



# The Future of AI

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## Defining Artificial Intelligence

The term “artificial intelligence” has a tendency to evoke imagery of robot overlords and all-knowing computer programs. While this imagery makes for a great blockbuster, it doesn’t paint a very accurate picture of what AI actually is, making it seem like meaningful AI is further off than it really is. In fact, we are already starting to see the beginnings of AI technology in our daily lives.

An example of AI that you’re probably familiar with is the virtual assistant on your smartphone, whether that be Siri, Google Assistant, or Bixby. There are also increasingly popular smart speakers, dedicated virtual assistant devices like Amazon Echo or Google Home. All of these devices are examples of very simple AI. But there are also some not-so-simple AI technologies making their way into our daily lives and improving the way we interact with the world around us.

Artificial Intelligence refers to any non-living device that can perceive the environment around it and use that information to accomplish goals. Along with being a bit of a scientific marvel, AI is also an incredibly powerful tool. As seen in the example of Siri and the Amazon Echo, it makes doing work on a computer as simple as talking to a coworker. Combine this with machine learning – a field of computer science dedicated to teaching computers how to learn independently – and we can start breaking down the limits of traditional computers and create products that are as versatile as us.

For consumers, this means new technology that allows difficult or time-consuming tasks to be accomplished with a few basic verbal instructions. For businesses, it means a new way to reach consumers by providing them with new mediums of interaction. Making informed predictions, business decisions, and financial plans will be more efficient and reliable. Some of the biggest tech companies in the world – including Amazon, IBM, and Google – are working to raise this technology to its full potential.

This paper explores some of the immense advantages of artificial intelligence to help you understand where the industry is going and what your business stands to gain from investing in AI technology early on.





# The Current State of the Industry

When you browse the internet, listen to music, drive your car, or use your phone, AI is involved, whether you realize it or not.

In 2017, there were already **four billion AI-powered devices** in use worldwide.<sup>1</sup> Some of the biggest tech companies in the world – including Apple, Uber, Facebook, and Microsoft, in addition to those mentioned previously – have dedicated significant resources to AI and are using it to improve their products. AI gives businesses the ability to meet consumer demands more effectively, both directly (such as with personal assistants) and indirectly (such as by using AI to make smarter suggestions to consumers).

## Statistics and Projections

- **4 billion AI-powered devices** used worldwide in 2017.
- The global revenue of the AI market in 2018 so far is \$1.62 billion, and it is expected to reach **\$31.2 billion by 2025**, attaining a 52.59% CAGR (compound annual growth rate) during the forecast period.<sup>2</sup>
- By 2020, companies will have 20% of their workforces dedicated to managing neural networks; the need for **human oversight of AI will still be required** due to the nature of current AI systems.<sup>3</sup>

- **85% of interactions** between a customer and a business will be through AI software by 2020.<sup>4</sup>
- The AI software market is growing at an explosive rate and is **expected** to reach \$59.8 billion by 2025.<sup>5</sup>
- Even companies that don't produce AI-centric products are predicted to experience a substantial impact from the implementation of AI in their normal operations; an estimated **\$15.7 trillion will be added to the global GDP** due to AI-driven business practices.<sup>6</sup>



## Amazon

Amazon has been working on their line of **Echo products** for the past several years.<sup>7</sup> These are their signature smart speakers that use an AI assistant – “Alexa” – to help users with common tasks and routines, like streaming music and video, checking the weather, setting reminders, searching the internet, and more.

The first version of the Echo was **released to the public in 2015** and has become one of the most popular home personal assistants.<sup>8</sup> Since the first Echo product was announced, various versions have been released with different sizes and capabilities. Amazon has also partnered with individuals like Peter Thiel and Elon Musk to begin **monitoring AI development and promoting responsible practices** in the industry.<sup>9</sup>



## Google

Google is leading the charge on AI development. The tech behemoth has been working on implementing AI in just about all of its services, from the **Google Assistant** embedded in all Android phones to the way we **search for things on Google, watch videos** on YouTube, and access our **photos in Google Photos**.<sup>10 11 12 13</sup>

The company is pursuing the technology at a breakneck pace, having **purchased several AI startup companies** in the last few years, and is making massive strides in the area.<sup>14</sup> The most significant of these purchases have been **DeepMind**, a British AI research company discussed further down this list.<sup>15</sup>



## Apple

Apple was the first company to **debut a virtual assistant** with the iPhone 4s.<sup>16</sup> While Siri dominated the smart assistant market for a while, she was **passed by Google Assistant and Amazon Alexa** in several areas of functionality.<sup>17</sup> Apple also uses machine learning in other areas of their ecosystem.

