

## Customer Service Chatbots

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### ABSTRACT

A customer service chatbot is a conversational tool usually powered by artificial intelligence (AI) that engages in conversations with customers. Modern customer service chatbots range from simple rule-based systems to sophisticated AI-powered assistants capable of understanding context, learning from interactions, and handling complex customer needs. These digital assistants operate through text or voice interfaces. They provide quick, consistent responses to customer queries, encouraging self-service interactions. Businesses across various industries are increasingly adopting chatbots for customer support to enhance customer satisfaction, reduce operational costs, and streamline processes. By using these tools, businesses stand to significantly reduce operational costs, gain a better understanding of their client base, and improve the customer experience. The present paper examines chatbots and their applications in customer service.

**KEYWORDS:** chatbot, customer service, chatbots, customer service chatbots, automation.

### INTRODUCTION

The Internet has become an essential component in every aspect of our daily lives. This has resulted in a significant impact on the way people make their business purchases today, increasingly expanding what is today known as electronic commerce (or ecommerce). This is exactly where implementations of artificial intelligence come in. Natural language processing, machine learning, robotics along with eservice agents, also commonly referred to as chatbots, are regarded as the best known applications of artificial intelligence to date. The incorporation of chatbots in ecommerce and eservices is gaining momentum nowadays, representing a promising new way to improve customer service [1].

Customer experience is changing rapidly. Today, customers expect a top-notch experience when interacting with a business, including fast and proactive support and self-service options. Customer service chatbots can help you achieve all these. A customer service chatbot refers to an automated software application that uses artificial intelligence (AI) to simulate human conversation and assist customers with their inquiries. Unlike traditional

customer service that relies solely on human agents, chatbots handle multiple conversations simultaneously and operate around the clock. Thus, chatbots are no longer a dispensable luxury but an indispensable necessity. Chatbots' customer-related functions include interaction, entertainment, problem-solving, trendiness, and customization. Chatbots are capable of managing repetitive and routine tasks, allowing human agents to focus on more complex and value-added interactions [2].

In today's fast-paced digital landscape, consumers demand instant, personalized, and efficient service, and customer service teams are turning to chatbots to meet these evolving needs. Figure 1 shows a team of customer service [3].

### CONCEPT OF CHATBOTS

Chatbots are also known as conversational agents, interactive agents, virtual agents, virtual humans, or virtual assistants. Chatbots, as part of AI devices, are computer programs designed to carry on a dialogue with users using natural languages. Healthcare has become an attractive market for chatbot applications. The main purpose of healthcare chatbots is to help

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patients in less time and for less money than it would take to visit a medical professional. Healthcare chatbots have great potential, but they still have a long way to go to win over consumers.

The first chatbot (Eliza) was developed in 1966 by Joseph Weizenbaum for psychiatric patients. Since then, Chatbots have gained popularity in all the domains such as banking, e-commerce, healthcare, education, and smart homes [4]. A chatbot describes a computer system or the situation in which human is chatting with the robot (computer).

Chatbots may be regarded as mimic systems which imitate the conversations between two individuals. They employ different degrees of human-like appearance and behavior, such as facial expressions, compassion, humor, and tone of voice. Thus, chatbots are computer programs with a conversational user interface capable of emulating natural, conversational interpersonal exchange. Fueled by artificial intelligence (AI), chatbots are becoming a viable option for human-machine interaction.

Chatbots can be integrated into various messaging platforms, websites or mobile apps to interact with customers and prospects in real time. For example, healthcare chatbot can diagnose the disease and provide basic details about the disease before consulting a doctor. It is designed to reduce the healthcare costs and improve accessibility to medical knowledge. Healthcare chatbots depend on natural language processing (NLP) that helps users to submit their health problem [5]. Figure 2 illustrates a chatbot based on three key structures in AI.

