**[BrisbaneITCrowd](https://github.com/BrisbaneITCrowd)/**[**CPT110-A2**](https://github.com/BrisbaneITCrowd/CPT110-A2)

**Autonomous Vehicles**

*What does it do?*

In 2020, the volume of autonomous vehicles on the road will be worth over US$87 billion. By 2040, it is estimated that four out of ten vehicles on our road will be fully autonomous.

Autonomous vehicles have been used in mining for the last decade which has seen an increase in productivity along with lower business costs. What began as a trial of autonomous big haul trucks ten years ago at Rio Tinto mines in the Pilbara region has grown into one fifth of the company’s big haul trucks fleet being fully autonomous vehicles. Moving forward Rio Tinto is planning on increasing the number of driverless trucks from their current number of around 80 to over 140 by the end of 2019. In 2017 Rio in partnership with truck manufacturing company Komatsu successfully deployed the world’s first retrofitted autonomous haul truck meaning fleet replacement is not necessary and therefore costs will remain down while generating greater revenue into the future of the vehicle's life span. The mining company is also planning soon to deploy a fleet of autonomous locomotives where they successfully ran the first autonomous train in the Pilbara region in October 2012. The technology still employs a person to oversee the vehicles operations, but they can do so from a central control room many kilometres away while managing multiple vehicles simultaneously. During one of our group discussions team member Paul Harman disclosed that he works in the mining sector in Mackay where they are also moving towards autonomous vehicles where one of the main lines of infrastructure required is establishing a reliable wireless network to cover thousands of kilometres in remote areas.

It has been well documented for years that Google are investing in the development of autonomous vehicles with trials on public roads in the US and UK in recent years. These trials still had safety measures of a driver to take over in an emergency and a technician on board to resolve any issues. Much of the technology is already found in modern vehicles such as automatic braking and automatic parallel parking. These new semi-autonomous technologies out there already rely on the use of proximity sensors which are increasingly being added to new cars available on the market. Combining proximity sensors, automated steering aids already in use with park assist features along with old technology such as cruise control the autonomous vehicle on public roads is nearer to the norm than most people might consider. Google adds to these existing technologies with a roof top LiDAR camera that uses an array of up to 64 lasers to build a 3D map of the car's surroundings with a range of 200 metres. Again, combining this new technology with existing technology, the car is constantly being relayed information via GPS location similarly to what we see today with traffic conditions when coordinating routes with Google maps. Googles autonomous car relies on many technologies working in conjunction.

Recently Domino’s Pizza in conjunction with the Ford Motor Company began offering customers in the US cities of Michigan and Miami the option to have their food delivered by an autonomous Ford Fusion vehicle. The test program ran in October 2018 as a first step towards Ford’s 2021 target date of producing fully autonomous vehicles. To date Ford has invested over one billion dollars in artificial intelligence company Argo A.I which has taken them to producing a test vehicle autonomously running on public American roads and by partnering with Domino’s during this test phase valuable real world scenario data is being collected and incorporated into what will end up being the final product by the goal date of 2021. Fords objective is like that of the mining companies in that they envision to have a central control operation terminal where a commercial fleet of autonomous vehicles are monitored and stationed when not in use so thorough maintenance to the critical sensor components can be carried out. Ford CEO and president, Sherif Marakby, has said before the future of thousands of self-driving vehicles can be on the road, we need to be prepared to manage a large high-tech fleet efficiently and this is a significant stride in that process.

