

# Various Real Time Chat Bots and Their Applications in Human Life



V. Krishna sree, C. Kaushik, G. Sahitya , Remalli Rohan

**Abstract:** Chatbots are also referred to as virtual assistance devices. They are the basic forms of artificial intelligence software that can imitate human conversations. Chatbots are relatively a new technology. The main goal of this survey paper is to provide the information about the various existing chatbots and their history of evaluation, and the applications of various chatbots in different domains. Chatbots are applied in fields like medical, E-commerce, business, education, banking, customer services, entertainment, etc. Chatbots can be analyzed and improved. Main goal of any chatbot is to allow the user to make a natural conversation with machine. A conversational system consists of dialogue management, speech recognition, speech synthesis and conversation generation.

**Keywords:** Artificial intelligence, Artificial intelligence markup language (AIML), Chatbot, Knowledge base.

## I. INTRODUCTION

Now-a-days chatbots are widely popular and text communication plays a major role in people’s lives. Almost all age groups use text communication with each others. Personal, family, social communications many companies use text messaging for communication between employees. With the improvement of deep learning, machine learning and artificial intelligence, machine have started to learn and mimic as humans. These kinds of machines are known as “Chatbots”.

A “Chatbot” or “chatterbot” is a computer program or an “artificial intelligence” which conducts a conversation through sound or text as an input method [1]. These chatbots

are conversational software agents. Chatbot is the one of the most well-known technologies used to perform virtual assistance like giving the responses to the user queries, supporting, decision making etc. Natural Language Processing (NLP) is the main standard core for the any chatbot which aims to interpret, to recognize and to understand user request in the free language. NLP analyses the knowledge, based on the conversation context to give the proper response to the user. The basic architecture of chatbot consists of the Knowledge base, Knowledge identification engine as shown in the figure.1 [2].

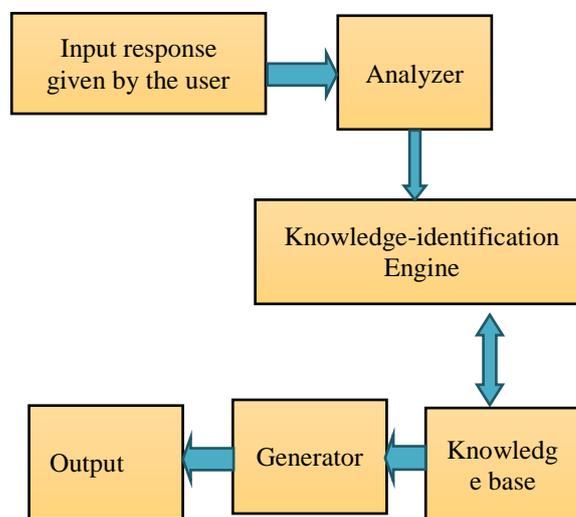


Fig. 1.Chatbot Architecture.

Analyzer reads the input statement given by the user; analyze the word syntax and semantics of the sentences by using the different normalization techniques. Engine communicates with the knowledge base and generates the suitable response according to the user input by using appropriate search algorithms to identify the correct response. Knowledge base is the brain of the chatbot system it is a database which contains various data/phrases. It is implemented by means of script files, text files, data files, XML files. Generator acts upon the response given by the knowledge identification engine and gives it to the user correctly.

### A. Paper Organization

Rest of the paper is organized as follows: section 2 provides the history of existing chatbots, section 3 reviews the related work on the different chatbots applied in the different domains and finally section 4 concludes the paper.

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II. EXISTING CHATBOTS

The term “chatbot” was coined by the Michael Loren Mauldin, is an American scientist and created a chatbot known as Verbot, in 1994 Michael also patented the term

chatterbot in order to explain the conversational software programs [3]. The evolution of various chatbots is given in table.1.

