

# THE DEVELOPING OF CHATBOT FOR UNIVERCITY AND COOLEGE ADMISSION

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DOI: 10.36724/2072-8735-2022-16-10-51-56

**Manuscript received** 20 August 2022;  
**Accepted** 28 September 2022

**Keywords:** chatbot, contact center, customer  
experience, artificial intelligence, mobile application

Today, customer service automation is one of the main business trends. The use of chatbots and other artificial intelligence tools replaces classic IVR (Interactive Voice Response) systems. Chatbot is a program that automatically answers customer requests by text or voice and, if necessary, routes it to an agent. Such solutions are actively used in contact centers of large companies (state institutions, banks, airlines, etc.). However, customers are not always satisfied with the service they receive. This can happen for various reasons, such as a limited number of communication scenarios, problems with recognizing customer questions, etc. In this article the development of a chatbot for university admission is considered. The goal is to improve customer experience and to increase the number of potential applicants through the use of modern customer service tools. The current state of affairs in the field of information support for applicants is analyzed. The main platforms of chatbots used in universities are considered, a comparison of their basic functions is given. The results of a sociological study to determine the questions most frequently asked by applicants are presented. Based on the collected data, the requirements for the functionality of the chatbot planned for development were determined. Plans for future work are given.

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## Для цитирования:

Степанов М.С., Попов В.Г., Федорова Н.К., Крошин Ф.С. Разработка чат-бота для приемной комиссии высшего учебного заведения // Т-Comm: Телекоммуникации и транспорт. 2022. Том 16. №10. С. 51-56.

## For citation:

Stepanov M.S., Popov V.G., Fedorova N.K., Kroshin F.S. (2022). The developing of chatbot for univercity and coolege admission. *T-Comm*, vol. 16, no.10, pp. 51-56. (in Russian)

## Introduction

Generally, call centers are used to provide customer information services. The range of their use is quite wide and includes business, government organizations, emergency services, etc. During the second half of the 20th century there were practically no alternatives to telephone communication, and call centers remained the most convenient way to connect the client and the company. With the development of infocommunication technologies and the emergence of new communication channels, it became necessary to transform existing information systems. Keeping traditional communication channels, nowadays contact centers provide customers with additional opportunities - write your question in the chat on the site, send e-mail, etc. However, simply increasing the number of channels is not the solution to the main problems. One of them is a large number of similar questions.

A new stage of contact center evolution is driven by the development of Artificial Intelligence (AI). The automation elements have been used in customer services before. It helps to reduce operating expenses (OPEX) on operators' wages. An example of automation is the IVR (Interactive Voice Response) interactive voice response system, which allows providing customers with answers to similar questions. Mathematical modeling shows that the use of artificial intelligence for customer service is similar to IVR [1,2]. However, from a technical point of view, the interactive voice response is not flexible and adaptive. The solutions based on AI and machine learning give much more opportunities for customer service.

Among the areas where customer service is important there is higher education. This is of interest to the authors of this article. The university admission offices play a significant role. Their task is to fully interact with potential applicants. The admission offices process applications, conduct entrance examinations. Also, they are engaged in information support, answering various questions related to admission or study at the university.

Today, most websites of higher educational institutions contain all the necessary information. However, applicants and their parents continue to contact the admission office through various communication channels, as well as ask their questions at introductory events (for example, Open Days). The experience of the participation of the authors of the article in such events suggests that these questions can be classified as "of the same type".

Thus, the following conclusions can be drawn:

People don't want to spend a lot of time searching for information on an organization's website, even if it's easy to navigate and well structured.

"Live" communication continues to be a priority for most clients.

Thus, one of the main problems of customer service continues to be relevant. The need to strike a balance between the number of operators and the quality of customer service makes it necessary to actively introduce self-service tools. At the same time, it is obvious that chatbots are the best choice today.

