IT Technologies

Autonomous vehicle

What does it do? (600 words)

Zhang et al. (2021) found that the operation of independent autonomous vehicle deeply depends on its radars, cameras, sensors, and other equipment which might supported its present location, to received newest traffic condition and analysis for next route. In theory, autonomous vehicles will utilize these automobile components to act a series of operation. Specifically, After Driver launch the self-driving car, A standard self-driving car must have complex sensing system, the sensors provide the various information that contribute Autonomous cars to mapping surrounding environment. There are four important parts of sensors system. Firstly, radar sensors, its function is to watch other nearly vehicles' positions. Secondly, video cameras can do multiple activity likes keeping safe distance with other vehicle, detecting road signs and traffic signal, and searching for pedestrians. thirdly, Ultrasonic sensors plays positive role when self-driving car start parking itself because it might detect barrier and other vehicle. Fourthly, lidar sensors bounce pulses of light off the car's surroundings to measure distances, detect and identify lane markings. Once we learn how to drive, the coach often asks students to stay a secure distance of 2 seconds from the car in front. If there are adverse factors such as rain or road conditions, the quality of safe distance is expanded. However，for traditional drivers, excellent responsiveness is essential needed，because if the driver is in a good state of mind, he can avoid taking highest damage during a very short reaction time when accident happened. The same with AT technology, after autonomous vehicles finish collect enough information from outer environment, Autonomous vehicle will provide corresponding strategy immediately, to follow the traffic order and protect the owner's safety as much as possible while driving.

In fact, this process still cannot avoid traffic accident happens. Francesca M.et al (2017) states that self-driving cars being rear-ended in front of conventional cars was the most common type of collision, occurring twice as often as conventional cars. At the same time, Autonomous cars also appear to be ''fatigue driving''，The longer an autonomous car travels, the more likely it is to have a higher accident rate than a conventional driver for a given distance. To sum up, present self-driving technology is still just as difficult to cater to rear-end collisions as traditional drivers, and the autonomous vehicle technology has a lot of improvement space. To boost the related technology，reinforcement learning as a decent choice for the further

development of Autonomous vehicle, “Deep reinforcement learning paradigm can be used with success in various environments, developing agents capable of dealing with different tasks.” （Marina L, Sandu A，2017）. Collecting data through continuous use by users in random situations, analyze through algorithms, and at last come up with the most effective option.

Due to the technology of today's self-driving cars still immature, it has not been put into the market on a large scale, and only a small number of them are used as private cars and taxis. In next 3 year ，after three years, the adoption of self-driving cars will still be slow, the situation of Autonomous vehicles would not change too much. Stoma, “most driver would show great attachment to traditional self-driving” (Stoma Monika et al.2021), because potential obstacles of self-driving car will exist for a long time, for example, privacy concern.

What is the likely impact? (300words)

Autonomous vehicles as a technology, its positive and negative and positive impact are both exist. this impact of technological development is mainly reflected in the economy, society, law and so on. self-driving vehicle has less limitation for passengers by comparing with conventional car, it doesn’t mate passenger’s ages, driving license, or health condition like fatigued, this technology will provide all the people on society the new travel mode choice. And follow the development of related technologies, self-driving cars have better environmental perception capabilities and better responses to risk factors than human drivers, this phenomenon will lead to less traffic accident. On the other hand, many social problems would increase, especially in the legal liability, for example, if your Autonomous vehicles made a traffic accident, who should mainly be responsible for, the owner? Or the business? Present existing laws are not good at making judgments and penalties for accidents that may be caused by this product. And widespread using of self-driving car will lead to problem of unemployment. Many Taxis and bus driver will lose their job. For entrepreneur, they always put profit first, and overlook the feeling of original taxi drivers. They might utilize Autonomous cars can compete with taxi drivers for customers through price wars, attracting customer by cheaper fee, then, taxi driver will find that it going to be more difficult to earn money. Under this situation, taxi drivers will have two outcomes: becoming one of the unemployed, being a risk factor to social stability, or lowering the rental fee to ensure stable economic conditions by squeezing themselves. As a result, bus drivers and taxi drivers are biggest victims of the development of Autonomous vehicle technology. But this technology won’t fully replace conventional vehicles industry and Taxi driver. First, because of concerns about the safety of autonomous vehicles, no one will easily give control of their own lives to a car. Second, based on the real economic

basis of most customers, traditional cars are more competitive in price than automatic cars.

