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# What role will Artificial Intelligence play in the future?

## Introduction

The question of how artificial intelligence (AI) will affect the future is a prominent one for today’s generation. Our involvement with and dependency on technology and computers is increasing drastically as the technology develops. According to an article by Trendhunter [1] in 2014, as much as 66% of the population suffered from nomophobia (the fear of being without one’s mobile phone). With technology becoming so important in our day to day lives, it begs the question of what will it look like in the future? In this essay I will discuss what AI is and what role it will play in our future.

## What Is Artificial Intelligence?

Artificial intelligence as described in the Cambridge dictionary [2] is “The study of how to produce machines that have some of the qualities that the human mind has, such as the ability to understand language, recognize pictures, solve problems and learn.” Put simply, programming computers to do tasks that are usually done by humans.

According to Nikita Duggal [3] , [4] there are three factors that are required to classify a piece of software as Artificial intelligence. Generalised learning, Reasoning and problem solving.

Generalised learning is the software’s ability to adapt and react appropriately to a new situation / environment. This is a vital part of AI and is arguably the most important characteristic when separating AI from other software. Reasoning is the process of the software deciding which option or route to take based on the circumstances it is in. The idea of the software being intelligent enough to make an executive decision which will affect future decisions is a critical factor of AI. Problem solving in terms of AI is the process of the software taking a given input and using it to solve or find the solution to a problem. These three factors are important to note when distinguishing between software and AI. She also discussed that there are three main types of AI. Weak AI, Strong AI and Super AI.

Weak AI is the current form of AI being used today. This is where a piece of software can focus on one task and cannot perform beyond its limitations. Contrary to popular belief, digital assistants such as the amazon Alexa are examples of weak AI. Despite Alexa being able to answer many questions and perform many tasks, it cannot answer a question which it is not trained / programmed to answer. This makes it a form of weak AI.

Strong AI is the form of AI which researchers are striving to achieve through the process of upgrading weak AI. Strong AI is where the software can learn any intellectual task that a human being can, and essentially makes its own decisions. Bernard Marr [5] explains that weak AI is the only form that exists today, and that strong AI will be achieved when machines have the cognitive abilities that humans have without any human intervention. This can be positive in the sense that it opens doors for future development and could increase efficiency in areas such as retail and banking, but also negative in the sense that the AI is now unpredictable which could lead to potential ethical issues.

Super AI is a form of AI which still in the theoretical stage. Concisely explained by Techopedia, [6] super AI or superintelligence is “an intelligence system that rapidly increases its intelligence in a short time, specifically, to surpass the cognitive capability of the average human being”. This research is useful as it provides an understanding of where we currently are in terms of advancement of AI software. Knowing the different types of AI is important when considering the direction of advancement in the future.

## Current examples of Artificial Intelligence

The world is currently developing weak AI and researching strong AI. At this current point in time, AI is used in almost every large company / organisation. It has become a very important part of our lives and many do not even realise it.

As mentioned by Sasha Reeves [7] in her article discussing everyday examples of AI, a prime example of artificial intelligence in today’s age is a chatbot. Chatbots are used by companies to answer customer queries to make it easier for the company and less time consuming for the customer. An artificially intelligent solution to the problem of getting customer queries answered is the use of algorithms to train machines to cater to customers via chatbots. This enables the machines to answer frequently asked questions and take and track orders. This is a good example of the positive impact that AI can have. It saves the companies a large amount of time and money as they do not have to employ workers to respond to online queries but instead use software to complete the task instead.

Similarly, a further example she discussed was the use of digital assistants. These digital assistants are used to help humans with everyday activities and make simple tasks much easier and quicker to do. This is a contrast to the chatbots which are used more in large companies as most digital assistants are used domestically. An example of a well-known digital assistant which has become prominent in recent years is the amazon echo “Alexa”. Alexa is similar to Apple’s Siri in the sense that they are both primarily voice activated and have programmed and changeable voices. However, unlike Siri, Alexa is more used for playing music and non-visual tasks due to its lack of GUI. Alexa is a great example of a constantly evolving and positive AI. Alexa has been used in millions of households worldwide. An article by Bloomberg Businessweek [8] states that Amazon determined that 25% of U.S. households have at least one Alexa device. This digital assistant is particularly useful to help the older generation who may find it difficult to perform seemingly simple tasks. For example, an elderly person with less mobility than others may find it difficult to turn on and off the lights at different intervals during the day. Alexa has evolved its AI software to incorporate hardware such as the “Smart light bulbs” which can be linked via an app to allow a user to verbally turn lights on and off. The digital assistant market is huge with a large amount of competition including the Google, Amazon, Android and Apple versions of this software, each with their own unique features.