There are essentially two types of chatbots: (1) Fixed chatbots: These are programs with fixed information and hence offer limited help; (2) AI-based: These chatbots thrive on dynamic learning and constantly update themselves using various customer interactions. An AI-based chatbot has three domains: databases, natural language processing (NLP), and machine learning (ML). Mostly chatbots are some kind of computer programs that use natural language processing (NLP) for interpreting the user input and generating the corresponding response. In other words, NLP helps users to submit their problem about the health. The aim of the system is to replicate a person's discussion. Chatbots interact with users using natural languages. Chatbot may ask a review of symptoms and relevant information such past medical or surgical history. It provides response by use of an efficient Graphical User Interface (GUI). The GUI is an artificial creation invented to enable interactions between human and computers. The chatbot system helps users to freely submit their complaints and queries regarding health by voice since customer

satisfaction is the major concern for developing this system [6,7].

One may also regard a chatbot as a software system that allows you to simulate real conversations between devices and users by means of a conversational interface [8]. Chatbots use three types of conversation styles [9]: static, semi-automated, and fully-automated conversation dialogue. The static conversation style is rule-based and it is easy to build. Automated refers to the generative-based model, which uses deep learning models to build interaction. This is very complex and requires a lot of training data. The semi-automated automates some parts while the rest is handled by a human. Figure 3 shows some examples of what chatbots can do [10].

### CHATBOTS IN CUSTOMER SERVICE

The customer service landscape is continuously evolving, with customer service chatbots leading the transformation. In customer service, chatbot in customer service are virtual assistants fortified with AI that engage customers via text or voice communication. Unlike traditional chatbots, which can only perform actions based on pre-set rules, an AI chatbot uses NLP-ML techniques to process queries, recognize intent, and respond in a manner closer to human speech. A modern AI agent is available 24/7, speaks your customers' language, accesses real data, cut down wait times, and executes real actions. It is designed to assist customers by providing automated responses to inquiries, handling complaints, or directing users to human agents when necessary. Your support team is relieved, your customers are happier, your costs decrease. Figure 4 shows customer service team [11], while customer service chatbot features are shown in Figure 5 [12].

### TYPES OF CUSTOMER SERVICE CHATBOTS

A customer service bot is a powerful tool. Its effectiveness largely depends on its type and functionality. There are several types of customer service chatbots. Popular ones include the following [12]:

- *Tidio*: This is an all-encompassing customer service chatbot platform that includes a no-code bot builder and a live chat feature. It provides customer support teams with advanced live chat and chatbot functionality, along with a host of other tools, like automation, to help them deliver excellent customer experiences.
- *Gorgias*: This offers dedicated ecommerce integrations with all of the major platforms. Designed specifically for ecommerce companies, Gorgias bills itself as an “all-in-one help desk” that allows users to manage customer

communications across multiple channels. There are also AI-based features and flows you can use to create personalized automations and elevate your support.

- *Intercom*: This is an AI-first customer service platform with three components: an AI Agent that provides answers for customers 24/7; an AI Copilot that assists support agents; and an AI Analyst, that provides AI insights and recommendations for support leaders. It is a customer service chatbot solution ideal for large businesses and enterprises.
- *Zendesk*: This is a customer service solution that combines chat, agent support, and help center tools in one. It provides a cloud-based customer service AI chatbot solution with agent role permissions, web SDKs, and operating hours. This customer service chatbot for websites is easy to use and offers handy features for sales and marketing.
- *Ada*: This is a full-blown AI-powered customer service automation platform that will help transform your client experience. It also comes with the ability to automate your customer service across multiple platforms and languages. Ada offers chatbot messaging and AI voice services for customer support teams. It works best in conjunction with platforms like Zendesk.
- *Freshchat*: This is a tool that comes with a live chat feature and AI-powered chatbots. It allows businesses to proactively reach out to customers with automated emails and SMS messages. You will be able to connect your favorite tools to Freshchat for unified customer support management.