How will this affect you (300 words)

In my daily life, based on my present economic condition, I and my family member won't purchase any Autonomous vehicle, because we already have enough conventional vehicles for personal use. In the respect of public transportation, the way we travel may change. On the way to RMIT university, I can reach the location by automatic train and bus, sometimes, I would book the service of automatic cars, if necessary, A variety of public travel options are very valuable to me, especially since I still lack experience driving a car. But this technology won't change my lifestyle in a short time. But The essence of people needing vehicle is to transport people or objects from one place to another, and the automation of transportation may not change this essence. So, The nature of people needing transportation is to move people or objects from one place to another place, and automation of transportation probably hasn't changed that. So as a student, using autonomous cars didn't make my lifestyle any different.

This technology has different value to my family members who already have children, the group of parents often need to spend many to take children, utilizing self-driving car would partly free himself, let child back home independently. Autonomous vehicle technology also benefits for people who have job, when they must work overdue, this kind of transportation can take him go home on time by according to the user's needs, avoiding the occurrence of fatigue driving.

As for my friend, the impact would be similar with me, because most of my friends are teenage aged 17 to 25, Due to concerns about the security conditions at night， they don't have requirement to study and work overdue outside, so the impact on them would not effective.

Clouds, services servers

What is cloud technology

The cloud technology, also known as cloud computing, which stands as a method of computing based on the internet. "Cloud computing is the delivery of computing services" (Microsoft ,2022). It has pointed out the most important feature of cloud technology: They

do not necessarily depend on physical medium to work, but like cloud, you can catch it by any device that linked to the internet.

The feature and future

W3school 2022, *Deployment models in cloud computing* W3school, viewed 27 April, 2022<https://www.w3schools.in/cloud-computing/cloud-services>.

Currently , there are three types of major services from cloud , Software (SaaS), Platform (PaaS) and Infrastructure (IaaS) (W3school,2009-2022) .As the user of cloud technology ,there are no longer have necessary to walk to physical shops to find something , but just open the mobile applications there will be commodity list waiting for select , As long as you remember the account and password , the order can be created at any time on any device that linked to internet . After an order has been decided, it will transfer to the shop side. And in the view of those companies, it usually a large information from many users, that was a unignorable cost to take care within past, and the cloud technology fix that, reduce the middle cost by process data in virtual world, and large amount of virtualized data are easier to manage and analysis than physical papers. And today, cloud technology is already applied everywhere around us, from YouTube or google file that we used every day, to the industry like medic, constriction, education, or any area related with remote control, even the internet we used are most typical cloud technology, thought literally cloud like exist as a part of our daily life.

Though it is already half century after the idea of cloud came up, there are still many potential powers of cloud technology. IoT, which stands as internet of things, is coming conception based on cloud technology. In the predictable future, everything, even a fridge

can link to the internet and let you check how many foods you left, everything can be done and shared remotely. For further understand about many coming applies from cloud technology, it's also good idea to look how many steps it has crossed.

Base stones

Based on the intraduct from Agiles (Agiles,2020), The original idea of cloud technology came from John McCarthy (agiles,2020), saving, calculating and applications as IT service, shared computer (information resource) and networking access as three features. In the following years, operating system has been virtualized, email as new communicate method exist on computer, microprocessor is developed and made computer are able to get into normal family, around 1980's, mobile phone with first generation (1G) are invented as rise of World Wide Web, and then the conception of SaaS has formed, AWS form Amazon as prototype of cloud service open to sociality.