One digital assistant that is particularly advanced is the “Olly” voice controlled digital assistant created by Emotech. This software’s personality comes from a mix of machine learning algorithms which allow the robot to be more like its owner, giving it what is marketed as an “evolving personality”. Sam Daley [9] says that Emotech’s Ai-powered technology can understand a user’s facial expressions, voice inflections and verbal patterns to proactively start conversations and make pertinent suggestions. This is an aspect of AI that many researchers and developers are striving to improve. A robot that can hold and initiate conversation would increase the effectiveness of chat bots, eventually getting to a stage where AI is able to answer almost every query a customer may have. Currently the AI used in customer assistance has a pre-determined list of questions the customer may ask and different ways of phrasing the question, along with a list of answers they can provide. However, this software is typically only used to narrow down the problem, making it easier for a human to then pick up where the AI left and ultimately help the customer. The development of AI that evolves to situations and questions could increase productivity across many companies as it frees up the humans to perform more important tasks that cannot be completed by software.

Olly’s visual abilities means that it is one of the most advanced voice assistants currently available. Not only is it capable of movement, being able to orient itself toward the user when determining what task to perform next, if for example the assistant sees you resting your head, it could ask if you’ve had a long day and can recommend certain music genres. The development of this type of AI is certainly a step in the right direction in terms of developing fully functioning chatbots, and eventually digital assistants so talented, they could replace everyday tasks such as washing up, cleaning or preparing food.

The healthcare industry has also been greatly affected by the development and implementation of AI. According to Accenture analysis [10], key clinical health AI applications could potentially create $150 billion in annual savings for the US healthcare economy by 2026. The top three AI applications that save the most money are: Robot assisted surgery ($40 billion), Virtual nursing assistants ($20 billion) and Administrative workflow assistance ($18 billion). An important application to note is the AI-enabled virtual assistants, which are being used to reduce unnecessary hospital visits are giving nurses 20% of their time back in the process. This was particularly useful during the COVID-19 pandemic in which many hospitals were full up with patients and nurses could not see them all. The application of robotic surgery or robot assisted surgery is one that has the potential to be invaluable in the future. According to the medical centre Mayo Clinic [11] robot assisted surgery includes a camera arm and mechanical arms with surgical instruments attached to them. The surgeon is then seated at a computer console which controls the robotic arm and can perform the operation. This current form of robotic surgery allows the surgeon to perform much smaller and more precise incisions, resulting in quicker recoveries and less noticeable scars. Over time as the technology advances, the surgeon will have to do less and less to control the robot until eventually they will just have to oversee the robot surgery to ensure nothing goes wrong.

From this we can see that AI technology is currently in a strong position, providing serious help in many prominent areas of our lives such as healthcare. The current examples must be noted to provide a foundation of the discussion regarding where AI will head in the future.

## Artificial Intelligence in the future

There are many ways in which AI will affect our lives and change the world in the future. According to Mike Thomas [12] there are 6 main ways artificial intelligence will change the world. These are: Transportation, manufacturing, healthcare, education, media and customer service.

### The impact of AI on Transport

In terms of transportation, the main method of incorporating AI is to develop self-driving cars. He states “Although it could take a decade or more to perfect them, autonomous cars will one day ferry us from place to place”.

Technology reporter Cristina Criddle [13] described the development of self-driving cars in an article for the BBC. She reported that according to the government, Self-driving cars could be allowed on UK roads by the end of 2021 and start of 2022. The first type of hands-free driving to be legalised would be a system known as ALKS (automated lane-keeping systems). This technology would have the ability to control the speed and position of a vehicle in a single lane. The government stated that it is designed for use on a motorway in slow traffic, it is limited to 37mph. A primary benefit of this system is that control of the vehicle can be easily and safely returned to the driver when required. The government states that this simple but effective technology could improve road safety by reducing human error which contributes to over 85% of accidents. This technology means that the driver will be able to hand control over to the vehicle which will then constantly monitor the speed and keep a safe distance from other cars. SMMT Chief Executive Mike Hawes was reported to have said “Automated driving systems could prevent 47,000 serious accidents and save 3,900 lives over the next decade through their ability to reduce the single largest cause of road accidents – human error.”