*What is the likely impact?*

The potential impacts of autonomous vehicles will be the shift in jobs and required skills. For example, in the mining industry drivers of machinery and trains will be made redundant while an increase in the need of technicians to service the new technology will be the new demand. The impact in this new technology may result in many people losing jobs because their skills are now redundant and while new roles are created less people will be required moving forward. People who have been operating large machinery or working as taxi or courier drivers for decades will potentially be out of work if they do not have other skills to fall back on. On the other hand, jobs that simply did not exist 20 years ago to service the new technologies and operate the central control rooms will become more in demand which will require people who have developed specific skills required for these new changes. A positive impact of the development of this technology is the reduction of potential road accidents as over 80% of car crashes in the USA are caused by driver error. Drink and drug affected drivers would become a thing of the past and the time spent travelling to work or required destinations could be better spent on more productive and enjoyable activities. One of the largest impacts of the autonomous vehicle is the ethical choice we leave to a computer to make in the situation where the car avoids running down a pedestrian but in doing so critically injures the occupants of the vehicle or vice versa. Security will be a large impact moving forward as the autonomous vehicle could be hacked or suffer software or hardware malfunctions while in use. From a military perspective as of now terrorists do not have unmanned vehicles but this could have the potential to change how terrorists strike.

*How will this affect you?*

As someone who grew up in an era where cars and vehicles were always manually operated but at the same time having a keen interest in technological changes, I have conflicting feelings about how autonomous vehicles will affect me in the future. I enjoy driving cars and have had the most fun in cars built from the 1970s era where there were no computers on-board at all. It will be a big change for myself if in the future I’m a passenger in an autonomous vehicle when I spent a large portion of my adult life manually operating a fully analogue carburettor air breathing machine. I can see myself becoming a clichéd old man pining for the days of old but perhaps if it makes the roads and our cities safer, I will embrace it. I would enjoy having more free time to myself on commutes and hypothetically travel speeds should be reduced if efficiency of all vehicles on the road is increased as has been seen in the commercial sector. In 20 years’ time if as predicted one in four cars on the road is an autonomous vehicle I would see my family and friends leaning towards this technology as myself and my friends will be in our 50’s and are of a generation that were born at the great technology boom. I would see autonomous vehicles as a safe option for elderly family members as it would give me peace of mind that in their old age due to any medical conditions due to age that might impair their driving abilities as one less thing to be of concern. Furthermore, autonomous vehicles could open up further possibilities for friends or family members who can’t manually operate a vehicle. As of right now I nor my friends or family work in heavy machinery so I don’t know anyone having their jobs phased out. I see the emerging technology as a positive for people in my social groups as I can see future job opportunities for them.

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**Cybersecurity**

*What does it do?*

Cybersecurity is the protection of software, hardware and data. It is the assembly of developments that ensure systems, projects and information from harm. The defence of the digital information against any internal and or external malicious threats. The detection, prevention and the response times are three of the most important factors that inhibit cybersecurity (Rouse, 2017).

One issue of cybersecurity is the developing landscape of security risks. Today’s generation rely on smart devices, however, not everyone is aware of how easy it is to steal the personal data from their smart devices.

The traditional method has been to emphasise on vital system components and protect against known coercions, which meant leaving components undefended and not protecting systems against less dangerous risks. The current state of our generation heavily depends on social media on their smart devices. This social habit leaves us defenceless from cyberattacks, stealing our data and personal information. Social Media Security protect the hardware and software from potential threats.   
Physical Security is the protection of personnel, hardware, software, networks and data from physical actions, intrusions and other events such as natural disasters, fire, theft and terrorism

An example of a cybersecurity threat is ransomware. Ransomware is locking the target’s smart device by encryption. A monetary fund is usually commanded from the target before the smart device is decrypted. The motivation for ransomware attacks is usually monetary funds. Ransomware can be spread through malicious email, infected software applications, external storage devices and conceded internet sites. A growing number of attacks usually do not rely on any form of interaction.

Malware, otherwise known as malicious software, is a plug-in or file that is destructive to a smart device. These malwares can include computer viruses; malicious programs can accomplish a variety of different functions such as stealing or encrypting without the target’s permission.

