**Autonomous Vehicles**

**Section 1 - 600 words**

**What does it do?**

* An autonomous vehicle is a ‘driverless’ car
* Self driving
* Humans are never required to take control of the vehicle to safely operate
* Combines sensors and software to drive/navigate
* There are 5 levels of autonomous driving
  + Level 1 - Cruise Control (from 1950)
  + Level 2 - Automatic Emergency Braking (from 2000)
  + Level 3 - Lane keeping (available now)
  + Level 4 - mostly automatic (in testing)
  + Level 5 - Fully automatic (2060+)

**What is the current state of art/what can be done now?**

* No legal, fully-autonomous cars in function (in US)
* There are partially autonomous cars
* Two types of autonomous vehicles are available for market - albumst completely autonomous vehicles or limited technologies
* Have achieved level 4 although in a very limited sense (pre-defined routes and specific conditions - safety drivers are onboard) - campus shuttles/employee busses
* Self-driving available to the public is at level 3

**What is likely to be done soon?**

* Level 4 and 5 automation in strict pre-sets (deliveries/shuttles)
* Not much hope for level 5 automation in general public driving - more likely that technological advances will eliminate the need of autonomous vehicles - in the sense that they are currently being produced

**What technological/other developments make this possible?**

* System built on suite of software and array of sensors
* Machine learning, Lidar (method for measuring distances by use of a laser), radar and ultrasonic sensors work together
* Most companies use the combination of lidar, radar, cameras and ultrasonic
* Notable companies such as tesla and nissan oppose use of lidar and rely solely on cameras and ultrasonic sensors
* Machine learning and AI is used by companies to simulate environments - used for testing scenarios and hardware tweaks
* Data captured by vehicles is scanned and distributed, allowing vehicles to be up to date with construction and aware of specified details of neighbourhoods (which neighbourhood has a lot of cyclists, etc)

**Section 2 - 300 words**

**What is the likely/potential impact of this development?**

* Road safety may improve - software being less error-prone than humans (cybersecurity is still a worry however)
* Could be a positive for those who are unable to drive themself (disabled/elderly)
* Could cause environmental concern or, on the other hand help the environment (cars in general will be used more often than going for public transport, increasing the number of miles on the roads. If these cars are fuelled by gasoline, emissions will sky-rocket - if by electricity, emissions may significantly decrease)

**What is likely to change?**

* Less people are likely to **own** a car and more likely to use ride shares
* City infrastructure will change dramatically (more precise vehicle movement = narrower streets and more pedestrian space)
* More independence for those unable to use current transport due to illness, disabilities, old age etc
* Donor organs in short supply (13% of organs for donation derive from car crash victims)

**Which people will be most affected and why?**

* Positively - people with disabilities, elderly that cannot drive themselves
* Negatively - people with jobs revolving around driving (public transport, deliveries, etc.)

**Will this make current jobs/technologies redundant?**

* Could cost millions of employees their jobs (taxi drivers, public transport operators)
* Could impact public transport funding - may become redundant

**Section 3 - 300 words**

**References**

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**Cybersecurity**

**Section 1 - 600 words**

**What does it do?**

* The practice of protecting systems, networks and programs from malicious digital attacks
* Preventing cybercrime before occurrence
* A few categories of cybersecurity include:
  + Network security
  + Applications security
  + Information security
  + Operational security
  + Disaster recovery & business continuity
  + End-user education
* Cyber threats include:
  + Cyber-crime
  + Cyber-attack
  + cyberterrorism
* Forms of cyber threats include:
  + Phishing
  + Malware
  + Social engineering
  + SQL Injection
  + Man in the middle attack
  + Denial of service attack

**What is the current state of art/what can be done now?**

* Cybersecurity is constantly evolving to keep up with the evolving threats being prevented

**What is likely to be done soon?**

* Continued growth and education of threats
* More advanced technology to further prevents attacks

**What technological/other developments make this possible?**

* Firewalls
* Antivirus software
* Encryption technique
* Web application firewall (WAF)

**Section 2 - 300 words**

**What is the likely/potential impact of this development/ what is likely to change?**

* Development of cyber security will impact the percentage of cybercrime attacks (lowering the numbers)

**Which people will be most affected and why?**

* Negatively - criminals using the internet as a form of profit through cyber crime - will be harder to infiltrate due to advancing cybersecurity meaning less profit for cyber criminals
* Positively - targeted people/businesses of cyber crime - specifically the elderly and people who are not IT savvy

**Will this make current jobs/technologies redundant?**

* Cybersecurity is likely to create more jobs vs make jobs redundant
* More and more technology being used means more cybersecurity specialists needed to implement security methods and further improve technologies
* Overall, more job opportunities within the IT field

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**Robots**

**Section 1 - 600 words**

**What does it do?**

**What is the current state of art/what can be done now?**

**What is likely to be done soon?**

**What technological/other developments make this possible?**

**Section 2 - 300 words**

**What is the likely/potential impact of this development?**

**What is likely to change?**

**Which people will be most affected and why?**

**Will this make current jobs/technologies redundant?**

**Machine Learning**

**Section 1 - 600 words**

**What does it do?**

* AI that allows a program to learn from experience and improve without specific programming
* Begins with data or observations - then analyses and looks for patterns - patterns are used to make better decisions in the future
* Computers learn automatically - without human interference
* Types of machine learning include:
  + Supervised machine learning algorithms
  + Unsupervised machine learning algorithms
  + Semi-supervised machine learning algorithms
  + Reinforced machine learning algorithms

**What is the current state of art/what can be done now?**

* Event detection
* Classifying objects
* Trend analysis (spotify for playlist recommendations, ride shares for estimated travel times)
* Machine learning applications include:
  + Email spam detection
  + Face recognition
  + Speech recognition
  + Computer vision and image classification
  + self-driving/driverless cars
  + Advertisements
  + Anti-virus
  + Affective computing
  + Healthcare
  + Weather forecast
  + Computational neuroscience

**What is likely to be done soon?**

* Fine-tuned personalisation (machine learning is a method of data analysis - this is influencing users of IoT devices such as smartphones, watches, cars etc. Machine learning can be used to fine tune marketing sales and product development as the data analysis will give insight to the consumers' use and day to day habits.)
* Better search engine experiences (user influence will create more specialised search engine results for each person based off past experiences)
* Evolution of data teams (IT and data teams will be spending less time on redundant tasks within programming as machine learning will be a fundamental tool in the coming future for developing and maintaining digital applications - less programming work for these teams means more time spent on improving their operations)
* No-code environments
* Rise of quantum computing

**What technological/other developments make this possible?**

* Algorithms
* Data
* Application of AI
* Important machine learning technologies include:
  + Keras
  + Torch
  + Caffe
  + TensorFlow
  + Theano
  + Microsoft Cognitive Toolkit

**Section 2 - 300 words**

**What is the likely/potential impact of this development/what is likely to change?**

* Smart gaming/intelligent gaming (smarter AI)
* Automated transport/driverless cars
* Environmental protection
* Aiding in elder care
* Healthcare
* Smarter homes/IoT
* Digital personal assistants
* Customised news/market reports
* Retail - insights, statistics of consumers

**Which people will be most affected and why?**

**Will this make current jobs/technologies redundant?**

**References**

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