For instance, the **cameras on iPhones use neural networks** to not only take better photos but perform tasks in real time that used to only be possible with a traditional camera.<sup>18</sup> At the **release of the iPhone X** they announced that machine learning would be incorporated in all of their new phones.<sup>19</sup> While its function is still mostly underneath the surface, many of the new iPhone features (like FaceID) use AI, and we will likely see more examples of this as time goes on.

## AIBrain

**AIBrain** is an artificial reality development company whose goal is to create AI software that will eventually become fully autonomous, and they are funding this ambition by providing consumer electronics companies with AI solutions.<sup>20</sup> AIBrain is working on projects in various areas like robotics, customer service, game development, and the service industry.

One example of this is their product **Athena**, an autonomous virtual assistant that can navigate and learn from its surroundings to assist customers.<sup>21</sup> It does this via SLAM technology, which allows the assistant to build a map of its surroundings and determine its location without any prior knowledge of its whereabouts. Their other products are **Tyche** (an AI for young child development), **Smile** (an AI to help children learn social and emotional skills), **Futurable** (a game that simulates aspects of the real world with the intention of teaching AI how our world works), and **dAIsy** (a virtual assistant for learning new languages).<sup>22 23 24 25</sup>



## DeepMind

**DeepMind**, an AI startup company owned by Google, is primarily concerned with research.<sup>29</sup> While they do offer to sell their software to companies open to their mission, they do not produce any actual products. Instead, they use their funding from Google and other supporters to advance AI, creating formal research papers on the subject about the practical applications of AI.

Their main area of focus is the impact AI will have on the healthcare industry and our society at large. DeepMind's **Ethics and Society** department is working to predict how fully autonomous AI will affect the various aspects of our day-to-day lives, our industries, and how we can manage it responsibly and safely.<sup>30</sup> And, of course, they are also **contributing their research directly to Google's** own products, helping them develop smarter assistants and more energy-efficient practices.<sup>31</sup>

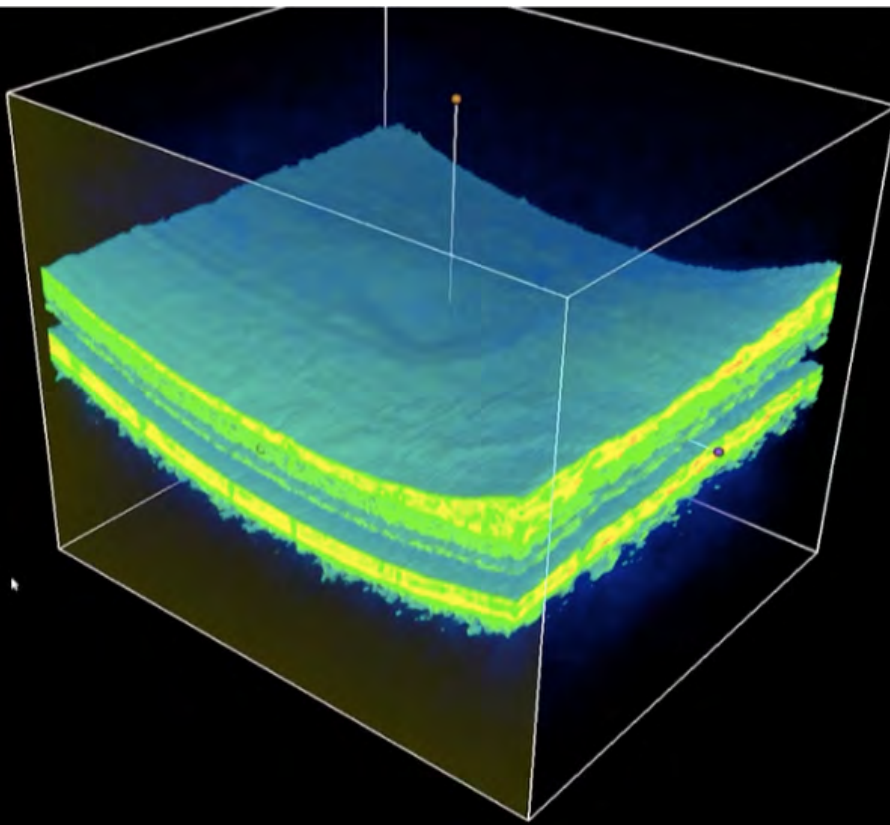


Image source: **DeepMind**



## IBM

IBM, one of the most influential tech companies of the last century, has been working on an AI called **Watson** for the past several years. While Watson first gained notoriety for **beating the Jeopardy! world champion** to develop the program for business applications.<sup>33 34</sup>

