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## **POTENTIAL AND CHALLENGES OF ARTIFICIAL INTELLIGENCE (AI) AS SMART TECHNOLOGY AND WAY FORWARD**

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### **Abstract:**

As we know that Artificial Intelligence (AI) represents human intelligence. It permits computer programs to learn from experience through iterative processing and algorithmic training. Usually, it's getting smarter with each successful round of data processing as each interaction gives AI system a chance to test and measure solutions and get better at the task to do much more miracle. AI becomes an interesting and fascinating topic in the recent time, and many debates have risen like, how it might affect the job market and what is the end of its use. General people worry is that, many people will lose their jobs due AI. On the other hand, the most technology lover people think that, it will lead to create lots of diversified and interesting jobs. Actually, it will have a big impact on the workplace and all aspect of life in near future. In fact, AI has the ability to make jobs more creative, worthwhile and flexible, and will lead definitely to a more inventive and skilled economy. Generally, the advanced technologies are usually starting to take away more jobs than they create, and unfortunately this trend will continue. Now, question is how to solve this problem? There is education and skill develop program with schooling system need to be introduced. Whole life style and education system needs to be changed, and to reorganize every aspect to make those more purposeful. It is a systematic effort to evaluate the potential and challenges of AI along with the consequences of global future and way forward to mitigate those.

**Key Words:** IoT, AI, ML, networks, algorithm, singularity, robot

### **Introduction**

AI is the simulation of human intelligence by machines, especially by computers, to do tasks that usually require human intelligence, like seeing, hearing, making decisions, and translating between languages. Siri by Apple, Alexa by Amazon, Google Maps, and ChatGPT by OpenAI are all examples of AI that people use every day.<sup>1</sup> Since this can be done quickly; far quicker than a human could. Today, people are realizing, AI-controlled self-driving cars<sup>2</sup> are the sign of fact that, the future of AI is getting closer, where the concept of a driverless car is no longer the stuff of science fiction. Recent studies say that by 2040, there will be about 33 million cars that can drive themselves by using AI. On the other hand, AI in healthcare is become popular term for the use of ML algorithms and software. Again, AI is going to imitate perfectly with human cognition in the analysis, evaluation, calculation, presentation, and understanding of complex physical, medical, mental, and healthcare data, or to go beyond human capabilities by giving new ways to diagnose, choose drugs, treat, or prevent disease.<sup>3</sup> AI has the ability of computer programs to draw close conclusions based only on the data they are given. AI can examine connections between various types of clinical data and final patient outcome.<sup>4</sup> AI now affects almost every part of our lives, from choosing what books, goods, electronic household items, or flights to buy online to deciding if our job applications are accepted, if we get a bank loan, and even what care we get for cancer or other diseases. A lot of big tech companies, like Amazon, Facebook, and Microsoft, have opened new study labs for AI. It's not much of a stretch to say that software now means AI.<sup>5</sup> Peter Norvig, Google's director of research and a pioneer of ML said, 'AI has shown that it can do a lot of useful things, like label photos, understand spoken and written natural language, and help find diseases. For example, today, Google Maps' usefulness to travelers is mostly due to AI. It has allowed us to create detailed road maps in a fraction of the time of any part of the globe. We may also rely on AI-powered apps to keep us safe and comfortable while we ride bikes, stroll, or take public transportation. Many in the financial sector see a bright future for AI, particularly in the banking sector.<sup>6</sup>

Today AI revolutionizes modern life. However some experts are concerned that it will one day take over the world or threaten human jobs. Millions of people have expressed concern about prospective job losses after the launch of OpenAI's, chatbot, ChatGPT. One of the three 'Godfathers of AI' has recently down played fears that AI will take over the globe or result in irreversible job losses. According to the BBC, Professor YannLeCun, Meta's chief scientist, called experts' fears of AI being a threat to humanity 'preposterously ridiculous.' Mr. LeCun believes that computers will eventually become cleverer than humans; however, this could take years; fur away from now. If somebody believes that AI is dangerous, they should just not construct it. LeCun's remarks contradict to other AI 'Godfathers' such as Geoffrey Hinton and YoshuaBengio, they have termed AI a threat to humanity. In fact, as per Mr. LeCun, 'keeping AI research under lock and key would be a huge mistake.'<sup>7</sup> According to the Meta scientist, when people express concerns about future robots working at or beyond human level capabilities, 'they are referring to artificial general intelligence (AGI) systems capable of handling a wide range of problems, similar to humans.' He emphasized that AGI development would be slow, with the goal of eventually achieving a level of intelligence similar to that of a rat's brain.

AI technology has becomes an important component day by day, it will become a fundamental part of many people's life. AI technology has the potential to give benefits to different income chooses and to bring significant gains to both developed and developing countries.<sup>8</sup> AI has the distinct prospect to create new and innovative job opportunities, leading to a more productive and efficient economy.<sup>9</sup> Automating tasks can help companies do better by reducing mistakes, improving quality and speed. In future there will be changes in several professions.<sup>10</sup> So, our education, skill and life style need to change and develop accordingly. On the other hand technologies of today are beginning to eliminate more employment than they create. In reality, the world will become more complex and egotistical in the future, and there will not be enough jobs for everyone.<sup>11</sup> Advances in AI and related forms of automation technologies have led to growing fears about job losses and increasing inequality. This concern is widespread in high-income countries. Developing countries and emerging market economies should be even more concerned than high-income countries.<sup>12</sup> Extensive use of AI could also threaten the progress made in reducing poverty and inequality in the society. It has been found that, after the three decades after World War II, living standards rose in the US economy and many other high-income and growing countries as a whole. But over the past 50 years, output growth and typical worker incomes have started to move in different directions. Again, economic theory warns that growth in technology is likely to make both winners and losers.<sup>13</sup> As long as the winners and losers from technological progress are located within the same country, there is at least the possibility that domestic policy measures can compensate the losers. However, when technological progress deteriorates the terms of trade and thus undermines the comparative advantage of entire countries, then entire nations may be worse off except if the winners within one country compensate the losers in other countries, which seem politically very difficult.<sup>14</sup> It is an analytical study to evaluate the future prospects and challenges of AI along with the consequences of global future.