Table-1: Evolution of Various Chatbots

Chatbot Name	Developer	Significance	Methodology	Drawbacks
1950	Alan Turing	In 1950, Alan Turing, known as the father of computer science published an article entitled “Computer Machinery and Intelligence” which is the basis of intelligence of computer programs. By asking the question “Can Machines think?” in his article he outlined the “Turing Test”- a way to measure the computer program ability to motivate human-like behavior in a written real-time conversation [4].	Turing Test	-
ELIZA (1966)	Joseph Weizenbaum	Joseph a computer scientist created a bot called “ELIZA”. Elizabot [5] is the one of the earliest well-known chatbot, it was developed at MIT lab, and it was aimed to signify natural language conversation between a man and machine. Based on the user given input sentences ELIZA would identify keywords and patterns match those keywords based on a set of pre-programmed rules to generate appropriate responses.	Template-based	Eliza was incapable of learning new patterns of the given inputs. Unrelated responses. No logical understanding and reasoning capability.
PARRY (1972)	Kenneth colby	This chatbot could simulate a person with paranoid schizophrenia. It is the advance program than ELIZA. The psychiatrists were able to make the correct identification only 48% of the time [6].	-	-
ALICE (1995)	Richard Wallace	Artificial Linguistic Internet Computer Entity (ALICE) is an open source natural language processing chatbot program that generates responses by using the pattern matching techniques and output stores in the knowledge base through an XML. These documents were written in the artificial intelligence markup language (AIML), which is an extension of XML. ALICE is very much used till today [7].	Hierarchy pattern matching techniques	Unable to pass the Turing test. Grammatical analysis.
Jabberwacky (1982)	Rollo Carpenter	It is the one of the earliest attempt for designing an Artificial intelligence for human interaction. It was aimed to operate the system from text to voice [8].	Pattern matching techniques	-
Watson (2006)	IBM	It is used for the revival the data in the QA format .it is designed to apply the advanced natural language processing, knowledge base representation, automatic reasoning and machine learning technologies. And Watson is the open domain operating system [9].	UIMA (Unstructured Information Management Architecture). Question and Answer (QA) matching Format. Deep NLP.	No relational data base. Does not process structured data.
Mitsuku (2012)	Steve worswick	It is a most widely used standalone human-like chatbot created by using AIML. It uses NLP using heuristic patterns. Whenever bot fails to find a proper match mitsuku can automatically redirect to the default category and it can hold for the long conversation and has the ability to reason with specific objects [10].	Supervised machine learning. NLP with heuristic patterns.	Failed to give dialogue components.
Siri (2011)	Apple	Siri uses Automatic speech recognition (ASP) to translate human speech into text format by using the NLP and QA matching format.	NLP and QA matching format.	It cannot answer directly

Alexa (2015)	Amazon	It is a virtual assistant developed by Amazon lab 126. It is capable of performing voice command, playing, streaming and all the real time home automation [11].	-	User needs to command in order to wake it by giving the command "wake"
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### III. RELATED WORK

Today, most chatbots are acquiring through virtual assistance (such as Google assistant and Amazon Alexa), messaging apps (Face book messenger), various websites and individual organizations apps. Methods for developing a chatbot based on the required application with various methods have been implemented and some of them are given in the table [2].

Mainly chatbots can be classified into different usage categories such as conversational e-commerce, shopping, productivity, analysis, news, HR, food, developer tools, social, travel, personal, design, education, health, finance, games, entertainment, marketing, customer support, sports, communication and utilities as shown in the figure2 [1, 12]. Problem solving Chabot is proposed and implemented for the data structures by using artificial neural networks which employs machine learning and deep learning algorithms for memorizing and retrieving the data. And neural stack machine with recurrent neural networks are used as a controllers [Ankil Shah et al., 13].