An example of malware is a virus; a malicious code that reproduces by lifting itself to another plug-in and deviates how a computer works. The virus involves somebody to perceptively or mistakenly spread the infection without the information or consent of a user. Most viruses are spread by opening an email, visiting websites that are infected with advertisements. A virus can also spread by an external hardware such as a USB device. When a virus infects the smart device, it will spread and infect other hardware and incapacitate it, replicating the data that is stored in the smart device.

Another example of cyberattack is phishing. Phishing is a form of scam and the attackers can extract your username and passwords online. The common ways people fall from phishing is through social media such as Twitter, Facebook and Instagram. As most social media users have their profiles on public display, anybody can gather detailed information of the user’s work history, date of birth and other personal information which can be used to initiate and steal someone’s identity.

To protect against cyberattacks, it is highly desirable to back up smart devices on a regular basis. End users should beware of clicking on links in emails from strangers or opening email attachments. A few ways to protect from cyberattacks is to ensure that there is a frequent detection of cookies, regular scanning of viruses and installation of updates of the operating systems. Victims should do all they can to avoid paying ransoms and report the incident to the authorities. Cybersecurity is a tricky technology. There must be a three-factor authentication that must be implemented to counteract cyberattack, setting a high goal to achieve resilience.

*What is the likely impact?*

*What is the potential impact of this development? What is likely to change? Which people will be most affected and how? Will this create, replace or make redundant any current jobs or technologies?*

Cybersecurity has a potential to save the technology world from being infested from cyberattacks. For instance, the resilience of ensuring that a defense structure for software, hardware and a security of information is always at its highest level. As we move into a world of technological advances, firewalls, anti-virus and spyware should be at its highest and greatest of defending network servers, smart devices and data from malicious attacks. The impact of this technology will inhibit viruses in attaining access to our private information and keep cyberattack from happening in the future.

The biggest threat and the most affected from cybersecurity and cyberattack are people. Everybody can inadvertently introduce a virus, however, to minimise this issue everyone will need to follow a virtuous security implementation such as ensuring that they keep their private information, private and educating people to remove suspicious email, being wary of unknown USB drives and having a two-step authentication process when logging online (Anon., 2017).

As we are in a world filled with technological advances, cybersecurity will not only create employment within the information security component of Information Technology, it will create more functionality and branch out in creating an even deeper brand-new malware detection. The change in this will secure the future of our lives and keep us safer and determined to keep our information safe.

*How will this affect you? (300 words) In your daily life, how will this affect you? What will be different for you? How might this affect members of your family or your friends?*

Cybersecurity has been in my life since 1990 when I was first introduced to information technology. As the years progressed and information technology began to be advanced, cybersecurity changed with it. When cyberattack with emails were happening around the world in the early 2000, I began to realise that we are responsible for our own actions.

Understanding what was going on with information technology, why cybersecurity was happening and for how long, also made me initiate the understanding that it’s a fact that cyberattack is the same as online terrorism. Cybersecurity will blanket the entire world, has blanketed my way of working with computer systems. My way of thinking regarding cybersecurity has also flowed into the minds of my family and friends, whom are also aware of the changes in information technology. My friends and family are wary of viruses, phishing and all other threats that we continually face each day, as we work with technology. These issues are resolved with the understanding of cybersecurity and how to overcome any threats, if it happens.

Data security is a priority, as well as ensuring that any potential virus is monitored even before it is introduced. For example, email security was not taken seriously in the early 1990 as nobody has really experienced it until it happened. USB drives were shared amongst people, introduced from external sources into the workplace. The process changed, rules were amended, and cybersecurity was revamped everywhere around the world. It begins with educating people on how to keep their private information safe and managing how to keep secret information locked in a safe place.

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## **Raspberry Pi**



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

A Raspberry Pi is one of the world's smallest desktop (or portable) computers. It is about the size of a credit-card and consists of a processor, RAM (random access memory) and standard hardware ports you would associate with most computers.

With almost everything like a regular computer, this means you’re able to do most things a desktop computer can do.