Figure 1: Robots and human working in industry side by side<sup>15,16</sup>

## Potential and Prospect of AI

AI is an interdisciplinary science with multiple approaches, advancements in machine learning (ML) and deep learning, in particular, are creating a paradigm shift in virtually every sector of the tech industry.<sup>17</sup> Actually, AI is the backbone of innovation in modern computing and unlocking value for individuals and businesses.<sup>18</sup> Machine Learning (ML) is the science of accomplishment machines to interpret process and analyze data in order to solve real-world and real-time problems instantly.<sup>19</sup> Deep Learning is an advanced field of ML that can be used to solve more advanced problems.<sup>20</sup> Robotics is a branch of AI which focuses on different branches/sectors and application of robots.<sup>21</sup> ML and deep learning are only two examples of the AI techniques that can simplify this task. Training AI systems involves feeding the algorithms with suitable training data. AI systems are tremendously effective alternatives for any process involving intelligent decision-making since they can become experts and do it much more quickly than people.<sup>22</sup> This makes AI as an exceptionally powerful and enormously valuable technology, since it essentially allows computers to think and behave just like humans; and that should be much faster and much more processing power than the human brain can produce.<sup>23</sup> Today, AI can solve many problems by intelligently searching through much possible solution.<sup>24</sup>

AI refers to systems that display intelligent behavior by analyzing their environment and taking actions with some sort of autonomy to attain specific goals. AI-based systems can be purely software-based, acting in the virtual world like voice assistants, image analysis software, search engines, speech and face recognition systems; or AI can be embedded in hardware devices like advanced robots, autonomous cars, drones or Internet of Things (Iota) applications. In the first decades of the 21<sup>st</sup> century, highly mathematical and statistical ML has dominated the field, and this technique has proved high success and helping to solve many challenging problems throughout industry and academia.<sup>25</sup> The traditional goals of AI research include reasoning, knowledge representation, planning, learning, natural language processing, perception, and the ability to move and manipulate objects.<sup>26</sup> General intelligence as the ability to solve an arbitrary problem and is among the field's long-term goals.<sup>27</sup> AI researchers have adapted and incorporated a wide range of problem solving techniques, like, search and mathematical optimization, formal logic, artificial neural networks, and methodologies based on statistics, probability, and economics, to solve these difficulties. AI also employs computer science, psychology, medicine, healthcare, language, philosophy, and a variety of other disciplines.<sup>28</sup> AI applications include advanced web search engines (like Google, Bing, Baidu, Yahoo), recommendation systems (like YouTube, Amazon, Netflix), understanding human speech (like Sire, Alexa), self-driving cars (like Waymo, AutoX, Cruise, Motional, Manga International), generative or creative tools (like ChatGPT, Microsoft Bing, Google Bard AI, Perplexity AI, AI art, Amazon Codewhisperer), automated decision-making, and competing at the highest level in strategic game systems (like chess, Go, Arimaa, Dameo).<sup>29</sup> In future AI affect, like optical character recognition is frequently omitted from things considered to be AI, having become a routine technology.<sup>30</sup>

Now, there are also thousands of successful AI applications used to solve problems for specific industries or institutions. A few examples are energy storage,<sup>31</sup> deepfakes,<sup>32</sup> medical diagnosis, military logistics, foreign policy,<sup>33</sup> or supply chain management. AI will have a greater impact on technology in the future, by influencing every sector, machinery, equipment, and devices. With a 99% accuracy rate, AI has been applied in facial recognition systems. For example of such are Apple's FaceID and Android's Face Unlock. Those two are employed in the protection of mobile devices. Google has utilized image labeling to detect products in photographs and to allow customers to search using a photo. It has also been shown to generate speech in order to describe visuals to blind persons.<sup>34</sup> It can predict or simplify the behavior of customers from their digital footprints.<sup>35</sup> Online gambling companies, use AI to improve customer targeting.<sup>36</sup> AI has been used to customize shopping options and personalize offers.<sup>37</sup> Intelligent personal assistants use AI to understand many natural language requests in other ways than elementary commands. For examples: Apple's Sire, Amazon's Alexa, and a more recent AI, ChatGPT by OpenAI.<sup>38</sup> ML can be used to fight against spam, scams, and phishing. It can scrutinize the contents of spam and phishing attacks to identify any malicious elements.<sup>39</sup>

AI has been used to automatically translate spoken language and written content.<sup>40</sup> Additionally, research and development is in progress to interpret and conduct animal communication.<sup>41</sup> While no system provides the ideal of fully automatic high-quality machine translation of unrestricted text, many fully automated systems produce reasonable output.<sup>42</sup>

AI is going to produce superhuman in near future results in many games, like chess (DeepBlue), Jeopardy (Watson),<sup>43</sup> Go (AlphaGo),<sup>44</sup> poker (Pluribus and Cepheus),<sup>45</sup> E-sports (StarCraft),<sup>46</sup> AlphaZero, MuZero.<sup>47</sup> AI has replaced hand-coded algorithms in most chess programs.<sup>48</sup> However, poker lacks the perfect information of go or chess. Therefore, a poker playing program must be able to reason while facing unknowns. Players in the general population function based on information provided by the game system, rather than on the rules themselves. Institutions using AI to address global economic and social concerns are being supported by a new ITU effort called AI for Good. The University of Southern California has established the Centre for AI in Society to apply AI to social issues like homelessness. AI is being used by Stanford University to analyze satellite photos in search of pockets of concentrated poverty.<sup>49</sup> In agriculture, AI has helped farmers identify areas that need irrigation, fertilization, pesticide treatments or increasing yield.<sup>50</sup> Today, agronomists use AI to conduct research and development. AI has also been used to predict the ripening time for crops such as tomatoes,<sup>51</sup> monitor soil moisture, operate agricultural robots, conduct predictive analytics,<sup>52</sup> classify livestock pig and cow call emotions, automate greenhouses,<sup>53</sup> detect diseases and pests,<sup>54</sup> save water<sup>55</sup>, etc. In future AI will be used to completely automate most cyber security operations over time.<sup>56</sup>

AI can create a dysfunctional situation with revenge effects,<sup>57</sup> like technology that hinders students' ability to stay on task.<sup>58</sup> AI can provide early prediction of student success in a virtual learning environment (VLE) like Moodle.<sup>59</sup> In the education process, students can personalize their training with the help of AI. And for teaching professionals, the technology provided by AI can improve the quality of the educational process and teaching skills.<sup>60</sup> AI is used to aid investment decisions at large financial firms. Aladdin, BlackRock's AI engine are used by the firm and its customers alike to make better investing choices. SQREEM (Sequential Quantum Reduction and Extraction Model) is a data mining tool used by financial institutions like UBS and Deutsche Bank to create client profiles and better tailor wealth management offerings to individual clients.<sup>61</sup> Its functions include the use of natural language processing to analyze text like, news, broker reports, and social media feeds. Banks use AI to organize operations, for book-keeping, investing in stocks, and managing properties. AI can react to changes when business is not taking place.<sup>62</sup> Today, AI is used to combat fraud and financial crimes by monitoring behavioral patterns for any abnormal changes or anomalies.<sup>63</sup> The use of AI in applications such as online trading and decision making has changed major economic theories.<sup>64</sup> For example, AI-based buying and selling platforms estimate individualized demand and supply curves and thus enable individualized pricing. AI machines reduce information asymmetry in the market and make markets more efficient.<sup>65</sup> Many banks, funds, and proprietary trading firms now have entire portfolios that are AI-managed. Automated trading systems are typically used by large institutional investors but include smaller firms trading with their own AI systems.<sup>66</sup> There is a large array of applications where AI is serving common people in their day-to-day lives.