The authors of this article set a goal to develop a chatbot for the university admissions office, which would allow its employees to be freed from a larger percentage of the same type of questions from applicants. To achieve this goal, it is necessary to consistently solve the following tasks:

To highlight the main trends in customer service related to the use of AI;

to analyze the current state of affairs in the field of interaction between universities and applicants (informativeness of the sites of admissions offices of various universities, used chat bots, etc.);

to gather information about the most common questions that applicants have.

to analyze which points related to the clarification of information on admission cause the greatest dissatisfaction;

to determine the requirements for the functionality of the chatbot planned for development basing on the collected data,

Develop a software tool that meets the requirements

The article is organized as follows. Section 2 provides general information about chatbots, their types and features. A comparative analysis of chatbots used in higher education institutions is given in Section 3. Section 4 presents a statistical study devoted to identifying the main issues of interest to applicants. A functional description of the developed chatbot is given in section 5.

## Chatbots

In today's world, automation is a necessity that can significantly save company resources. Chatbots actively help call centers to reduce the workload of operators [4]. A chatbot is a program that allows the user to get a solution to typical problems in a form of conversation. At the same time, the chatbot imitates the interaction of a user with a real person. Currently, there are two types of chatbots: artificial intelligence (AI) chatbots and fixed chatbots [8].

AI chatbots use machine learning, analyze conversations, and constantly update their database. Thus, they gradually become smarter, as they learn from communication with the client. Using the database, this type of chatbots understands the natural language of human communication, and in certain cases, is even able to understand emotions. The larger the database becomes, the better and more efficiently chatbots build interaction with the client.

Fixed chatbots use a specific script that contains questions and pre-prepared answers. Updating a fixed chatbot must be done manually. Obviously, chatbots with a fixed database are limited in their functionality. However, this type of chatbot is more reliable, as it is fully controlled by the developer. In addition, it is a more affordable and cost-effective solution [4].

The main steps in creating a chatbot are listed below:

1. Determine the goals and objectives of creating a chat bot
2. Analyze points of contact and identify opportunities
3. create a message thread
4. correct shortcomings and eliminate vulnerabilities
5. Set up the platform and test
6. Launch and update data.

Also, when implementing a chatbot, it is important to consider data security. A company that wants to retain customers and increase their loyalty must ensure the confidentiality of data.

There are clear benefits to using chatbots. For example, a chatbot is not limited by working hours. It's available for consultation around the clock and, in addition. Moreover, the user receives an instant response from the bot.

The main disadvantages of chatbots include failures due to poor Internet connection and the inability to correctly interpret the emotions of customers.

The subject of study in this article is a chat bot for the university admission office. Such an intelligent assistant must meet all the standard requirements of applicants.

Nowadays, people (especially young ones) are not interested in a long search for information on the organization's website and reading large amounts of text. It is much easier and more convenient for them to ask a question to a chatbot in order to get a specific and short answer.

The chatbot for the admission office allows applicants to receive the necessary information. Moreover, applicants can ask questions or find out the list of documents for admission all the time, since the chatbot is not limited by working hours. Thus, chatbots are a round-the-clock help system without queues and interruptions. Universities that use chatbots increase the loyalty of applicants and, thereby, attract the attention of future students.

### Comparative analysis of chatbots used in universities

To date, there are several chatbot platforms used in Russian universities. These include: Multichat, Webim, Jivo. Each platform has its own functional features and certain benefits for customers.

Jivo is currently the leader in terms of the number of users [5]. Jivo offers a simple widget design for any site and support on all devices. The platform uses the common way of interaction for users of the need, offers the site visitor access to communicate with the operator (for non-standard requests) or leave contact details for a call back from a specialist. Jivo has the ability to communicate in more than 20 languages.

The platform also has additional important functionality:

- Downloading the dialogue history for the user/operator.
- downloading files, pictures, GIF-files.
- smiley support.
- ability to rate the quality of service.
- template messages for operators.
- displaying the user's contact information.
- checking spelling errors.
- integration with social networks etc.