You can edit documents, you can watch HD video, you can play games, you can surf the internet, you can use it as an [Onion router](https://www.raspberrypi.org/magpi/tor-router/) or you can simply use it for coding.

Generally speaking, you will install Raspbian OS (a Debian based operating system, which is a flavour of Linux).

This OS is different to Windows in many ways; however, it isn’t too difficult to navigate around and there are plenty of help out there in the Raspberry Pi community to find what you’re looking for.

**The current model is a Raspberry Pi 3 model B+ which has the following specs:**

* 1.4GHz 64-bit quad-core processor
* Dual-Band Wireless LAN
* Bluetooth 4.2/BLE
* Faster Ethernet
* 1GB LPDDR2 SDRAM
* Gigabit Ethernet over USB 2.0 (maximum throughput 300 Mbps)
* Extended 40-pin GPIO header
* Full-size HDMI
* 4 USB 2.0 ports
* CSI camera port for connecting a Raspberry Pi camera
* DSI display port for connecting a Raspberry Pi touchscreen display
* 4-pole stereo output and composite video port
* Micro SD port for loading your operating system and storing data
* 5V/2.5A DC power input

The initial goal of Raspberry Pi developers was to increase the number of people applying to study computer science at Cambridge University. By putting cheap programmable computers in the hands of the right young people, a revival of the interest in computing *as witnessed in the 80’s* through models such as the Sinclair Spectrum and the Commodore 64 was hoped to be achieved.

The creators had no idea that adults would also be interested in the product and subsequently sold over 10 million units within a four-year period.

There are many Raspberry projects available through quick internet searches for you to follow.

Some such projects are:

* Setting up your Pi as a VPN
* Using your Pi as a portable gaming console (mainly for retro games)
* Setting up a digital clock by using led lighting.
* You can set up Xbox controllers and PlayStation controllers on the Pi
* You can set up RaspbiCast, which is a form of Chromecast.

These things plus many more are things that the Pi can do now with the technology we have available. The list is growing everyday as people invent new ideas of what they can use their Pi for.

As new developments emerge, the possibilities of new project use for the Pi increase.

The future of Raspberry Pi could be that it is used in small to medium businesses as a thin client and connect to the cloud. The potential savings of replacement traditional desktop computers would be enormous as the Pi is generally around the $50 price tag.

Some companies are already re-developing the Pi and creating actual thin clients for the market. With the current trend in virtualization this is being taken into consideration and the Pi will be used as virtual desktops and applications.

**What is the likely impact?**

The likely impact of this new development which will see the Raspberry Pi being used in virtualization would see many more new start-ups coming in to play.

With the current price and the ability to virtualize and utilize cloud services the cost of initial hardware setup has dramatically reduced.

As more and more businesses look to save money, the way forward for them could be by utilizing the Pi for everyday use.

All the Pi would be doing is basically connecting to their existing cloud service and dependent on the application; the processing power of the Pi would be enough to get them through.

They could also use one single Pi as a virtual host and potentially save even further by have two or more users accessing virtual machines from the host Pi.

I think this will create more jobs for businesses as the continual shift toward cloud-based services and the lessening of traditional server rooms based onsite means the IT budget will shrink substantially.

This will allow more room in the budget for more staff to join and help grow the business. Whether that be in sales or customer service, who knows? But it would be a potential and significant shift in the way IT is used in future business. The downside to this might be in the sales arena of the bigger manufacturing companies that produce desktop computers for business use.

I would expect to see either a pushback from these companies to retain their clients or they would adopt the technology and submit their own products into the marketplace.

Businesses would no longer need to supply laptops for staff to work from home as the Pi is extremely portable and can be taken anywhere, plugged in anywhere and used from wherever the user wants.

**How will this affect you?**

As a business manager, I can see the potential for switching over to these current trends and technologies and the benefits that would result.