What sets Watson apart from other AI is its ability to perform the same tasks as other AI entities with less information. By “training” Watson, businesses can use the software to **make more informed decisions share the knowledge and experience of each employee with all employees predict and prepare for disruptions detect liabilities**. Watson also keeps an employer’s data completely secure; it is a self-contained system designed to protect a company and improve its effectiveness.<sup>35 36 37 38</sup>



## Microsoft

Microsoft's approach to the artificial intelligence field has centered around helping developers understand and utilize AI concepts, working with companies to create new workflows, and **demystifying this technology through research** and easily accessible explanations of the inner workings of AI programs.<sup>39</sup>

Their Azure cloud service now includes AI software that can be used by developers and enterprises to make AI development faster and simpler. Azure's **Cognitive Service** gives users access to over 24 cloud-based APIs for various aspects of AI, including vision, speech, knowledge, search, and language. These APIs make it faster and simpler to begin employing AI, as well as offer the security and privacy that comes with Microsoft systems.<sup>40</sup>



Image source: **Microsoft**



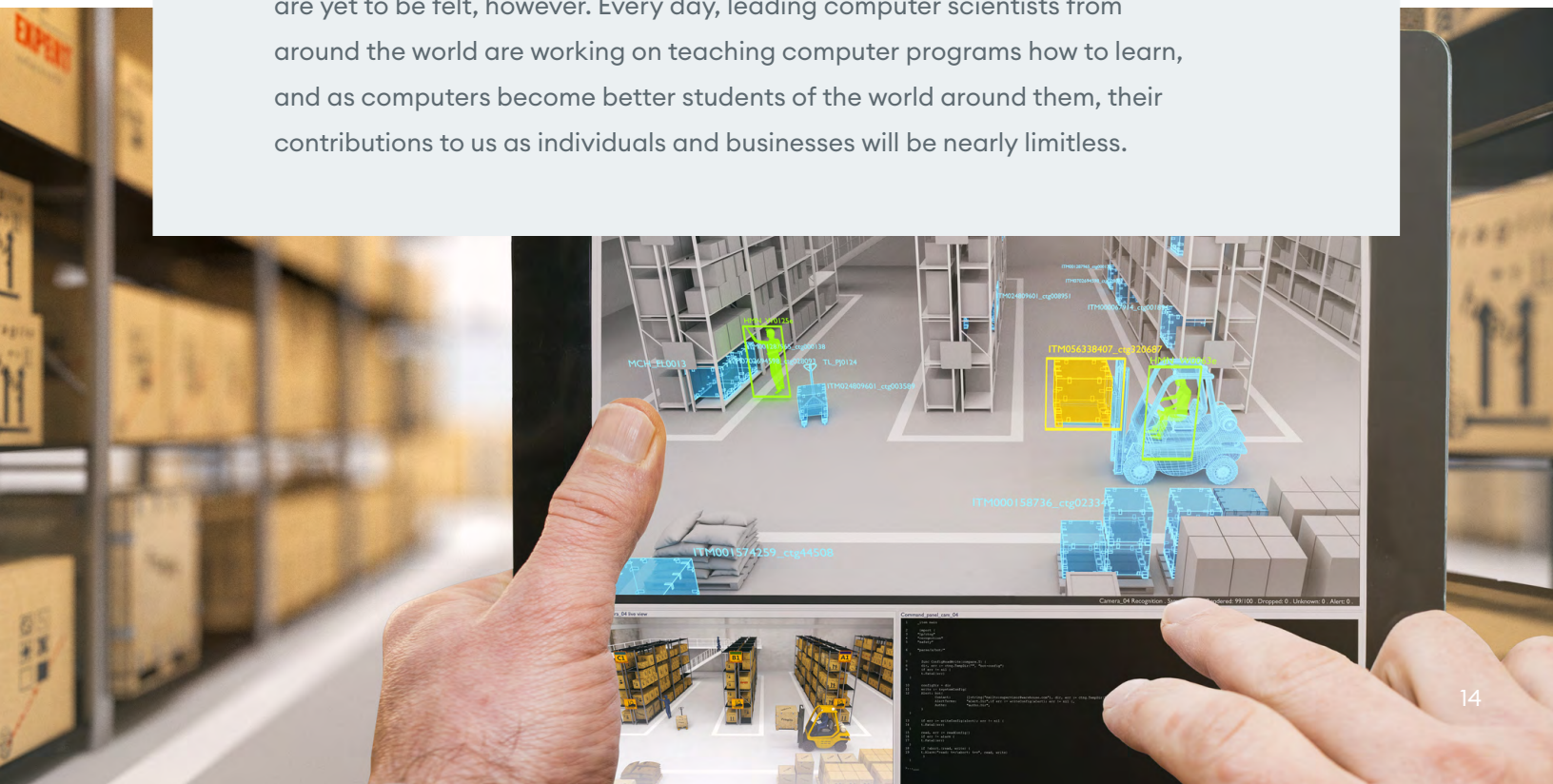
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# Industry Applications, Use Cases, and Examples

