# Abstract book

## 14th BCSWomen Lovelace Colloquium (virtual)

## Host Universities: Aberystwyth, Lancaster, London South Bank

## 13th April 2022

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# Preamble

## Welcome

Welcome to the Abstract book for the 15th BCSWomen Lovelace Colloquium. This is the 3rd virtual colloquium, and we were really hoping we could be in-person this year. However we erred on the side of caution and it seems that was the right decision as several members of the organising team currently have COVID…

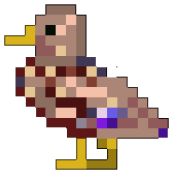
Anyway - welcome to the conference and welcome to the Abstract book. This contains bios and abstracts for all the speakers, and abstracts for all the student poster contest finalists.

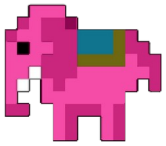
I hope you all have a fantastic day. Enjoy the talks, enjoy talking to other students about your work and their work, and have fun chatting to each other during the event.

In case you're wondering about the pixel animals, they represent the organising universities this year. Aberystwyth is full of seagulls, Lancaster is full of ducks, and London South Bank University is full of … not really. London South Bank University is next to Elephant and Castle in London, which used to have a big pink elephant outside[1]. The little pixel beasties are designed by Lucy Hunt. Next year, we're going to be in Sheffield, who've chosen a peregrine falcon, and Lucy is going to have a challenge on her hands!

Hannah Dee
Conference chair

Aberystwyth April 11 2022





1 https://www.google.com/search?q=elephant+and+castle+pink+elephant&source=lnms&tbm=isch&sa=X&ved=2ahUKEwjm_9uohof3AhX9QEEAHeCbCQYQ_AUoAXoECAEQAw&biw=1920&bih=910&dpr=1

# Thanks

Thanks to all our sponsors:

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- Airbus (Pre-event social)
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The poster judges:

Andrea Palmer, Chris Price, Denia Katsuda, Fiona Macaulay, Gunshi Gupta, Kelsey Doerksen, Louise Brown, Nnenna Idegwu, Samia Kamal

The abstract reviewers:

Alex Stanhope, Alice Ashcroft, Alice Miller, Annalies Gibson, Carron Shankland, Emily Winter, Heidi Christensen, Helen Miles, Herbert Daly, Jess Friersdorff, Karen Petrie, Kathy New, Lucy Hunt, Matthew Barr, Miriam Sturdee, Neil Walkinshaw, Safia Barikzai

The abstract book construction: Heidi Christensen

All at BCS for their support, particularly Olivia Wolfheart and Mandy Bauer.

All of the students who submitted posters, and all the employers with stands at the event.

The organisers and helpers: Lucy Hunt (University of Lancaster), Safia Barikzai (LSBU), Amanda Clare, (Aberystwyth University).

Miriam Sturdee for helping with Qualtrics and the poster submissions

Edel Sherratt and Christine Zarges for helping with Discord.

All speakers and poster presenters, who can now meet and read about in the rest of this book!

# Programme

Note: The Youtube talks are live (as of Sunday 10th) and so can be watched in advance if you want. The student posters are also up on the Discord server. This allows attendees more flexibility in planning their day.

Speakers will be in their Discord channel ready to answer questions during the talk slot.

| | |
|---|---|
| 9.00 | Informal networking and poster preview |
| 9.45 | Welcome (live via Teams) |
| 10.00-11.00 | Keynote: Rebecca George OBE (live via Teams) |
| 11.00-11.15 | Break |
| 11.15-11.45 | Talk 1 How to Navigate a Career in QA (Nicola Martin, Adarga) https://www.youtube.com/watch?v=8Bft-x3yqI8 |
| 11.45-12.15 | Talk 2 Using speech analytics and AI to detect dementia in a person's speech and language (Heidi Christensen, University of Sheffield) https://www.youtube.com/watch?v=Q1elwIN5X60 |
| 12.15-12.45 | Skills Buffet (Short talks, speakers online to take questions as a group)<br>● Communication skills for women (Anna Klosowska, NMI) https://www.youtube.com/watch?v=n7_Kll3zwAw<br>● Consciously Navigate Your Career - Career advice I would give to my younger self (Bhavisha Patel, Ocado Technology)<br>● How to get the most out of employer stands and careers fairs (Amanda Clare, Aber University) https://www.youtube.com/watch?v=2yppBHLQITg |
| 12.45-2.30 | Posters |
| 2.30-3.00 | Talk 3 A day in the life of a Software Developer (Muna Venning, NMI) https://www.youtube.com/watch?v=1JPdTMmSDxo |
| 3.00-3.30 | Talk 4 Robotic Manipulation (Silvia Cruciani, Ocado Technology) https://www.youtube.com/watch?v=pcs8hwNcoMc |

| | |
|---|---|
| 3.30-4.00 | Skills Buffet 2 (Short talks, speakers online to take questions as a group)<br>● How to nail your interview (Fay Benefield, NMI) https://www.youtube.com/watch?v=4zKbmhInJJA<br>● Applying for a PhD at a CDT (Benedetta Mussati, University of Oxford) https://www.youtube.com/watch?v=1TYrWHyaGyM<br>● How to get the most out of a professional body (Hannah Dee, Aberystwyth University) https://www.youtube.com/watch?v=mFllwc3zVLE<br>● Pilates (Rachel Hubbard, Aberystwyth University - but no Q&A, just enjoy the exercise!) https://www.youtube.com/watch?v=ZgOlCjk2B8o |
| 4.00-4.15 | Break |
| 4.15-5.00 | Panel |
| 5.00-5.15 | Prizes and close |
| 7pm+ | Evening social (in Gather Town): link to follow |

# Talks from women in tech

## Speaker information

### Keynote: Rebecca George OBE (live on Teams)

**Bio**: Rebecca George is the Immediate Past President of the BCS, the Chartered Institute for IT, in 2020. She has worked in IT for over 30 years, including for companies such as IBM and Deloitte. Her career has been defined by digital transformation and leveraging data - and for the last 20 years she has worked with the most amazing Public Sector clients. She has extensive experience of IT enabled change programmes and operational efficiency - improving the way in which people, organisations, processes and systems work together. Rebecca was awarded her OBE for services to IT and for her work supporting the Egan Review of Skills for Sustainable Communities.

The following talks will be available at https://www.youtube.com/playlist?list=PLqq4UEy_EwMNF_CZxVVLbeeLo5O60hZvI

### Nicola Martin, Ardaga:
### How to Navigate a Career in QA

**Abstract**: If you are starting a tech career, you will have thought about testing and development but do we really talk about quality? This is important across every area of an organisation, and in tech teams ‘culture of quality’ has become a strong talking point. In this talk ‘What is quality?’, we look at different aspects of quality from process and standards to culture and how these important elements come together to help tech teams produce better software.

**Bio**: Nicola is currently working in the AI and Data Science field as Head of Quality Engineering at Adarga.

Nicola is passionate about increasing diversity and inclusion in software engineering. She is a panelist and speaker for global events focused on quality, diversity in tech, and mentoring. She mentors and coaches professionals wanting to either change or develop their careers.

She is a member of the British Computer Society (BCS) Council, and active member group volunteer, Nicola is currently Vice Chair for the BCS Special Interest Group in Software Testing (SIGiST) and BCS Pride and a committee member for BCSWomen.

## Heidi Christensen, University of Sheffield: Using speech analytics and AI to detect dementia in a person's speech and language

**Abstract**: This talk will start by looking at what information is present in the speech signal and how we might use machine learning and signal processing to extract these discriminative cues and patterns. We will then look at some recent research by my team on automatic methods for detecting early signs of dementia in a person’s speech and language.

**Bio**: Heidi Christensen is a professor of spoken language technology in the department of computer science at the University of Sheffield, United Kingdom. Her research interests are in the use of speech and language processing in the healthcare domain. Her main research interests are in the areas of recognition of disordered speech, automatic processing of conversations, and the automatic detection and tracking of paralinguistic information such as emotions and general interactional behaviours.

## Muna Venning, NMI: A day in the life of a Software Developer

**Abstract**: Muna Venning, Software Developer at NMI, will be giving a brief overview of NMI's activities, what it's like to work in software development at NMI and how she became a software developer.

**Bio**: Muna Venning has a Law degree and an MSc in Computer Science from University of Wales in Aberystwyth. She has worked in Software

Development in Four countries (Israel, Germany, Switzerland and UK) and in a few industries (such as NGOs, Banking, Finance, Fintech, Digital Marketing, Publishing and Software Houses) mainly developing in Java, PHP and more recently in C#. She stepped back from hands on programming a few years ago and is now back to full-time programming at NMI as of six months ago.