This potential benefit means it is logical to assume that this will be an area that is focused on as the level of technology increases. It is likely that government budgets and spending will be focused on aspects that protect and save lives such as healthcare and reducing accidents on the road. Therefore, it is very likely that the development of AI in the area of transport will be seen in the near future.

The closest to self-driving cars we have currently is Tesla’s optional driver assistance system. Which has two additional purchasable features available on the new vehicles: “Autopilot” and “Full self-driving capability”. According to the Tesla Website [14], Autopilot is an “advanced driver assistance system that enhances safety and convenience behind the wheel”. This system is standard on every new tesla vehicle. The autopilot system has two main features which allow for an easier driving experience for the driver but currently Tesla clearly states that the self-driving features do not make the vehicle fully autonomous and still require driver supervision.

One of the most interesting and potentially ground-breaking examples of AI within self-driving cars in Tesla’s “smart summon” feature. They describe it as a feature which allows your car to “navigate more complex environments and parking spaces, manoeuvring around objects as necessary to come and find you in a carpark within your direct vicinity.” In essence, the driver uses the Tesla app to send a location to the vehicle which then drives the vehicle to this location. This piece of technology is available in current tesla cars however the AI is not advanced enough currently to allow for use on public roads. This technology works by detecting objects via the “8 external cameras, 12 ultrasonic sensors and a powerful onboard computer”.

The development of this software is very important as it provides a stepping stone for potential improvements in the future. For example, this could lead to fully autonomous cars that do not need a human driver. The human could merely sit in the passenger seat and set the location.

### The impact of AI on the military

Autonomous military systems that can pick their own targets and strike have already been developed and are being deployed across the world. Russia in particular seem very enthusiastic about the destructive potential of AI, over the past few years their defence ministry has taken research and development very seriously, continuing to integrate AI into their military systems. An article published by Gerrit De Vynck [15] explained the current state of military AI and the direction it will go. The most notable form of AI in military systems is the drone strikes. These drones can be controlled directly by humans, or can be programmed to pick and destroy a target themselves. A prime example of autonomous weapons being implemented is in 2010 when the arms division of Samsung designed and developed autonomous sentry guns that use image recognition to spot humans and fire at them. We have seen similar technology and weapons be deployed by Israel on its border with the Gaza strip. However, there are currently many debates on the ethics of using automated weapons to kill humans. There is no doubt these debates will continue and get more intense as the technology advances in the future. Many are concerned about the dangers of relying on computers because AI algorithms are essentially only as good as the data set and program that trained them. Studies have also shown that the AI facial recognition programs used are better at identifying white faces than black or brown faces. This raises many concerns as to whether governments should be deploying these systems in combat. There are already efforts to ban the use of lethal autonomous weapons in combat, a movement which is supported by 30 countries. Although, many countries who advocate the use of AI military systems including Russia and the USA have stated that the concerns are overblown because humans can monitor the systems and easily regain control.

It is difficult to say the path the military will take on autonomous weapons and systems because the technology is evolving so rapidly and the possibility of them being banned is becoming more likely the more lethal these systems become. However, it is a logical assumption that AI military systems will continue to evolve and be deployed in combat but with specific conditions regarding the level of human involvement and the method of assassination.

### The impact of AI on Education

Technology is becoming more and more important in education. We have already seen in recent years the conversion from physical recourses to digital ones. The primary advantage of digitalising learning resources is that it saves time. Put simply, the time that the teacher uses to organise worksheets, print off copies and write questions, could be better spent on teaching the students. In an article written by David Karandish [16], he talks about the importance of the automation of administrative work, assessing learning patterns and replying to general questions. He says that teachers spend 31% of their time planning lessons, marking assessments and doing administrative work. Therefore, if technology can automate these processes, it would leave the teachers more time to focus on teaching core competencies

The development of AI that can organise resources is no doubt one we will see soon. A further system we are likely to see being developed fully is personalised AI programs that use machine learning to view the history of students to offer personalised resources and other materials. An issue that many students who are struggling academically have is that teachers don’t have the free time for students after hours. The development of AI tutors and chatbots could potentially provide a solution to this problem. The technology for a basic student chatbot already exists today, with students being able to ask simple questions and the software being able to produce a response. It is the logical assumption that this technology will continue to advance over time to become more and more independent. This solution also has the added benefit that it will be available 24/7, unlike teachers. This will also be of huge use to the teachers as they will not have to spend their time answering frequently asked questions that could be answered by a piece of software.

