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The Future of Customer Experience in the Information Age of Artificial Intelligence - Get Ready for Change

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Abstract — In the growing global economy, where the total number of digital products and services sky rocket day-by-day, managing information technology systems, even for billion-dollar companies can be as challenging as it is complex. Enterprises are constantly seeking to accomplish the mission of enriching customers through outstanding service by supplanting legacy networking systems with today's most advanced technology solutions. In a strategically competitive business world, organizations need to be conscious about the real-time trends and behavior patterns of customers, which helps them to consistently deliver high quality goods and services addressing the key demands anytime and anywhere. Nowadays, with the innovation of technological breakthroughs such as data science, machine learning and artificial intelligence, offering excellent customer service to clients is not a daunting task, however, if the service is not delivered on time, it can result in a loss of opportunity and can therefore wipe out significant profit margins from such customers. In order to gain insights by processing the data in real-time, Information based decision-making strategy, which lies at the center of gravity offers the competitive advantage for several organizations, regardless of its size and business sector. In the era of artificial intelligence, human civilization is already making progress where one machine is sitting in front of the other machine reshaping organizations today from the core of its business processes into the future-generation intelligent platforms that essentially engages businesses to communicate with clients through enhanced, unique customer relationship channels. This article provides detailed information on how the entire customer engagement process is augmented into something productive and promising which truly allows businesses to upscale in terms of market share and return on investment utilizing the new human-to-machine communication network of digital assistants named "Chatbots" powered by artificial intelligence.

Keywords — Artificial Intelligence, Digital Assistants, Virtual Assistants, Chatbots, Smartbot, Machine Learning, Data Science, Design Thinking, Turing Test, Digital Transformation, Digital Revolution, Natural Language Processing (NLP), Neural Networks.

I. MANKIND'S INNOVATION PARTNER – FRIEND OR FOE ?

The evolution of *Homo sapiens* [1] from *Stone Age to Digital Age* [2] has laid the foundation for millions of inventions which truly helped them build divergent civilizations, surmount environmental challenges, effectively communicate from one place to another etc. which transmogrified life here on earth in each and every dimension of the voyage. The paramount fuel beyond all these scientific discoveries was the powerful "*Human Brain*" which really educated them to improve productivity over time through the lifelong learning process from the available knowledge and information that helped to acquire intellectual capabilities with the principle center around transfusing biological morals and values that significantly contribute to the path of Wisdom.

"Wisdom and understanding can only become the possession of individual men by travelling the old road of observation, attention, perseverance, and industry." - Samuel Smiles

Over the period of time, human civilization has advanced from one era to the next, during which our ancestors have developed skills and abilities which have enabled them to use land and natural resources to bring in tools and techniques in order to solve the problems smartly that improved their quality of life. All these resources have laid the foundation for the rapid growth of 21st century technologies such as Artificial Intelligence, which is at the center of gravity for human creativity that goes beyond imagination and today the innovation is far advanced where sky is the limit. From one of my earlier research work with author "*Shailaja Arsid*" on *Design Thinking* [3] is published in the "*International Journal of Engineering Research and Technology*" – *IJERT*, provides an outline on "*Evolution of Technology*" as well as how the human race has been progressively reliant on it for thousands of years.

Moreover, in the process of automation and centralization, all through the past decade, there have been increasing numbers of people, systems and smart products are connected to the Internet resulting in enormous amounts of data being generated which goes well beyond the intellectual capabilities of the human mind to break down, analyze and draw any conclusions. This brought on a need for more efficient and powerful machines which can process the data in real time to gain insights and make the decision-making process simple and smooth, and that is where the human species begun relying much more on the Artificial Intelligence that propels the skyline boundaries to conquer an ever-increasing number of convoluted undertakings. Today we are already continuing to advance in the information age driven by data, the primary fuel for the transformation of economic state into a digital ecosystem whereby the innovative and extraordinary advancements of artificial intelligence are continuing to grow

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at an exponential rate and the utilization of smart machines and algorithms are accelerating the productivity by contributing to organizations in numerous industry sectors such as healthcare, manufacturing, education, government agencies, and so on.