The 5G mobile chatbot is suggested and its performance is tested for applications in various environments, under different conditions and various versatile case scenarios by experimenting on the performance/QoS under different emulation test bed [Vaios Koumaras et al., 14]. An automatic dialogue template synthesis was built for a chatbot by story information extraction. The system adopted the information extraction technology to synthesize dialogue template in 'AIML' so that a chatbot can chat a new story with a human [Shih-Hung Wu et al., 15]. Natural language

processing (NLP) techniques were utilized to improve the inquisitiveness and interactions of chatbots by adapting standard core NLP techniques of named entity recognition (NER) to chatbot [Reshmi. Set al., 16].

An intelligent chatbot system was implemented in the travel domain. A chatbot was proposed based on the DNN (Deep Neural Networks) for predictive recommendation in echo platform which would gather user preferences and model collective user knowledge based recommend using the Restrictive Boltzmann Machine (RBM) with Collaborative Filtering [Ashay Argal et al., 17]. An end-to-end semantic based integration approach from sensor to chatbot was proposed and it provides integration between two different IOT platforms and offers a coherent view of a building facility [Charbel EI Kaed et al., 18].

An artificial intelligent based talking chatbot was designed and implemented to improve elder caring with the technologies of speech recognition to make a conversation with the elders [Wei-De Liu et al., 19]. A chatbot developed was used for the bibliometric analysis which is to examine the past research gap for the future research agenda [H. N. Io et al., 20].

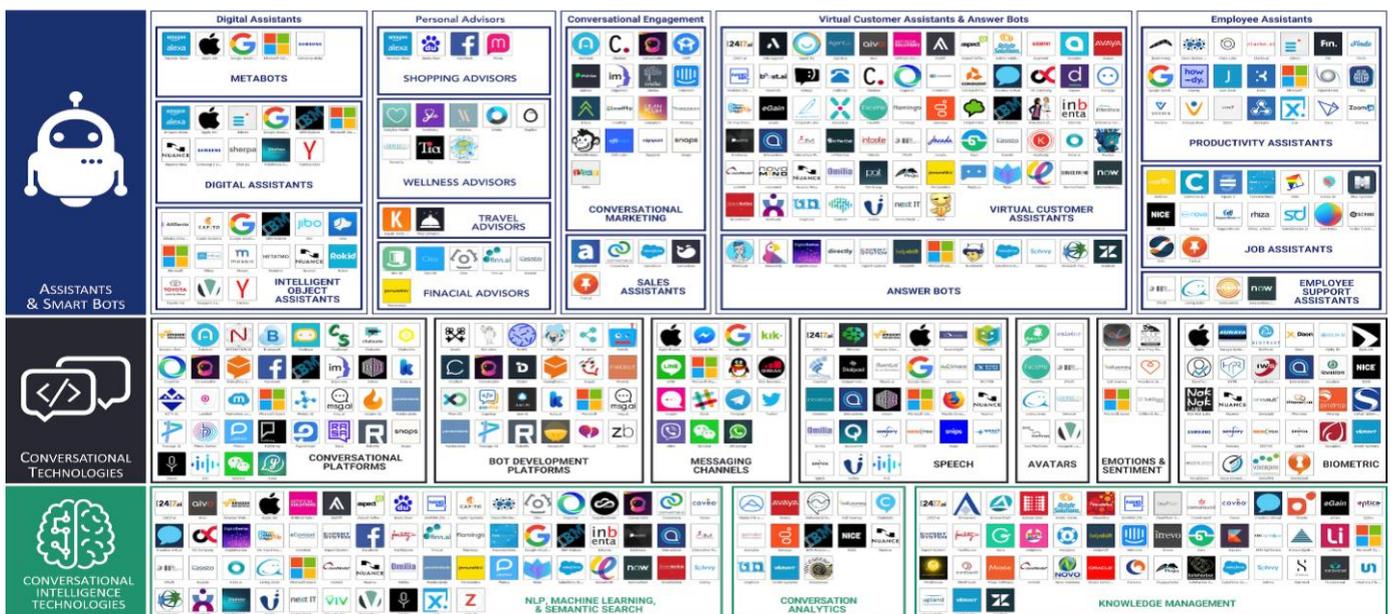


Fig. 2. Chatbot Landscape.

