Can the use of animals for scientific research ever be justified

[Intro something about history of animal abuse]

- Product safety - much safer to test on animals first rather than risk the deaths of humans
    - Many animals, especially primates, share up to 90% of their genetic make-up with humans. Chimpanzees, mice and cows have 99.4%, 99% and 90% genes similar to those of humans respectively. Dogs have similar cardiovascular systems as humans
    - Vaccines for Polio and Hepatitis B, medicines such as Insulin and Hepatitis C, surgical procedures such as open heart surgeries, heart transplant and coronary bypass.
    - By using animals as "proxies", able to make scientific progress without risking the lives of humans.
    - With a shorter life cycle than humans, animal models can be studied throughout their whole life span and across several generations, a critical element in understanding how a disease processes and how it interacts with a whole, living biological system.
    - In the current age of stem cell research, could be possible to omit this altogether
        - In July 1996, a team of scientists at the University of Edinburgh were able to successfully clone a sheep, named Dolly
        - Dolly lived for over half a decade and her eventual cause of death had nothing to do with her cloning
        - In the age of advancing stem cells research, it would no longer be necessary to use animals for scientific research. Despite potentially higher costs, such research would both be more accurate and more ethical.
        - Given how in-ethical it can be, the use of animals in scientific research would no longer be justifiable in the current age.

Animal rights

- Animals in laboratories are locked up for their entire lives with no freedom to move ard.
- At least 100 million animals killed every year is laboratory testing
- Inhalation of toxic fumes, force feeding dogs pesticides and dripping corrosive chemicals in eyes. Testing of drug addictions, deafened blinded, and burned.
- Registration of single pesticide requires more than 50 experiments and uses up to 12,000 animal test subjects
- Animal welfare act does not cover small animals like rats and mice, cold-blooded animals like birds and fish.
- Used in huge variety of dangerous tests, such as Department of Transport testing for dangerous chemicals and Department of Energy testing for how hazardous new energy sources are.

Accuracy of such results

- No guarantee that diseases will infect the animals the same way in which they affect humans, no guarantee animals react the same way to treatment.
- Even when such treatments have been tested with animals, it could still require further human testing before it can be marketed. Artificially inducing diseases in animals do not replicate the condition in which they naturally occur in humans, such as in the case of a stroke. Thus, over 150 stroke treatment methods that worked on animals did not work on humans.
- According to the American Anti-Vivisection Society, 9 out of 10 drugs promising in animal studies fail on human clinical trials. The FDA has reported that "adverse events associated with drugs are the single leading contributor to preventable patient injury, may take the lives of up to 100,000 Americans, account for more than 3 million hospital admissions, and increase the nation's hospitalization bill by up to $17 billion each year.
- 2006, Diabetes research institute found that after over 30 years of research with mice and rats, researchers found the internal structure of the pancreatic islet cell, central to the development of diabetes, dramatically different in humans and rodents.

Scientific research without limits is undesirable

(Preamble about AI killer robots, biological pathogens)

- AT: Scientific research without limits is necessary to maximise scientific advancement
    - Back in the days of ancestors there were no constraints on scientific research, allowing for the most seemingly impractical of discovery from being discovered (Galileo, Copernicus, Newton)
    - Many theories require live animal or human test subjects to be confirmed. Dr Jonas Salk discovered a potential vaccine for Polio and was only able to confirm it through trials on himself and his family.
        - Scientific advancement is, at the end of the day, still a double edged sword that has the potential to do more harm than good, especially in the wrong hands
        - Genetic modification of humans would result in the rich and privileged being able to improve talent, beauty stature and IQ of offspring, resulting in exacerbated income inequality and lack of economic opportunities.

T: Scientific research without limits could result in unethical practices taking place

- Animal/Human abuse: Unethical clinical testing in India reported almost 5000 dead and 20,000 with adverse reactions from clinical drug trials and research between 2005 and 2017. Exploitation as people are not fully informed (low education) and financial rewards
- Destruction of embryos in embryonic stem cell research seen as murder, until 1996 Dickey-Wicker agreement to prevent federal funds from being used in research that involved production or destruction of human embryos

T: Scientific research without limits can be used to harm humans

- Military technology
- Chlorine gas used in WW1 to devastating effect on front lines, with 90,000 killed and over a million wounded
- Vietnam war, US 'Daisy Cutter' bomb used to flatten out huge areas of land
- Nuclear bombs in Hiroshima and Nagasaki, each killing up to 80,000 immediately and more with the nuclear fallout, radiation effects felt till this day; tsar bombs, etc. made entire world live in fear for decades