For the past several years, data has been the primary driver behind business growth. Understanding how consumers behave, why they make the decisions they do, and how to use that information to improve marketing is key to a business's success.

To say that AI will be able to improve our ability to interpret and utilize data is a vast understatement. Currently, data analysis is done by a person reasoning through data, an automated program that provides us with concise information, or some combination of the two. The big leap with AI is the emergence of software that can perform both tasks as a simultaneous process: automated reasoning.

AI is already playing an important role in many of our interactions with technology, from simple assistants like Siri to machine learning algorithms that can predict consumer trends. The biggest effects of artificial intelligence are yet to be felt, however. Every day, leading computer scientists from around the world are working on teaching computer programs how to learn, and as computers become better students of the world around them, their contributions to us as individuals and businesses will be nearly limitless.





## Data Analysis and Decision Making

- Human decision making is **greatly weakened by our inherent bias**; while our age, past experiences, and personal beliefs give us a unique and valuable perspective, often times this clouds human judgment when making decisions by leading us to be overly confident or brash.<sup>42</sup> An AI, on the other hand, is able to make decisions based purely on reasoning, leading to smarter and more effective choices.
- Our decision-making capabilities can also become hindered when **under stress or facing a large number of variables**.<sup>43</sup> As a result, we hone in on a small number of variables and in some cases, make irrational decisions. Because AI can't experience stress, it can consider every variable simultaneously and choose the best path.
- Another area where AI or other computer automation provides value is in repetitive work. A person may tire or get bored and lose focus, but that is not an issue that AI has.
- While AI can make better judgment calls than we can in theory, there are human factors that an AI won't be able to account for; as such, it's more likely that in the near future **AI will be used to provide advice** when making a decision, rather than removing the human from the equation altogether.<sup>44</sup>

Many of the points about human vs. robot decision-making skills discussed above are also covered in our **Future of Workplace Automation** white paper. If you are curious about understanding the different areas where humans and robots excel at accomplishing tasks, it's a great starting point.

## Accomplish Business and Marketing Tasks More Efficiently

- **Predictive lead scoring** can benefit not only from AI's data analysis capabilities but also from its ability to learn.<sup>45</sup> Along with processing a large amount of data in a short amount of time, AI can be trained to view and interpret data based on a business's unique needs.
- Companies like Google are already **using AI to improve search engine optimization** through machine learning.<sup>46</sup> By analyzing what people search and what they're drawn to, **AI can provide marketers with information** on how to bring in more customers and drive traffic to a product.<sup>47</sup>
- Retailers can employ similar SEO-focused AI on their own sites. For example, if you are browsing Amazon and search for a specific product, an SEO AI could use your past Amazon search history to **better suggest products** suited to your specific taste, making online marketing more personal and less "one size fits all."<sup>48</sup>
- AI assistants can be deployed in retail stores to help consumers find products and answer questions, becoming more effective with each product suggestion as it learns from its interactions. One such example is Pepper, a friendly automaton that can improve the shopping experience for customers. In one use case, Pepper was found to **increase customer interactions** with the store by 98% and improve revenue by 300%.<sup>49</sup>