The platform makes it possible to view the history of dialogues for further analytics. Also, the data collected includes average response time, agent rating, number of successful requests, total messages per day/week/month, total number of conversations, etc. The analysis of this information helps to improve the quality of service to a higher level and increase user loyalty. In the case of a spam user, the operator has the option to mark the conversation as spam or block the user. The Jivo platform has several tariffs. The basic version price is 742 rubles per month for one operator.

MultiChat is an online chat with built-in CRM (Customer Relationship Management). This platform includes the basic functions of regular chats. It also helps to attract more new customers, personalize the site and optimize advertising [6].

MultiChat has a simple and adaptive design for any site, support for all devices, including a mobile application for user convenience. A consultation on this platform can be accompanied by pictures, GIFs and file downloads, which will reduce the service time (for example, the client does not need to search for a specific document on the site, as this document will be sent to him in the chatbot).

For the operator, the platform has a control panel with all chats and template messages for effective interaction with user. Moreover, MultiChat allows to divide operators into groups.

The site visitor, accessing the online chat, has the opportunity to get advice from the chat bot, call the operator or leave their contact details for a call back in a special application form.

Additional features of MultiChat are

- CRM system;
- quiz constructor;
- analytics and advertising optimization;
- synchronization with external web services;
- checking spelling errors;
- automatic invitation to chat;
- displaying user contact information.

The platform also allows to set up integration with various social networks, messengers and other services. At the same time, MultiChat has the ability to customize the appearance and chat templates individually for each client. While using this platform it's possible to monitor and analyze the work of chat operators and indicators such as the average response time and the percentage of missed calls. The platform has several tariffs, however, unlike Jivo in each tariff, all the functions and capabilities of MultiChat are already included. The difference in tariffs is solely in the number of site visitors. The standard tariff price is 1000 rubles per month.

Webim is a top-ranked online client consulting platform [7]. It has a simple design suitable for any site, chat support on all devices and its own mobile application. The main features of Webim are listed below:

- Sending a conversation to an email;
- editing and deleting messages already sent;
- quoting posts;
- auto invitation to communicate with the operator;
- checking spelling errors;
- smiley support;
- ability to upload files, pictures, GIF-files;
- notifications about new message in chat
- integration with social networks.

In terms of functionality, Webim is similar to Jivo and MultiChat in many ways. Moreover, the platform has the function of dividing operators into groups and tools for monitoring and analytics of chat operators. This allows to constantly improve the level of user advice. For the number of operators from two to five operators, the cost will be from 458 rubles per month at the initial tariff. The comparison of these platform functions are shown in Table 1.

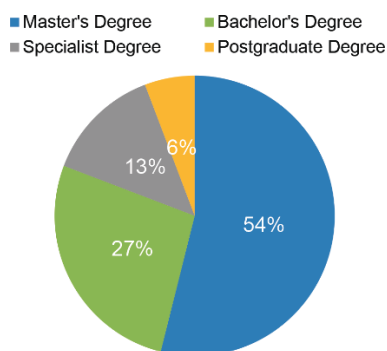
Table 1

Comparison of platform functions

Functions	Jivo	MultiChat	Webim
Template messages for agents	+	+	+
Monitoring of Quality of Service (QoS)	+		+
All devices support	+	+	+
Integration with social networks	+	+	+
Editing and deleting messages already sent			+
Notification about new visitors on the site			+
Various languages support	+		
Smiley support	+		+
Auto invite to chat	+	+	+
Checking spelling errors	+	+	+
CRM system		+	
Division of agents into groups		+	+
Char for agents		+	+
Marking a user as "spam" or blocking	+		+
Agent work analytics	+	+	+

### The main questions that interest applicants

Every year, applicants have various questions when entering a university. To identify the main issues, a sociological study was conducted, during which the results presented below were obtained. The main groups of students participated in the study are presented on Figure 1.



**Figure 1.** The main groups of students participated in the sociological study

The most popular question remains the question «how many budget places per direction?» This question is asked by more than 90% of respondents. The next most popular questions are the list of required documents for admission to the university, the number of possible directions for participation in the competition for admission and the process of competition for state-funded places. These questions are asked by about 65% of the respondents. Almost half of the applicants are interested in the size of the scholarship and the conditions for its obtaining. Less than half of the respondents ask the following questions: “Is it possible to transfer from paid education to state-funded education after admission?” and “Is it possible to change the direction of study after admission?”