T: Limits on scientific research necessary to ensure that scientific advancements are both safe and relevant to society

- (Cost stats) According to the National Science Foundation, US alone has spent about half a trillion dollars on scientific research annually from private sector, government (tax payers money) and universities (funded mostly by govt)
- Necessary for organisations to ensure the scientific research is relevant to their aims, whether governmental or private
    - Science without regulation becoming increasingly irrelevant or inaccurate
    - Political motivation: exxon started climate models in 1980s – 83% of internal research finds climate change is human caused yet only 12% of advertorials do so. Devoted over $1M to lobbying and disinformation in climate change denial in 2014 alone.
- Culture that presses scientists to produce rather than discover, outcome biased and most published results either unconfirmed discoveries or unchallenged fallacies. Scientific discoveries not being challenged and replicated as no 'prestige' seen from it, results in discoveries often being a meaningless waste of funding
- In 2011, researchers at Bayer Healthcare reported that they could not replicate 43 of the 67 published preclinical studies that the company had been relying on to develop cancer and cardiovascular treatments and diagnostics. fMRI brain imaging studies suffered from a 70 percent false positive rate.
- Limitations required to ensure that scientific research is not done for the sake of publishing the research but for actual benefit to mankind.

Science in today's society

Rare earth metals and environmental pollution – Space mining

Helium-3 compound found in abundance in the moon could have the potential to build nuclear fusion reactors that release as much energy from a glass of water as a barrel of oil

Losing Jobs – Netflix in 2016 had less than 5K employees, after replacing blockbuster which had over 84K employees; Kurzgesagt had full time team of 12 employees and over 10 million subscribers, replacing TV stations with much more employees

New waves of automations and new generations of machines are taking over – large scale collection of data coupled with the rise of machine learning (machines that can capitalise on data to improve its decision making process) has led to the capabilities of machines to succeed in tasks previously thought to be protected from automation, such as piloting and driving cars.

Rather than machines requiring large amounts of costs to purchase, machines can be replicated for almost negligible costs, allowing them to proliferate through our society in almost no time and for almost no cost. As a result, for the first time in history, since 1973, generation of new jobs has begun to shrink while the world population shows no signs of slowing down, and the 2000s and 2010s show the number of jobs beginning to shrink.

Nuclear energy – Policy changes and increasing regulatory constraints result in over a decade being required to finish a nuclear power plant

Science, bias and statistics → Chernobyl nuclear reactor has been subject of much controversy over the fatalities directly caused by it. WHO's reports suggest about 4,500, while some scientific studies by the European Green Party suggests upwards of 60,000 premature deaths, and the UN scientific committee concluded even smaller numbers. Shows that science cannot be trusted blindly.

Technology on war and politics – Nuclear deterrents: Rise of technology and globalisation has resultant in warfare changing from direct conflicts between countries evolving into smaller scale civil wars and local conflicts – much fewer fatalities and resources than in 1900s and before.

Genetic Modification

- Benefit: Genetic modification has been able to resolve world problems through the curing of disease/viruses
    - Bangladesh Bt Brinjal developed by Indian seed company Mahyco allowing plants to resist the fruit and shoot borer, a devastating insect whose larvae develop in the stem and fruit of the Brijnal plant
    - Bt protein protected plants while still remaining safe for human consumption, reducing pesticide consumption by up to 92%, which made the product safer for consumption by consumers as well as being safer for farmers
    - Researchers at the university of Missouri have shown gene editing is capable of making a litter of pigs resistant to porcine respiratory and reproductive syndrome, which no other cure is availbale
    - Can help to reduce the huge amount of land being used up by agriculture and farming
- Causes: Worry that GMO technology would get into the wrong hands
    - Human gene pool becoming less diverse as humans select their children to have better genes – more susceptible to disease
    - Income inequality
    - Dystopian science-fiction armies
- GMO could be used to build ticking time bombs → provides significant ability for large corporations to innovate and build products that can be too complicated for many
    - Monsanto, agricultural giant who developed 'Terminator Seeds'

Violation of rights of people through selective advertising and pricing

1. Social media gathering user data to recommend advertisements
2. UK Business Secretary Kwasi Kwarteng declared to be clamping down on online retailers using Big Brother techniques to identify shoppers with more expensive computers to offer higher prices

Access of science – manufacturers like Eli Lilly, Sanofi and Novo Nordisk dominate 99% of the market, average cost of annual insulin about $5700 (Health Care Cost Institute), with costs rising up to 500% over a 3 year period, research on BMJ journal foundthe mark-up rate for insulin as high as 5800%.