## Personal Assistants

- Smart speakers like Google Home, Apple HomePod, and Amazon Echo are becoming increasingly popular. A reported **8 million people** owned an Amazon Echo product in 2017, which was a 60% increase over the previous year. <sup>50</sup>
- AI assistants, while helpful for just about everyone, will be especially important for **the elderly and disabled**. <sup>51</sup> These assistants can help individuals with everyday tasks like ordering groceries, locking doors, turning on lights, texting and calling others, and more. As the technology continues to advance, benefits created by AI for the elderly will increase.
- The day where our homes are just as smart as our phones is approaching quickly. Already there are AI apps like **Chefling** that make cooking easier by giving you control of your groceries, recipes, and pantry with only your voice. <sup>52</sup> Companies like Samsung are also working on **smart appliances**, which give you the ability to manage your fridge, stove, washer, and dryer through an assistant. <sup>53</sup>
- AI's ability to process large amounts of data will also come in handy for **analyzing politics**. <sup>54</sup> Predicting political outcomes and determining more effective campaigning strategies will each be made easier and more effective with the use of artificial intelligence.
- **Babylon Health's "AI Doctor"** beat a human doctor on a medical exam in June of 2018. <sup>55</sup> This not only demonstrates the ability of AI to help doctors diagnose patients more quickly but also how they can detect symptoms and problems that a human doctor might miss.
- BioMind is a similar **AI doctor that specializes in detecting brain tumors**. <sup>56</sup> It is faster and more accurate than traditional methods, leading to fewer complicated surgeries and higher survival rates for patients.

## Areas of Caution for Potential Misuse

While there are numerous examples of AI being used for good, there are several cautionary examples where the technology is being applied questionably or ineffectively.

- Developers are working on “**robo-graders**,” which are AI programs that can grade student essays and long-form answers.<sup>57</sup> While helpful for teachers, it poses the ethical dilemma of whether or not a student’s future should be determined by AI.
- **YouTube uses AI software** to help manage the billions of hours of content that are uploaded to the site every day, determining if content breaks certain site rules.<sup>58</sup> While the effort is commendable, there have been numerous cases of creators on the site being wrongfully flagged by the AI, while other harmful content has managed to slip by.
- Github user **daviddao** has put together a list of questionable uses of AI, including discrimination, misinformation, and misleading platforms.<sup>59</sup>

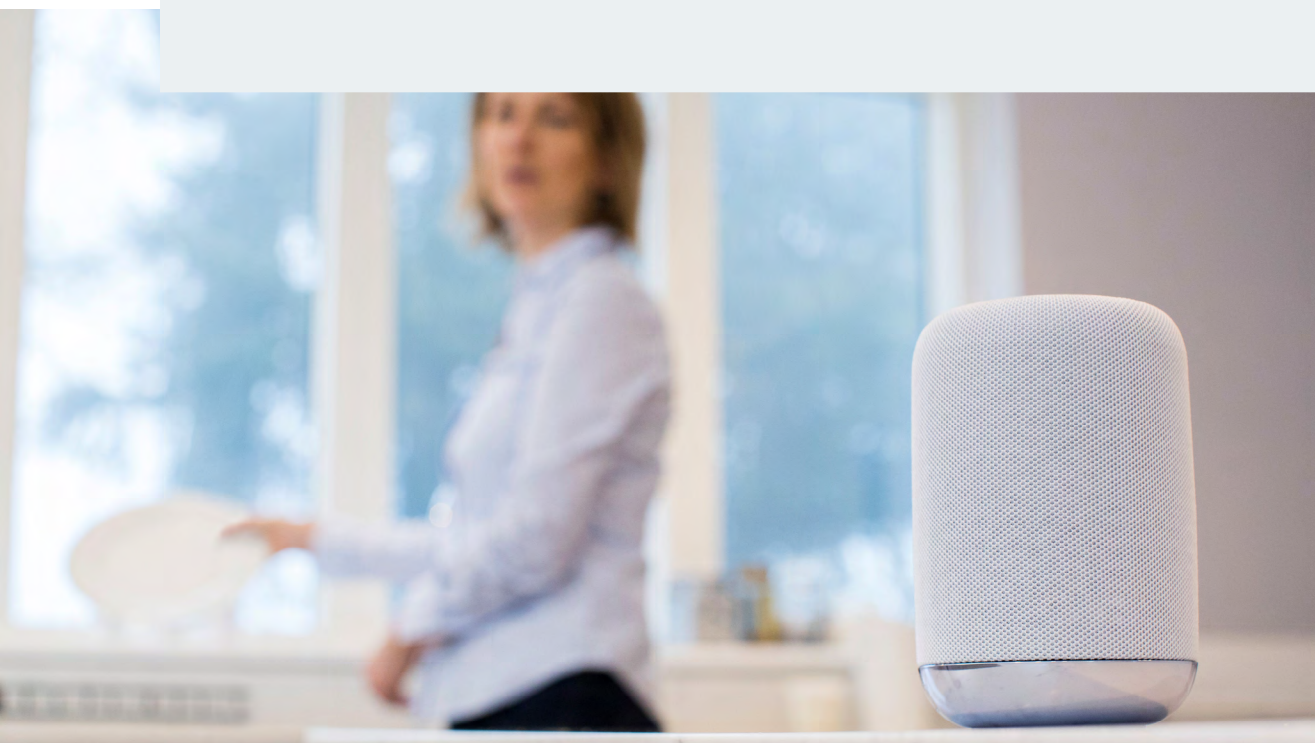
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# The Future State of the AI Industry