In that time, the increasing efficiency of data flow transform are start explosion as shown figure1 below (data rate increases ,2018), we saw the increases of data flow between different generations of mobile,

It seems a huge increase between 3G to 4G like explosion, but what need to remind is that we develop data transformation on mobile just after 40 years, and we touched milestone of 1000 Mbps from 0. Maybe there are not strong relation to cloud technology, but do not forget look back to the past. When we in the period of 1 and 2G, searching and mailing remotely are already impressive to the people at that time. After 3G we know that we can also watch videos and film remotely, but how can they image what an impact did

video platform and streaming video could be done in the time of 4G? From the figure 1 above we saw there are another incredible jump from 4 to 5 generation, cloud technology is the general frame we designed, and such break on base technology have create every brick to build it up to the cloud.

Impact

When we mention impact, the background of pandemic will be one of them, and the cloud technology are widely applying after

Like the two side of coin, although cloud technology brings bunch of benefit to sociality, there are still some problems waiting to solve. Security issues are near as greatest worries from people. An example is hacker attack during cloud IP transfer (Eric 2022). Every cloud, the service provider has a unique IP address to collect the manage the data from users, at the time that IP address stopped service but before the address gets deleted, the private information from user will keep send to there and cause the leak of personal information like address. Eric Pauley points out that many mobile users could easily share their information from apps, which might set their identity and reputations at risk.

But After complains , we have to remember what positive impact did cloud technology takes , many information platforms like YouTube , twitter and TikTok are typical Paas cloud product , when people can share the knowledge , life or another things without the limitation of location and device , it actually shared the shape of world , united the power of people in world like tale of babel tower , many people can even feed them self by share theirs life and skills , even just at home .

As individual, what cloud technology brings to me is the different working, or leaning method. Compare with past days, when I was learning in physical school, every class was necessary to go, almost had no second chance to go again. Lots of books and notes set for less missing on class. But during the background of pandemic, after everyone got at least one online device, I feel some of past are repeatable and able to search for anything. That does make life easier, for some classes I can just take a photo or watch the recordings. Even there was a family member of mine standing on shop about 5 minuets just because he forgot how to say “cash”, because everyone pays by ER code now.

On the other hand, cloud technology can virtually save information and share it with many people. There are usually a bunch of information to check. For sure, they are easier to save and share, but that will cost a lot of time to check and learn, epically when everyone has the mind of “shared are told”. Similar impact went to everyone, and we have to filter, analysis and learn that information from ourselves. The changes in communication and learning methods are still a challenge to many people today.

But I will keep a positive idea to feature of cloud technology. Because we already paid what we need to pay for different methods of learning, and cloud technology gives us feedback us the better life and a higher view in this world with many gifts that wait to explore. Generally, we are worth it. And we have time to fix up and keep chance to make further improvement with cloud technology.

IT Technology___Cybersecurity

What does it do (600)

What is the state of the art of this new technology?

Cybersecurity is the practice of keeping critical and sensitive information safe, which includes personally identifiable information (PII), protected health information (PHI), personal information, intellectual property, data and governmental and industry information systems free from attacking from digital attack and it is also called information technology (IT) security. It is built to fight against threats originated from either inside or outside from an organization.

According to research ("What is Cybersecurity? | IBM", 2022), it is estimated that data breach costed around USD 3.86 million around the world in 2020 and instead of addressing the dangerous of physical terrorism, the United States has recently declared that terrorism is no longer the largest threaten to their national security and cyber-attack should be considered as the greater threaten. Because one of the most powerful nations in the world expressed such concerns, Australia responded quickly. According to Australian Government Department of Defense(7"Bloomberg - Are you a robot?", 2022), Australian government has decided to invest $38 million to boost the nation's defense force and will recruit another 1,900 employees including hackers, language specialists and psychologists to enhance its defense ability. ("The 5 Latest Cyber Security Technologies for Your Business", 2022)

What can be done now?

For personal computer user, cyber security can protect people's computer from viruses and other malware infections by developing and using anti-virus and malware protection software and also keep people's computer up-to date with the latest security patches. For cybercriminals, they always interested in our personal identity information such as password, PIN, or other credit care related information. Cyber security can protect users' confidential information from being hacked.