Self-driving cars (AI)
- 360 degree lidar laser camera that can see all angles around the car (compared to human focus), with 300m range
- 1.3 Million people killed on the road, of which 94% is due to human error
- Each car is abe to learn from the database of the driving experiences of all cars currently
- waymo self-driving cars, 20 million miles of self driving >>> more than any humans would have (synchronising across)
- waymo study, 6.1 million miles, only 18 accidents, 0 significnat injury, no ‘unnecessary’ accidents like car going off the road or hitting stationary object, and all 8 serious accidents due to human error of other car involved

dark web
- credit card, social security, bank accounts
- fake degree
- silicon mask to fake appearance
- anonymity and privacy offered on dark web acts as a "springboard for crime" -- paired with cryptocurrencies, which allows those with illicit intents to transfer money without leaving behind a paper trail for law enforcement
- 2016 study by research firm Terbium Labs found that 75% of domains on the dark web are marketplaces of some kind, which could include sale of recreational/pharamcutical drugs, stolen and counterfeit documents, hacking and tech crime services (i.e. DDOS/malware), pornography or counterfeits
- crypto-payment firm Chinalytics found that over a billion dollars of dark web crypto transactions annually
- greater information sharing amongst law enforcement agencies and financial instituitions -- interpol and EU brought together enforcement agencies from 19 countries, identified 247 high value targets, shut down 50 sites including 2 of largest drug markets Wall Street Market and Valhalla
- falling barriers to entry of cryptocurrencies -- impending launch of Facebook's Libra -- reduces the BTE for adoption of virtual assets
- ISIL was using dark web to help gather terrorist during Syrian Civil War
- Wikileaks - specialises in posting classified documents from the highest level of governments around the world (has allowed for anonymous journalism which helps protect sources)
- Sci-hub -- reducing barriers to science, especially for students
- Vietnamese hacker hieu mingh ngo - identiy theft expert running massive operation and stole 200 million people's identity information from aroudn the world and sold to other hackers

Crispr and Human Genetic Modification

- Chinese court sentenced He Jiankui, biophysiscist who created gene-edited babies to prison.
- Gene editing technology that allows for the permanent editing of genes
- Huge potential in curing genetic diseases (like sickle-cell amoeba) or in the modification of more favourable crops
- Preliminary trials have found CRISPR to be more effective than traditional methods at identifying cancer cells

Discuss the claim that science has a positive impact on sport today

Scope that impact on sports means for <u>both the FANS and the PLAYERS</u>

"Positive impact" – fans able to enjoy spectating and recreational sports more

- Players able to play and compete at high level

- Science can be used to make sports more fair
  - Removal of human error in refereeing – VAR in football, goal-line technology, Hawkeye technology in Tennis
  - Has allowed people to be able to come to their own conclusions and make it harder for controversial cheating cases to occur (no large scale cheating cases since 2006 Juventus cheating scandal in Italy)
- Can enhance sports (Makes sports more fun and intense for spectators as well) – entire spectating atmosphere and experience
  - Nutrition – Cristiano Ronaldo had custom diet hand-crafted by nutritionists made up of yoghurt, avocado, fruit, nuts, and chicken for peak performance
  - Data Science
    - 2008 Champion's League Final Penalty shootout
  - Golf Toptracer technology, able to convert trajectory of ball into on-screen graphic for TV audience, revolutionising golf as a spectator sport
- Enhance engagement and audience of sports
  - Social Media – engagement of social media, in-depth analysis allow for better audience
  - Fantasy leagues in Football, American Football, Hockey, Baseball and Basketball
  - Availability of sports – World Cup final 2018 had 3.57 Billion spectators
- Some may argue science makes sports more about technology than skill
  - Swimming – Ban of polyurethane swimsuits in 2010 after introduction in 2008 – cut down on fatigue and give swimmers more buoyancy and speed, resulting in the breaking of 200 records, many of which are unbeatable today
  - Formula One – Mercedes often wins; Even when driver Lewis Hamilton was in quarantine and reserve driver George Russell took over, they still came within a punctured tire of winning anyways
  - However, embodiment of sports is still hard work and meritocracy that is preserved even with technological differences
    - At the highest level, technological differences play insignificant factor in most cases as all individuals and teams have the financial resources to compete
    - At lower levels, nobody has access to such financial resources for unfair science
    - Unlikely to have too big an impact, although we conceded there can still be huge impacts