What would be different for me is that I wouldn’t have to supply every staff member with either laptops or expensive smartphones as they could take the Raspberry pi home or even out on jobs.

As the Pi could connect wirelessly and a touch screen can be connected, the Pi can be used as a mini tablet or phone.

Any friend or family member that doesn’t have the budget to be able to upgrade or even access the internet would be able to do so now.

The potential to connect with all friends and family through this cheap PC alternative is very real and very exciting.

Third world countries would benefit greatly and allow start-ups to blossom without having to find capital for equipment investment.

This would help to boost their national economy and create employment and eventually help to bring their people to a decent standard of living.

With access to modern technologies and I would think an abundance of untapped new ideas, all sorts of new developments could emerge.

As always, there is a downside to everything, with the availability of such cheap computing power, scammers would now have access to a tool that has not previously been an option.

This could potentially lead to an influx in a problem that we already have.

I think that it would see newer security techniques being developed to help prevent this type of activity been used and, in the process, create more jobs in the IT security sector.

In summary, all in all I believe that this little device has a lot more to bring to the table than it currently does.

If the explosion of smart phones due to their portability and processing power is anything to go by, then keep a close eye out for this little fella in the future.

I may not be personally affected by future developments with the Pi but I’m certain that there will be millions of people who will be advantaged by it’s capabilities and power.

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## **clouds-services-servers**

Clouds, Services, Servers

**What does it do?**

As what computers do get more complicated, the tasks they perform grow more diverse and the results are needed to be accessed from more and more locations. The needs of the average user have gotten beyond the said user's ability to afford or maintain. To combat this in the new millennium the “cloud” has moved from a vague buzzword in corporate boardrooms to something that is pretty much the foundation of Information services today

I think to properly discuss, I need to define the three terms individually:

*Cloud,* There is a joke amongst IT people, “There is no cloud, it is just someone else’s computer” and to be honest this is true, The cloud is someone else’s computer sitting in someone else's network connected to the Internet, however most people including System administrators, do not need to know what sort of hardware, network or operating system the infrastructure is running on, all you need to worry about is the service you require is up accessible and stable. To simplify network diagrams technicians and engineers would use a cloud as the symbol of what is on the other side of the edge of what they can control and do not need to document, or support and this interpretation were carried over into the acquisition of services. The service is the part we need to be concerned about, what the hardware it sits on or even where it sits inconsequential. Hence, we refer to the cloud, rather than use a detailed description of what we do not need to know about.

*Services* simply put a service is the job that the computer has been set to do, or simply put the service the computer provides to the end user’s computer. Services vary from network storage to Email, from Databases to Web servers, Terminal emulators to gaming and thousands of other jobs computers can do. Services can have their own dedicated server or share a server with other services depending on the requirements of the service, emails, printing and file shares can be a single server for a small company where a large corporation is likely to have emails shared across numerous servers in numerous locations

*Servers,* Servers are the “other person’s computer” that provide services and physically make up the cloud. This is quite a simplification and very vague, A laptop under someone’s bed with a file share application such as bit torrent running is technically a server in the cloud as is a Dell EMC or HP Blade system cluster providing multiple servers via HyperV or VMM and taking up an entire building floor. Any computer providing one or more service is technically a server. The range and scope of what makes up a server are why we refer to a cloud rather than once again use a detailed description of what we do not need to be concerned about. If the laptop under the bed or the old PC on the shelf is providing the service in a stable and secure way, why purchase hundreds of thousands of dollars of hardware you really do not need.

*Client,* whilst not one of the three terms I think the client is a term that needs to be included, the client is the PC, smartphone, tablet or anything else in the Internet of Things (IoT). The reason I think the client is an important term is the client is the part of the cloud that the user sees and physically interacts with. Even the most powerful server is just a very expensive box of useless electronics without at least one client.