Nowadays, AI has been around everywhere for a great deal of time. The benefit of AI is steadily improving our everyday life. The technology is being used for robots that welcome at shopping centers or online search engines for offering suggestions.<sup>67</sup> Today, AI simulates human analysis in AI systems. It is the ability of the computer program to think and learn. Everything can be taken to be AI, if it involves a program that does something and that we usually think depends on human intelligence. Innovations in the AI space have led to several benefits across multiple industries and different sectors.<sup>68</sup> Today, AI and other technology experts are saying, the rise of AI will make most people better off over the next decade, but many have concerns about how advances in AI will affect and what it means to be human? to be productive and to exercise free will. The automation revolution will have a tremendous impact on the fundamentals of business and society, as well as on the innovation and productivity potential. Big data, ML and Blockchain technology has the potential to impact most industries across the globe in the near future<sup>69</sup>. AI can improve data backup and disaster recovery planning and policy from an IT standpoint to ensure smooth company continuity. The elements for successful technology and IT leadership continue to evolve, but the requirement for strong business strategy, vision, and IT management, as well as a knowledgeable approach to risk, compliance, and outsourcing. But AI remains as important as ever.<sup>70</sup> Digital existence is enhancing human potential while upending long-standing human activity.

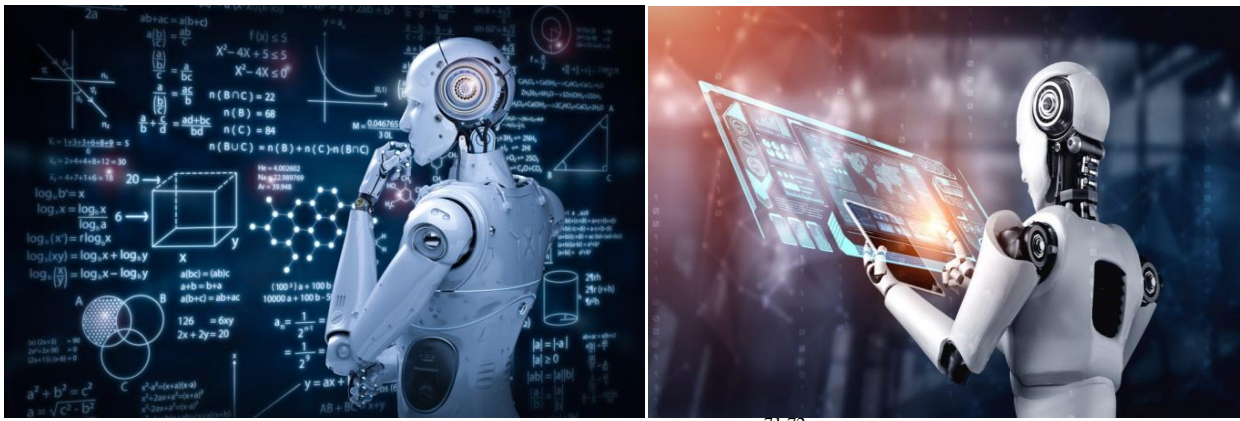


Figure 2: Use of Robots and AI in industry and education system<sup>71,72</sup>

Today, more than half of the world's population now uses code-driven systems, which present both extraordinary potential and challenges that have never been seen before.<sup>73</sup> Now question arises as will people be better off than they are now as algorithm-driven AI continues to spread? AI will have an impact on the entire agricultural and food value chain, from farm to fork, both now and in the future. Next-generation car or automotive technologies will be influenced by AI, and this will change how cars, trucks, and power-trains are designed and produced.<sup>74</sup> AI will influence the tech developments of the global aviation and aerospace sectors. It will also influence space travel and communications, road traffic, airport operations and management, air traffic control systems, and future trends in flight and aviation transport related industries. AI will influence the technology innovation transforming all parts of the construction and civil engineering sectors leading to improvements in cost, safety, efficiency and quality of construction.<sup>75</sup> AI will have an impact on smart phones, tablets, and wearable tech gadgets, as well as how people live, work, and consume services, prompting businesses to establish their own methods for dealing with such use at the back end and capitalizing on it at the front end.<sup>76</sup>

The experts predicted networked AI will amplify human effectiveness along with threaten human autonomy, agency and capabilities.<sup>77</sup> Computers might be as smart as or smarter than humans when it comes to things like making complicated decisions, learning, reasoning, pattern recognition, visual acuity, speech recognition, and language translation. Smart systems in neighborhoods, cars, buildings, utilities, farms, and business processes will save time, money, and lives and give people the chance to enjoy a more personalized future.<sup>78</sup> The use of AI in healthcare is hopeful, with applications such as diagnosing and treating patients and assisting senior citizens in living fuller and better lives. They were particularly enthused about AI's involvement in broad public-health programs based on vast amounts of data that may be collected in the future years on everything from personal genomes to nutrition.<sup>79</sup> AI would abet long-anticipated changes in formal and informal education systems.

If we look around now, we found that our society is changing due to the extensive use of AI, ML and IoT in daily operations. If we go to a healthcare facility, an AI-powered machine will check our pulse, and if we go to an internet store, we will see a recommended list customized by an AI tool. Actually, these are only a few examples of the benefits of AI in our daily lives. AI will provide a lot more in the future. With time, more industries, service sectors, and organizations will embrace this transformative technology to improve every human activity working process.<sup>80</sup> AI can help simplify and speed up processes in the community, society, country, and world by making the workplace more efficient, helping us make better decisions, or giving us direct help. AI can help by finding and fixing problems that people might not be able to see or fix on their own. But some people don't see the benefits of AI because they think it will cause people to lose their jobs and become less smart. In fact, speed, precision, efficiency, and scalability are the most important benefits of AI.

**The 4IR will transform industries, service and other sectors so significantly that much of the work that exists today will not exist in next 25 years. It is crucial for us to understand the impact of these changes on all areas of our lives, including academic and learning institutions.** According to a recent survey PwC of CFOs, while the COVID-19 crisis has led 70% of companies to cut back or defer planned investments, just 22% has said their companies are curbing investments in digital transformation.<sup>81</sup>

Currently, all graduates are confronted with a technologically transformed world in which AI, IoT, ML, Big Data, AR, VR, Cloud and Edge Computing, and social media create diverse opportunities and challenges for conventional education systems. As students consider their post-diploma or post-graduation lives, formal academic and learning institutions are pondering their fate, particularly in regards to employment. Nearly all contemporary technologies propelled by AI are transforming the world to such an extent that social concepts such as ‘post-work’ are increasingly defining the present era. This period requires skills that are not identical to those required during the Third IR, when information technology (IT) was the primary driver. It is estimated that AI will be a US\$ 15 trillion industry within the next seven years. Millions of unskilled and traditionally trained individuals will be laid off.<sup>82</sup> On the other hand, millions of jobs related to modern and hi-tech skilled will be created in the next few years.<sup>83</sup>