## Silvia Cruciani, Ocado Technology: Robotic Manipulation

**Abstract:** Manipulating objects is a fundamental human skill that exploits our dexterous hands, our motion ability and our senses. Giving the same level of skill to a robot is an open challenge. Tasks that are simple and intuitive for humans, such as picking an item and placing it down somewhere else, become challenging when executed by a robot. Sensing the environment, understanding each part of it, and interacting with it are not problems that have fully been solved for artificial systems; the result is a multi-disciplinary set of problems that span across computer vision, machine learning, control engineering, robotics and hardware design. This talk will discuss the challenges and research opportunities in the field of robotic manipulation, with special focus on picking and packing items for the online grocery market.

**Bio:** Silvia is a robotics software engineer specialised in robotic manipulation. With a background in control and automation engineering, she is an expert in developing robot programming solutions that involve limited hardware dexterity and require the help of computer vision to succeed. She holds a PhD in Computer Science from KTH Royal Institute of Technology (Stockholm) where she researched robotics in-hand manipulation and vision-based dexterity enhancement. She joined Ocado Technology as a robotics engineer, and uses her knowledge of robotics manipulation to enable novel solutions for the task of warehouse picking automation in the challenging grocery industry domain.

# Skills and Careers talks

These talks are available at https://www.youtube.com/playlist?list=PLqq4UEy_EwMOiq9aF_PQGTWEXfZ6j9zzv

## Communication skills for women (Anna Klosowska, NMI)

**Abstract**: Anna Klosowska, People Advisor at NMI, will deliver a talk on communication skills, focusing on how to communicate assertively, from a position of personal power, knowledge and confidence.

**Bio**: Anna Klosowska is an enthusiastic HR professional with over 5 years' experience in the field. She graduated from University of the West of England in 2018 with a Masters Degree in International Human Resource Management. She joined NMI in April 2021 as the People Advisor. Before NMI she had an opportunity to work as an HR professional within various industries, including hospitality, healthcare and charity sector. She is passionate about making people's working lives better.

## Consciously Navigate Your Career - Career advice I would give to my younger self (Bhavisha Patel, Ocado Technology)

**Abstract**: Your first role after graduating is a defining one as it can steer the next few years of your career. With so many roles and companies to choose from, how do you know which one to apply to and accept?

Bhavisha, has learnt how to consciously navigate her career by making career choices that will help her achieve her career goals. Bhavisha will share learnings and insights from her career that she wished someone had shared with her. The talk will cover:

- Developing self awareness
- Salary vs experience
- Fear and failure

**Bio:** Bhavisha graduated from Computer Science with Management over two decades ago. She has since worked for a variety of companies, from small software firms and startups, to larger tech companies. She is currently Senior

Product Manager at Ocado Technology where she is also chairing Women in Tech.

## How to nail your interview
## (Fay Benefield, NMI)

**Abstract**: Fay Benefield, Global Talent Acquisition Specialist at NMI, will be providing some top tips for how to succeed in a job interview.

**Bio**: Hi, I'm Fay Benefield, I graduated in 2005 from the University of Southampton with a First-Class Honours degree in French and Spanish. After working for several years as a translator in Paris, France, I returned to my home city Bristol and have worked in several engineering companies in the field of Human Resources. I joined NMI in October 2021 as the Global Talent Acquisition Specialist.

## Pilates
## (Rachel Hubbard, Aberystwyth University)

**Abstract**: After a day at the computer, have a 10 minute stretch with this Pilates session!

**Bio**: Rachel Hubbard brings a wealth of knowledge and experience to deliver engaging fitness sessions.

## Applying for a PhD at a CDT
## (Benedetta Mussati, University of Oxford)

**Abstract**: Benedetta will describe the application process to a Centre for Doctoral Training (CDT). She'll describe her experience and also let you know what points to consider when choosing or not choosing this career path. Benedetta will also talk about the differences between a traditional PhD programme and a CDT programme and will give you tips on the application process.

**Bio**: Benedetta Mussati is a first year DPhil student in the AIMS CDT at the University of Oxford.

# How to get the most out of a professional body (Hannah Dee, Aberystwyth University)

**Abstract**: Hannah will tell you what a professional body is, which ones you might join and what you can get out of it.

**Bio**: Dr Hannah Dee is a Senior Lecturer at Aberystwyth University and chair of the Lovelace Colloquium 2022. She's a member of the BCS and the BMVA, and she has been a member of the IEEE, the ACM and IET.

# How to get the most out of employer stands and careers fairs (Amanda Clare, Aberystwyth University)

**Abstract**: Nervous about how to approach the employers? Not sure what to make of all the employer channels on the Lovelace Discord site? They're really very friendly and approachable, and are just waiting for you to ask them about what life is like working for their company. This talk reminds you of some of the questions you might want to ask them, and suggests why you should chat to all of them, even if you're hesitating, because they're keen to say hello to you all.

**Bio**: Dr Amanda Clare is a Senior Lecturer at Aberystwyth University and has seen and chatted to lots of employers at Lovelace Colloquium and at other careers fairs. She loves computing, and would try out many of the opportunities offered by the employers if she didn't already have a job she enjoys.

# Student posters

## First year or foundation year

### Can cosmic rays flip bits? (151)

Alexandra Cooper Aberystwyth University

Cosmic rays have been implicated in several dramatic natural phenomena, from mass extinction events to a potential role in causing lightning strikes our planet is at the mercy of outer space. It seems that, in addition to damage on the macro scale, cosmic rays may be having an adverse effect on our electronics. A cosmic ray is a high energy particle which moves at or around the speed of light. These can hit a computer and invert the value of a bit, 'flipping' a one to zero or vice versa. This is called a 'single event upset'. Typically, most rays striking machines tend to do little to no damage. However, there have been several cases in which a flipped bit has been said to cause significant disruption, both at ground level and in space. Perhaps most dramatically, an error with the flight controls during a passenger flight to Perth twice caused the plane to suddenly pitch downwards. The event, thought to be the result of cosmic rays, left both crew members and passengers injured. Despite this, the risk of damage to electronics as a result of cosmic rays is generally low at ground level - the risk increases with altitude. However, as increasingly complex devices become available at consumer level, the potential disruptive impact of single event upsets heightens. There are several types of both software and hardware protections available, but it is essential that we continue to develop measures to shield our electronics from damage caused by cosmic rays.

### Beauty is in the AI of the beholder (180)

Ciara Gillen *Queen's University Belfast*

We know beauty; rolling hills to lazy autumn eves, the hidden spectacle of Fibonacci. We find beauty in silence, in song, in art and culture. In famous faces and family. Our history is written as expertly by the hand of the craftsmen as by any of war and what is science but a craft. As put by Leonardo da Vinci 'The painter has the universe in his mind and hands.' Even now AI is used to create art, see the work of artist Refik Anadol. And

as we step off the metaphorical ledge toward an unknown computerised future we must see the implications of beauty on the robot mind. The new renaissance is one of code, man made machine. How will we impart not only our knowledge but the value of life beyond statistics? We are building the grounding of a future we won't see, those that could succeed us represent the best of us. If man makes machine in his own image it should see beyond the screen. We are so focused on the benefits AI can bring us that we forget one day the capacity of AI to accrue sentience will be realised. The age of AI will bring new challenges but perhaps we should focus on the deeper concepts beyond the 'see-a-need-fill-a-need' attitude we have adopted. Maybe we need to give the new mechanical minds the full breadth of living. If AI is going to be a part of our shared future we have to decide now.

## Can we use natural computing techniques to solve the climate crisis? (142)

Elizabeth Maggio-Kotkowska *Keele University*

Climate change is a complex and seemingly impossible and devastating problem demanding great computational innovation to solve. Our inefficient systems are fast causing widespread destruction. Although combinations of human and artificial intelligence have taken advantage of the rapid growth in environmental data, forming hopeful and dooming models and predictions encouraging mitigation strategies, the true key to solving the climate crisis has thus far not been widely recognised. The new paradigm encompassed by the field of natural computing offers a way to model and understand the complex interactions between environment, climate, ecosystems, and human social and economic systems. Due to its complexity, the field invites cross-disciplinary questioning, especially as we are just at the beginning of gaining the knowledge and computing power required. What if there is a possibility that development of quantum computing may give us insight into the way atomic processes function without the limitations of silicon-based computers? What if we were able to simulate chemical reactions, enzymes, and proteins using computers? Is it possible to use computing devices for the sequestration of carbon? For the invention of new, more energy efficient batteries? To synthesise bacteria that could fertilise the soil and promote nitrogen-fixation? Greater emphasis on natural computing techniques in climate action research has the potential to evoke a deep understanding of the behaviour of nature. With this knowledge, relevant natural phenomena can be simulated and emulated, allowing us to engineer a greener, more abundant and sustainable society that works in symbiosis with nature.

