



LET'S TALK CHATBOTS:

Everything You Need to Know About Conversational AI

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It wasn't long ago that a phone call to change your flight or confirm your birthday via a robot would end in an irritated request for a live agent. One of the most critical obstacles to introducing effective and useful AI into our daily lives has been something that comes so naturally to humans: clear communication.

For decades, researchers have worked to teach the technology the quirks and nuances of human interaction. Luckily, the days of disjointed interactions with chatbots and virtual assistants should soon be over thanks to the underlying technologies tied to advancements in conversational artificial intelligence (AI) today.

Recently, the capabilities of speech recognition, conversational AI, and natural language processing (NLP) have accelerated to a level that they can finally help make our lives easier – not harder. Whether it's an initial phone screen that can verify your identity, a doctor's device that transcribes patient notes through verbal descriptions, or simply asking questions that can be understood and actioned by a responsive chatbot for an online retailer, conversational AI has come a long way. Speech-to-text technology can now represent different backgrounds within broader populations with various accents.



We believe that performing customer care using AI presents a tremendous potential in terms of applications across all sectors, and hence, investors should have exposure to these rapidly evolving technologies. Here's what investors need to know when it comes to the talk about chatbots – and how to capture the growth of conversational AI to come:

NOT ALL CHATBOTS ARE CREATED EQUALLY

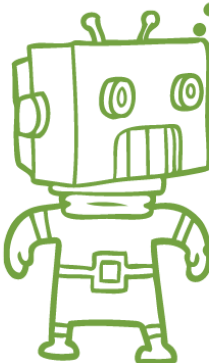
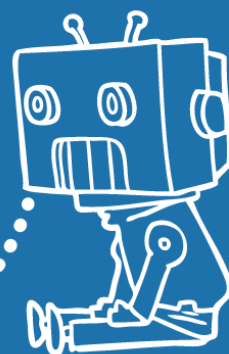
For a human and robot to communicate, there are a lot of moving parts that must come together behind the machines. Think about this process as being like that of a normal human conversation: listening, understanding, and responding.

- **Listening**
 - Automated Speech Recognition (ASR): technology that can translate speech into text
- **Understanding**
 - Natural Language Processing (NLP): interpreting the meaning behind the text
- **Responding**
 - Dialog management & Natural Language Generation: creating a verbal response to the request that is understandable to a human
- **Remembering & Learning**
 - Machine/Deep Learning: an algorithm that is programmed to learn from various data sets and human interaction to go beyond just performing repetitive tasks



LISTENING

By using Automated Speech Recognition (ASR), robots are able to **LISTEN** to what a human says and then translate their speech to text.



UNDERSTANDING

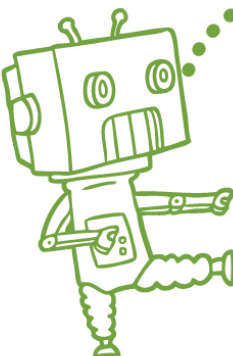
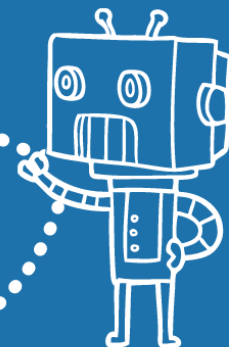


Next, robots use Natural Language Processing (NLP) to help them **UNDERSTAND** what a human said so they can interpret meaning from the translated text.



RESPONDING

Now that they understand what is being said, robots can create a verbal **RESPONSE** that is understandable by a human using Dialog Management & Natural Language Generation.



REMEMBERING & LEARNING



Using Machine/Deep Learning, robots are able to learn from their conversations with humans and improve on application over time.



Within conversational AI, there are varying levels of complicity in terms of applications. The most basic of these barely scratches the surface in terms of its capabilities and is one you've likely interacted with before: a chatbot or FAQ bot. Chatbots are good for solving basic issues. These may simply collect the customer's name and contact information and basic details, such as order number and description of the issue.

The next step up in intelligence is another household presence: virtual personal assistants, like Siri or Alexa. These assistants can converse and fulfill requests in the moment, utilizing technologies like automated speech recognition and NLP. If it can't solve the problem, then it will be elevated to an agent.

The most developed of applications for conversational AI to date are virtual customer assistants or AI chatbots. These conversational AIs serve a particular purpose and are well versed in that field for dialog management, usually using robotic process automation (RPA) to help streamline operations. These advanced technologies are a true goldmine in terms of use-cases for the betterment of society as it helps you automate simple tasks, improve employee morale, and create better experiences for your customers.

Levels of Intelligence in Conversational AI

LEVEL ONE:

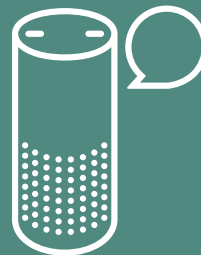
Chatbot or FAQ Bot



- Good for collecting simple data
- Commonly seen in website pop-ups
- Uses keywords to trigger automated responses

LEVEL TWO:

Virtual Personal Assistants



- Commonly used in households - Siri, Alexa & Google Home
- Can fulfill basic human requests in a moment's notice, such as "Hey Alexa, what's the weather today?"
- Utilizes ASR & NLP to listen and understand human requests

LEVEL THREE:

Virtual Customer or Employee Assistants



- Popularly used in more complex customer service situations
- Well versed in its respective field for dialog management, usually using robotic process automation (RPA) to help streamline operations.
- Some benefits of these robot assistants are:
 - automating simple tasks
 - improving employee morale
 - creating better customer experiences



USES OF CONVERSATIONAL AI

Customer Service

FAQ web pages no longer cut it in the days of on-demand service. Chatbots and conversational AI allow superior and immediate service that can get customers from point A to point B faster than ever before. With 2.5 quintillion bytes of data being produced by humans every day, that's a lot of data that robots are capable of processing to help better the human experience. Small and nimble retailers are able to source a chatbot that can compete with the instantaneous culture Amazon has created. For example, solutions provided by one of our index members Zendesk can empower customers to self-serve 95% of the time, so the customer service reps are free to focus on more complex and urgent concerns.