A meticulous survey conducted by the authors "*Jeff Loucks*," "*Susanne Hupfer*," "*David Jarvis*" and "Timothy Murphy" released on *Deloitte Insights*[4] revealed some groundbreaking factual information on how various countries define their investment strategies on Artificial Intelligence, which has great potential to fundamentally boost the economic, social and political developments around the globe. In another instance, on my flight back from New York to California, a great conversation with one of the chief technology officer of the fortune 500 company pointed the direction to the overview of Artificial Intelligence polices, standards and regulations announced by some of the leading nations such as India, USA, Canada, United Kingdom, France, Germany, etc. which has been excellently outlined in his research by author "Tim Dutton" on *Medium Corporation*. [5] Nowadays, be it from alarming *law enforcement officers* [6] to take any action or for smooth navigation of *Autonomous Vehicles* [7] on the road, one thing is clear: Artificial Intelligence has become the critical part of modern day life and it is perhaps the most revolutionary technology ever invented by human species which is already creating the universe of infinite possibilities that provides various perspectives to drive the digital transformation innovation during the 4th and future Industrial revolutions. Artificial Intelligence is the most powerful software among the 21st technologies, brings intelligence in every dimension of the journey that simplifies the number of challenging tasks, making zero human interaction and therefore has great potential to create phenomenal opportunities over the next decade that will stand to benefit societies and cultures in an unimaginable way possible. Furthermore, with the significant advances transpiring in Machine Learning, Natural Language Processing, Neural Networks etc. the revolution is changing rapidly, but the day is not so far when AI adapts to learn the techniques by itself and continues to repeat the process quicker and quicker every other time and becomes extremely Super Intelligent that brings many life-changing powers to AI which can perform billions of times faster than today.

Then again, the other side of the Super Intelligent AI can be utilized as a weapon if inappropriately handled by the wrong individuals which can result to unavoidable human dangers and repercussions. For example, *Nuclear energy* [8] is one of the incredible renewable sources of energy which is cost-effective, less contaminating and much better than other energy sources such as coal, hydroelectric, natural gas, etc. and today, this same nuclear power is the primary focus for terrorist operations which brings in genuine danger to the world. An intriguing article by author *Tom O'Connor* [9] published on "*Newsweek*" provides an overview on how U.S. military tested Artificial Intelligence Robots in the field bringing in innovation in terms of military research and development. Super power nations like USA, UK, China and so forth are already allocating funding levels to support AI robotic research primarily intended for military purposes. As per the bulletin from *mintpressnews* [10] "*by 2025 the U.S. military will have more robots than humans*" this opens up questions such as, will robots to supplant human fighters in the next war? Another precedent that makes us consider how the world will accelerate considerably further in the coming couple of years. An organization named *Hanson Robotics* [11] situated in Hong Kong, activated the social humanoid robot called *Sophia* [12] on February 14, 2016, which can show in excess of 50 facial expressions. *Sophia* [12] was granted *Saudi Arabia citizenship* [13] in October 2017, making it the first human robot on the globe to receive citizenship from any country, and today *Sophia* [12] really does seem to enjoy more privileges compared to more than 50 percent of the total population living in Saudi Arabia.

A few other firmly related use cases of self-learning AI machines which have been programmed to think for themselves, for example: from Google's self-mastered *AlphaGo Zero*, [14] which continually wins over its ancestor *AlphaGo* *100 times in a row* [15] and Facebook's Artificial Intelligence *robots talking* [16] in their very own language, makes us think about, does the future of AI looks amazing or horrendous? Will comprehensive regulations with tough accountability empower mankind to govern AI advances? Or will over-regulations end up making the innovations operate in the darkness? This may take any time from months or even years for AI to become extremely super intelligent and reach the point of *Technological Singularity* [17] wherein the advance intelligence and insights generated by AI machines cannot be comprehended by human brains.

The power of super-intelligent AI already appears to exist that will further augment the endless possibilities of the physical world to the extension of our mind, and only the future could perhaps reveal if mankind is stepping forward or backwards during his adventure of innovations.

II. HUMAN INTELLIGENCE + MACHINE INTELLIGENCE – REDEFINING BUSINESS MODELS

The World Wide Web has made it lot simplifier to stay competitive by utilizing many of the technological advances which truly empower billions of people all through various geographic locations in order to communicate at whatever point and wherever necessary by relying completely through the analog medium of electronic gadgets which is the primary fuel that pushes the horizons of all the 21st century technologies in the modern era. But then again, the key factor that differentiates the 4th Industrial revolution from the previous Industrial Revolutions is the exponential rise of volume, velocity and variety of Big Data that is growing on a daily basis, which brings up several challenging questions for the executives and employees of various organizations.