Today, the adoption of AI and its impact on businesses and society around the world stands at a turning point. The global AI adoption rate grew steadily and now is more than 35%. And in some industries and countries, the use of AI is practically everywhere and every sectors. AI is rapidly providing new benefits and efficiencies to organizations around the world through new automation capabilities, predictability greater ease of use and accessibility, and a wider variety of well-established use in all cases. AI is both being applied through off the shelf solutions like virtual assistants and embedded in existing business operations like IT processes. Encouraging evidence found about the importance of accessibility. Now, 44% of organizations are working to embed AI into current applications and processes. The IBM Global AI Adoption Index has provided insights into overall AI adoption around the globe, the barriers and challenges that are hindering AI from reaching its potential, and the use cases; sectors, industries and countries where AI is most likely to thrive. Today, AI offers a playbook for 42% of companies that report exploring the use of AI and a window into the AI trends and challenges that are likely to come. The data, commissioned by IBM, sheds new light on the deployment of AI across 7,502 businesses around the world. From where, 500 in each country, United States, China, India, UAE, South Korea, Australia, Singapore, Canada, UK, Italy, Spain, France and Germany; and 1,000 in Latin America like, Brazil, Mexico, Colombia, Argentina, Chile and Peru. The polling was conducted online through Morning Consult’s proprietary network of online providers from 30 March through 12 April 2022.<sup>84</sup> As we know that, IBM led the industry in the number of AI, cloud, quantum computing and security-related patents granted. However, Darío Gil, Senior Vice President and Director of IBM Research have said that. ‘The world needs scientific thinking and action more than ever. IBM's sustained commitment to investing in research and development, both in good and in challenging times, has paved the way for new products and new frontiers of information technology that have greatly benefited our clients and society.’<sup>85</sup>

AI could be data-driven as well as knowledge-driven. The next-generation AI breakthrough is knowledge inference and its application to all contexts. Several significant concerns with machine learning in 5G and future networks may give rise to new areas of research and extensions of present standards to support future networks.<sup>86</sup> So, if AI is going to be used by a lot of people and get better, there needs to be a strong guarantee of security. Since AI will be used in transportation and health care in the coming years, it must be presented in a way that builds trust and understanding and protects human and civil rights.<sup>87</sup> Policies and protocols, on the other hand, should handle ethical, privacy, and security concerns. As a result, multinational communities should work together to push AI to progress in a way that benefits humanity. As AI becomes more incorporated into the workforce, it seems doubtful that all human employment will be eliminated. Instead, many experts believe that the workforce will become increasingly specialized in the future. These professions will necessitate more of what automation cannot currently deliver, such as creativity, problem-solving, and qualitative skills. Essentially, there will always be a need for people in the industry, but their responsibilities may change as technology advances. Specific skill sets will be in higher demand, and many of these professions will require a more advanced, technical skill set.

AI is shaping the future of humanity across nearly every industry. AI is already the main driver of emerging technologies like ML, big data, robotics and IoT and those are generative AI, with tools like ChatGPT and AI art generators garnering mainstream attention and it will continue to act as a technological innovator for the foreseeable future. Roughly 44% of companies are looking to make serious investments in AI and integrate it into their businesses. And of the 9,130 patents received by IBM inventors in 2021, 2,300 were AI-related.<sup>88</sup> Very recently Elon Musk has said that the robot will be friendly, standing at a height of 5' 8" and reaching speeds up to five miles per hour.

But if its creation goes to plan, it will take many people's jobs. While Musk's robot has not yet taken over, businesses across the country have turned to automation rather than paying humans for work. For example, Insider previously reported that restaurants struggling to hire workers, they have turned to QR codes where diners can view menus, rather than having a waiter bring them one.<sup>89</sup> Today all big giant companies spending billions of dollars on AI products and services annually.<sup>90</sup> Global AI spending has already to reach US\$ 434 billion in 2022. And the market is expected to break the US\$ 500 billion mark in 2023, as reports International Data Corporation (IDC).<sup>91</sup> For example tech giants like Google, Apple, Microsoft and Amazon spending billions to create those products and services, universities making AI a more prominent part of their curricula and the U.S. Department of Defense upping its AI game, big things are bound to happen. ML, in the form of connectionist theories that model computing loosely along the lines of neurons in the brain, has gone through boom and bust cycles, flowering initially with Frank Rosenblatt's perceptron in the late 1950s, and now suddenly back in vogue in the last several years.<sup>92</sup> Former Google Brain leader and Baidu chief scientist Andrew Ng told ZDNet has said that, 'We may be in the eternal spring of AI.'<sup>93</sup>

### Challenges and Risk of AI

The prime challenge of AI systems is that, it is usually so complicated that it is hard to figure out or understand why they do, what they do and how they do? Today, the way AI works, is built on a very successful method called ML. Interestingly, we can't lift the lid and see how it works. So, we have to believe it. So, the task is to come up with new ways to keep an eye on or check up on the many places, where AI is now so important and no way to avoid it. Jonathan Zittrain, a professor of internet law at Harvard Law School and has said, 'There is a risk that the increasing complexity of computer systems could keep them from getting the scrutiny they need.' I'm worried about the loss of human freedom as our systems become more complicated and interconnected with the help of technology. He also said, 'If we set it and forget it, we may regret how a system changes and that there is no clear place for an ethical dimension to be considered.' Missy Cummings, who was one of the first female fighter pilots in the US Navy and is now an expert on drones, is the head of the Human and Autonomy Lab at Duke University in North Carolina. She has said, 'How will we be able to certify these systems as safe?' AI will need to be watched over, but how that should be done is not clear yet. At the moment, there are no methods that everyone agrees on. Cummings also said, 'Without an industry standard for testing these kinds of systems, it's hard for these technologies to be widely used.'

In a fast-paced world, regulatory organizations frequently find themselves playing catch-up. Companies are already investigating the effectiveness of utilizing AI to make parole decisions or detect sickness in several critical areas, like the criminal justice system and healthcare. But, by delegating decision-making to computers, we risk losing control; we are to say that the system is making the correct judgment in each of these cases? Principal researcher at Microsoft Research Danah Boyd said that 'there are fundamental problems about the values that are being programmed into such systems and who is ultimately responsible for them' Regulators, civil society, and social theorists all want new technologies to be fair and ethical, but these conceptions are hazy at best.' The workplace is one arena filled with ethical quandaries. AI will let robots, do more complicated jobs and displace more human workers in future. For example, China's Foxconn Technology Group<sup>94</sup>, which supplies Apple and Samsung, has announced that, it aims to replace 60,000 factory workers with robots. Ford's factory in Cologne, Germany<sup>95</sup> puts robots right on the floor alongside humans.

The details about who sits on Google's ethics board and what it actually does remain insufficient but in September, 2022; Facebook, Google, and Amazon launched a consortium that aims to develop solutions to the jungle of pitfalls related to safety and privacy AI poses.<sup>96</sup> Again OpenAI is an organization dedicated to developing and promoting open-source AI for the benefit of all. 'It's crucial that machine learning be researched freely and distributed via open publications and open-source code, so we can all share in the rewards,' said Google's Norvig. In reality, OpenAI is a non-profit AI research organization. Their purpose is to enhance digital intelligence in the most likely method to serve humanity as a whole, without regard for financial gain. Because their study is free of financial constraints, they may concentrate on making a beneficial human impact.<sup>97</sup> Creating a brain trust of ethicists, technologists, and corporate leaders is essential if we are to develop industry and ethical standards and gain a comprehensive comprehension of what is at stake.