## APPLICATIONS OF CHATBOTS IN CUSTOMER SERVICE

Chatbots are increasingly finding their way into ecommerce and eservices, as their implementation opens up promising opportunities to improve customer service. Common applications of chatbots in customer service include the following [3,13,14]:

- *Automation*: It helps to automate customer support by providing assistance, answering questions, and resolving issues. Automated services are instant, easy to use, and help remove traditional elements of frustration that creep in for customers. By handling routine tasks and initial customer interactions, AI chatbots can make sure all the new customers you bring on board get a seamless introduction to your services. Automate onboarding and, overnight, your process can become more efficient and user-friendly.

ChatBot is an all-in-one customer service automation tool that allows you to streamline all aspects of customer support.

- *Ecommerce*: Basic, pre-scripted chatbots based on simple templates have been deployed since the early days of ecommerce. The integration of AI-powered chatbots and virtual assistants in customer service has revolutionized how businesses interact with their customers across various industries. Companies across different sectors can benefit from AI chatbots and virtual assistants for tasks like assisting with general customer service inquiries, improving employee productivity, and reducing operational costs. Industries such as travel and hospitality, ecommerce, contact centers, and many others have witnessed significant advantages from leveraging AI technology to enhance customer interactions. AI-powered chatbots can streamline sales processes, improve customer engagement, and increase sales leads and conversions in the ecommerce sector.
- *Social Media*: Users are rapidly turning to social media to request and receive customer service. Social media has changed the way users approach customer service. Nearly half of US Internet users are turning to social media for help, as they can easily send off a Tweet or Facebook status rather than call a 1-800 number. With the rapid increase in the number of user requests, it has become increasingly challenging to process and respond to incoming requests. To address this challenge, many organizations form dedicated customer service teams responding to user requests on social media.
- *Large Language Models*: LLMs (large language models) like ChatGPT are transforming customer service, making it faster and easier to create and train your AI chatbot. LLMs represent a breakthrough in chatbot capabilities. These models are trained on vast amounts of data, enabling them to understand context and generate coherent responses. LLMs provide natural, human-sounding responses.
- *Sentiment Analysis*: AI-driven sentiment analysis helps chatbots detect customer emotions and adjust their responses appropriately. By analyzing data points like word choice and punctuation, these AI models can indicate whether a customer is satisfied or confused. This capability allows chatbots to escalate upset customers to human agents and helps businesses understand major pain points in the customer service pipeline.

## BENEFITS

Chatbots operate continuously, providing assistance to customers at any time. AI chatbots improve customer service by enhancing the omnichannel customer experience, automating lead generation, improving accuracy of information, facilitating self-service, and much more. Customers benefit from a more convenient service, get more accurate information, and consistent support in any language. Other benefits of chatbots in customer service include the following [12,15].

- *24/7 Availability:* Chatbots provide consistent support at any time of day or night, across time zones. Nowadays, customers want to get answers to their questions almost immediately. They expect support around the clock. Bots can send instant replies to user inquiries since the bots are operational 24/7. An AI chatbot can give your customers real-time, instantaneous responses to promptly solve their queries.
- *Cost Effectiveness:* Customer service chatbots offer substantial cost savings by reducing the need for large customer support teams. Companies can save millions each year through chatbots that solve simple queries for users about password resets, order status, or general information. Not only does an AI customer service chatbot boost your sales, but it can also save your brand some money. Namely, installing this type of software is much cheaper than employing and training customer service teams.
- *Speaking Multiple Languages:* AI-powered chatbots communicate fluently in multiple languages, allowing businesses to serve a diverse, global customer base and expand into new markets. Most customers prefer to shop in their own language. AI customer service chatbots running on NLP technology are able to easily understand different languages and respond to visitors accordingly. Breaking down language barriers is a breeze for AI chatbots, thanks to their multilingual skills. Figure 6 shows that AI chatbots speak more than 150 languages [15].
- *Providing Accurate Information:* Using an AI chatbot to handle routine enquiries eliminates the risk of human error, making sure customers receive consistent and correct information every single time, so they can put trust in your service and stay loyal.
- *Customer Experience:* Well-designed chatbots stand to transform a business' customer service operations. Companies of all sizes want to provide a best-in-class customer experience.