"According to research conducted by IDC Data Trends - Data Age 2025 research paper *[18] sponsored by Seagate, the world's data explosion is growing from 33 Zettabytes in 2018 and will reach to 175 Zettabytes of data by 2025 which will be stored across various cloud data centers and data lakes."*

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To address all these data challenges, organizations really have to scale up their enterprise architecture by adopting modern technology solutions for example: Artificial Intelligence Platforms, Machine Learning models which really facilitate massive quantities of data to be processed in real time in order to gain insights and understanding that enable them to reinvent the convoluted business operations into simplistic and groundbreaking solutions giving executives the right edge to take each and every strategic decisions that generates sustainable value proposition for their organization. Moreover, technological breakthroughs alone will not really address the problem here. Nowadays for any industrial sector, the fundamental driving factor for successful digital transformation lies in confronting the essential needs of the business variations of customers in real time and at the same time, it is important to understand that perhaps the journey of digital transformation extends well beyond the technology alone, rather, it emerges with the right combination of people, for example: implementing *Design Thinking* [19] principles and techniques which really necessitate end-users in each and every core business discussions right from the start and trying to align the right combination of technology such as AI machine learning components that really can process the data in a blink of an eye for critical day-to-day business operations makes it possible for businesses to operate competently, touching off the intensity of any organization.

Today, Artificial Intelligence is at the cutting edge of technology for many economic sectors, providing executives the potential to drive the digital transformation path efficiently wherein it prompts increased sales and profits, giving a superior client steadfastness by building new innovative products. Author “Scott Likens” – PWC's emerging technology pioneer elucidates in his article published on *Barrons* [20] about how AI disrupts financial services industry operations by utilizing intelligent technologies to robotize some portion of the day-to-day operations leading to more productivity with zero human interaction. Another industry with groundbreaking benefits is the *Healthcare* [21] sector, where AI can be utilized to streamline numerous medical procedures, for example: during drug discoveries, cancer prediction, MRI scans, monitoring of patient health conditions, optimizing daily routine tasks, etc. The massive amounts of patient related data generated can be processed in real time utilizing propelled machine learning models which provide the medical professionals with hidden knowledge and insight from previously inaccessible large unstructured data sets, helping them to take effective decisions and at the same time connecting patients with self-administration assets for better treatment procedures. My previous research survey with “*Dr. Meher Geeta*” published on “*International Research Journal of Engineering and Technology (IRJET)*” uncovered some critically acclaimed factual information about how the digital transformation journey of *Magnetic Resonance Imaging (MRI)* [22] scanning machine when combined with intelligent technologies of Edge Computing, Internet of Things (IoT), Machine Learning, Data Intelligence brings the path of innovation in the healthcare sector.

Moreover, with the market for IT cloud services continuing to grow at a rapid rate, fueling the demand becomes the center of gravity for digital transformation during which the business executives face major challenges trying to secure their IT application environments which often extends far beyond the organization network peripherals. AI-based cyber technology solutions safeguard organizations from cyber-attacks, which is one of the most significant risks facing today's businesses, smart cities, and critical infrastructure. It prevents malicious activity uniquely by identifying, investigating and neutralizing attacks on the digital estate directly on behalf of security teams, wherein the same operation with human interaction can sometimes take several weeks to resolve the issue.

A fascinating article on *scmagazine* [23] by author “*Doug Olenick*” explains clearly how to win the race of cyber-crime by bringing in the AI based digital security solutions that avoids unnecessary costs to the businesses. Then again, every business these days are accelerating repetitive tasks by incorporating the advanced AI components in each and every dimension of the business operations that helps to generate insights by having the right information for the right people at the right time. Now if this critical feedback is therefore not digitally communicated with the customer on the fly, it can lead to underperforming of business in this competitive world. Therefore, in the context of maintaining a successful business which really generates high profits and lessens operating costs, for example: from large scale enterprises such as Walmart to a small-scale distributor of automotive parts, organizations are now bringing in the innovative game-chaining paradigm shift of "chatbots" powered by Artificial Intelligence, which automatically responds to any inquiries or issues without any human interaction. This results in a superlative customer experience which really eliminates the lengthy waiting queue for the customers.