Improve patient outcomes

The healthcare industry is broken in some nations; but luckily, transformative technologies are being introduced to the industry to help overhaul healthcare systems for the betterment of patient care, and to improve preventative medicine, doctor retention, and more. The technological revolution disrupting the healthcare industry is what inspired the creation of the ROBO Global Healthcare Technology & Innovation Index (ticker: HTEC) to help provide investment exposure to this impending market growth.

Imagine a world where physicians can speak to their smart computing device, which is tied in with radiology, pathology, and other specialists, to accelerate the time required for a proper medical diagnosis and ultimately, for a better patient outcome. This use case only scratches the surface.

In the clinical setting, integrating AI into employee chat platforms can power an ambient clinical intelligence solution, helping to summarize patient-clinician interactions using conversational AI, integrate that data with information from electronic health records through deep learning and automate workflows, and update the patient's medical records.

The CEO of Microsoft, Satya Nadella, recently called AI in healthcare "the most urgent application." The company's recent acquisition of Nuance proves its dedication to moving into healthcare, along with the likes of Amazon, Alibaba, and Apple.

Mental health response

Far beyond the word of hospitals and e-commerce shops, AI chatbots are beginning to be used for more human applications and for the betterment of society. As the more human level of NLP continues to grow and learn, AI chatbots can be used to help when it comes to mental healthcare, suicide prevention, and even domestic abuse response.



When it comes to therapy, it's no surprise that for many people, the idea of openly sharing secrets and deep-seated emotions with a stranger can be terrifying. In fact, a recent survey from Workplace Intelligence and Oracle found that only 18% of the 12,000 participants surveyed would prefer humans over robots to support their mental health, with a whopping 68% preferring to talk to a robot over their manager about stress and anxiety at work.

During the COVID-19 pandemic, demands for dealing with depression have soared, creating a shortage of options when it comes to new patient in-take. The non-judgmental and 24/7 nature of conversational AIs are proving to be an interesting fit for basic mental health responses.

While AI has some ways to go in simulating human empathy, we will undoubtedly see continued progress in this field by the developer community.

COMPANIES LEADING THE WAY IN NEXT-GENERATION AI CHATBOTS

NICE, a THNQ index member, is a market leader in providing customers the cloud contact center software solutions that empower organizations to make smarter decisions. Over 25,000 organizations in more than 150 countries, including 85 of the Fortune 100 companies, are using NICE solutions.

In the past 5 years, NICE has developed and acquired advanced AI capabilities to augment its contact center platform/customer engagement as their customers have gone into the cloud. One of their product offerings, NICE Real Time Authentication (RTA), uses voiceprint to authenticate the claimed identity of customers calling into the contact center. The caller's identity can be verified through voice recognition software in the first few seconds of a call through natural conversation with an agent. Its Cognitive Automation Platform, for example, comprise highly responsive robots that can deliver real-time transactions and solve complex customer requirements. Its solutions also allow organizations to custom build their own API and conversational AI bots.

Nuance is a company in all three of the ROBO Global innovation indices due to its leadership in intelligent systems powered by AI, such as speech recognition, natural language processing, text-to-speech (TTS), biometrics, and more. The company has been at the forefront of driving innovation with AI technologies for decades and in delivering enterprise-grade AI systems, and currently holds 2,350 patents.

The company's role in providing the underlying technology for NPL was the driver of [its recent acquisition by Microsoft](#), which is looking to make strides into the realm of healthcare technology.



Blue Prism, another index member of ROBO and THNQ, is a pioneer in the digital workforce revolution with its Robotic Process Automation (RPA) platform based in the UK. It creates software robots to help guide customers and streamline workflows, ultimately freeing up valuable time for human employees. Blue Prism integrates intelligent automation capabilities, such as chatbot solutions, document data extraction, and workflow optimization, to help simulate human behavior in engaging with customers for their clients.

Zendesk, a member of THNQ, is a leading provider of AI-powered bots, with over 4.75B interactions processed annually. Zendesk serves small to large businesses across a multitude of industries, with more than 160k paid customer accounts, offering services and support in 30 languages. Zendesk's powerful combination of AI, its knowledge base, and live chat software make conversations highly personalized such that customers can't tell they are talking to a robot. Its full suite, which includes an analytical tool, AI-powered automation, and advanced workflow capabilities, allows for the easier integration of data and communications across all departments for smoother customer interaction.



THE FUTURE OF CONVERSATIONAL AI

As we continue to research the investable companies paving the path for this AI revolution, it's fascinating to see how different technologies can come together to create truly life-changing applications across sectors globally. The continued improvements in conversational AI will surely present attainable applications for businesses both big and small and we believe this points to a strong investment opportunity. The [ROBO Global Artificial Intelligence Index \(ticker: THNQ\)](#) is one way for those looking to invest in conversational AI providers and the underlying technology companies that are making this all possible.

The question is not if, but where will we continue to see conversational AI and chatbots popping up in the world around us. Welcome to the new world of connection and customer experience, created by robots.