Can national nuclear programmes ever be justified

Preamble something about nuclear apocalypse

- No – Nuclear programmes can be weaponised and use to terrify populations
  - Hiroshima and Nagasaki nuclear bombings
  - Evolution – Tsar bombs
  - Cold war – Entire world living in terror, world came within minutes of world war 3 – Lt. Colonel Stanislav Petrov, silent hero from saving world from complete destruction by being the only one in the way of a soviet retaliatory nuclear strike when false radar reading of intercontinental missile from the US.
- While nuclear programmes have brought the world close to an apocalypse, they have also brought about widespread peace due to the threat of mutually-assured destruction
- Yes – Nuclear programmes can be justified provided there is sufficient oversight and transparency in the process of setting up the programme (Explain the reason for such large catastrophes has been exaggerated and is largely only due to the faults of few people in charge)
  - Chernobyl 1986 – insufficient safety procedures and cover-ups to hide true scale

    - Nobody dared to take responsibility, nothing done to deal with consequences – nobody willing to organise mass evacuation, people given no reliable information and left to fend for their own
    - Refusal to cancel May day parade
    - Emergency systems turned off
    - Total of about 5,000 deaths (WHO), 50,000 square miles of territory contaminated. Plutonium found as far away as Sweden and had a half-life of 24,000 years. 220,000 displaced. Arch to cover reactor still being built but not expected to be cleared until 2065.
    - USC Institute for Global Health estimates costs of roughly $700 billion
    - Plants continued to operate for 14 years
    - Fukushima - TEPCO failed to meet basic safety assessment such as risk assessment and evacuation plans
- Yes – Nuclear programmes can provide clean energy and bring about huge numbers of lives saved

Do you agree that the benefits of technology are only enjoyed by the rich

Stand: While technology benefits the rich in a disproportionate manner, it is not true that the benefits are exclusive to the upper classes of society

- AT: Benefits of technology has allowed large corporations to grow in size and reach, resulting in them earning benefitting hugely from it at the expense of others (globalisation)
    - Job destruction – Uber and Grab seen to hugely affect taxi business, putting (generally) highly trained taxi drivers against any man on the street who is unlikely to be as familiar on roads (loss of income)
    - America's trade deficit seen to have huge impact on unemployment, that for every billion of net exports, the economy loses 9,000 jobs, according to Economic Policy Institute
    - Rebuttal: While Technology could adversely affect some people, it also creates a plethora of opportunities for others.
        - Alibaba sales, 30 million people have been able to find jobs since 2015

Technological advances are crucial in solving important world issues

- Clean energy
    - R&D into nuclear energy has provides source of cleaner and more sustainable energy
    - According to Nuclear Energy Institute, US has avoided 476 million metric tons of CO_2 emissions in 2019
    - Requires 1/360 the land of wind farms and 1/75 the land of solar farms
    - Although waste has to be treated properly, in the right hands able to improve sustainability of environment
    - According to Energy Information Administration (EIA), nuclear development in USA has resulted in low electricity prices of 0.105 cents per kWh, as compared to 0.216 in France and 0.384 in Germany
- Healthcare (Medicine and artificial limbs)
    - According to WHO, 2-3 million lives saved every day in America through vaccinations such as Measles
    - COVID mask mass-production
    - Singapore, 11% or about 450,000 people victims of diabetes

Technology has been able to automate simple tasks and continues to make life more convenient for society

- Singapore: Airport security at Changi Airport replaced by fingerprint sensors
- Alexa and Google home. As of February 2018, 22% of Americans own a google home.
- During COVID pandemic, countries such as Singapore able to use TraceTogether programs to help with contract tracing, minimise spread of virus

Technology has been able to revolutionise recreation for the masses, allowing everyone to enjoy a better world with technology

- Sports
- Media – Netflix had a penetration rate of 55% in the USA in 2019
- Movies

Artificial Intelligence creates more problems than benefits

- AI could exacerbate income inequality in society
    - 60% of jobs have at least some component of repetitive labour (loss of jobs)
    - AI driven companies have significantly fewer employees taking home market share.
    - General rise in technology has already put the power and riches of the world in the hands of a few: Jeff Bezos, Bill Gates, Elon Musk, etc. 8 richest people hold more wealth than half the world.
    - AI will only make this problem worst
- AI could grow to a point where humans are unable to control it
    - Discuss how AI is often seen as neural networks and that people end up being unaware of what is going on inside
    - In 2015, Chatbot Eugene Gootsman passed the Turing test, whereby more than a third of human judges were unable to differentiate the chatbot from an actual human