III. THE INNOVATION TO CUSTOMER ENGAGEMENTS – CHATBOTS

Over the past decade, all through the mission of accelerating business performance, various organizations from startups to big corporations such as *Amazon*, *Bank of America* and so on have productively utilized social media channels for example: *Instagram, Twitter, LinkedIn, Facebook,* etc. which stands among the most powerful and influential assets of the today’s digital marketing platforms that helps businesses to increase their brand awareness through engaging customers and enterprises across the globe.

In the 19th century, with the *invention* [24] of “*Telephone Lines*” and “*Radio Signals*” the seeds for the network broadcasting were introduced wherein mankind begin to rely on these communication mediums to reinforce his long-distance relationships across the globe, which eventually paved the path for the *evolution of the social media platforms* [25] in the modern-day era. In the year 1997, the first social media networking website was introduced by an organization named *Six Degrees* [26] which were limited for personal

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communications that provided an opportunity for individuals to interact and share knowledge by connecting through other people around the world. Moreover, with the dynamic advancement of technology, every month a groundbreaking innovation of digital tools and platforms are emerging where sky is the limit for the future. Furthermore, with the development of intelligent mobility, content marketing and consumer accessibility of 4G network, online networking systems has received tremendous momentum with the astounding potential to influence millions and millions of people in their everyday undertakings that really grabbed the attention of entrepreneurs to adapt the whole paradigm shift of this digital revolution from personal to the customer engagement process in order to promote their brands.

A fascinating article about *Social Media Usage & Trends 2019* [27] by author "*Nathan Sebastian*" published on "*GoodFirms*" gives the statistical overview of the famous digital networking sites which influences individuals and organizations in many dimensions such as brand engagement, predicting customer purchasing trends and the future of businesses through the lens of digital marketing channels. However, in order to gain the advantage in the market, countless corporations started connecting their established software platforms into the completely new world of advanced digital media era wherein this massive revolution gave rise to huge competition in the market with endless possibilities and today this is leading us towards the direction of data deluge. Therefore, in order to keep up with the pace with social media trends and manage the ever-changing customer demands in real time, digital transformation leaders face tremendous pressure to improve their critical customer engagement processes and compliance procedures, at the very same time following the footprints of regulatory guidelines. This brings in the most influential AI-powered virtual assistant *Chatbots* [28] that can be utilized to automate the much-needed cost-saving customer engagement processes which handles the customer inquiries efficiently and resolve them in a matter of a few minutes.

With the essential purpose of creating profound customer experience through elevated-value communications, Chatbots are AI fueled conversational intelligent solutions that interface with certain kinds of messaging platforms, for example: Slack, Facebook, Skype, Office365, WeChat and so on to successfully drive the machine to human communication through Speech, Text and Natural Language Processing.

In 1950, *Alan Mathison Turing* [29] a pioneering computer scientist, mathematician and philosopher played out a *Turing Test* [30] also referred as "*The Imitation Game*" which was published in the article "*Computing Machinery and Intelligence"* [31] where he contrived a hypothetical test about " *whether or not a computer is smart enough to think like a human being?*" This experiment investigates the machine's ability to mimic the intelligent behavior by trying to impersonate a human mind in real-time that further paved the path ahead for the chatbot revolution.

"*A computer would deserve to be called intelligent if it could deceive a human into believing that it was human." – Alan Turing*

In 1966, a German American computer scientist named *Joseph Weizenbaum* [32] coined the first chat-bot *ELIZA* [33] at the MIT artificial intelligence laboratory. *ELIZA* [33] was the first one to clear the *Turing Test* [30] through some kind of natural language processing (NLP) computer algorithm which utilizes pattern matching and substitution methodology to demonstrate the superficiality of communication between humans and machines as like a simulation of an AI *Rogerian psychotherapist* [34] by promptly connecting user requests to scripted solutions.

In 1972 at *Stanford University*, [35] a psychiatrist named *Kenneth Colby* [36] introduced a highly sophisticated version of the chatbot named *PARRY [37]* something that simulated a patient's behavior with *Paranoid schizophrenia* [38]. *PARRY* [37] has demonstrated advanced conversational strategy when compared to *ELIZA,* [33] and that is the reason why it is now and then alluded to as "*ELIZA With Attitude*".