# What programming language should you be learning in 2022? (170)

Hadar Cohen *Middlesex University*

The first compiled programming languages were designed as early as the 1950's to communicate instructions to a computer. Since then, there have been numerous programming languages being developed, that are high-level and general purpose and differ in programming style, i.e. imperative, declarative, object-oriented, functional, scripting. As a first year Computer Science student, it is often daunting to know which of the languages to learn and to understand what is currently of interest to employers. My poster aims to identify and compare the most popular programming languages that are used today.

# 'Do Android( User')s Dream of Electric Sheep': Do Mental Health Apps Assist with the Symptoms of Anxiety Disorders?'' (141)

Haleena Hussain *University of Wolverhampton*

The scarcity of mental health resources has caused many of those in need to instead turn to less traditional methods ' sometimes on the advice of a professional. Often these methods involve using 'mental health apps' which claim to be effective in aiding the user in dealing with their symptoms.'An increase in screen time has been shown to negatively impact sleep in both adults, and teenagers ' in fact, it is known that sleep and mental health have an intimate relationship with each other. This raises some questions about whether these apps can truly say that their claim is genuine. Furthermore, regularly the treatment offered by these apps is Cognitive Behavioural Therapy ' which, for those with more complicated requirements is ineffective. Both of these points refute the effectiveness of mental health apps, though others do the opposite and could prove the effectiveness.'For instance, typically these apps have deep breathing/meditation features ' both of which have been proven to lower levels of anxiety, and stress. This poster will analyse both sides of this argument, though will focus on the symptoms of Social Anxiety Disorder, and Generalised Anxiety Disorder. Additionally, we will explore some of the lesser acknowledged symptoms of these disorders. Lastly, this poster will use the former points to examine how mental health apps can be improved.' This poster will analyse both sides of this argument (though focusing on the symptoms of Social Anxiety Disorder, and Generalised Anxiety Disorder). Additionally, we will explore some of the lesser acknowledged symptoms that consumers experience.

Lastly, this poster will use the former points to examine how mental health apps can be improved.

# IS TECHNOLOGICAL INEQULAITY A THING? (120)

Humaira Shahzad *University of Leicester*

The world as we see it is evolving. New inventions are introduced every day and technologies are built to combat every little issue we have. We are lucky enough to live in the developed regions of the world to experience such change. But what about the rest of the world? They see these modifications much later. With the lack of power, money, freedom, and education, they do not have the chance to experience the world technologically evolving as we do. A very practical example would be the distribution of vaccines in the covid19 pandemic. The much more powerful and richer countries hogged the vaccine supply and were even able to buy excess supply which they inevitably would have no use for. However, those countries with less capital were not able to risk investing in vaccines that had no assurance of working. Consequently, these countries are now heavily struggling with their health with no one to help. So, as all these game-changing algorithms and automation are being built and designed to help and simplify tasks for an individual, what happens to the poorer less educated regions? They will not have access to it, let alone know about it, for several years. Part of the world will be progressing with groundbreaking computational solutions, but the other less advantaged part will still stay struggling. This occurs due to various factors, and I would like to discuss if the issue can ever be solved.

# Why Bias is a larger issue to AI than "World-Dominating Robots" (105)

Jennie Phuong *Brunel University London*

Artificial Intelligence (AI) is becoming increasingly popular within healthcare, criminal justice, education and more. Because of this, there are many debates about the ethics of this new technology. On the outside AI seems futuristic, complex, and unflawed- but beneath the shiny technological coating lies the same issue of bias that we as humans have, reflecting the inequality and discrimination that remain in our society. Biased algorithms have already been used: from Amazon's biased hiring algorithm, racial bias within the American healthcare system and even with Facebook using bias ads targeted at marginalized communities. This can be detrimental as AI systems are used to support business decisions, and the

fields mentioned above are especially sensitive to bias. Dealing with this issue is not always so simple. As humans our biases, whether racial, gender-focused or socio-economical, bleed back into the AI we create. As the AI is used, the extent of its bias only increases with each run. For example, after a hiring algorithm has recognised a larger number of male applicants, it will favour male applicants and more often push aside female applicants. As it continues to run this pattern strengthens. This was the foundation for Amazon's unsuccessful hiring algorithm. This poster tackles the question of whether Artificial Intelligence can truly make less biased decisions than humans, the varying ways bias is introduced into our algorithms, its impacts, and ways we can reduce bias towards future AI development.

## How To Save A Life (110)

Kaalkidan Sahele *Durham University*

It is well known that the field of computer science branches out into various industries, and as it continues to develop further, the main improvements envisioned are usually to do with refining computers themselves. We consider faster computers, growing digitalisation, and increased interconnectivity. However, with the dawn of quantum computers, we are starting to see the implementation of this field in areas beyond that of pure technology. Quantum computers operate on completely different principles to classical computers ' they harness the abilities of quantum mechanics, making them computationally much more powerful. One particular field they could make beneficial contributions to is that of medicine. They are already exhibiting signs of great potential in molecular and drug modelling and are currently putting into use these modelling abilities to develop treatments for widespread conditions, such as Alzheimer's, Parkinson's Disease, and potentially cancer. As quantum computers operate on the same laws of physics as molecules, they are able to very closely replicate their behaviour and interactions. Calculating the probability of an interaction between certain molecules is an incredibly difficult task due to the scale and the sheer number of possibilities. However, using a quantum computer, scientists can, not only predict these interactions but also test these drug compounds on living cells, paving the way to finding a cure. This poster will discuss how the development of quantum computers science means so much more than improving performance speeds, computerising systems and increasing mass usage ' it can save lives.

# Could giving a machine a mind allow it to read ours? (118)

Kashvi Panta *Durham University*

Previously, 'mind reading technology' meant apps such as 'Akinator' that guesses what person you're thinking of or strategic adverts for products you've considered buying. These illusions created by algorithms rather than the inner workings of your brain are nowhere near the level that is now being reached. Technology that can monitor and decode the human brain in real time is a rapidly growing field and one that has yielded much success. The ability to read electric signals in the brain through brain-computer interfaces is being used to develop ways of communicating and controlling external devices with just your mind. Examples include NextMind who have a device that can allow users to navigate computer screens with their thoughts and a research group at a university in California that have managed to convert thoughts to text through a machine learning algorithm that converts brain signals to numbers and then into words. These advancements will be game changers in several fields, leading to patients with locked in syndrome or in comas being able to communicate with doctors and loved ones. The fantastical power of telekinesis could become a reality by connecting thoughts and objects, greatly aiding people with disabilities. However, the threat to personal secrets and basic rights along with problems such as the inability to lie are only some of the ethical dilemmas this easily abusable technology could bring. This poster will further explore the current and potential uses of this technology as well as whether the advantages are worth the risks.

# Hello, I'd like to book an appointment for my device please. (161)

Kehinde Gbolade *University of Chester*

Mobile phones and computers are so ubiquitous now they are like appendages of our bodies. Many people proudly state that they 'can't live without' their devices. So, should we start treating our electronic devices like our bodies and subject them to check-ups with professionals too? Mobile devices and computers have a huge impact on every aspect of our daily lives that such a suggestion does not seem absurd. In the UK we have regulated checks, for example, of our health, teeth and vehicles, checks which are important for us to live productive, safe and healthy lives. While 'computer clinics' and IT companies exist for these purposes for computers, there is no regulation of them. This is in no way an accusation of

wrongdoing, just a simple fact. How do we know who to trust with our devices when something goes wrong? Are we taking enough, correct preventative measures? Despite improved security in electronic devices and more electronic systems education, there are still so many stories of electronic data security breaches, hacking of systems and theft via digital media. This suggests there is still some way to go in terms of mass computer and digital security education. This poster proposes a new type of national health service, the NCHS - National Computer Health Service. It looks at how it could be structured and addresses the pros and cons. It aims to create a thought-provoking discussion about the nation's electronic devices health.