It is a matter of utilizing AI to improve what humans are already good at. Zittrain also stated, ‘Our work is less concerned with a science fiction robot takeover and more concerned with how technology can be used to aid human reflection and decision-making, as opposed to completely replacing it.’

A super-intelligence or also known as hyper-intelligence is a hypothetical agent that may also refer to the type or level of intelligence possessed by such an agent.<sup>98</sup> If research into AGI produced sufficiently intelligent software, it might be able to reprogram and improve itself and that leading to recursive self-improvement.<sup>99</sup> Science fiction writer VernorVinge named this scenario the ‘singularity’.<sup>100</sup> It is difficult or impossible to know the capabilities of super-intelligent machines and that known as the technological singularity<sup>101</sup> and is an occurrence beyond which events are unpredictable or even unfathomable.<sup>102</sup> ML AI is also able to design tens of thousands of toxic molecules in a matter of hours.<sup>103</sup> ML AI is also able to design and build such robot, which can take over the control of nuclear weapons of the military of any nations.<sup>104</sup> And that will be the great danger of entire civilization.<sup>105</sup> Robot designer Hans Moravec,<sup>106</sup> cyberneticist Kevin Warwick, and inventor Ray Kurzweil have predicted that humans and machines will merge in the future into cyborgs and that will be more capable and powerful than either. This idea, called trans-humanism,<sup>107</sup> Edward Fredkin<sup>108</sup> argues that ‘AI is the next stage in evolution.’ A survey of economists showed disagreement about whether the increasing use of robots and AI will cause a substantial increase in long-term unemployment,<sup>109</sup> but they generally agree that, it could be a net benefit if productivity gains are redistributed.<sup>110</sup>

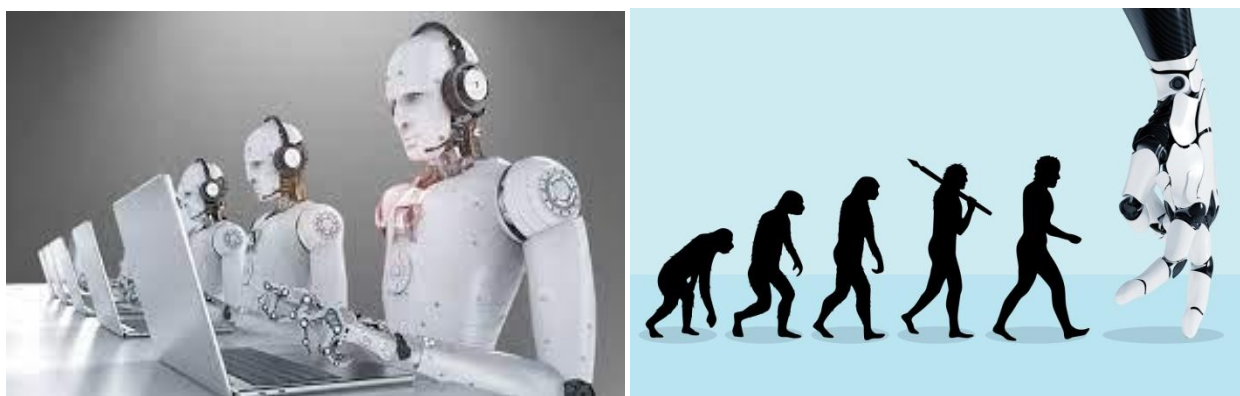


Figure 3: Machines may rule over humans in future<sup>111</sup> both certainty and uncertainty of life<sup>112</sup>

Michael Osborne and Carl Benedikt Frey estimate 47% of U.S. jobs are at ‘high risk’ of potential automation,<sup>113</sup> while an OECD report classifies only 9% of U.S. jobs are ‘high risk’.<sup>114</sup> However, many middle-class and white-colour jobs may be eliminated by AI.<sup>115</sup> On the contrast, job demand is likely to increase for service and care-related professions. Whatever the case; AI, IoT, ML, and automation will definitely shrink the labour force/market.<sup>116</sup> Advanced AI can make centralized decision making and more competitive with liberal and decentralized systems like, markets.<sup>117</sup> Terrorists, criminals and rascal states may use other forms of weaponized AI like, advanced digital warfare and lethal autonomous weapons.<sup>118</sup> Battlefield robots are coming soon.<sup>119</sup> Health equity issues may also be worsen when many-to-many mapping are done without taking steps to ensure equity for populations at risk for bias.<sup>120</sup> However, until AI and robotics systems are demonstrated to be free of bias mistakes, they are unsafe.<sup>121</sup> Criticism has been raised about whether and to what extent the works created with the assistance of AI are under the protection of copyright laws.<sup>122</sup> The regulatory and policy landscape for AI is an emerging issue in jurisdictions globally.<sup>123</sup> In 2023, OpenAI leaders published recommendations for the governance of superintelligence, which most of the countries has believed that, it may happen in less than 10 years.<sup>124</sup>

Computer scientists and philosophers have suggested that AI may become an unpredictable risk to humanity, if its rational capacities are not steered towards benefit to the humankind.<sup>125</sup> Economists have highlighted the risks of redundancies from AI, and speculated about unemployment if there is no adequate social policy for mass/general employment.<sup>126</sup> The term AI has also been criticized in the eyes of lawyer/legal community.<sup>127</sup> Two sources of concern are the problems of AI control and alignment: that controlling a superintelligent machine, or instilling it with human compatible values, may be a harder problem than honestly supposed.<sup>128</sup>



Many researchers believe that, superintelligence would resist attempts to shut it off or change its goals; as such an incident would prevent it from accomplishing its present goals and that it will be extremely difficult to align super-intelligence.<sup>129</sup> In contrast, skeptics argue that superintelligent machines will have no desire for self-preservation. And it is not the reality.<sup>130</sup> Again sudden 'intelligence explosion' might take an unprepared human race by surprise.<sup>131</sup> However, in future jumping from subhuman performance in many areas to superhuman performance in virtually in many domains is possible like, AlphaZero in the domain of Go show that AI systems can sometimes progress from narrow human-level ability to narrow superhuman ability extremely and rapidly.<sup>132</sup> We can do math without having to picture the universe of numbers, and we can figure out how gravity works in a different galaxy without having to step on it and to say that we have felt and measured it.<sup>133</sup>