Increasingly, consumers expect the speed and convenience in using technological tools. Customer service chatbots enhance the customer experience by reducing wait times and providing immediate assistance for common questions. They serve as the first point of contact in many customer service operations, freeing human agents to focus on scenarios requiring nuance.

- *Customers Independence:* One clear theme that runs through all the reasons AI chatbots improve customer service is eliminating frustration. AI chatbots naturally create a smoother self-service journey for customers with parts of your service fully automated. They provide a much better experience for your customers, making the booking process quicker and easier.
- *Personalized Experiences:* Using AI chatbots, it is easy and affordable to offer a convenient, personalized customer experience so that everyone that comes to you gets a superior service. AI chatbots take personalization to a whole new level, catering your experience to each unique individual, even if you have tens of thousands of customers. Knowing the habits and preferences of every customer, smart AI assistants can offer highly personalized recommendations for each person.
- *Scalability:* This means organizations can handle a larger number of interactions, increasing customer satisfaction through an always-on help desk. Chatbots can scale instantly to high traffic, such as during the holiday season or a product launch, a process that would require training and extra resources for human teams.

Figure 7 shows some benefits of using customer service chatbots [12].

## CHALLENGES

Chatbot software is not yet perfect. Companies are quickly realizing that chatbots can confidently handle standard queries and are less able when faced with complex emotions, nuances, or sensitive situations. While very good at handling simple standard requests, multi-layered requests or strange ones requiring human judgment throw off the chatbots, thus disgruntling customers. Despite the growing presence of chatbots, there remains a need for deeper academic investigation into their real-world effectiveness, limitations, and impact on both user experience and operational workflows. Other challenges include [16,17]:

- *Data Privacy:* The chatbots deal with very sensitive data, such as account details, credit card information, or health-related information. How

do we ensure GDPR compliance while also trying to prevent data breaches remains a big challenge.

- *Integration:* Almost all organizations are still working with an outdated CRM or ERP. Interfacing these systems with modern AI chatbots is often costly and complicated, with results often found lacking in functionality.
- *Lacking Emotional Intelligence:* Chatbots struggle with grasping human emotions such as anger, sarcasm, or urgency. Lacking empathy sometimes makes customers feel as though their concerns went unheard. AI chatbots can never replace the empathy, creative ability, and problem-solving skills of the human agents.
- *Culture Barriers:* Companies serving global audiences need bots fluent in their respective languages. Despite NLP advances, bots still mess up with slang, anti-dialect of some area, or some cultural peculiarity, resulting in confused or wrong answers.
- *Trust:* Some customers do not want to interact with machines and want to talk to a person instead. The over-reliance on chatbots will drive away such users, lowering the reputation.
- *Costs:* Deploying such high-end AI chatbots with NLP and ML poses an upfront challenge as far as investment, training data, and integration of company systems; this might slightly challenge small businesses.
- *Overdependence:* Companies that rely too much on chatbots are undermining human support, primarily when such support includes empathy, negotiation, or really complex solutions.
- *Customer Resistance:* Workflow automation services are not always accepted by customers. Chatbots can be considered impersonal and thus produce a negative customer experience, especially when the user wants to talk to a human immediately.
- *Human Handover:* The best AI agent cannot do everything and it knows when it is stuck. AI chatbots are typically excellent at picking up keywords, but even advanced ones may have a hard time following deeper contexts. Complex complaint? Upset customer? Technical problem outside the knowledge base? In these cases, the handover to a human must work smoothly. The human agent takes over without the customer having to repeat everything. Chatbots give an option of handing over an exceptionally complicated issue to the human agent.

- *Regulations:* Maintain security standards by protecting customer data and adhering to relevant regulations like GDPR or industry-specific requirements. Provide clear privacy policies and standardized internal data management practices. Security and privacy compliance build trust and protect customers. GDPR and EU AI Act Compliance are not "nice to have" for European companies. They are mandatory.