## Can you see me? How social medial algorithms affect black individuals (148)

Keisha Owino *Middlesex University*

Social media is part of our everyday life. It allows us to communicate with others, share our thoughts and emotions and businesses have found it useful for promotion and marketing. The social media platforms rely on black-box AI algorithms for deciding on what posts should be prioritised, what adverts should be shown and even for automatically cropping images. However, there have been several examples where these algorithms act in a biased way. For example, Twitter's automatic algorithm for cropping images would exclude/crop out black individuals and favour white individuals, mostly white women. This was observed by a twitter user in September 2020 [https://tinyurl.com/2p84xuyt ] and made headlines. It was also written about by The Guardian [ https://tinyurl.com/24a3u4r6 ] and the BBC [ https://www.bbc.co.uk/news/technology-57192898 ] as well as many other American news sites such as CBS News, ABC News and NBC News. Another instance is on popular app Tiktok where white creators are being uplifted and rewarded for content taken from their black counterparts because the application is simply not showing these black creators; Insider wrote an article investigating in more detail [ https://tinyurl.com/4rjkx89x ]. It can be difficult for users to detect bias on their own, as for example, they can't compare their news feed with others news feed or adverts that are shown to them with those shown to others. This poster aims to show why AI algorithms in social media platforms can be biased and what methods have been developed for detecting and mitigating biased algorithms.

# The Dark Web; where the good and evil co-exist (154)

Leah Zara Da Silva Bliszko *Swansea University*

Many people have this obsessive worry about technology advancing and what may come of the future. There already exists a concern which many people are oblivious to; The Dark Web. It uses a network that bounces information through encrypted layers, which does not index searches online by hiding the IP address. The anonymity of the Dark Web enables individuals to purchase the most malicious products and services; such as child pornography and human trafficking. Law enforcement were constantly playing catch up with cybercrime and when within reach, the Dark Web knocked them back. In order to feign anonymity, users need to access this network with a VPN and make their purchases using cryptocurrencies. As revolutionary as Cryptocurrency is, does it encourage criminal behaviour? Since 2021, there has been a 79% increase of illicit transactions, not to mention the 340% increase of Bitcoin usage over the last three years; maybe the correlation being the Dark Web? Authorities are finding ways to tackle this oppressive anonymity by using Blockchains and inside investigators. Despite the negative stigma around the Dark Web, there are also progressive examples. In some third world countries, it is evident that education is hard to come by. In some instances, it can be illegal for women to be educated. Therefore, women can freely learn anonymously by using the Dark Web without any consequences. In addition to examining how anonymity fuels many interactions, this poster will discuss the benefits and drawbacks to society which stems from the Dark Web, such as drug addiction and free speech. My work will raise the question, are we in too deep?

# How Phone Cameras Cheat Physics (113)

Lyka Ada Rhodes *Aberystwyth University*

Modern phone cameras have the ability to overcome their physical limitations. But what are these limitations? A camera works by converting data from light into a 2D image. It's important to give the sensor (chemical or digital ) the correct amount for light so that theres enough data to generate the image. My poster will cover how computational photography enhances images, the technologies behind it and their social & artistic impact. Digital sensors capture data via a 2D array of pixels. Each pixel captures the light of part of the image. One of the most important factors is the physical dimension of a sensor. By increasing the sensor size, you can increase the size of a given pixel. This means more light can hit each pixel

creating more data to build a better image. Phone cameras have minuscules pixels that receive less light so produce worse images. For example the iPhone pixel size are 1.9_m2 compared to a modern camera (Sony a7s3) which are up to 70_m2. Early mobile phones addressed the lack light by increasing the sensitivity (ISO) of their sensors. However, this produces noisy images. To reduce the noise, phones starting using computational post-processing. This was the start of 'Computational Photography' which is the core of mobile photography. It works by applying algorithms and programs to enhance the image. One method is to take multiple photograths and combine them into one image, this is often achieved via machine learning.

## Metaverse (166)

Niama Abdirashid Mohamed *London South Bank University*

The Metaverse was inspired by 'Neal Stephenson's dystopian cyberpunk novel Snow Crash' as the term Metaverse was first used in this novel. This novel was released in 1992, and it coexists with William Gibson's Neuromancer as they are both canons of the genre, as the Necromancer has some details of a virtual reality dataspace called the matrix. The metaverse used in Snow Crash is a 3d virtual reality space. It can be accessed through personal terminals and virtual reality goggles, these features mentioned are similar to Oculus quest and other virtual reality headsets. As mentioned above, the metaverse created by Facebook was inspired by Neal Stephenson's vision of the metaverse. Since I have always been interested in playing games, I came across the Metaverse through twitter. The concept of metaverse was very familiar to me as I've seen many games share the same properties as Metaverse, for example VR chats. VR chats is a virtual world platform that allows players to create their own 3D avatars and interact with other 3D avatars in the virtual world.

## Minecraft for Minors: Could a digital life improve an education system? (179)

Petronela Lazar *University of Wolverhampton*

Is everyone adapting to how the world has become a more digitalized one? When we think about the future, we often think about ways to make life easier for adults, forgetting how these may affect the children. A few years ago, it would have been expected to see them playing physical games, but now they have phones or tablets, they play together through games on digital platforms. While not all the digital activities undertaken are

productive, it is arguably too late to remove these devices from their lives, so how can digital activities be made more beneficial? Could primary school children benefit from a game like Minecraft introduced to the education system? Minecraft is a virtual world where the kids have to make their own decision leading to success or failure, consequently learning from their decision. It has the potential to develop their problem-solving abilities, math skills and teamwork. The young learner may learn to code and be encouraged to think outside the box through the creativity of the game. Nevertheless, how can this be balanced against the effects of so much additional screen time? This poster will explore the effects of virtual games introduced in the early education system and consider their future.

## Next Generation: Swarm Robots (128)

Shukri Mohamoud and Sofia Marijuan Carreno *London South Bank University*

In this project we will be focusing on how to move the kilobots, which are insects like swarm robots that work as a team to perform tasks and they carry out tasks using C files and then we use the kilo GUI which is a control panel to program the overhead controller and the kilobots. For the kilobots to work, the overhead controller should be placed on top of the kilobots within 1 meter range. First, we execute the kilobots.exe file, we uploaded the firmware for the overhead controller i.e., a hex file, then we bootload the robots so they synchronize and get ready to be programmed. We press the upload button to upload the hex file into the overhead controller and press run with the c file selected for the kilobots to carry out. In terms of usage, micro-nanos of kilobots can be introduced to deliver medication to a specific part of the body. For example, to make the Kilobots disperse, the disperse.c file uses functions such as loop which generates random values so that the Kilobots move in random directions and to make the Kilobots realise that they are still too near one another the control variable new_message is assigned the value 1, once the value for new_message is changed to zero the individual Kilobots will stop moving since it means that they are far away enough from other Kilobots. Then the hardware is intialised using kilo_init() and then the kilo_start() will implement the loop function.

# Can a mature woman succeed in the IT industry? (159)

Sneha Landge *Middlesex University*

Can a mature woman succeed in the IT industry? Abstract by Sneha Landge (Middlesex University) Owing to the increase in child-care costs, many women are unlikely to return to work after having a baby. According to data from Understanding Society, the UK Household Longitudinal Study [1] 67% of women were in some form of employment before having a baby: 37% were employed full-time, 17% were employed part-time and 13% were self-employed. Three years after having a baby, 55% of women were still in employment, but there was a clear change with regards to the type, i.e., 28% were now part-time, 20% were full-time and 7% were self-employed. Moreover, there is a tech skill shortage in the UK [2], particularly around cybersecurity (42%), big data and analytics (36%) and technical architecture (33%). Technology sector is thus generating a lot of jobs that can benefit women, regardless of their age. As a mature woman myself, I am interested in identifying what the opportunities for mature women are in the tech sector and understand the reasons as to why mature women are not taking up these opportunities. My poster will present the results of my research. References 1.Understanding Society, the UK Household Longitudinal Study (https://theconversation.com/expensive-childcare-is-making-it-harder-for-women-to-return-to-work-125511) 2.Tech skills shortages delay two-thirds of digital transformation projects (https://techmonitor.ai/leadership/uk-tech-skills-shortage-digital-transformation#:~:text=The%20tech%20skills%20shortage%20is%20worse%20than%20ever.&text=The%20UK's%20talent%20shortage%20is,with%20the%20biggest%20skills%20shortage)

# Second year (or third year for 4-year BSc courses)

## Technology- The knight in shining armour for ASD individuals (160)

ASHIMA JINDAL *SWANSEA UNIVERSITY*

Autism spectrum disorder is all about seeing the world from a different angle. Since technology is such a helpful tool, many children having ASD develop skills with it early in their life. Building on those skills can open up

some exciting educational and occupational paths later in life. The requirement for a wide scope of accessible, and inexpensive yet powerful assistive technologies to assist with autism is clear. Fortunately, research into the use of technology by children with ASD shows that new high-tech tools can help kids to express themselves and better cope with the challenges of their daily lives. The poster emphasizes how cutting-edge technologies like Machine learning and Mixed reality is helping children with autism to enhance their skills. For instance, Virtual reality can be beneficial to improve social skills, wearables with acupuncture techniques to lower stress levels, augmented reality to improve their ability to recognize and understand emotions. Based on the work of many skilled researchers, robot-based therapies have the potential to aid the treatment of autistic children. For example, At the University of Hertfordshire, the robot KASPAR can represent facial expressions with less complexity than a real human face. This has helped autistic children to pay attention to KASPAR'S expressions without showing any signs of anxiety as they have when they read human expressions. Every child has an equal right to access the opportunities available on the planet. Technology is booming every other day and so should the chances for a better future. The poster elaborates on the day-to-day difficulties faced by the ASD individuals and rightly explains the current scenario as well as the future potentials of technology to help them out.