**Table-II: Various Methods for Developing a Chatbot Based on the Required Applications**

**A. Health care:**

Author	Input	Applied Technique	Significance	Application
Abbas et al., [21]	Text	Question answering matching form	Designed an architectural Virtual dietitian (ViDi) chatbot for diabetic patients. This chatbot has the ability to remember the past inputs of the respective patient's data in order to give the proper advices to the diabetic patients.	Android Mobile app
Divya Madhu et al., [22]	Text	Question answering matching form	Proposed an idea to create a chatbot with artificial intelligence where it can predict the disease based on the symptoms and also has the ability to guide the user to give the composition of the medicines in a right protection.	Android Mobile app
Chin-Yuan Huang et al., [23]	Text	Question answering matching form	Developed and implemented a chat bot which is a smart wireless interactive healthcare system for weight control and health promotion (SWITCHes). This chatbot supports and facilities user to keep track of weight, diet intake and physical activity on a daily basis in an easy and convenient way.	Android Mobile app
Dongkeon Lee et al., [24]	Text, voice, video and Bio-sense	Emotional Recognition based on NLP	Introduced a novel chatbot application which provides mental healthcare counselling services based on emotion recognition methods and natural language processing method in chat assistant platform which consist of the context extraction and user sensitive emotion.	Server platform
Abbas Saliimi Lokman et al., [25]	Text	One-Match All-Match category (OMAMC)	Proposed a new technique named OMAMC in order to get the possible keywords surrounding one sample input sentences, which improves the pervious matching time precedence and increases in flexibility context.	Mobile app
Shubham Melvin Felix et al., [26]	Text, voice and video	Question answering matching form, image recognition, etc	Proposed a method to help the blind or visually impaired people using artificial intelligence, machine learning, image and text recognition. This chatbot is capable to assist using voice command to recognize objects, does text recognition and reading analysis and also does currency recognition to do easy payment.	Mobile app

**B. Educational system**

Author	Input	Significance	Application
Fernando A. Mikic Fonte et al., [27]	Text	Implemented a system that works as an assistant for students in their learning and also allows the students to consult exam questions from a repository in specific fields, to receive learning material, to ask questions regarding the courses and to check the exam assessments.	Mobile app
Fernando A. Mikic et al., [28]	Text	Intelligent educational system (INES) is a functional prototype of an online learning platform which consist of Learning management system (LSM), Content management system (CSM) and Intelligent tutoring system (ITS) capabilities. And the interface is done by the chatterbot known as CHARLIE which is an AIML based agent able to improve communicates between students and educational system in a natural language.	Server platform
Luciana Benotti et al., [29]	Text	Designed and introduced a tool (called chatbot) in high school students to computer science concepts with automatic formative assessments in a novel way by programming.	Server platform
Bhavika R. Ranoliya et al., [30]	Text	Designed and implemented a chatbot for a university to answer FAQs to various queries asked by the students in an interactive manner. This chatbot provides efficient and accurate answers for any query (regarding the college admission, about college information and other things related to academics) based on the dataset of FAQs using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA).	App
Naveen Kumar M, et al., [31]	Voice	Implemented an android based educational chatbot especially for visually impaired people and can be used by the normal people also. Wikipedia is connected to this chatbot so user can search from it and can get answers directly without any facing difficult.	App