Later in 1988, a British programmer, *Rollo Carpenter* [39] developed a chatbot named *Jabberwacky*, [40] which made the very first endeavor to actualize Artificial Intelligence through Human Interaction predominantly for entertainment purposes with the primary expressed intent of communicating using a speech-operated system, continuing to make it learn and understand effectively from sound and other audiovisual inputs rather than text-based frameworks.

Creative Labs [41] launched the very first Artificial Intelligence audio recognition program named *Dr.Sbaitso* [42] in 1992 for personal computers running on the Microsoft *DOS* [43] operating system. This AI-based chatbot performed the role of psychologist while interacting with customers and therefore is primarily known because of its speech-operated messaging platform.

In 1995, an American author *Richard Wallace* [44] created the "*Artificial Linguistic Internet Computer Entity*" - *ALICE* [45] an award-winning *Natural Language Processing* (NLP) [46] chatbot *Loebner Price Award,* [47] which really engages in a conversation with mankind through implementing several heuristic model correlation guidelines for human interference to perform interactions.

In 2001, *ActiveBuddy, Inc.* [48] today called *Colloquis*, [49] developed a conversation-based collaborative smart bot called *SmarterChild* [50] which was very widespread across instant messaging and SMS platforms that allowed people to experience personalized conversations by attempting to access real-time information via *AOL Instant Messenger*, [51] *Yahoo! Messenger*, [52] *Windows Live Messenger*, [53] and so on.

Technology has advanced rapidly in the early 21st century, during which numerous corporations started promoting systems and applications which were introduced to

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impersonate human conversations precisely in real time, and that is where, depending on such computers, humans began to automate much of his everyday tasks.

The super-computing cognitive platform *IBM Watson* [54] was introduced in 2006, which is a combination of a wide variety of applications and techniques including sophisticated machine learning models, natural language processing, human interaction, interpretation, AI frameworks, and so on. *IBM Watson* [54] is named after *Thomas J. Watson* , [55] the first Chief Technology Officer of the IBM, which is capable of processing and evaluating massive quantities of data and was specifically designed to respond to questions in the popular American game show officially named *Jeopardy!*. [56] Watson won the $1 million first prize in 2011 by winning over former world champions *Brad Rutter* [57] and *Ken Jennings*. [58]

In 2010 *Apple Inc* [59] introduced *Siri* [60] – "*Speech Interpretation and Recognition Interface*," which was an element of every product of *Apple Inc* [59] including personal computers, Watch, Mac, TV 's runs as part of the *IOS* [61] operating system. *Siri* [60] is a digital, intelligent, personal assistant, which utilizes the natural language processing interface to respond to questions, offer suggestions, and distribute internet-based requests by translating human voice into sounds, phrases, and processing them accordingly.

In 2012, during the launch of the *Android* [62] 4.1 version, *Google LLC* [63] introduced a virtual assistant chatbot called *Google Now*, [64] and later this was made accessible for both *Android* [62] and *IOS* [61] platforms. *Google Now* [64] utilizes a natural language user interface to execute actions, respond to questions based on voice instructions.

In 2015, an American multinational company, *Amazon.com* [65] released a new product into the market called *Alexa*, [66] often known as *Amazon Alexa* [66] which again is speech-based service offering a solution capable of secure voice communications, playing music, streaming podcasts, providing real-time information on weather, traffic, etc. that uses natural language processing algorithms to acquire, understand and answer to the voice commands.

In that same year 2015, *Microsoft* [67] came up with another popular digital assistant chatbot named *Cortana* [68] which can perform a broad spectrum of operational tasks such as managing calendar appointments, sending reminder messages, providing weather updates, etc. by recognizing the human voice without any need for keyboard interaction and responding to questions by processing data from the *Bing* [69] Search engine. *Cortana* [68] is now a feature of every computing device running on the *Windows* [70] operating system. It's given the name after a synthetic intelligence, personality in Microsoft's *Halo* [71] Computer game.