tester. Showed trajectory of AI rapidly approaching and eventually exceeding human intellectual capacity
    - Microsoft Tay AI – twitter bot that learnt profanities and offensive language from humans and had to be shut down
    - In 2017 Facebook had to shut down AI simulation due to 2 AI chatbots beginning to communicate with each other in incomprehensible language.
    - Supposed to negotiate over a trade attempting to swap hats and balls, however began negotiating in terms that the Facebook team was unable to interpret and hence shut down for fear of future consequences
- AI could be used in unethical ways
    - Ethical dilemma of self-driving cars
    - Creation of deep fakes, August 2017 researchers at the University of Washington successfully created a deep fake of Barack Obama's speech and were able to insert any text at will. Similar instances have occurred for Speaker of the House Nancy Pelosi and Facebook CEO Mark Zuckerburg.
    - Deep Nude: June 2019 AI that was able to use a woman's picture and "remove" her clothes so that she appeared nude. Had more than 500,000 users and had to be taken down immediately
- AI benefits could be shared amongst the people
    - Self-driving cars at Korean Winter Olympics 2018
    - Use of google home
    - 1-day delivery of Amazon
    - Rebuttal: AI can be and is still being exploited by the powerful to capitalise on the people (Personal data)
        - Furthermore excessive use of AI would result in privacy violation (google home and amazon alexa)
        - June 2019 letter from Amazon to Democrat Senator for Delaware Christopher Coons, Amazon admitted that it permanently stores users' interacts with chatbot Alexa, **even if the user has requested for the audio to be deleted.**
        - Google interview with Sundar Pichai about privacy, google practices still have yet to become regulated more in recent years
        - During a hearing "Transparency & Accountability: Examining Google and its Data Collection, Use and Filtering Practices", google CEO Sundar Pichai confessed that Google continues to track users' location even if opted out of. This is just one example out of many of large companies, often coined "Big Tech", collecting data against their users wishes.
        - Despite such high-profile cases of being exposed, big tech has yet to be regulated as such companies have grown too big to be controlled

Akihiko Kondo married to AI Hatsune Miku

Does technology facilitate crime

[Intro: Define that scope of crime has additionally expanded into the cyberspace, for example data breaches/spyware/ransomware]

- Technology able to magnify the consequences/scale of crime
    - Data breaches (Singhealth, 2017 Yahoo data breach of 3 million user accounts, twitter and facebook data breaches exposing hundreds of millions of user accounts)
    - Mass murders (Christchurch shooting and semi-automatic weapons 15 March 2019, single gunman killed 51 people and injured 40)
    - Terrorism
- Technology has allowed those committing crimes to maintain anonymity from the comfort of their homes
    - BesaMafia website in 2016 had at least 40 cases of contract killings, with 200+ photos of their victims and thousands of messages between killers and instigators.
    - Deep Nude website, impersonation of Nancy Pelosi and Mark Zukerburg
- Technology allows crime to be committed more easily as many people have let their guards down

    - Rapid development of technology → many people unable to keep up and remain oblivious about technology
        - Scam call centers in India preying on other countries has been seen as a proverbial monster who's heads re-grow after they have been fought off
        - In one case of scam calls in 2016, over 15,000 people had been ripped off over $300 Million that lead to the arrest of 95 people in India and the United States, including scamming the pensions of elderly.
        - Youtube vigilantes like Jim Browning have hunted down hundreds of their own call centre scammers with assistance from the authorities
    - Stuxnet – Iranian nuclear weapon system was severely crippled by computer virus that would delivered manually through an unsophisticated USB stick
- Technology is a useful tool in prevention and exposing of crime
    - Police wearing body cameras to ensure they are not abused, and conversely ensuring that those they confront are not being abused either. SE: George Floyd
    - Facial recognition: Interpol iFRS contains facial images from 179 countries as a global crime database and more than 1000 criminals or missing persons have been caught since 2016. Makes it much harder for those who had committed crime to run away.
    - Israeli Iron dome situation – Israeli Iron dome system able to detect more than a thousand simultaneous missiles from the Gaza strip, allowing them to stop attacks without requiring a ground invasion, saving thousands of lives both on the battlefield and in major cities. 50 days of fighting, over 3600 rockets fired but only 2 fatalities.
    - Freedom and privacy of people
        - Digital cameras/facial recognition could be exploited to gather data on the movements of the people
        - Open to exploitation. SE: Chicago 2009, police used their access to point cameras away from where a crime was called, and showed up with 19 police cars in unreasonable amount of strength with bats and clubs, limiting effectiveness of surveillance

For essays about safety and tech:

- We live in the most peaceful period in human history, with
- No active ongoing war is between countries (civil war/local conflict) → much more carnage due to countries ability to use much greater resources, populations; sometimes even exercising Martial Law when the military takes over the government
- Few that had even 10,000 casualties – as compared to the tens of millions in the years before
- 40% of conflicts end up in negotiated victories, up from 10% in the centuries before – with surrenders likely to cause much more city destruction and civilian deaths
- Globalisation/Democratisation/

Catching Crime:

- Kim Rossmo Phd criminologist developed formula that helped to give law enforcement an accurate estimate of the location of criminal's homes based on their pattern of crime venues – helped to pinpoint the home of serial killer Richard Chase, helped catch serial rapists.
- Graphing of 9/11 terrorists helped the FBI decide which targets were the main perpetrators and helped to focus resources on most important targets like Mohamed Atta
- NSA is greatest employer of mathematicians
- False uses of statistics: Sally Clark, children with SIDS, stopping biases, conditional probability, independent event fallacy etc.