Vishal Bhargava et al., [32]	Voice	Designed a new chatbot based on the AIML and natural language speech. By using the limited words as input and output used it in an E-learning system especially for the disabled people to learn via speech.	Software platform
Yi- Ting Huang et al., [33]	Text	Proposed a system to help elementary school students to learn second language as English which is known as English Dialogue Companion (EDC) system? EDC is designed in the 3 phase: choice of learning companion phase, the conversation phase and the teaching phase.	Server platform
Eueung Mulyana et al., [34]	Text	Designed and implemented a LKTA- bot which introduces an automation and demonstration to the classroom. LKTA-bot, a ChatOps based virtual assistant that can help and facilitate lectures and students in all course-related activities such as: group, scoring management, logbook, session, task assignment, outcomes etc. it has the potential in streamlining and automating various process and thus lifting up higher education to the next level.	Mobile App
Hemkesh Vijaya Kumar et al., [35]	Text	PESUBot, a robot-receptionist was designed and implemented in the university to give answers questions related to the university and also to maintain an interactive conversation with the use.	PES university Server

**C. Personal**

Author	Input	Significance	Application
Tussanai Parthornratt et al., [36]	Text	In this paper the author demonstrates an experimental implementation of a smart home automation through Face book chatbot and Raspberry Pi which allows users to access and take control of their home appliances remotely. The proposed system is low cost for implementation, maintenance and hardware replacement in case of hardware failures. Only drawback is that user needs to have a Face book messenger because it is implemented only in Face book.	App
Chien-Hung Lai et al., [37]	Text	Presents an observation system which has the ability to provide video stream and remote control appliances through frame work based on Facebook chatbot, implemented by using audio and internet of things techniques	Mobile app

**D. Social Network**

Author	Input	Significance	Application
Marco L.DellaVedova et al., [38]	Text	Proposed a novel machine learning chatbot which detection fake news automatically in online by combing social signals and content features, 81.7% of accuracy was achieved.	Web server
Salto Martinez Rodrigo et al., [39]	Text	This paper describes the linking of chatbot with the twitter social network and tells how it is able to entertain user by using a simple algorithm. The algorithm is divided into 3 parts: Message reception, Message processing and generation of a suitable reply.	Mobile app (Twitter)

**E. Travel**

Author	Input	Significance	Application
Albert Verasius et al [40]	Text	Optimized knowledge base chatbot which will assist the tourists to get the information on the tourism sites around Malang city, Malang regency and Batu city based on AGNES (Agglomerative Nesting) algorithm. The knowledge base is derived from the hierarchical clustering analysis and the parameters used for AGNES algorithm are average linking criterion and Euclidean distances for measurement type.	Mobile app

**F. Classification**

Author	Inputs	Significance	Application
Daria Korotaeva et al., [41]	Image	Implemented a botanicum chatbot which classifies the different trees based on the images of leaves. It can identify 20 different tree species typical for Russian flora. A K-NN classification algorithm was used and achieved the accuracy of 93%.	Mobile app

G. Business

Author	Inputs	Significance	Application
N T Thomas [42]	Text	Proposed a chatbot for an E-business purposes which automatically gives immediate response to the user based on the data sets of FAQs using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA).	-
Ming-Hui Wen [43]	Text	Developed a stock chatbot by applying the conversational user interface which allows to invite individual and group communities, embed the services on their community where the chat bot pushes investments-related information to the other community members and share their ideas and exchange opinions about the decision making in stock investment activities.	Website
Rupesh Singh et al, [44]	Text	Implemented a chatbot by using Tensor Flow for developing neural network model and by using the NLP techniques chatbot can maintain the context of the conversation where user queries can be handled automatically and reduces need of human labor and expenditure in the businesses.	Website
Adhitya Bhawiyuga et al., [45]	Text	Proposed the design and implemented an E-commerce chat robot which will give a quick answers automatically to the incoming (customer queries) customer-to-seller question with in less than 5 seconds with relatively good matching accuracy.	Mobile app

IV. CONCLUSION

In this work, the survey has covered a number of research papers that have focused specially on history of various existing chatbots and their applications in various domains. General purpose chatbots must be user friendly, easy to understand and be simple. From the above survey it can be concluded that improvement, design, implementation and development of various chatbots is taking place at an unpredictable rate.

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