## Key Predictions

As it is now, the way we use computers requires a bit of know-how; they're much simpler than they used to be, but computer skills are still required for most industries. The more complicated a task you're doing with a computer, the more skill and prior knowledge are required.

The beauty of AI is that it will allow you to do everything computer users to be more effective, without any additional intensive computer training. **All you will need to know to work with an AI is how to communicate with it**, and since they learn based on their interactions with you, that communication will become more natural and intuitive every day. **Generating reports, making important financial decisions, shopping at your favorite store, and accomplishing tasks around the house** will be easier than ever. <sup>60 61 62 63 64</sup>



## How AI Will Affect Consumers

Currently, there is a disconnect between the way we interact with people and the way we interact with computers. When we communicate and share information with one another, we do so through body language and verbalization. When we communicate with a computer, we grab a mouse, poke at a keyboard, or drag our fingers across a screen.

AI, however, enables us to **communicate with our computers the same way that we communicate with each other**.<sup>65</sup> Similar to how you can control your GPS by telling Google where you want to go, you will be able to control your environment by telling an AI what you want to do and what you want to know.

Our interactions with computers will become more human and natural. Going to the store or shopping online will be much simpler and faster, as the need to search through countless products will be less necessary. Additionally, **customer service** won't be limited by the number of employees a business has or the capabilities of an automated computer program.<sup>66</sup> Companies will gain more trust from consumers through AI representatives that can give them the most effective support possible.





## How AI Will Affect Businesses

As consumers become more and more comfortable with relying on computers, it is the businesses that offer the best user-to-software interactions that will win their loyalty. The easier a business's service is to use, and the more modern and streamlined it is, **the more attractive consumers will find it.**<sup>67</sup>

Companies can use AI software to make customer interactions more natural and effective, saving customers frustration and time while also earning their trust. Tools that make finding a product or answer simpler will help companies compete in a rapidly advancing world. Traditional marketing and **brand identities will give way to convenience.**<sup>68</sup> By using AI to understand what someone wants before they know they want it, businesses will be able to gain repeat traffic from customers who trust the company to give them exactly what they're looking for.

Because AI is such a versatile form of technology, the ways it can be used are limited only by our ideas of how to use it. **The more you begin to use and work with this technology,** the more obvious its benefits will be.<sup>69</sup> And because AI learns from its interactions, the sooner a business starts using it, the faster they can train it to their specific needs. Whether it's automating simple tasks or analyzing expense reports, tools like Watson and Pepper can help businesses stay ahead of the curve by incorporating this technology into their daily operations.