## Using AI to address the phenomenon known as the paradox of choice (132)

Agnieszka Kowalska *Middlesex University*

In today's world, consumers have so many choices whenever they decide to buy anything. For example, when shopping online at Tesco's, there are 209 types of bread and rolls, 99 types of cookies, 61 types of milks, 78 types of pasta and so on. So much choice can lead to consumers being overwhelmed and lead into indecision. This is known as the paradox of choice. AI has been used to address this problem with the development of recommendation systems that personalise choices to consumers. To personalise these choices, the recommendation engines need to analyse vast amounts of data and deploy the results in real-time. The recommendation systems act as sales assistants and help consumer make decisions, that leads to sales. In my poster, I will give an overview of what recommendation systems are and how they have been used for alleviating this problem.

# How do we evaluate "evaluation metrics" (130)

Chloe Gilmour *University of Edinburgh*

With the rising popularity of data science and machine learning, a common question these days is: how do we evaluate our recommender systems? To get an idea of how our recommender systems run we can use online A/B tests, offline metrics, and behavioural tests which zone in on specific use cases.I will focus here on the low-risk, cost-efficient offline metrics, of which there are plenty to choose between. You have metrics to measure accuracy, such as ndcg and map, metrics to measure content diversity, such as intra-list and inter-list diversity, and many others such as recency, novelty, coverage and more. These evaluation metrics are great in providing an overview of how your model performs. However, how do we use these scores to determine if our model is 'good' or not? And further, what does 'good' look like? If we have a high accuracy score, for example, but a low diversity score, this may be ethically problematic and suggests our recommender isn't giving a well-rounded, personalised experience. However, it would be equally problematic if we switched these results.We need to settle on a trade-off between our metrics, possibly finding a way to combine all the scores together to fit our recommenders needs and goals. But how is this trade off decided? What do we really want to achieve with our recommendations? To get an idea of how our recommender systems run we can use online A/B tests, offline metrics, and behavioural tests which zone in on specific use cases. I will focus here on the low-risk, cost-efficient offline metrics, of which there are plenty to choose between. You have metrics to measure accuracy, such as ndcg and map, metrics to measure content diversity, such as intra-list and inter-list diversity, and many others such as recency, novelty, coverage and more. These evaluation metrics are great in providing an overview of how your model performs. However, how do we use these scores to determine if our model is 'good' or not? And further, what does 'good' look like? If we have a high accuracy score, for example, but a low diversity score, this may be ethically problematic and suggests our recommender isn't giving a well-rounded, personalised experience. However, it would be equally problematic if we switched these results. We need to settle on a trade-off between our metrics, possibly finding a way to combine all the scores together to fit our recommenders needs and goals. But how is this trade off decided? What do we really want to achieve with our recommendations?

# CRYPTOGRAPHY: Importance of cryptography in security system (182)

Esra Alioglu *London South Bank University*

As information technology improves, security becomes an increasingly important component in communication. The users exchange private information while we communicate online, such as creating an account, making an online transfer, or sending an email. As users, we employ cryptography to provide strong security for transferring data in this case. Cryptography is a data transformation technology that converts readable and intelligible data into a coded representation. Cryptography is information security in which data is encoded using algorithms and is unreadable by humans. The institutes have supplied modern cryptographic methods to protect the security of transferred information. Many people nowadays use cryptography procedures to keep their information safe. Cryptography is a factor that ensures the security of correspondence and private data communicated via secure services such as information consistency, access control, non-repudiation, identification, and authentication. It supplies a method to secure sensitive details by moving them into incomprehensible, and the authorised person can access data by converting the initial text. A procedure known as the file encryption process is required for this transformation from readable text to cypher. Using a memory footprint and implementing the numbers field, the cryptographic algorithm technique provides safety and security. The mathematical technique has several advantages that can be used to create and maintain strong cryptographic algorithms. Algorithms play a key role in protecting cryptographic portions from cryptanalysis in high-security transformations. While using the bank account, the personal details keep safeguarded from any attacks. At this point, file encryption methods are in use.

# Extrasolar planets and how to find them (111)

Ivana Vilhanova *The University of Edinburgh*

Exoplanet is a planetary body outside the Solar System, which is usually orbiting a star other than the Sun. People have suspected the existence of exoplanets for centuries, however the first officially confirmed detection of such a planet is dated back to the year 1992, when radio astronomers Aleksander Wolszczan and Dale Frail announced the discovery of two planets orbiting the pulsar PSR 1257+12. Since then, exoplanet detection has come a long way with the use of various methods, the most popular being transit photometry, microlensing and Doppler spectroscopy, also known as radial-velocity method. National Aeronautics and Space

Administration (NASA) scientists recently added 301 new exoplanets to the total count of 4569 already validated planets. The secret behind the discovery of such a huge number of exoplanets, seemingly all at once, is in the use of a deep neural network called ExoMiner. This machine learning technology uses previously confirmed exoplanets and false positives to successfully distinguish real extrasolar planets from different types of imposters. This poster aims to introduce this new neural network and its background, explains the advantages and disadvantages of using deep learning for exoplanet detection, and explores other ways in which NASA scientists use artificial intelligence and machine learning for discovering extrasolar planets.

## From Non-Playable Mannequins to Playing the Most Competent Protagonist: History of Artificial Intelligence in Gaming (133)

Karolina Anna Kowalska *Durham University*

Games are a key part of our world, offering escapism, a great source of entertainment and for some, sense of purpose. But years ago, a player whose style and grace had shaken the battleground ' AI ' had entered the field and slowly blew long-time champions out of the water. They did not have much of an aim and didn't discriminate when it came to opponents; any and all progress was vital in pursuit of their masterminds' and creators' key goal. Knowledge. As silly as it sounds to claim that training artificial intelligence entities to play games and play them well is vital to the field of computing and more, it could not be closer to the truth. Although the role of AI began as small forays into automating enemy behaviour and static dialogue from a bored avatar, today, models can shake hands with past victors, taking their new place upon the podium. From the likes of university research labs to the large company-owned behemoths like DeepMind and OpenAI, several AI-oriented bodies have spent huge amounts of resources over the last decade on training models like convolutional neural networks to perfect their gaming techniques. I aim for my poster to introduce readers to the history of AI in gaming, its transition from passive bystander to active player, recent developments and how the future might look like with artificial players at its helm.

# The programming industry's treatment of those not male (103)

Kayleigh Bird *De Montfort University*

It is widely considered and taught in computing that the Ada Lovelace, an English visionary, was the first computer programmer, beyond simple calculations. Even though this is widely known and considerably well distributed knowledge, the outlook now days of the programming industry is that it is one for males only. A recent, global, online study (2021 Developer Survey May 25th ' June 15th) revealed 91.67% of the 82,286 respondents were male ' compared to the 5.31% of female and the 1.42% non-binary, genderqueer, or gender non-conforming - with 2.67% in the prefer not to say / other section (Liu, 2021). These statistics show just how male dominated the industry as a whole is and, a major contributor to this is the treatment and discrimination of other genders within not only companies but the education as well. Many individuals would say, when in the hiring process in the industry, the drive to fill out a companies' diversity quota means those who do not identify as male find it an easier and a more straightforward process as companies look towards them with interest. However, the subsequent treatment of those hired creates a difficult and unwelcoming environment for them to work in, let alone stay in their position. In addition, many studies have uncovered a large amount of internal discrimination and belittling by males, towards other genders in the education needed for the programming industry as a whole which lowers spirits and drive in many. It is clear that in order to gain a more diverse employment base ' the discrimination needs to be identified and, a solution to be placed in the works to make others feel more comfortable and accepted into the industry as a whole. Liu, S., 2021. Software developers: distribution by gender 2021 | Statista. [online] Statista. Available at: [Accessed 21 October 2021].