On March 23, 2016, Microsoft [67] Corporation released "*The AI with zero chill*" Artificial Intelligent Chatbot named Tay [72] through the *Twitter* [73] Platform. *Tay* [72] was designed to simulate the speech and behavior of a young American girl who tends to learn continuously by interacting with human users on Twitter. However, *Microsoft* [67] had to shut down *Tay* just after 16 hours of its launch since the bot started commenting provocative and offensive Tweets on its *Twitter* [73] account.

In April 2016, *Facebook* [74] launched a messenger platform generally called "*Bots for Messenger*," [75] which allows developers to create their own customized chatbots that can communicate with several other users using the *Facebook messenger* [76] interface. Nearly 30,000 bots have been created in the first 6 months after the interface was launched and this number reached a milestone of 100,000 by September 2017.

Nowadays, from marketing to sales to support, in order to assist the clients immediately and effectively, chatbots are being utilized in pretty much every industry segment, which benefits organizations to alleviate operational expenses and dependably be receptive to clients round the clock.

IV. THE FUTURE OF SUPERLATIVE CUSTOMER EXPERIENCE

In the age of digital competitive markets, trying to run business is not just about having to sell products and services, it is more of a superlative experience that customers really look for in a very short period of time. Regardless of whether it is for qualifying leads or possibly for addressing customer service and support related issues and from providing real-time inventory updates to managing organizational campaigns, innumerable organizations these days are utilizing AI-driven virtual assistant chatbots, which helps them to maximize consumer satisfaction by addressing the customers key demands successfully and productively round the clock that enables them to save thousands of dollars in the growing global economy.

In October 2016 at the *Money 20/20* [77] conference, *Thong M. Nguyen* [78] the president of *Bank of America* [79] introduced a digital financial assistant chatbot named *ERICA* [80] powered with AI, something that makes banking easier than it was before. Since 2017, *ERICA* [80] was made available to the consumer market day in and out by offering clients with a broad spectrum of services consistently, including up to day bill information, monitoring recurring payments, transaction status, instant access to rewards etc. enabling customer-friendly real-time access to information and services via any mobile or handheld device. According to the survey conducted by "*Derek Top*", [81] research director of *Opus Research* [82] a prominent diversified advisory and analysis firm revealed some groundbreaking factual information about *ERICA* [80] which has "*interacted with more than 7 million customers*" and genuinely "*engages 500,000 new clients every month*". Until today *ERICA* [80] has accomplished over "*50 million customer requests*" something that includes banking operations and much more sophisticated tasks.

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According to a survey conducted by the world's leading market research company *researchandmarkets.com* [83] the global chatbot market is projected to increase from "*USD 864.9 million in 2017 to USD 3146.4 million by 2023, growing at a CAGR of 24.1 percent over the period from 2018 to 2023*."

Another excellent instance where all these innovative chatbots are bringing various international personalities to the world of technology. In her article on *Forbes*, [84] author "*Blake Morgan*" [85] describes how numerous celebrities, for example: "*American actress Christina Milian*, [86] *reality TV star Jennifer Lynn Farley* [87] *also known as JWoww, model and actress Karrueche Tran*, [88] *musician Kehlani"* [89] are utilizing various social media platforms such as Instagram, Facebook, Twitter etc. to directly engage with the millions of fans.

From assisting end users in the decision-making process to booking a dream vacation for your platinum customer on the fly, Innocuous Digital Assistants has the potential to address numerous business needs by anticipating extremely customized consumer demands and reacting to hundreds of clients simultaneously, these days chatbots are redefining the 9 to 9 paradigm shift of business operations to the fast and efficient service offerings available 24/7 to customers which avoids client fall outs and turnaround time.

An American advanced multinational media and entertainment organization *Walt Disney*, [90] well-known by the name *Disney*, [90] has launched a chatbot named Judy featuring a protagonist from the 2016 fictional crime caper movie *Zootopia's* [91] officer *Judy Hopps* [92] by establishing an interactive medium that connects to audiences across the globe using the Facebook Messenger Platform. *Zootopia's* [91] Judy is an impressive live-stream game that encourages users to *investigate and tackle violent crimes* [93] while driving awareness for the success of the movie. *Disney* [90] was quite successful in acquiring a larger audience base by integrating the information from the movie into something like an augmented experience of the next generation.