When people shopping or transferring money online, data are transferred through internet from end-user to website administrator and cyber security can encrypt this data and encryption is the fundamental of cyber security. The Rivest-Shamir-Adleman algorithm (RSA) is the basis of encryption. The RSA algorithm can encrypt information through a public and private key and hacker can only get public key but cannot decrypt it. The RSA provides a powerful method to assure the confidentiality, integrity, authenticity, and non-repudiation of electronic communications and data storage.

Some specific cyber security tools build for cloud will be widely used because the future of cyber security is being shaped according to the demand of users and companies. In the future, cloud computing will be widely used because it is much cheaper, faster, and easier to put new services online and collect and compute data. Because of the above advantages, people will depend on cloud computing heavily and when moving everything to cloud, the leaking risk is higher and as a result, people may hope cyber security can solve this problem.

Cyber security can also be combined with Artificial Intelligence and create an automated security system. Because of the development of blockchain, bitcoin is widely used by cybercriminals. It is very hard to trace where the bitcoin goes so ransomware has become more

prolific and potent for years. As a result, cyber security will pay more attention to preventing cyberthreat instead of fixing current problems. As a result, in the future people may develop some kind of computer security algorithms which enables people to create specific bots. Those bots can search for potential risks and climate them although this algorithm still need human to maintain and improve it, to make those bots more productive and detect risks accurate.
Because of the pandemic, many people start to work at home and rise the demand of remote working. This caused the demand to assure the security of remote access and some companies have noticed this problem. Nowadays, some widely used software such as Microsoft teams and zoom can make sure the communication is safe and in the future, they may enhance their ability to prevent data leakage and critical remote worker should use a uni-purpose laptop that is only used to do certain task and cannot use email or USB.

What is the likely impact? (300 words)

As the rising amount of ransomware case, normal people, companies, even nations will pay more attention to security area just like people value their privacy in real life, they will not want other people violate their privacy in cyber world as well.

Normal people will learn more knowledge of cyber security and try some easy but effective method to protect themselves such as using a more complex password, do not use public WIFI. Nowadays, every industry is trying to be connect to internet. For small companies or small business owner, they simply make a website and put it online. They cannot afford to hiring security analysts to maintain their website which makes them valuable but instead they can purchase security service from cyber security company such as Nuance or JumpCloud. For large companies and nations, they are rich and can hire professional cybersecurity analysts and even organize a cyber security department to defense themselves.
As the developing of information technology, internet has literally linked everyone, every company and every nation. Just like every city needs at least one police station and every apartment needs some guards, every internet user will have the need being safe which will create the demand of cyber security. In the future, IT companies will segment the market very clearly and develop software for different users such as social media users, business website owner, and large companies. Nations will invest more money in IT area and try to recruit more security professionals. As the demand going up, it will create more job opportunities.

How will this affect you? (300 words)

After doing research about cyber security, I noticed that cyberthreats are so close to us. We may face cyber-attacks everyday including scam email, identity information leaking. I may do some changes such as changing my RMIT password every 3 months and use free disposal email to sign on the website which I am not very familiar with. For my family members, I will change WIFI password at my home and my router's password as its password is 'admin' which is too weak. I will explain to my parents why they should not believe the website with a very big red 'dangerous', and do not click the links send by the people they don't know.

As an IT student, I do like this trend as people are realizing the importance of security in cyber world just like people noticed their rights during Renaissance and it will open a new era. I think cyber security is slightly different to other coding skills. It is more like a special or advanced skill instead of normal website or application developing skills. For now, I am just a student with very little knowledge about information technology and I don't think I am capable of learning very profound cybersecurity course. However, I can start to develop some knowledge of cybersecurity analyst tools such as data protection, endpoint protection, SIEM and some fundamental knowledge about system and network. As I believe cyber security will be highly demand in the future, in the second year of my learning at RMIT, I will choose security and cloud computing as my major streams.

Robots

What does it do?(600)

Actually, robot has changed human society for so many years. What is robots? Robot is a kind of automatically operated machine that can repeat what human can do. There are so many advantages about the robots. They can repeat one specific task over and over again without question or emotion which human will have and impact the efficiency. "Human and robots already work together in production today. Robots support and relieve human operators, enable versatile automation steps and increase productivity(*KUKA, 2022*)" . KUKA, a robot company come up with a idea to sell their robots, which is based on how the workers collaborates with robots. They call this Human-Robot Collaboration.(HRC) and it has 6 stages.