## CONCLUSION

A chatbot can be described as a conversational software system capable of simulating human communication skills so as to interact with a user via chat. Chatbots are able to provide a more convenient, interactive, and unique alternative to traditional customer service. A chatbot is always ready to offer 24/7 support. Its mood remains unaltered, far from the stressful and tired human feeling, thus demonstrating care and kindness to customers on a constant basis. The goal of a chatbot is accompanying its user towards greater overall satisfaction. Although chatbots are a fairly new technology for the customer service profession, customers have already started expressing a preference for them. Companies of all sizes are using chatbots more frequently. Chatbots are becoming integral to the customer experience in many different industries.

A customer service chatbot is a software application that simulates human conversations using artificial intelligence (AI) or pre-programmed rules. The main purpose of a customer support chatbot is to offer fast, consistent, and efficient customer service. In recent years, the market for chatbots has exploded — leaving you with a lot of potential options. More information about customer service chatbot can be found in the books [18-20].

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**Figure 1 A team of customer service [3].**

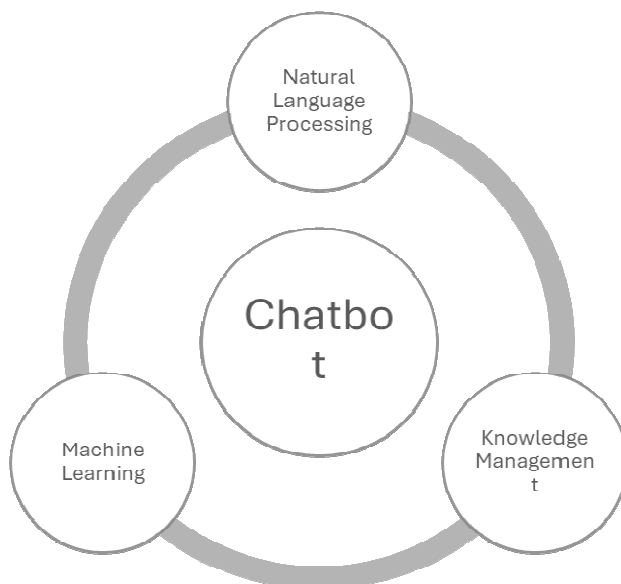


Figure 2 A chatbot based on three key structures in AI [5].

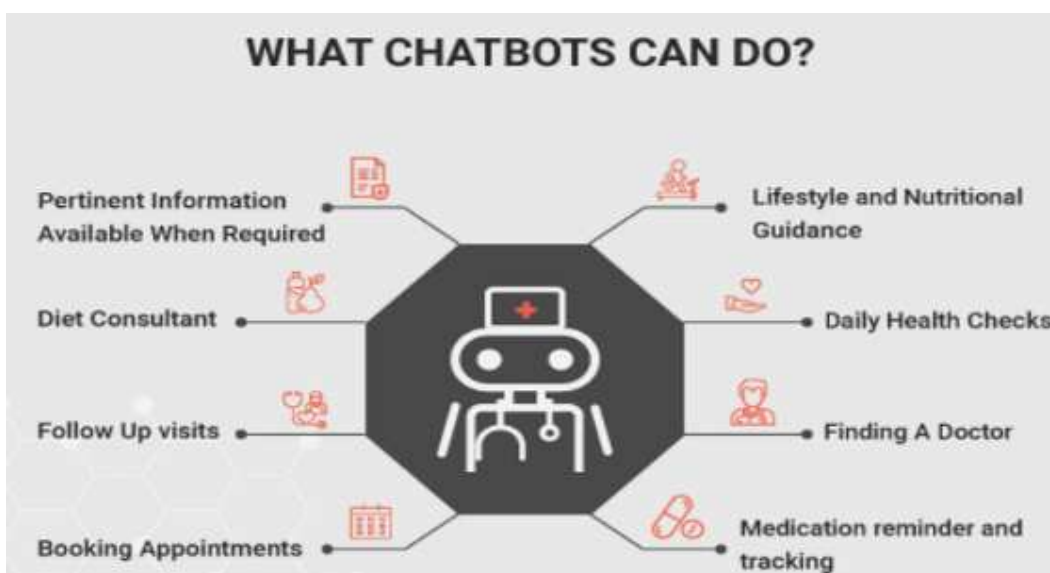


Figure 3 Typical examples of what chatbots can do [10].