# Hacking (162)

Lara Mohamed *London South Bank university*

'Hacking' when this word crosses your mind or you just hit by while scrolling newspapers, surfing the internet, watching a movie or TV series, the first thought your mind came up with is stealing information and invading someone's privacy without his permission, it's always attached to a very bad experience even if you didn't experience it by yourself or know someone personally who has exposed to it, the general public has a readymade picture of hacking and how hackers can be young and devious creatures who are greedy enough to ignore all ethics and invade someone's

privacy or threaten mega companies and organizations with many forms such as privacy violation, identity theft, sharing copyrighted files, electronic funds transfer, electronic money laundering, ATM card details such as account number and pin numbers, violating database security for spam and sending unauthorized emails, the purpose of all these unethical actions varies, it can be for curiosity, blackmailing, unglorified profit and getting all the benefits they can reach to, may be just to destroy information, some individuals may not has those dreadful purposes, they might start it out of curiosity and challenging themselves to reveal the unknown, curiosity and blackmailing are not the only reasons behind hacking the butler motive goes to seeking revenge as most of the earlier computer break-ins happened with that driving force, Hackers they have a very considerable knowledge of private information worth and how can it impact and ruin peoples life, destroy their reputation and no organization regardless its economical size and weight can claim that they guarantee their security system and users database is 100% secured and protected from hacking attacks. The very well-known website we used to interact with on daily bases like Facebook, Twitter and Microsoft has been exposed to security breaches several times. If there is no strong and effective procedures which are prepared to control that breach as soon as possible unfortunately, this attack might destroy mega organizations economy and these leaked data may cost worldwide peace a lot as long as hacker can send social, religious, and political messages or it may be worse he can access information that can affect national security and it is highly expected that any individual or organization can surrender to protect their personal and trustworthy data and information. This is the main focus that is so easy to grab your attention completely ignoring any other aspect of hacking and hackers' qualifications personality.

# From Hiring to Autonomous Weapons'(Im)moral AI (135)

Luise Woehlke *University of Edinburgh*

As technological progress advances and the amounts of available compute and data are going through the roof, more and more of the world is running on artificial intelligence (AI). Today, AI models make decisions on the content that is recommended to us online, the screening our resumes, and the authorization of our loans. These decisions are often highly moral in nature. And the number of morally critical applications of AI is only increasing, as businesses and even governments are competing for the fastest innovation. If we can't stop AI systems from being deployed in these critical ways, how do we make sure they are at least safe? Following scandals of immoral AIs, such as the Google Photos scandal, where photos

of black people were labelled by the AI as apes, many researchers are asking this question. Clear seems that when an AI doesn't have full understanding of morality, it's behaviour is also not necessarily bounded to the rules of morality. Zhijing Jin at ETH Z'rich & MPI T'bingen and Sydney Levine at MIT & Harvard are joining their expertises in AI and moral psychology to tackle this problem. I am assisting them in their current research, focussing on the difficult problem of when breaking moral norms is viewed as acceptable vs. unacceptable. We use Wikipedia edits as an analogy'when are Wikipedia edit policies followed vs. ignored? My poster would be on our research, giving background on the problem of moral AI for context, and diving into our approach to moral AI in-depth.

## Cyber Security (140)

MEENAL JAMIL AHMAD *LONDON SOUTH BANK UNIVERSITY*

Cyber attacks take place every day and every day they are progressing constantly. Counting from small microprocessor viruses to large data cracks, Cyber attacks take their shape in all sorts of forms. According to the statistics on cyber attack in 2020.Around the globe 30,000 websites were hacked on daily basis. It is hard to believe but every single day millions new different type of malware viruses are created and tested varying from viruses to adware to Trojans to spyware and countless. In 2019, 3.92 million was the average cost of cyber attack and the standard cost was 141 dollars per record being stole. As threats continue to develop and increase with the passage of time, the defence against them also strengthens itself to protect our identity and secure our sensitive data. As time goes on, more and more attacks will take place and living in a society I believe spreading the awareness about the importance of securing online information should be done. During the pandemic, cyber attacks and cyber scams increased as more people accessed online platforms. This study looked at how Computer Science students may have become victims of cyber crime and how it impacted them and their families.

## Help! TikTok thinks I have ADHD (107)

Maddy McMurray *The Open University*

Social media and its influence on neurodivergent diagnoses. Whether it's welcome or not, social media is seen as a vital part of modern life. It's used for much more than sharing food reviews or posting a new outfit and has become a tool for maintaining communities throughout the world. Part of building a community means sharing your experiences, but what if your

experiences resonate with a community of TikTokers with ADHD, and it starts to make you wonder if you too are neurodivergent? Scroll through #ADHDtok, and you'd find video after video of symptoms to look for, tips to get through the day and how to get diagnosed. There are videos of those who have been diagnosed because they recognised their symptoms from a TikTok video, and adult ADHD diagnoses are growing each year. Although useful and insightful, are these videos safe? Anyone can post on social media, so there's no guarantee that these videos are medically accurate. Due to the overlapping nature of neurodivergent and mental health issues, self-diagnosis could make it more difficult to get an accurate diagnosis. Due to the pandemic and the existing mental health crisis in the UK, the NHS may not be equipped to deal with an increase in diagnostic assessments. In this poster, I will be discussing the good, the bad and the ugly of neurodivergent representation in social media and whether its impact is inherently positive or negative.

## Molecular Dynamics: A Powerful Tool in the Fight Against COVID-19 and Beyond (165)

Megan Ratcliffe *Durham University (currently on placement with STFC)*

Molecular dynamics (MD) is a particle-based simulation method used to explore the motions of macromolecule and their interactions in atomistic detail. Originally developed in the 1950s after the success of Monte Carlo simulations, the field was initially applied to investigate conformational landscapes of proteins and has since developed into a powerful tool in pharmaceuticals; drug discovery and guiding experimental structural biology work. In recent years, advances in experimental imaging techniques, such as cryo-EM, and exponential growth of computing power have accelerated the scale of MD simulations. The benefits of such are best demonstrated by COVID-19 MD research. Current petascale computational power has enabled large scale simulations of the viral membrane with full-length spike proteins. This provided a greater insight into the virus' molecular pathways and accelerated the development of therapeutics and vaccines. However, computing power is not the only driver of MD research. Artificial intelligence models trained on chemical structures, such as natural language processing models developed at Oak Ridge National Laboratory, has improved the process of screening potential drug candidates. Looking beyond the pandemic and into a future where exascale is on the rise and advanced AI systems in structural biology such as AlphaFold become more abundant, MD simulations are likely to become increasingly more detailed and skilled in navigating biomolecular energy landscapes. Therefore, allowing MD to deepen our understanding of the complex pathways which underpin diseases and cellular life.

# (A) I RECOMMEND you to try this COOKIE!! (173)

Name: Wing Yung; Surname: Fung *Lancaster University*

I am sure you have seen a lot of suggestions when you use social media apps or while surfing the internet. For example, Instagram nowadays always pop up several strangers' profiles and suggest you follow them because you might have followed accounts that posted similar content. On the other hand, you might have also been suggested a list of headphones on Amazon, just because you searched it once on the e-commerce website. Who has been annoyed by such a suggestion feature? I have, and I am sure that others might have had the same feeling like me at least once. There is no doubt that these state-of-art technologies are making life more convenient, yet we should still by all means take our privacy into account when deciding to click on the 'I consent'! A lot of websites require cookies when visiting, but it is alarming that some people are unaware of how their cookies might be used. Even cookies do, beyond a shadow of a doubt, make users' online experience better to an extent, there are still banes and boons on how everything works. This poster will offer a glimpse into the current existing types of cookies, and that they might be used for marketing. The poster will then aim at how AI recommendation (machine learning algorithm) is infiltrating into our daily life, and how they might take a toll on people's privacy.

# 'Crypto Art': Ownership In the Newest Generation of Digital Art (126)

Niveetha Sivaruban *Nottingham Trent University*

Whilst the integration of technology within art had been pioneered over 60 years ago, the legislation of such art has increasingly become a grey area. A 2019 exhibition, Public Key / Private Key, held in the Whitney Museum of American Art, explored the ownership of art through digital certificates on blockchain. The donors were able to sell, transfer or gift the certificate of the 16mm film as they wished, causing a changing list of the 50 viable donors. The shelf life of the artwork was increased within the museum by providing the donor with tokens instead of the film itself. Thus, does the film now belong to the artist, museum or only to those who are in possession of the digital certificate? The transformation of everyday life into a digital format has been a pattern within the Information Age, especially considering the use of blockchain to disperse unique certificates. Cryptocurrency was deemed as 'new age gambling' but has proven to be a

key component in working towards Web 3.0; where information should not be localised or restricted. Art collecting is a quintessential display of exclusivity through ownership, even with digital work. Will this become endangered with the growing preference towards the decentralisation of information? Within this poster the next generation of digital art will be discussed, and how such work can now be collected through NFTs and 'Crypto Art'. Exploring digital scarcity and the wider audience it has attracted aids in understanding this newest method of art collection.