AI will greatly affect security in education also. Some Chinese academic institutions have started using AI-powered facial recognition cans to identify students. This theoretically eliminates the need for student ID cards, and can also provide greater security for students as they could potentially buy lunch or take a book out of the library for example. The implementation of facial recognition software as a whole in education is one that is very probable to occur in the near future. The added security benefits it provides, as well as a way to stop using plastics such as that needed to make lanyards and ID cards is likely to be capitalised upon in the future.

It's clear that AI will take a multitude of forms in the future, many of which will be beyond our current imagination. The huge potential in the military and education markets will be among the first areas to receive significant funding for developing the AI technology.

While one can predict the direction of where this technology will go, it is impossible to say for certain. Technology is advancing at such a rate that it is difficult to suggest what technology may exist in the near future.

## Advantages and disadvantages of artificial intelligence

The most common concern surrounding the rapid development of AI is the possibility of a “Robot uprising”, more specifically, the AI becoming so advanced that they can control themselves and rebel against humans. Patrick Tucker [17] stated that “We can’t appreciate the obsessive devotion of a computer program to the thing it programmed to do”, meaning that the only purpose of AI is to execute the task it has been programmed to do, and it will put that as its first and main priority. He also stated that “The more logical the robot, the more likely it is to fight you to the death”.

His argument, that AI will always continue to do what it has set out to do, is beneficial when the AI is given a simple task to complete such as Excel, but becomes a major problem when dealing with more complex problems – such as when AI entities are used to take over weapons, utilities or other dangerous or valuable assets. It has been shown that these programs do not worry about the cost in terms of relationships, or discomfort for others or any form of empathy. He explained that the only way to get a program or robot to worry about these costs is if they present a clear barrier to the primary function, in other words if it stops the AI from completing the task it has been programmed to do.

On the other hand, according to Will Knight [18] it is unlikely that a robot uprising will happen in the near future. He states in his article on the topic of how a robot uprising will begin that “Anyone worried about a robot uprising need only step inside a modern factory to see how far away that is. Most robots are powerful and precise but can’t do anything unless programmed meticulously”. This links to Nikita Duggal [2] and her definition of weak AI in that it can only perform a task that it has been programmed specifically to do. In essence, he is saying that the level of AI that would be needed to reach a full “Robot uprising” is so advanced and far off, that it does not actually pose a threat, and will not any time soon. It is important to remember that for a robot uprising to actually take place, both the software and robots must reach such a level that they can make decisions for themselves and are more intelligent than the humans who will be attempting to stop this uprising.

He further explains that in recent years, AI software has become exceptionally skilled at tasks such as identifying images and winning board games, and that it is even able to teach itself new abilities if it is given enough time to practice. However, this is only the software versions of the AI. He says “Al this while AI’s hardware cousins, robots, struggle to open a door or pick up an apple”. This is true to an extent, while it is definitely true that the software capabilities of AI are leaps and bounds ahead of the hardware counterparts, there are many robots which can do a given job very effectively. For example, Amazon’s robot “Ernie” is described by Alan Boyle [19] as a robot which is “designed to take boxy product containers known as totes off shelves at different heights, and then use its robotic arm to deliver the totes to warehouse employees at a standard height.” This is a prime example of weak AI as it is specifically programmed to do a singular task. Therefore, while Will Knight is correct in the sense that hardware AI is further behind, it is still being developed and made more efficient as we speak. He reported that workplace robots that are equipped with AI capabilities will be the bridge to transitioning into AI in the workplace, this would be through replacing humans anywhere that products need to be sorted, unpacked or packed, and that while there may not be an “uprising”, a revolution is inevitable, with not just robots but AI also. He says that “putting Ai software into a physical body allows it to get smarter as it feeds on more data” and that with every task it completes, it becomes more adept at making sense of the world and how it works.

A further concern with AI is the very high cost of development, implementation and maintenance. Andrei Klubnikin [20] reported that, while it is difficult to estimate the cost of developing and implementing an AI application without knowing specific details, “you may easily spend $50 thousand on a very basic version of the system you’re looking to build”. This is a large disadvantage of AI as often the applications that are required are very large and require a long development process which will ultimately be more expensive. For larger companies this is less of a problem, however for smaller companies this could cause an issue. This is also an issue as the market of AI is expanding drastically with time. He says that “by 2030, AI could contribute up to $15.7 trillion to the global economy, with increased productivity and automation driving the lion’s share of this sum”. This is one of the main problems in the technology industry. While it is beneficial that technology is improving rapidly as it is making our lives easier and we are discovering new things, because the technology is increasing, the cost to develop and maintain is also increasing. As time goes on, the machines will become more advanced and the cost to maintain and fix them when they go wrong will go up.