Stage 1 which is the most basic collaboration that most of the companies are using. In this stage. Contact has been eliminated between workers and robots. Higher the stages, more contact between human and robot.

Since robots are invented by human. We also create the **Three Laws of Robotics.** ("Handbook of Robotics, 56th Edition, 2058 A.D.") .

First Law

A robot may not injure a human being or, through inaction, allow a human being to come to harm.

Second Law

A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.

Third Law

A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

In this situation, nowadays, robot are mostly designed to help human without emotion. However, With the advent of the intelligent era, the traditional industrial robot has long been unable to meet the needs of modern society. The development of intelligent robot has become the choice

of the new era, especially the development of artificial intelligence. Its machine learning, natural language processing and other technologies have been applied to machine people. They help people work, improve work efficiency, reduce the burden of labor, and even replace the work of some people. The rapid development of artificial intelligence makes intelligent robots possible. Intelligent robots no longer only execute edited programs like traditional industrial robots. They are equipped with various sensors. They can have vision, hearing and smell like people. They can perceive the external environment and make corresponding decisions according to the sensors.

What can be done now?

Robot can already replace all the work that human can do in some area, for example, Car industry. As we all know ,**Tesla** have a lot of full-robot factory in the world that help them to make car, what human need to do is just control and check if the robot is not working or having issue, the rest of them can all be completed by robot. For example, in the factory. Robots are an important force in the production line. At present, there are 160 robots in it, which belong to four manufacturing links: stamping production line, body center, paint baking center and assembly center. These robots really help Tesla to fixed their main problems, One is cost, the other is capacity.

What is the likely impact? (300)

The impact of robots on human society is labor employment. Because artificial intelligence can replace human beings in all kinds of mental work, some people will have to change their types of work and even cause unemployment. With the change of social structure, on the one hand, people hope that artificial intelligence can replace human beings in all kinds of labor, on the other hand, they are worried that their development will cause new social problems. Danger of losing control of Technology, The greatest danger of any new technology is that mankind loses control of it, or it falls into the hands of those who try to use it against mankind. Some people worry that robots and other products of artificial intelligence threaten human security. But at the same time, robots have also brought a lot of convenience to our life and assisted production. At present, robots are widely used in the field of automobile production. In addition, robots are more and more widely used in other manufacturing fields. By using robots, some jobs with the characteristics of high labor intensity, high risk coefficient, high repetition rate and low technical content can be gradually replaced by robots. What's more, helping human's daily life. In recent years, service robots have received extensive attention and development. Some robots serving home life have entered people's life one after another. In addition, many window units, including banks, government agencies, airports and other units have also begun to use some service robots.

How will this affect you (300)

In recent years, I have found that robots have begun to appear in every corner of my life. There will be a floor sweeping robot in my own home to help me clean up, which can make me focus more on other work and save me a lot of time, Also, In China and Melbourne, I found that more and more restaurants will start using robots to transport food, effectively avoiding the situation of low service efficiency when restaurants are understaffed. Robots have brought me a lot of convenience in life. For example, Xiaomi's smart home can adjust the temperature and humidity at home according to my settings and can be controlled automatically. In summer, when I can open the door of my home, I can start the cooling mode of the air conditioner in a comfortable environment without turning on the air conditioner. I can set the cooling mode of the air conditioner when I am very close to my home, So you don't have to sweat like outside when I get home. I have also experienced the convenience brought by express robots. For small packages, they can even use drones to express packages to my balcony For example, JD logistics uses express robots to sort parcels. In a large logistics warehouse, the number of express parcels processed every day may be as high as millions or even tens of millions. If sorting by manpower, it will not only take time and effort, but also lead to wrong delivery. By using express robots, hundreds of them can work together. They can identify the address of express, so as to transport the collected express to the designated delivery port, and then transfer it to the express logistics center in other provinces by logistics vehicles for the next step of sorting. Using these artificial intelligence robots, we can greatly save the cost of labor and make the logistics center operate efficiently at night.