 37(11): 12635–12643.
7. Nikiforova AA, Baklanov PV, Blinnikov SI, Blinov DA, Grishina TS, Troitskaya YV, Morozova DA, Kopatskaya EN, Larionova EG, Troitsky IS. Parameters of the type-IIP supernova SN 2012aw. Mon Not R Astron Soc. 2021 Jul; 504(3): 3544–9.
8. Xiao Z, Zhou MX, Liao QV, Mark G, Chi C, Chen W, Yang H. Tell me about yourself: Using an AI-powered chatbot to conduct conversational surveys with open-ended questions. ACM Trans Comput-Hum Interact (TOCHI). 2020 Jun 13; 27(3): 1–37.
9. Jin Y, Chen L, Zhao X, Cai W. The way you assess matters: User interaction design of survey chatbots for mental health. Int J Hum-Comput Stud. 2024 Sep 1; 189: 103290.
10. Li CH, Chen K, Chang YJ. When there is no progress with a task-oriented chatbot: A conversation analysis. In Proceedings of the 21st International Conference on Human-Computer Interaction with Mobile Devices and Services. 2019 Oct 1; 1–6.
11. Chiu S, Li M, Lin YT, Chen YN. Salesbot: Transitioning from chit-chat to task-oriented dialogues. arXiv preprint arXiv:2204.10591. 2022 Apr 22.
12. Izadi S, Forouzanfar M. Error Correction and Adaptation in Conversational AI: A Review of Techniques and Applications in Chatbots. AI. 2024 Jun 4; 5(2): 803–41.
13. Szőke J, Lakosy D. Chatbot as a Corporate Communication Tool: Best Practice of a Hungarian HR Services Company. J Ecohumanism. 2024 Sep 15; 3(6): 849–58.
14. Kurnaedi D, Widodo AD. Implementation of Telegram Chatbot as an Effective Communication Means at SMK PGRI 1 Tangerang. 2023 Dec 28; 6(2): 183–9.
15. Reddy R. (2018 Jun1). Chatbot Myths You Need To Stop Believing. [Online]. BotCore. Available from: https://botcore.ai/blog/7-chatbot-myths-you-need-to-stop-believing/
16. Atlas S. (2023). ChatGPT for Higher Education and Professional Development: A Guide to Conversational AI. College of Business Faculty Publications. [Online]. Online: https://digitalcommons.uri.edu/cba_facpubs/548 [DW 21.06. 2023].
17. Lhakard P. AI catalyst: revolutionizing workforce development - a comprehensive study of intelligent learning systems. Asian J Manag Entrep Soc Sci. 2024;4(4):331–46. DOI: 10.2139/ssrn.4975627.
18. BotPenguin. (2022). Top 10 Fascinating Facts About AI Chatbots. [Online]. Botpenguin. Available from: https://botpenguin.com/blogs/top-10-fascinating-facts-about-ai-chatbots
19. Smith R, Lee J, Chen Y. AI in Corporate Training: Chatbots for Skill Building and Knowledge Management. International Journal of Workplace Training. 2021; 40(2): 120–138.

20. Tamrakar R, Wani N. Design and development of CHATBOT: A review. International Conference on “Latest Trends in Civil, Mechanical and Electrical Engineering. 2021 Apr.
21. Ayanouz S, Abdelhakim BA, Benhmed M. A smart chatbot architecture based NLP and machine learning for health care assistance. In Proceedings of the 3rd international conference on networking, information systems & security. 2020 Mar 31; 1–6.
22. Brin S, Page L. The anatomy of a large-scale hypertextual web search engine. Comput Netw ISDN Syst. 1998 Apr 1; 30(1–7): 107–17.
23. Shepherd SJ. Concepts and architectures for next-generation information search engines. Int J Inf Manag. 2007 Feb 1; 27(1): 3–8.
24. Adamopoulou E, Moussiades L. Chatbots: History, technology, and applications. Machine Learning with Applications (MLWA). 2020 Dec 15; 2: 100006.