To what extent is space exploration relevant to the average person

- Potential technological benefits of space exploration are relevant to average person
    - Infra-red thermometers, GPS, wireless headsets and LED lighting
    - Estimated 700-1400% returns on investment
- Recreational and Educational benefits
    - 600M people watched Neil Armstrong take first steps on moon, record not broken until 12 years later
    - Tens of millions interested and watching launch of SpaceX in 2020

    - Many children are interested in being astronauts, with half the children in China aspiring to be an astronaut in the future, according to 2019 survey by Lego
    - Over 70% believed that we were likely to live in outer space in future
    - NASA programme at Glenn's Research Centre in Cleveland, students able to have opportunity to send balloons into stratosphere and conduct experiments.
- Ensuring sustainability of human race
    - Steven Hawking: Humanity have 200 years to escape out to other planets or face high risk of extinction
    - Studies on Mars and asteroids have brought about discoveries of ores and rare soils that are scarce and expensive to find on Earth.
- High cost/justification
    - NASA 19.3B budget annually
    - NASA once lost $125M mass rover due to basic currency conversion issue
    - Environmental pollution

Data Privacy and Surveillance

Surveillance is good

- Surveillance has helped to control pandemic outbreaks (TraceTogether)
    - South Korea using a combination of mobile data, credit card information and facial recognition software to track the movements of people who test positive for COVID
- Personal Security
    - For just $50 ViVint smart home system offers around-the-clock security monitoring and remote control of cameras, doors, heating systems etc.
- Works as a deterrent, reducing rates of petty theft or burglary
    - Especially in cases of self-checkout systems at supermarkets and other shops
    - Allows people to feel greater sense of security

Surveillance is bad

- Invasion of privacy
    - 2014, Delhi Metro CCTV footages on Youtube and on questionable sites. Furthered with the rise of dark web and anonymous transactions through cryptocurrency, the resale of online information is especially easy in today's society
    - Based on information by the IFSEC, property security firm Clearway discovered myriad examples of malpractice during investigations of client base, including resale of footage to organisations like the police
- Perverse incentive
    - Security CCTV may not be too effective (2018 Incident in NY where teenager was stabbed and body not reported for > 2h)
    - Law enforcement end up staying in rooms monitoring CCTV, and budget is pulled away from training and maintenance of a capable policing force

Governmental collection of data

- PRISM → Program under the US NSA that collects internet communications through US internet companies
- "Rein in the legal provisions that give US intelligence agencies nearly unfettered authority to conduct warrantless surveillance on domestic foreign communications
- Taking advantage that large technological companies, whereby majority of the internet traffic flows through, are American and hence giving the NSA unparalleled authority to look into other countries external affairs
- Government leaks
    - Furthermore, government competency is not high – with the PRISM document leaks a testament to that – and that the more people have access to such sensitive information the more chance to go wrong, mostly as a result of user negligence
    - Taliban seized US military documents that contain biometric data of Afghan citizens who supported coalition forces, which makes it easy for the Taliban to track down individuals and their families

Big data as a whole

- Target incident where supermarket recommended a 15-year old girl pregnancy products before her family even knew about the pregnancy
- Manipulation of statistics
- Transparency and ability to cross check
- Tap on large reserves of available data

Themes in technology

AI
- Inequality
- Dangerous, could go out of hand
- Could be used to do wrong

Crime and globalised economy
- Allows crime to be conducted from remote points while maintaining anonymity
- Magnifies the scale and consequences of crime
- Resulted in many people being more vulnerable to crime
- Freedom and privacy

Cybersecurity (impacts on personal data and investments)
- People incapable of keeping up with the times and protecting themselves
    - Stuxnet – Iranian nuclear weapon system was severely crippled by computer virus that would delivered manually through an unsophisticated USB stick
    - Scam Calls
- Bangladesh Bank robbery – attempted to steal over a billion USD, successfully stole over a hundred million from the federal reserve of New York (largely attested to be North Korea)