# Search Engines' Significance in Today's Culture. (145)

Omamoke Efadue *London South bank university*

Search engines have evolved as the latest entry point for all online digital experiences. Search engines started as plain directory lists before progressing to crawl and index pages, eventually evolving algorithms to increase relevancy. The search engine is indeed a software platform that searches the Deep Web for relevant data listed in a textual web search query. Any web browser gathers data from archives or public repositories. In the last 10 to 15 years, search engines have grown in popularity. It wasn't until the late 1980s that the Internet became searchable. Especially when it comes to businesses and commercial operators. Search engines are used by businesses to find useful information from the internet. Companies will learn about their clients and get advice on how to run a company. It has become a way of popularizing certain industries while also being the downfall of others. Vannevar Bush proposed a method for recognizing written material in which he imagined collections of study with relevant explanations close to current embedded links. Algorithms such as Hyper Search and PageRank will eventually make relationship analysis a necessary ( Amanda C. Kooser, n.d. agrees that business uses search engine to find relevant information.) This report will concentrate on the benefits and values of search engines in today's society, particularly as they relate to businesses and commercialization. This article will not include all forms of search engines but will instead talk broadly about the benefits of search optimization.

# THE USE OF MACHINE LEARNING IN CANCER DIAGNOSIS AND TREATMENTS (139)

Omma Habiba *London South Bank University*

Cancer is the second-leading cause of death through-out-the world. More than one million people are diagnosed with cancer in every year in USA. Cancer is a disease caused by uncontrolled divide of cells and spread into other tissues. However, more than 200 different types of cancer have been identified in human body. A research state that in the U.S, 1 out of 3 women are developing cancer at some point of their life and 1 out of 2 men can expect to develop cancer. A study of World Health Organisation state that Worldwide nearly 10 million deaths caused for cancer in 2020. In the UK, more than 166,000 people die from cancer which means more than 450 people in everyday (2017-2018). Approximately, 77,800 cancer deaths among female and 88,027 in men. In recent years, the rate of deaths has decreased because of new alteration of Artificial intelligence being used in health sector. This paper is going to demonstrate how machine learning algorithms has been using to detect cancer in human body and the use of machine learning in cancer treatment. Artificial intelligence specially machine learning and deep learning played a salient role of this transformation. Machine learning has made unique contributions in anticancer drug development, chemotherapy, radiotherapy and other treatments. AI specially machine learning has the potential to transform oncology by leveraging the power of big data to propel cancer care into the twenty-first century and beyond. I believe that Machine learning will bring thorough changes to medical technology in the future.

# Why AI, why? (115)

Roshni Vachhani *Durham University*

Artificial Intelligence is increasingly being used all around us, from our digital smart assistants like Alexa and Siri to commerce to predict items that the user is most likely to buy. It is widely used to provide personalised recommendations to people. However, as the dependence on AI increases, trust can begin to be lost. Hence, Explainable AI is necessary to help characterise model accuracy, fairness, transparency and outcomes in AI-powered decision making, developing a level of trust and confidence when relying on AI models. As we move into a world where technology is starting to be used more in everyday instances, one such important circumstance where Explainable AI is beneficial is when a doctor is depending on an AI-based system to make a diagnosis. The result of employing Explainable AI will ensure that every diagnosis is fully described, including the likely

source of the disease, the potential damage of the disease, and the various sections of the body that the disease may affect. This further knowledge of understanding why the AI model does what it does will help build a layer of trust, which is paramount to our society as we become more and more dependent on technology.

## Was Online Education For Crisis Or Is This The New Norm: Future of higher education in UK (137)

Saima Durrani *London South Bank University*

In 2019, China reported to WHO that their citizens of Wuhan are losing their lives due to new virus. By January 2020, this virus had spread outside of China into many countries including U.K. This meant we were all working and learning from home with the help of online platforms. Was online education headed for crisis or is this the new norm? What does it mean for the future of UK's HE; this thought has been with higher education students over two years when we suffered so much devastation, due to Covid-19 many industries took hit along with higher education. From being in labs, and lecture halls, seeing our peers, and lecturers, we were all behind our screens at home, not by choice but due to necessity and preservation of lives. Higher education caused a crisis for students during COVID-19. Students and teachers were not prepared to have zero face-to-face. COVID-19 has been one of the biggest crises in modern era that human race is facing. The usual way of doing business and being in education has been affected. Platforms like MS Teams, Zoom, Google meet etc. are learning from their mistakes, predicting the future while facing the COVID-19 crisis. Online education will never be seen the same way again. Fields like IT are looking for alternative ways to bring some normality into our lives. We analysed data collected on the impact of online education during covid-19. The survey results highlight how higher education students were affected by online education, and what swayed them to be for or against online education. Finally, we attempted to answer whether online education is here to stay.

## Life Repeating Itself in Numbers (153)

Saxon Partridge-Smith *University of Wolverhampton*

Humans didn't invent mathematics, we simply stumbled across it and moulded it into a format we could understand. More than 2500 years ago,

Chinese mathematicians used rods which would denote numbers based on their strategic position or colour. Roman numerals were composed of mostly straight lines to aid their carving processes. During the sixth century, Indians simplified their number system by incorporating a decimal place value. Arabs then used this system and integrated a zero as a place holder for their own scheme during the ninth century. Since our existence, the way in which we perceive mathematics has changed, however there is one mathematical pattern which always prevails: the Fibonacci Sequence. This sequence appears across the universe, governing all inventions and natural life forms. Pascals Triangle, the Mandelbrot sets, flowers, trees, humans, galaxies, the Parthenon, and modern-day structures follow the laws governed by the natural sequence. This academic poster will explore the extent to which the Fibonacci sequence is embedded in our day to day lives and demonstrates how life repeats itself because of this.

## Honey what's cooking for dinner tonight? (119)

Srimoyee Ghosh *University of Bath*

It's a question that haunts us (at least those of us without a butler or private chef) everyday, as we rack our brains to decide on a menu,that will satisfy all members of the family,across different age groups,and of varying tastes and moods. Netflix has invested millions in improving their movie recommendations,and still thinks I want to watch all historical romances ever made just because I watched the Downton Abbey once. Meal selection is much harder as food is more intimately linked to a person's psyche and needs to consider a much larger number of factors-from demographics like age,gender to individual drivers like health/dietary requirements and current mood,to even external factors like weather and day of the week. Alongside,it has to abide by the limitations of available ingredients in the pantry or leftovers in the fridge and maintain enough variety and excitement in the menu selection. An Artificial Intelligent(AI) agent can help us in this arduous task by building personalized meal plans, thus saving us a lot of valuable time. I will explore the various AI-based meal planning apps in the market trying to make headway in this space but haven't yet ticked all the boxes. Some of them are suitable for a specific demographic of people,some cater to specific dietary guidelines. But what we need is an all-rounder agent that helps us decide meals that are filling,nourishing and satisfying. That's the holy grail we are aiming for-when finally, we can have our very own Mr. Carson in our pocket.

# Who am I? (150)

Xinyi Wang *Durham University*

Since the dawn of philosophy, we as humans have asked ourselves: What is the purpose of living? We may not currently be able to give a certain answer. Maybe one day, in the future, this answer will begin to take shape. And the very person to answer this question may not be us, but our very own creation ' computer intelligence. Many writers have expressed their views on technology. Mary Shelley's Frankenstein expressed a pessimistic viewpoint. However, this was countered by Isaac Asimov in a foreword of his Foundation series, where he expressed a positive view of technology. In Homo Deus, Yuval Noah Harari has given us a waring. We, as humans, are creating powerful tools like the computer in the 21st century, but without knowing how to use our power properly, what will be the consequences? What will we do to our planet and other species with such power? The Turing test is used to distinguish between machines which inhibit human intelligence and actual humans. The concept suggests it does not matter whether a computer or human is conscious or not, only the person who interprets the behavior matters. In machine learning when an algorithm is fed enough data, its ability to make correct predictions goes up. Would it potentially develop the ability to pass this test given enough data on human behavior? Could computers learn so much that they make better decisions than us, will our own conscious matter anymore?