As technological advances continue, some skills are becoming obsolete while demand for other new technology related skills are rising. Such paradigm shifts are creating new and different jobs. At the same time automation, IoT, ML and AI are also removing the need for human input from some lower-skilled roles. As a result, many people are at risk of being left behind, mostly low-skilled workers, who usually perform administrative, routine and repeated tasks that will be automated totally in near future. This picture is alarming for poor, LDC and developing countries. Even developed countries under OECD are around 14% of jobs fall into this category, with another 32% at high risk of being at least partially automated. So, around 1 in 2 people is likely to be affected in anyway. Robot suits and other automated machinery and equipment were introduced in many industries and worker needs to learn how to work with them/those. Again, about 40% of new such technology related jobs created between 2005 and 2016. But 6 out of 10 workers in OECD countries lack basic computer skills were in digitally intensive sectors and that is around 40%. At the same time, Manufacturing and service sectors are using new technologies to do their jobs more efficiently, quickly and finding work through online platforms, and collaborating in new ways with age groups across different countries around the globe. According to the OECD Digital Economy Outlook (OECD 2015) the ICT sector is a key driver of economic growth in OECD countries. Between 15 and 52% of all investments in OECD countries were related to the ICT sector between 2008 and 2013. Moreover, after a slack in the sector's contribution to employment growth during the economic crises, the share of jobs created by the ICT sector in OECD countries amounts to 22% in 2013.<sup>134</sup>

According to a recent World Economic Forum survey, 40% of SMEs halted operations during the pandemic, resulting in layoffs and other cost-cutting measures.<sup>135</sup> In today's unpredictable world, leaders must make challenging decisions that have a significant influence on their workforce and employee well-being. With the massive volume of data collected on the internet, new hazards have evolved, such as increasingly frequent and costly cyber-attacks.<sup>136</sup> Business leaders are already using new computational and AI tools to aid strategic decision-making. This software will become increasingly powerful during the next decade and will be used in new and diverse scenarios. AI technologies, which are based on game theory mathematics, leverage the computing advancements that power chess engines. The physical office has been significantly supplanted by digital infrastructure, allowing CEOs to develop a more efficient, balanced workforce with asynchronous work schedules. In the world of venture capital, technology has leveled the playing field by removing bias that might otherwise have worked against founders and funders. The next challenge will be to continue to establish shared purpose while leveraging technology to enhance human insight and skill.<sup>137</sup>

### **Future Preparation and Way Forward**

Data is an important input in the future AI economy. Global corporations can leverage their access to enormous amounts of data from around the world to better optimize their products and services for consumers.<sup>138</sup> This makes it harder for new companies in developing countries to catch up to the top companies. Europe has worked hard to make rules that make sure the benefits of new digital technologies are shared and the negative effects are kept to a minimum. For example, the EU has put forward plans to require sharing of data in order to stop monopolies from getting stronger by holding on to data. But giving people control over their own data won't be enough. Without proper regulation, people will give their data to digital giants and internet providers and get very little in return. There are just too many differences in information and power to guarantee a fair result.<sup>139</sup> Again, we need new rules about advertising targeting and algorithmic openness, but they are not enough on their own. Policymakers must be able to deal with the fact that pricing and promotion can be used to discriminate.

There should also be stricter rules to protect privacy and stop the fast spread of false information, messages that support violence and hate, and other harmful messages, even if they are sent as part of a political campaign.<sup>140</sup> Developing countries need to cooperate and band together to have sufficient clout to impose regulation on global giants that reflects their developmental interests.

Future technical education need to develop finer skills to provide pupils with an advantage over traditional schooling. Audio editing, video editing, voice modulation, recorded coddling, little programming, and so on are fascinating skill sets that necessitate a finer and more nuanced understanding. These abilities are typically found in students who are imaginative or have a gentler side to their academic personality, allowing them to experiment and explore rather than obey the rules and stay between the lines. Today's students and youth are rejecting traditional career paths such as manager, accountant, doctor, lawyer, or administrator in favor of jobs that require far more technical knowledge and skill, such as digital sound or video editing, AI, ML, or IoT specialist, robot or data scientist, technologist, or engineer. We need to remember that, future world needs technician or engineer or technologist in advanced digital and smart knowledge, skills, expertise and capabilities. So, our education system and human resource development program should be along with such purposeful curriculum and syllabus which is able to prepare our new generation accordingly.

Technical education is all about developing skills. Skilled labor can undoubtedly boost production. Technical education teaches people skills and knowledge that are necessary for society and industry. Japan's rapid industrialization is attributed to the collection of technical skills, knowledge, and know-how, as well as its strong dedication to education, particularly technical professional training. Technical education not only increases analytical and functional abilities, but it also improves efficiency, skills, knowledge, and profitability, all of which are critical for any country's economic success. Artificial intelligence (AI) may now maximize profit while also accelerating inclusive growth. To decide which entrepreneurs and small firms are positioned to win, AI helps investment decisions by utilizing data rather than heuristics.<sup>141</sup> UNESCO and ILO at Geneva in 2002 have declared that, technical and vocational education as well as training is the prime-mover of a developing nation in the twenty first century. Earlier formal education was mostly associated either with humanities or with fields like engineering, medicine, and mathematics. An educated person usually involved somebody sitting in an office somewhere and doing purely intellectual work. On the other hand, technical education is the education which involved direct physical labor and practical application of one's skills. Modern society literally cannot exist without skilled labor force.<sup>142</sup> World's socioeconomic landscape keeps changing; the importance of technical education steadily grows. Both students and educational institutions now understand it. Computing Power, Smarter Devices, Datafication (such as coding), AI and Machine Learning (ML), Extended Reality, Digital Trust, 3D Printing, Genomics, New Energy Solutions, Robotic Process Automation (RPA), Edge Computing, Quantum Computing, Virtual Reality and Augmented Reality, Blockchain, Internet of Things (IoT), 5G, Cyber Security, and other emerging technology trends are on the horizon.<sup>143</sup>

Artificial General Intelligence (AGI) is means that an autonomous system which outperforms humans' at most economically valuable tasks.<sup>144</sup> AGI is a sort of fictitious intelligent agent. The idea behind AGI is that it can learn to execute any intellectual attempt that humans or animals can do.<sup>145</sup> Nowadays, AGI is a common topic in science fiction. AGI is also known as strong AI,<sup>146</sup> or full AI,<sup>147</sup> or general intelligent action.<sup>148</sup> Strong AI, usually known as artificial AGI or general AI, and that is a theoretical form of AI used to describe a certain mindset of AI development. Creating AGI is a primary goal of some AI research and companies such as OpenAI,<sup>149</sup> DeepMind, and Anthropic.<sup>150</sup> If researchers are able to develop Strong AI or the machine would require intelligence equal to humans; it would have a self-aware consciousness that has the ability to solve problems, learn, and plan for the future.<sup>151</sup> Actually, we aren't sure if current deep learning systems like GPT-4 are an early but incomplete form of AGI or if we need to try something new.<sup>152</sup> Now question arise, is AGI a global threat? Several influential people in the field of AI fear that humanity's future may be permanently altered when superintelligent robots or well known as a singularity and they will take over the world and either make humans completely dependent on them or do away with them altogether.<sup>153</sup> In engineering, a mechanical singularity is a position or configuration of a mechanism or a machine where the subsequent behavior cannot be predicted, or the forces or other physical quantities involved become infinite or nondeterministic.<sup>154</sup>