The applicants frequently ask about hostels provided by universities. For example, the most popular question is «How many people live in one dorm room?». In addition, the following questions were identified:

- What type of hostel is provided?
- How many places in the hostel are allocated for applicants?

Also, some applicants asked a number of additional questions:

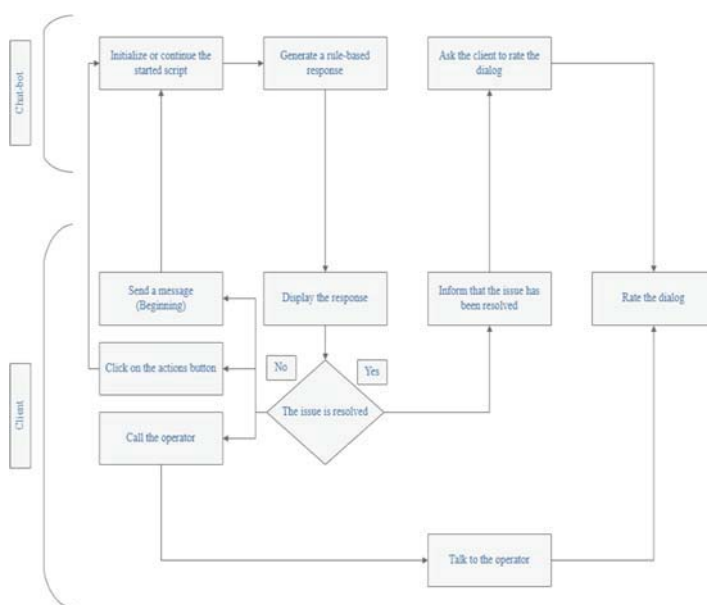
- What is the rating of the University?
- Where do university graduates work?
- What teaching staff at the faculty of interest?
- Where can I get acquainted with the curriculum for a particular direction?

### Functional description of the developed chat-bot

The chatbot being developed will work on the basis of scenarios (rules, commands, keywords). It means, this chatbot is fixed and it communicates using predefined answers. The chatbot always adheres to the script and responds based on a set of rules, and can vary in complexity. It doesn't understand the context of the conversation and will only give matching cues when the user uses a keyword or command.

The algorithm of the chatbot is simple, when it is asked a question, for example, "How to reset the password?" it first of all looks for familiar words in sentences. In this sentence, such words will be: reset, password. But often if the question goes beyond the capabilities of the chatbot, and it cannot match the question with ready-made options, the chatbot can ask the user to reformulate the question.

On the initial step, the goal is to develop a non-AI chatbot. It doesn't have the opportunity to learn. It responds only to what was put into the database for it. To improve such a chatbot, the only way is to add more ready-made answers to it and improve the rule-based mechanisms. The block scheme of the developed chatbot is presented on Figure 2.



**Figure 2.** The block scheme of the chatbot

The process of the client services using the developed chatbot includes the following steps:

1. The client writes a message to the chat.
2. The chatbot receives a message. If this is the first message from the client, then it searches for a suitable scenario, using keywords, and initializes the script. Otherwise, it continues the script that has been started.
3. The chatbot generates a response based on certain rules and following a script.
4. The client receives a message, and depending on the scenario and the response, the client can either write a new message or click on one of the action buttons, or call the operator.
5. If the issue has not been resolved, the process goes back to step 2, otherwise move on to the next step.
6. The client informs that the issue has been resolved, after which he can evaluate the dialogue with the chatbot or operator.

The main job of the chatbot will be to be able to answer simple questions, for example, "What is the start date for accepting documents?" or "When is the start of the entrance exams?". For more complex questions, the client will have the opportunity to call the operator to the dialogue by clicking on the appropriate button or write a message.

To add new scenarios and view existing ones, a simple interactive map with all the scenarios will be developed. On this one,

it will be possible to add new or modify existing steps, buttons, and various logic.