Figure 4 Customer service team [11].

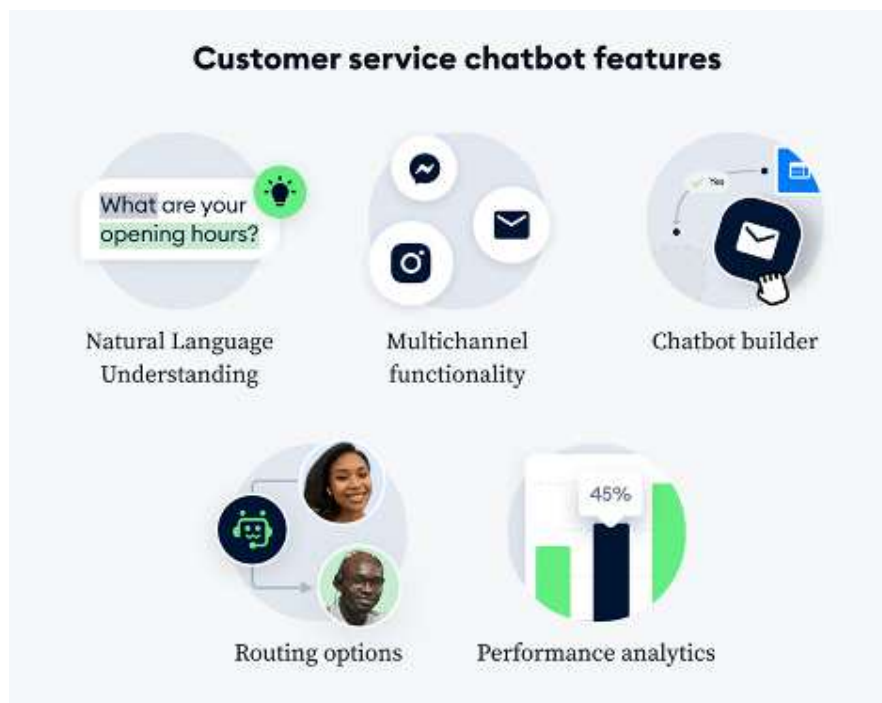


Figure 5 Customer service chatbot features [12].

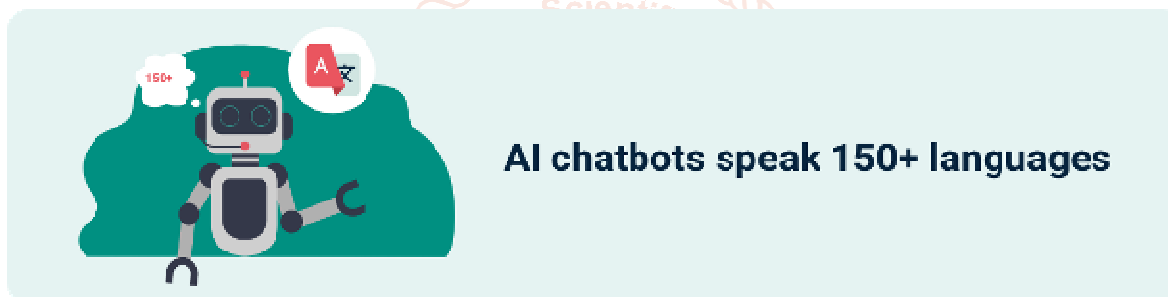


Figure 6 AI chatbots speak more than 150 languages [15].



Figure 7 Some benefits of using customer service chatbots [12].