With the immense unimaginable ways to communicate personalized messages to millions of viewers, these powerful chatbots are indeed making a significant contribution by providing great rewards wherein the possibilities are endless. In April of 2016, *CNN* [94] was the very first mainstream media and news source agency to release a chatbot on the Facebook platform and eventually joined the *Kik Bot Shop* [95] along with expanding mass communication to speech-activated smart devices such as *Amazon Alexa*. [66] Undoubtedly, the *CNN* [94] chatbots had a significant influence on digital life, offering viewers with highly customized contexts to choose the top headlines depending on their preference and the more the viewer interacts with the bot, the *smarter the bot* [96] continues to learn regarding user preferences and recommends the leading news based on this real-time user information.

According to the research conducted by *Gartner* [97] - *world's largest research and advisory firm*, Author, "*Kasey Panetta"* – Brand content manager describes in her article, the statistics published, "*By 2021, more than 50% of the enterprises will be spending more per annum on bots and chatbots creations than traditional mobile app developments.*"

The rapid developments in data science models and natural language processing (NLP) are making chatbots more astute, increasingly open and broadly utilized all through numerous business markets. Another ground-breaking industry where the advanced virtual power of conversations is driving recruitment organizations make use of these digital assistants to streamline the communication between both companies and candidates, allowing businesses to redefine the whole experience of individually sourcing and connecting skilled applicants with the new AI driven digital interview mechanism.

Stella [98] is the world's first intelligent digital networking chatbot that truly benefits businesses by matching the right professional to the correct position from a large pool of resources. Fueled through AI, *Stella* [98] brings down 80 percent of the time required to hire a new applicant by utilizing advanced natural language processing algorithms in order to identify the outstanding candidates from the market depending on the open positions available in its network. As indicated by the news distributed on *PR Newswire*, [99] *Stella's* [98] innovative solution is overhauling the recruitment process which truly empowers organizations end up saving money time and resources. Author *Kayla Matthews* [100] highlights a few other innovative chatbots in her article released on *VentureBeat* [101] which will always help employees who truly are searching for innovative opportunities to find their dream job and advance their profession without having to leave the desk.

Regardless of whether your business utilizes it or ignore it, numerous such chatbots already are influencing every single division of the worldwide economy. Furthermore, with the availability of connected devices, for example: Amazon Alexa, Google home, Apple home pad, etc. skyrocketing these days, the utilization of chatbots is foreseen to be significantly more fueled by speech enabled devices, and numerous different industries will start bringing in these voices-controlled digital assistants in the future. Author "*Anush Fernandes"* explains in his article published on *Verloop* [102] the "*7 Compelling Artificial Intelligence Chatbot Trend lines, Economic forecasts and Demands"* that are happening right now in 2019 which may very well lay the foundation for the potential mass implementation of chatbots in the future.

In the 21st century, chatbot is the interactive game-changing technology that is really helping various companies maximize their brand reputation in the market. According to statistics released by the principle of marketing insights - *Mathew Sweezey* [103] published on *Salesforce.com*, [104] *"69 percent of consumers prefer chatbots for quick*

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communication with brands." However, with the increasing trend of chatbot tools and frameworks rapidly expanding day by day, it's always challenging to identify the correct platform that will help your business to optimize the key business processes and this tends to come only when you have the right vision, mission to invest in the right technology. According to the research conducted by *Predictive Analytics Today*, [105] well-known as *PAT Research*, [105] the *top 19 chatbot platforms*, [106] for example: *ManyChat*, [107] *IBM Watson Conversation*,[108] *Microsoft Bot Framework* [109] etc. are offering customer engagement solutions by "*connecting clients to their organizations through the influence of intelligent*" communications.

These days in the era of information, customer experience is the fundamental building block of your partnership with clients where Artificial Intelligence creates value by bringing in virtual assistant chatbots that delivers a superlative experience which delights customers in each and every dimension of their journey across all the different sectors of the economy.

Besides that, with the emergence of intelligent enterprises and the ability to analyze massive volumes of data and communicate the real-time information on the edge, one thing is evident, the future of consumer engagements using machine to human communication of digital assistants looks splendid and are established to continue for several decades. Be it through sales channels or marketing platforms, the customer experience indeed will be augmented in some or other way through Artificial intelligence and companies which are the early investors of this new paradigm shift are heading in the right direction with substantial gains in terms of market share, more profits and high return on investment.

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