Node will be used to develop the Node.js, it will act as a separate abstract service. When the main server is started and initialized, a connection to the service will be established, and all configuration, scripts and other components will be sent to the chatbot service. When receiving a message from the user, the server will determine where to send the message, either to the chatbot or to the operator.

The chatbot service will use the following libraries:

- Express – node.js framework for web server development.
- Axios – client-server utility for executing HTTP requests.
- Socket.io – JavaScript library for real-time data exchange.
- Nodemon – a utility to run a server for development.

The result of the project is a tool with which potential applicants will be able to receive answers to their questions from a chatbot online. If necessary, the request can be redirected to the agent. This application will include:

- Online chat for the user, control panel with chats for the agent, control panel for the administrator.
- Simple and responsive design for any website or device.
- Support for Android and iOS operating systems.
- Support for two languages (English and Russian). If necessary, other languages can be added.

### Conclusion

In this article the development of a chatbot for university admission is considered. The current state of affairs in the field of information support for applicants is analyzed. The comparison of

three main chatbot platforms used in the universities is given. The results of a sociological study to determine the questions most frequently asked by applicants are presented. Based on the collected data, the requirements for the functionality of the chatbot planned for development were determined. Further work will be devoted to the development of the finished product, its testing and optimization.

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## РАЗРАБОТКА ЧАТ-БОТА ДЛЯ ПРИЕМНОЙ КОМИССИИ ВЫСШЕГО УЧЕБНОГО ЗАВЕДЕНИЯ

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### Аннотация

На сегодняшний день автоматизация обслуживания клиентов является одной из основных бизнес-тенденций. Использование чат-ботов и других инструментов искусственного интеллекта заменяют классические системы IVR (Interactive Voice Response). Чат-бот – это программа, которая автоматически отвечает на запросы пользователя и, при необходимости, перенаправляет его на оператора. Такие решения активно используются в контакт-центрах крупных компаний (госучреждения, банки, авиакомпании и т.д.). Однако заказчиков не всегда удовлетворяет качество предоставляемого обслуживания. Среди основных причин – ограниченное количество сценариев общения, проблема с выявлением проблем пользователя чат-ботом и другие. В данной статье рассмотрена разработка чат-бота для приемной комиссии университета. Целью является улучшение качества обслуживания и привлечение абитуриентов с помощью использования современных инструментов. В статье проанализированы текущие проблемы в информационной поддержке абитуриентов. Также рассмотрены основные платформы чат-ботов, которые используются в университетах и проведено сравнение основных функций рассмотренных платформ. Проведено социологическое исследование студентов по выявлению наиболее часто задаваемых вопросов при поступлении в университет. На основании полученных данных были определены функциональные требования к разработке чат-бота и определены планы на дальнейшую работу.

**Ключевые слова:** чат-бот, контакт-центр, опыт работы с клиентами, искусственный интеллект, мобильное приложение.

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## XI Ежегодный Форум "XI Telecom & Finance LOYALTY FORUM 2022"

Открыта регистрация на XI Ежегодный Форум "XI Telecom & Finance LOYALTY FORUM 2022", который пройдет 20 октября 2022 года в Москве. Участники могут зарегистрироваться на официальном сайте мероприятия.



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- Аналитика и измерения. системы лояльности во взаимодействии с клиентами, отечественные идеи и решения.

Кроме того, запланирован ряд дискуссий:

- Перестройка моделей продаж, продуктовой линейки и сервисов, риск-моделей;
- Развитие внутренних инструментов для повышения эффективности привлечения и работы с клиентами;
- Возможности взаимодействия с клиентами – от традиционных к перспективным.

Форум объединит топ-менеджеров, руководителей и представителей ТЕЛЕКОММУНИКАЦИОННЫХ КОМПАНИЙ, БАНКОВ, СТРАХОВЫХ КОМПАНИЙ и др., представителей вендоров, поставщиков решений и услуг, представителей госорганов, руководителей отраслевых ассоциаций и СМИ.