A further disadvantage and potential problem with AI the increase in unemployment. In Sunil Kumars [21] article on the advantages and disadvantages of artificial intelligence, he states that “As Ai is replacing the majority of the repetitive tasks and other works with robots, human interference is becoming less which will cause a major problem in the employment standards. Every organization is looking to replace the minimum qualified individuals with AI robots which can do similar work with more efficiency”.

A study and report from McKinsey Global Institute [22] says that by 2030, AI software and robots could replace as much as 30 percent of the worlds current human labour. McKinsey suggests that depending on how the AI is adopted, automation will displace between 400 and 800 million human jobs by 2030, and this would cause up to 375 million people to switch job categories entirely. It is undeniably true that the implementation of AI software at a rapid rate could potentially cause high levels of unemployment in certain fields of work. However, it is also true that the level of AI we are currently on (weak AI) is only able to perform a singular task when programmed to do it. Therefore, it would be quite difficult for AI to actually replace an entire occupation because in almost every job there are tasks that software is not able to complete. Furthermore, the development and implementation of AI will create many new jobs in the future. This could be because the technical innovations we have currently and the ones we are developing are likely to continue to enhance the productivity and efficiency of workers, this would in turn create new products and thus new markets, resulting in many new jobs being created. Also, as the software and machines become more advanced it is likely that there will be major help needed in the maintenance and prototyping of this technology, creating more job opportunities.

There are many benefits regarding the development of AI. Possibly the most beneficial advantage of AI is the potential for development of a robot that can take risks in place of humans. This can be in situations such as space exploration, deep sea exploration and bomb disposal. A prime example of an advanced piece of AI used to reduce the risk to humans is the Indian bomb disposal robot “DRDO Daksh”. Which, according to Harshajit Sarmah [23] can be “remotely controlled from a range of over 500m for location, handling and destroying hazardous objects safely”. The same technology can be applied to all kinds of man-made or natural disasters. For example, the nuclear power plant explosion in Chernobyl was in a time before AI-powered robots could minimize the effect of radiation by controlling the fire in an early stage. They eventually poured sand from helicopters to help reduce the spread of flames. If there was AI-powered robots with the technology and capability to put out fires, made of a material that could at least somewhat withstand the conditions of the plant, it could have been controlled at an earlier stage. This has also been seen in space exploration via robots such as the Mars rover. This is a prominent advantage of AI as it means that the risk to humans is next to none. However, this also comes at a greater cost as the development of these robots are obviously larger than the cost of sending a human to complete the task.

A further advantage of AI is its ability to work and be available 24 hours a day, 7 days a week. This can be seen in the workplace for example. The average human works for around 4-6 hours excluding breaks. The productivity of a human is therefore limited as they need breaks and nutrition. However, robots and AI programs do not need breaks and thus can work almost constantly if programmed to do so. This can therefore be very helpful in repetitive but simple tasks such as packaging and moving objects. This is a large advantage as it allows the humans to prioritise their time and focus on tasks that an AI robot cannot perform, such as creative tasks or decisions involving emotion and empathy.

Moreover, a strength that has already been mentioned but must not be forgotten is the reduction in human error. The primary reason behind the development of the self-driving car, human error is a problem that can be overcome via the discipline that comes with AI software. An article by Information System Engineering [24] stated that 23% of all unplanned downtime in manufacturing is due to human error. An example of a human error that cost a substantial amount of money was the engineers who worked on the Mars Climate Orbiter failed to convert between units of measurement properly, resulting in a $327.6 million spacecraft being destroyed. This is a prime example of tasks that could be performed by software to result in more accurate results and no human error.

## Conclusion

Overall, it is clear to see that the development and maintenance of AI will most certainly have a great effect on our lives in the future. Through many aspects of our lives, AI will undoubtably make our lives simpler through the use of home assistants, automated super market checkouts and many other creations. However, it is important that researchers and developers take a slow, structured approach to developing the software more intelligent in order to avoid a scenario in which the AI is more intelligent than humans and are capable of making dangerous decisions. Ultimately, the debate as to whether the pros outweigh the cons is another discussion, but it is certain that AI will play a huge role in the future.

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