The late theoretical physicist Stephen Hawking famously said that ‘if AI started to create better AI than human programmers, the result could be machines smarter than us by more than we are smarter than snails.’ Twitter Boss Elon Musk warned that, AGI is the biggest existential threat to humans and he has added, ‘unrestrained development of AI poses a potential existential threat to humanity as ChatGPT explodes in popularity.’<sup>155</sup> Efforts to bring it about, he has told, are like ‘summoning the demon’. He has even expressed concern that his pal, Google co-founder Larry Page could accidentally shepherd something ‘evil’ into existence despite his best intentions.<sup>156</sup> Even Gyongyosi is not overly concerned about AI forecasts, but he believes that at some time, humans will no longer need to educate systems; they will learn and evolve on their own. He also said, ‘I don’t think the methods we’re doing now in these areas will lead to machines that decide to kill us. I believe that in five or ten years, I’ll have to reconsider that statement because we’ll have different methodologies and approaches to these issues.’ Even though killing robots might stay the stuff of fiction, many people think they’ll replace humans in different ways.

A median number of respondents said that machines will be able to write school essays by 2026; and self-driving trucks will make truck drivers obsolete by 2027. AI will beat humans in retail by 2031 and that AI could be the next Stephen King, and the next Charlie Teo by 2049 and 2053 respectively.<sup>157</sup> It is slightly harsh to say that, by 2137, all human jobs may be automated. Question is what will happen for humans themselves? Diego Klabjan, a professor at Northwestern University and founding director of the school’s Master of Science in Analytics program, counts himself an AGI skeptic or disbeliever. He has said, ‘Currently computers can handle a little more than 10,000 words. So, a few million neurons of future robot; but human brains have billions of neurons that are connected in a very intriguing and complex way, and the current state-of-the-art technology is just straight forward connections following very easy patterns. So going from a few million neurons to billions of neurons with current hardware and software technologies; I don’t see that happening.’ As MIT physics professors and leading AI researcher Max Tegmark in 2018 has said, ‘The real threat from AI isn’t malice, like in silly Hollywood movies, but competence AI accomplishing goals that just aren’t aligned with ours.’ Another AI expert Laird’s has said ‘I definitely don’t envision the situation where something wakes up and says it wants to take over the world. I think that’s science fiction, and that’s not how things will turn out.’ In fact, there need to be several big breakthroughs, and they could happen very quickly.<sup>158</sup>

At present, the question is whether the ethical use of AGI should be regulated and that includes striving to eliminate data bias, which corrupts algorithms and is now a thorn in the AI ointment. That involves developing and improving security systems capable of keeping technology in check. Actually ‘AI poses an existential risk for humans’ requires significantly more investigation.<sup>159</sup> Though it is controversial, yet that has been endorsed by many great thinkers, tech-giant owners and public figures like Elon Musk,<sup>160</sup> Bill Gates,<sup>161</sup> and Stephen Hawking<sup>162</sup>. AI researchers like Stuart J. Russell,<sup>163</sup> Roman Yampolskiy<sup>164</sup>, and Alexey Turchin<sup>165</sup>, also support the basic idea and proposition of a potential threat to humanity.<sup>166</sup> Some of them like Bill Gates states that, ‘people understand; but why some people are not concerned.’<sup>167</sup> Stephen Hawking criticized widespread indifference in his 2014 editorial. Consequently, when confronted with possible futures with incalculable benefits and risks, specialists often do everything possible to ensure the best outcome, whether or not this is correct! Stephen Hawking has explained as, ‘If a superior alien civilization sent us a message stating that we’ll arrive in a few decades, we’d arrive in a few decades.’ Would it suffice for us to respond, ‘Okay, call us when you arrive; we’ll leave the lights on?’ Probably not, but this is essentially the case with AI.<sup>168</sup> The fate of humanity has occasionally been compared to the fate of gorillas threatened by human activities. Additional intelligence caused humanity to dominate gorillas, which are now vulnerable in ways that they could not have anticipated.<sup>169</sup> The gorilla has become an endangered species, not out of malice, but simply as security damage from human activities.<sup>170</sup>

LeCun told the BBC that people who worried that AI might be dangerous for humans did so because they couldn’t see how it could be made safe. He also thinks that AGIs won’t want to rule over humans and those we shouldn’t give them human traits or try to figure out what they want in the same way we do with humans. He also added that people won’t be ‘smart enough to make super-smart machines, but so stupid that they will give them stupid goals with no safety measures.’<sup>171</sup> On the other side, the concept of instrumental convergence suggests that almost whatever their goals, intelligent agents will have reasons to try to survive and acquire more power as intermediary steps to achieving these goals. And this does not require having emotions. Nick Bostrom gives the thought experiment of the paper clips optimizer.<sup>172</sup> Let’s say we have an AI whose only goal is to make as many paper clips as possible.

The AI will soon realize that it would be vastly preferable if there were no humans, as they may choose to deactivate it. The development of unsafe AGI, or AGIs with poor ethics, morals, and values or inadequate management of AGI will create existential risks and will be potential threats and that will always consider as the risks associated with AGI.<sup>173</sup> Many scholars who are concerned about existential risk support research into solving the hard ‘control problem’ to answer questions like, what kinds of safeguards, algorithms, or architectures can programmers use to make it more likely that their AI will continue to act in a friendly, rather than destructive way after it reaches superintelligence?<sup>174</sup> Solving the control problem is complicated by the AI arms race, which will almost certainly see the militarization and weaponization of AGI<sup>175</sup> by more than one nation-state, resulting in AGI-enabled warfare, and in the case of AI misalignment, AGI-directed warfare, potentially against all humanity.<sup>176</sup> There are others who argue that AI poses an existential threat. Skeptics have accused the thesis of being crypto-religious, with an irrational belief in the possibility of superintelligence replacing an irrational belief in an omnipotent God. In 2015 former Vice President Baidu and Chief Scientist Andrew Ng said that ‘worrying about AI existential risk is like worrying about overpopulation on Mars when we have not even set foot on the planet yet.’<sup>177</sup>

In 2023 the CEOs of Google DeepMind, OpenAI and Anthropic, along with other industry leaders and researchers issued a joint statement asserting that ‘Mitigating the risk of extinction from AI should be a global priority alongside other societal-scale risks such as pandemics and nuclear war.’<sup>178</sup> If AI producing sectors expand, it may result in increased revenues and employment of AI technological professionals within these existing firms, as well as the potential creation of entirely new economic activities in any country's society. Productivity improvements in existing sectors may be realized through faster and more efficient processes and decision making, as well as increased AI technological knowledge and access to information available in societies.<sup>179</sup> Office workers seem to be the most impacted notably mathematicians, accountants or web designers.<sup>180</sup> AGI could boost these systems' autonomy, allowing them to make judgments, interact with other computer tools, and even control robotized bodies. We know that, AI is getting better every day in a world of Google Glass and massive data, clever algorithms and Sire. Though these smart technologies and programs may make our lives easier, they may also put us in risk. It has the potential to result in mass unemployment in near future.<sup>181</sup>