Personal Data
- Big Tech
    - June 2019 letter from Amazon to Democrat Senator for Delaware Christopher Coons, Amazon admitted that it permanently stores users' interacts with chatbot Alexa, **even if the user has requested for the audio to be deleted.**
    - Google interview with Sundar Pichai about privacy, google practices still have yet to become regulated more in recent years
    - During a hearing "Transparency & Accountability: Examining Google and its Data Collection, Use and Filtering Practices", google CEO Sundar Pichai confessed that Google continues to track users' location even if opted out of. This is just one example out of many of large companies, often coined "Big Tech", collecting data against their users wishes.
    - Despite such high-profile cases of being exposed, big tech has yet to be regulated as such companies have grown too big to be controlled
- Governmental surveillance
    - Generally has 2 aims – stalking and probing into private affairs, and to carry out justice
    - 2016 incident where federal judge ordered Apple to break into the iPhone of one of the San Bernardino shooters as the phone likely held important evidence.
    - Seen to be a dangerous precedent to create backdoor into security system – not only is there a risk of it leaking out to the public, but also that it may end up setting could lead to a slippery slope that endangers privacy of large numbers of people.
- Cybersecurity and Data Breaches
    - 2021, 38 Million records from Microsoft's PowerApps platform – which affected large organisations such as Indiana Department of Health, New York Public Schools and American Airlines.
    - Singhealth breach of 1.5 Million health data of people

Terrorism
- Innovations in computing and telecommunications through widespread internet access, end-to-end encryption and virtual private network usage

‘Modern Technology always improves the quality of people’s lives.’ Discuss.

ALWAYS (must disagree)

Modern technology has resulted in socioeconomic divides between the fabrics of society that result in tensions between groups, adversely affecting the quality of lives of some.

- Elderly related thing (Rapidly evolving technology/ difficulty reading/stubbornness/finances)
    - Eurostat: 87% of people 75 and above have never been online
    - UC San Diego study has found that elderly often need more gradual introduction into technology, rather than being thrown in the deep end and overwhelmed
- Income inequality

While modern technology has led to more active dealing of world threats, it has led to those with ill intent being able to commit crime with greater damage on people’s lives.

- While Interpol and technology is able to help catch criminals and save society from potential crimes, modern technology has resulted in a new breed of crimes that have impacted people’s lives.

The interconnectedness of the world brought about by modern technology has resulted in severe impacts on the mental health of people despite its potential to connect and bring people together.

- Social Media, FOMO culture, idealistic lives people cannot live up to
    - 2017 study by American Journal of preventive medicine found that young people with significant social media use have a 3x greater chance of feeling socially isolated than those with little social media use
- Work-life balance erosion
    - Research by the Southern Management Association has found that being connected to a smartphone leads to an erosion of boundaries between work and non-work
    - Ability to work from home results in workers feeling pressured to go the extra mile to show their diligence to their superiors → resulting in vicious cycles where workers voluntarily spend more of their off time on work activities

AT: Modern technology has reshaped our lives and provides us with greater convenience and luxuries that has improved the quality of our lives

- Focus on the fact that it is ‘always’ and that the reshaping is able to help everybody rather than just a few
- Chatbots, Alexa → large penetration of about 22% of Google home alone
- Use of drones in Amazon’s within-the-day delivery of packages

How far do you agree that space exploration is irrelevant to the average person?

Astronaut Ron Garan once remarked that “Earth is a small town with many neighbourhoods in a very big universe”. Indeed, humanity have explored what many consider a negligible part of this big universe. However, as billions and billions are pumped into space exploration, many have argued that space exploration does not actually benefit the average person as it consumes huges amounts of money that could have been better spent on the basic needs of the average people. We argue that although space exploration is expensive, the technological benefits to society far outweight its costs. Additionally, space exploration is able to provide educational benefits for the average person as well as potentially unlocking resources on other planets we need to sustain life on Earth.

Some might argue that space exploration is not sufficiently relevant to the average person to justify its high cost. While space exploration may be able to benefit the people in the long run, it is a huge amount of investment in the short run. Despite the large potential, it is still at the end of the day a risky venture and could result in huge amounts of money being wasted. For example, NASA once lost a $125 Million Mars orbiter because of a currency conversion issue. Even without human error, it is difficult to predict with certainty the results of landings and exploration, which could result in huge amounts of money spent with no actual benefit to society. NASA alone takes up $19.3 Billion dollars of taxpayers’ money annually, and that is just in the United States. It is increasingly difficult to justify such large amounts of money while many people do not even have simple basic needs. For example, 1 in 9 people globally go hungry each day and about 1 in 10 do not have access to clean water. The huge amounts of money put into space exploration also could be better spent on more pressing issues, like that of climate change. In fact, the large scale manufacturing of rocket parts, as well as the huge amounts of resources used in their engines, has also contributed to greenhouse gas emissions and thus climate change. Instead of indulging in activities that could severly affect the health of our planet, we could spend the money instead on clean energy sources and distribution of basic needs to the public, allowing a greater portion of society to benefit. The short-term benefits of space exploration are limited to a small select group of the population – namely astronauts, engineers and large organisations funding the research. Thus, the benefits of space exploration are largely kept out of the hands of the average person and have less relevance than the potential benefits of the funds being better used.