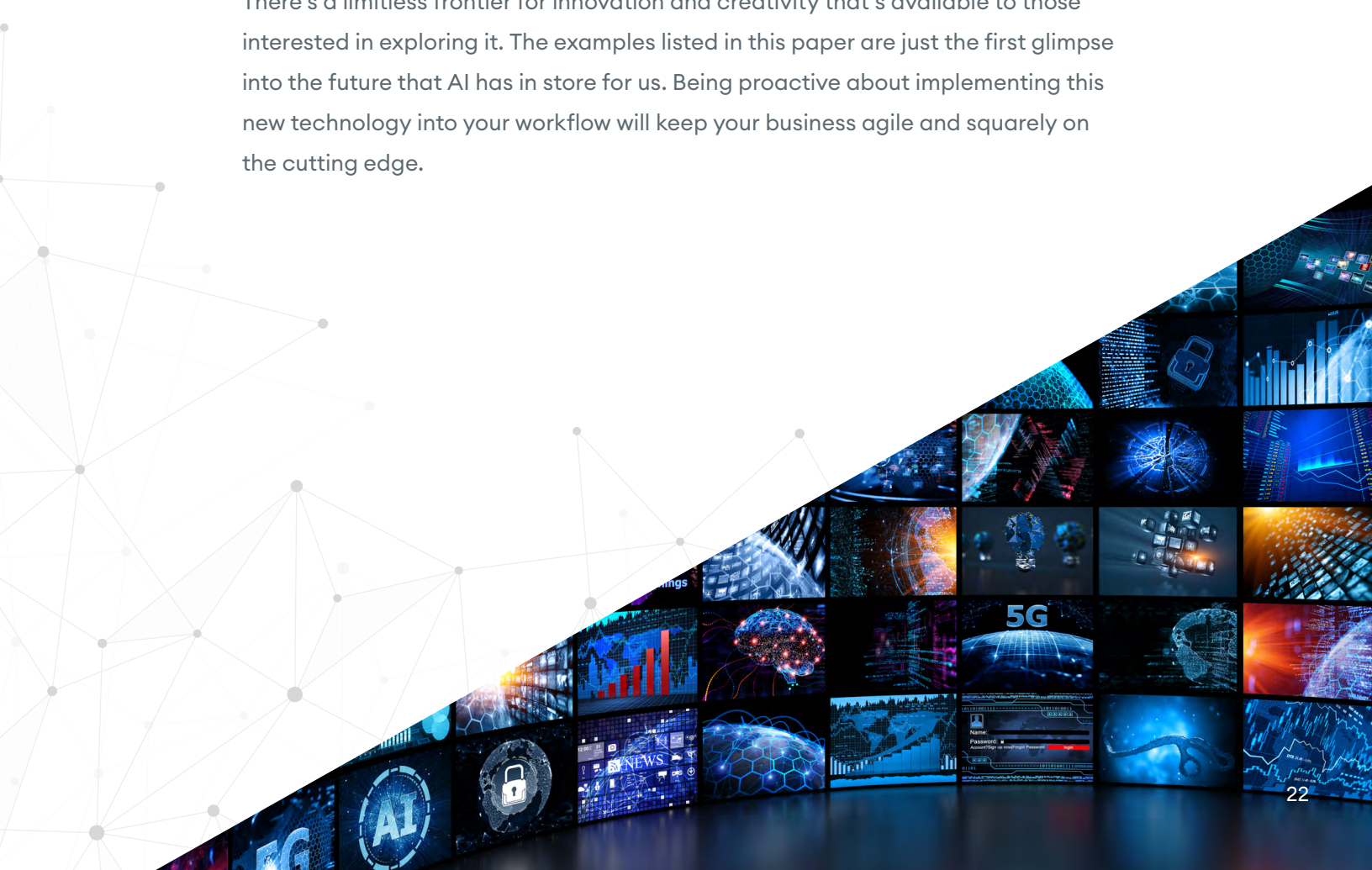
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# AI's Limitless Frontier

Artificial intelligence makes intensive computer tasks effortless. Whether it's understanding the scope of your company's expenses, maximizing on marketing strategies, or providing customers with memorable and unique experiences, AI can save you money and time by doing the heavy lifting for you.

AI's ability to learn from interactions and become more efficient with time means that the sooner a business invests in the technology, the more of an advantage they will have against competitors. AI is still in its infancy stage, making it easy for early adopters to set themselves and their service apart. Along with modernizing business practices, AI tools can provide users with nearly limitless benefits and use cases.

The possibilities with AI are limited only by your ability to think how to apply it. There's a limitless frontier for innovation and creativity that's available to those interested in exploring it. The examples listed in this paper are just the first glimpse into the future that AI has in store for us. Being proactive about implementing this new technology into your workflow will keep your business agile and squarely on the cutting edge.



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