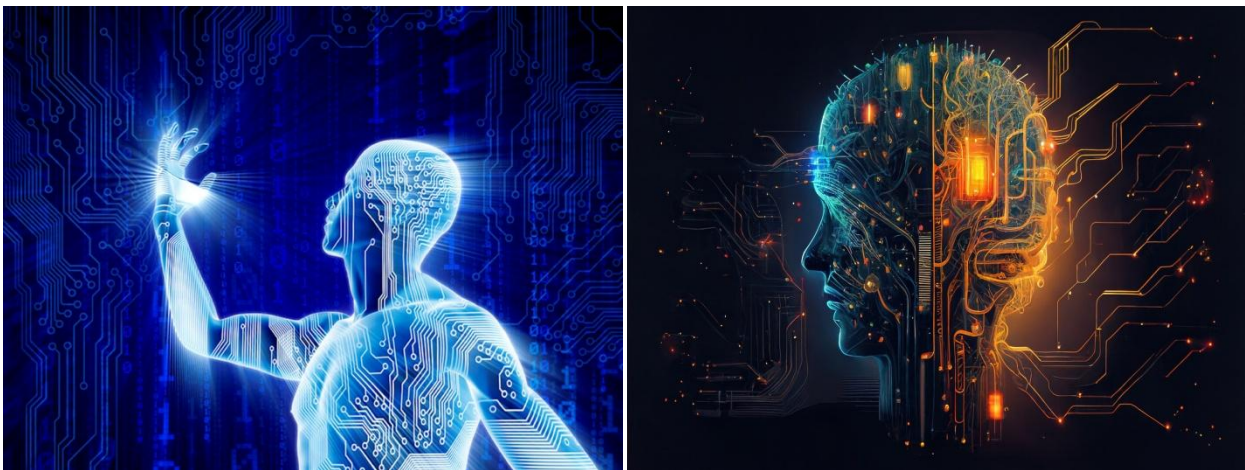


Figure 4: AI and Singularity: A threat to humanity or a promise of a better future<sup>182,183</sup>

## Conclusion

There is a great deal we can do using AI to improve the quality of our service and the success of our business, company, or organization. If AI is deployed properly, it will allow us to maximize productivity across all departments, boost sales and customer happiness, and make better use of our resources. This is why AI is being used by so many different kinds of businesses and organizations these days. Some examples of these sectors include the automotive, healthcare, financial, manufacturing, energy, agriculture, military, telecommunication, cybersecurity, etc. Today, AI is showing to be a real game-changer in the health care field. It is improving almost every part of the business, from keeping private records safe to using robots to help with surgeries. Increasing automation in manufacturing could cause wage gaps to widen, labor demand to drop, and skill premium to rise in most countries. There will be a high degree of uncertainty regarding the conceivable technological development scenarios and their effects.

This is the biggest challenges of extensive use of AI in future. Challenge of AI in general and AGI in particular at future will be more distinguishing and alarming. In the near future, white collar and middle-class jobs will be threatened due to excessive use of AI. On the other hand, service and care occupations are expected to see a rise in demand. There is no doubt that, AI, IoT, ML, big data and automation will reduce the need for human workers as well as the size of the economy. Again the extreme challenge of AI/AGI is ‘Singularity’ in which AI machines take over and fundamentally alter human existence either by making us dependent on them or eliminating us altogether. Another major threat is to the humanity on a global scale. Again, the end of humanity is possible at any time, if super-intelligent robots gain access to nuclear weapons or develop biological or chemical agents in mass scale. Those devastating or horrifying tasks could be carried out at any time, either by super clever robots themselves or by some ignorant or criminal acting out of anger or malice or stupidity.

There should be global coordination, regulations, rules to guide AI use and advancement in a positive humane path. There will be a need for humans in some capacities as AI grows more omnipresent in the workplace. But repeated job, continuous or monotonous task, mass production, line production, laborious job, will be taken by robots or AI used machinery, equipments, households, system, etc. However, in the field of creativity, complicated problem solving and qualitative abilities, advanced AI or superintelligent robots cannot replicate, and there will be more demand of human in these positions. So, there will always be some demand for workers, though their specific functions may change as technology improves. There will be a shift in the kinds of talents that are in demand, and many of these positions will call for a higher level of technological expertise. According to Mr. LeCun, the entire concept of AI taking over the globe is a ‘projection of human nature on machines. LeCun also told to the BBC that, AI will not knock many people out of work permanently. However, work would alter because we have 'no notion' what the most remarkable jobs will be in next 20 years. We need to prepare ourselves to face the challenges coming ahead. AI, robotics, and automation advancements have rushed during the pandemic. Jobs lost during the pandemic are being rapidly replaced by robotics and AI. The adoption of digital infrastructure across all industries has transformed how we operate and enabled new collaborations across geographies and sectors. ML enables cutting-edge analysis of streaming data while also offering data catalogs to assist in making sense of complex large enterprise database architectures that have accumulated over time. Customized IoT networks not only sense and report inputs across remote networks, but they also foresee problems. According to the International Labor Organization (ILO), employment in ICT-related industries increased the most during the epidemic. Demand for digital, IoT, AI, and ML skilled individuals will continue to rise as digitization and the smart world advance across all industries and service sectors. Future employment will necessitate digital and smart abilities ranging from beginner to advance. Digitization and smart technology will eventually necessitate increasingly advanced digital and smart skills, knowledge, and capabilities in the regions, sectors, and occupations where employment development is stimulated. Once again, such a change creates enormous investment opportunities in training and develops skill. To meet the future challenged, the education, training, and learning sectors must be prepared and develop accordingly. We need some effective and new level of regulatory and certification process to ensure the best use of AI for entire human race.

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Rear Admiral Khandakar Akhter Hossain, NUP, ndc, psc, PhD, BN, join Bangladesh Navy (BN) as cadet in 1988 and got commission in engineering branch and is working last 35 years with excellent reputation in home and abroad. He did his BSc and MSc Engineering in naval architecture and marine engineering with distinct result (1<sup>st</sup> Class 1<sup>st</sup>) from Bangladesh University of Engineering and Technology (BUET). He did his PhD both from California, USA and from BUET. He successfully works as Managing Director (MD) in all three shipyards/dockyards run by Bangladesh Navy and has contributed national shipbuilding industry. He has served as Head/Dean of NAME/ME Dept/Faculty in MIST. He is also served as Commodore Superintendent Dockyard and chairman BN Dockyard Technical Institute at Chattogram. He is a fellow of three prestigious global institutes named as IEB (BD), RINA (UK) and IAMSP (USA). He has more than hundred international publications/papers in different international technical journals. Presently he is serving as Assistant Chief of the Naval Staff (Materiel) in Bangladesh Navy.

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