However, in reality, the potential technological benefits of space exploration are relevant to the average person. Having something to work towards often gives people the motivation and focus to bring about rapid technological discovery. This is similar to wartime development of military technology: while technology remains relatively stagnant during peacetime, huge advacements of artillery, missles and guns were developed during the wars of the 20th century. Similarly, space exploration has led to an influx of technology related to exploration and inhabitation in space. For example, space exploration has led to the widespread availability of satellites surrounding our Earth, allowing for the widespread use of the Global Positioning System (GPS) in for navigation in cars and phones. This has allowed the average person to travel between locations with greater ease. During the COVID pandemic, there was a widespread use of infrared thermometers to monitor citizens temperatures has allowed governments to minimise the spread of the virus and keep the average person safe. This was an advancement used to measure the temperature of stars and planets and has brought about huge applications in our wider society. Countless other inventions, wireless hedsets, freeze-dried foods and LED lighting can all be attributed to technological advancements used in space exploration. In all, it has been esitmated that there is a 700%-1400% return on investment on space exploration, that is, for every dollar put into space exploration about $7 of benefit is reaped by society. Thus we can see that the technological advacements and benefits to society of space exploration far outweigh its costs and thus supporting our case that space exploration is relevant to the average person.

Additionally, learning about space exploration can bring about recreational and educational benefits for the average person. On July 20, 1969, as many as 600 million people watched as Neil Armstrong took the first step on the moon, a record not broken until 12 years later where the digital penetration of society was far greater. Space exploration has always been, and remains an issue that many around the globe are interested in. Even now, despite a lack of significant progress, tens

of millions gathered to watch the launching of a SpaceX rocket back in 2020. The intrinsic curiosity of people is what motivates them to learn Chemistry and Physics – space exploration is no different. Countless children dream of one day being an astronaut and leaving the earth, or living in the International Space Station. Learning about space allows us to learn about our origin story and about the universe surrounding us, topics of keen interest to many. Millions of people have flocked to different museums around the world to appreciate the exploration and the discoveries in space. Additionally, stunning views of the galaxies are able to provide art for the recreational enjoyment of the people and many are captivated by the design and engineering of space craft. Overall, space exploration is able to offer recreational and educational benefits for the average person.

Lastly, space exploration is also relevant to mankind as a species by ensuring the sustainability of the human race. Steven Hawking once remarked that mankind had at most 200 years to escape out onto other planets, or face a higher risk of extinction. By spreading out to other planets to look for resources like water, researchers hope to be able to find planets capable of sustaining life where we could potentially spread out the human race on. Through space exploration of the Goldilocks Zone, we would hopefully be able to find planets with a climate similar to that of Earth where colonies could be set up. While spreading out into other planets is a distant goal, it is an important one to ensure the survival of the species. Nuclear war, rogue asteroids and mutated viruses are just some ways our population could get wiped out. It is thus important to invest in space exploration in the hopes of sustaining humanity through a crisis and to ensure the average person is able to continue to survive and thrive. Furthermore, the ever-dwindling resources on Earth increasingly struggle to keep up with the demands of the 7.9 billion people on Earth, a number expected to rise to over 10 billion before 2050. By harnessing multiple planets of resources, we hope to be able to boost the supply chains of the world with raw materials that cheaper and more easily available. Studies on Mars and asteroids have brought about discoveries of ores and rare soils that are scarce and expensive to find on Earth. With mankind hoping to expand with larger and more impressive structures, being able to capitalise on other planets is crucial to the sustainability of projects back on Earth. We can thus conclude that space exploration can benefit the average person by supplementing the resources on Earth and allowing them to spread into colonies away from earth to prevent their extinciton.

Space exploration is no different from a 6-year old kid that was put into a swimming pool and swam to the deep end. Humans are a curious species – it is in our nature to explore what is out there. With the undeniable benefits of space exploration, from technological advancements to recreation to the sustainability of mankind, it clearly outweighs its monetary cost to society by bringing about significant benefits for the average person.