So, what we have is a varied collection of computers we refer to as Servers, doing a multiple of different jobs we refer to as Services connected in a cacophony of Switches, Routers, Firewalls and other networking components all bundled together and referred to as a The Cloud. Clear? Great can you explain it to me? Sometimes I think the more you try to explain cloud the more confusing it can get, which makes sense as Cloud is the definition we use to simplify complex systems, once you attempt to explain simple, she packs her bags and leaves whilst complex spreads to take over the whole couch. The cloud is also quite the area of debate in the IT industry some people love it and some hate it. Having an ethereal entity on the web is great the physical maintenance, real estate etc are still not your problem, your concentration can be on more critical areas of IT, all good right? Are you sure, is it secure? if you do not know where it is or even what it is, how can you be sure? What are the persons hosting your section clouds level of competence, could they accidently wipe your data, what is their WAN connection like, how many other people are sharing it? The list of issues and concerns that the system administrator hands off to the cloud provider are varied, A really good Cloud provider or host will advertise as having a rating of 5,9s meaning 99.999% uptime which is great but as a Sysadmin, who is the boss going to be screaming at when the service he needs is not working?

**What is the likely impact?**

The impact of cloud services is that it allows more nuanced and specialised hosting services come into the reach of more and more end users it allows end users to concentrate of content rather than technical issues like hardware platforms, bandwidth allocations and to some extent security. This in turn allows more businesses such as retail outlets to have an online presence, geographically diverse groups can collaborate real time with services such as [Asana](https://asana.com/) or Microsoft Teams. Small businesses can employ professional communication systems such as Citrix’s [Grasshopper](https://grasshopper.com/) as well as Document management systems, accounting/payroll platforms, Customer Resource management, in house educational systems such as [Docebo](https://www.docebo.com/), helpdesk solutions. The “cloud” is far more than just document storage and webhosting.

To put succinctly the cloud allows the small or medium business SMB to compete and have the corporate presence, at least online of the larger corporate entities. No matter what service the cloud is providing, Infrastructure **IaaS**, Software **SaaS,** Everything **EaaS** or any other “flavour” of cloud, online presence is becoming a more and more accessible commodity for more and more people.

Another Impact of Cloud services is many software developers and application providers are modifying their goods to work predominately online and example of this is would be Microsoft’s office suite and the changes brought about with 365.

Probably the biggest impact of cloud services as well as the largest and most prominent service at this point however would be storage, it is almost at a stage where you cannot create a email or buy a mobile device, network device or PC these days without the being offered some sort of cloud storage be it Microsoft’s OneDrive, Apples iCloud, Google drive or something similar.

The impacts of the Cloud, Services and Servers are as diverse and numerous as the Servers and Services that make up the Cloud.

**How will this affect me?**

To be honest in numerous ways.

As an end user: The options available to me are staggering, today’s end user is spoilt for choice and opportunity, I can, for example, have my webstore on a 5 9s platform without having to build my own datacentre with redundant WAN connections and power, I can have information pictures and any data I choose on my phone and at hand at all times and know that even I lose said phone, my data is safely retrievable online.

As an IT professional: The scope and variety of work available to me expands, I could specialise in hardware solutions and concentrate on Infrastructure as a service systems or Platform as a service, I could concentrate in modifying existing software to work in multi-user or concurrent user environments. I could specialise in the communication between systems. I could choose to not worry about the workings of data centres and trust in my provider, I could do or not do a thousand different things depending on the needs of the role and my interests dictate. The opportunities opened by the cloud are staggeringly vast.

The dark side: Whilst the cloud is a mostly positive entity and I personally am a proponent, there is a flipside to the way the cloud affects us. Not all cloud services are secure, not all way of getting information onto the cloud are safe and a lot of people do not expend anywhere near as much thought as they should on what they share in platforms like Facebook and Instagram. This has meant that alongside the cloud there has been a growth in social engineering, identity theft and other nasties of the cyber world, I can say from own forays into penetration testing that the information available on most people borders on the terrifying.