# The Effect of Increased Screen-Time on Sleep Health and Mental Health during Covid 19 Pandemic (138)

olivia grundman *london south bank university*

The Digital Age has affected sleep and mental health due to increased screen-time, I wanted to know if this has worsened during the Covid 19 pandemic, where screen time has drastically increased. The pandemic has caused major life changes for billions of people worldwide, moderation is key when it comes balancing mental health, sleep health, screen-time and surviving a global pandemic. The use of technology to socialise, learn and work creates an escapism from the psychological stress of the pandemic and has helped with mental health problems. However, there is such a thing as too much of a good thing, so when we abuse our increased amount of free time by constantly accessing negative news, home confinement may have exacerbated symptoms of anxiety. Although screen-time and over exposure to blue-light at night has been proven to effect sleep health and

consequentially mental health, the pandemic has brought loss of loved ones, businesses and more. I believe that longer screen-time has a positive correlation with poorer sleep, however during the pandemic it seems that the other causes have a stronger negative effect on sleep and mental health. Humans are social creatures and we have never experienced anything like the isolation faced in the previous two years, therefore sleep and mental health have been negatively affected but by several other causes, and increased screen-time has in fact helped in some situations, because without it and its social interactions, life would have been much harder. A survey method was conducted with interesting but mixed results, meaning more thorough studies need to be carried out.

# Final year undergraduate (or third year for integrated masters courses)

## Data, the new gold (122)

Alejandra Delgado Fernandez *University of Strathclyde*

Currently, we live in a technological world where we depend on our devices for just about everything, they hold our schedules, control our homes, and essentially run our lives. These tasks involve the collection of data to improve our ways of living, but why is this data relevant to tech corporations? Businesses use this as an opportunity to mine and analyse data. They find the gaps in our lives where we are missing something we hadn't thought we needed and try sell it to us. The mining process is quite simple, you get sent a short survey and your data is collected, processed, and an appropriate advert is generated. If the advert doesn't entice you the first time, it is then shown to you again in different formats until eventually you buy the product. Much like gold, it is the small data capturing methods that make companies billions. Data collecting is a goldmine for big companies like Facebook, who acquire 98% of their income from ad revenue. This number comes to show just how truly phenomenal our data can be. Data is powerful, it's something that seems so simple, yet its value is so unfathomable. If our data weren't so valuable, we wouldn't be trying to harvest it and creating specialists for these things. I believe that we will keep on collecting data for many decades to come. Enterprises will find more and more ways to reuse data and find new and inventive ways of profiting from its wealthy value.

# Do mobile apps really keep our data private? (131)

Aleksandra Madej *Keele University*

Mobile apps are known for collecting a vast amount of private information about their users. With the increasing popularity of apps for e-health, in particular, very private aspects of our lives are monitored including our sleeping habits, what we eat, where we go and for how long. This is all used to monitor our health and help us make better choices. Yet, even with the vast amount of private information being collected, serious concerns have been raised about such data being used for any purposes other than those agreed to in the terms and conditions. This poses a great risk especially when users belong to vulnerable minorities. Many of these apps have been shown to overstep their intended purpose. They may gather information about users' location and social media, and above all share this data without explicit consent. Importantly, this may open the way to user profiling, so that a vulnerable user easily becomes a target for commercialisation. Using a tool for differential analysis of network traffic for a set of sample Android apps, this project aims to verify which data is exchanged with which remote locations, so that it is possible to determine whether apps can hide the fact that they are leaking information and assess potential vulnerability of privacy.

# Austen, Atwood, and AI? Could an AI author write the next bestseller? (116)

Amy Laws *Durham University*

AI can now produce increasingly complex creations, and has already contributed to the creation of music, produced animations, and mimicked the style of world-class painters. AI is certainly capable of creativity, but could it ever outperform humans and write the next bestselling novel? Although it's hard to predict which books will become a bestseller, there are features that many bestselling novels have in common, such as voice, tone, and pace. Many algorithms can identify these features, with tools such as Grammarly monitoring tone and purpose, as well as suggesting improvements to improve clarity and conciseness. An algorithm has been developed to calculate a novel's chance of being a bestseller. The creators claim that the algorithm can predict with 80% accuracy if a book will hit the New York Times bestseller list. Word editors such as Google Docs, now offer smart compose functionality and many companies offer AI writing software that allows users to create interesting and error-free content, either from

templates or by autocompleting what the user has previously written. With algorithms being able to predict what will make a book a bestseller, and autocomplete text, AI being able to write a novel from scratch isn't infeasible. In fact, '1 the Road' is a novel composed entirely by AI, emulating Jack Kerouac's 'On the Road'. The novel was far from being a bestseller and was described as being 'choppy' and full of 'typographical errors', but the experiment does show that AI written bestsellers may be possible in the near future.

## Evaluation of a semi-supervised expectation-based dependency parser (163)

Antonia Boca *Cambridge University*

State-of-the-art dependency parsers require sufficient labelled data to learn the grammar of the language. While such systems are great for popular and well-studied languages, low-resource languages, which contain fewer than 1,000 labelled data points, cannot be modelled well with such parsers. In this paper, we extend the biaffine dependency parser of Dozat and Manning (2017) to perform semi-supervised learning using the generalised expectation (GE) criteria, as proposed by Mann and McCallum (2010). By training the parser in a semi-supervised manner, we can use unlabelled data, which can be more easily attained for low-resource languages. The GE criteria is an interesting way of injecting linguistic knowledge into the parser, by creating a prior distribution of important POS tags. We find that our semi-supervised parser has very low accuracy in comparison to a purely supervised approach. By examining the dataset we find that the GE prior represents only a small percentage of the test data and further examine how many features we would need to use for our prior to sufficiently represent this test data. We find that a large increase in the required features can pose a potential issue for our GE parser, as this increase would make the parser impractical.

## Improving Scalability and Security of IoT environment by blockchain technology (124)

Ashley Hoi-Ting Au *University of Warwick*

By the year 2021, the IoT network will have 46 billion devices connected to it, compared to 24 billion devices by year 2020 (Nick G. How Many IoT Devices Are There in 2021?). With the growth of the interconnected network, it is inevitable to make the devices more scalable. Scalability

means being flexible in a sensor network which contributes to the overall efficiency and quality of the network. As the IoT network connects a large amount of sensors, actuators and other nodes to share information via internet, maintaining scalability is crucial such that devices adapt to changing environment and demands. In particular, it allows the system to work without undue delay and excessive resource consumption, and to make use of available resources effectively. To maintain scalability, blockchain is introduced. In the blockchain environment, blocks of valid trades are verified by miner nodes through a consensus algorithm, and after verification, the block can be added to the local chain of nodes in the network. Famous consensus algorithms are Proof-of-Work (PoW) and Proof-of-Stake (PoS). As this process of reaching consensus throughout the network requires significant resources and time, optimizing the consensus algorithm becomes the most challenging part of implementing blockchain to IoT application. This project aims to deeply investigate how can blockchain integrate with the IoT environment to enhance scalability and security by analyzing and comparing the Proof of Authentication (PoAh) and Proof of Block and Trade (PoBT) algorithms, which are proposed to be suitable for blockchain-based IoT implementation.

## Beauty and Best (123)

Aya Saie *Birkbeck, University of London*

In this project, an online beauty and health web application will be developed, which is accessible by anyone with internet connections. The application will contain details of many beauty products on the market, including their features, price range, side effects and benefits. The products can be filtered down to suit different users. It will also have the common functionalities like user registration, user authentication and login, user profile management, secure payment, invoice generation, order history, etc. It is shown in a survey that more than 70% of people are not certain about the products that are suitable for their skin; as a result, they may use or buy wrong products. To overcome this problem, the main contribution of this web application is to build a system that can recommend the best and most suitable products to the user. This will be done by first learning the user's own choices and preferences via a questionnaire/quiz about their skin type, complexion, skin condition. The application will then analyse the provided answers and recommend the users the suitable products for their skin. The web application will be developed using a client-server architecture. The client and server sides will be hosted on different servers ' we will request the server-side to retrieve data from the database and return it to the frontend at the client-side. A full stack of techniques will be used for the web application, including PHP, Draw.io, React.js, MySQL, HTML5, CSS3,

JavaScript, GitHub and XAMPP. The application can be easily used or adapted by any retailer or online store to help customers find the right products.

## Computer Games - Another Addiction? (114)

Caroline Hanson *The Open University*

Restless, irritable, manipulative, and lying. These are all traits of addiction and parents who fear their child is addicted to computer games recognise these signs. Computer game addiction is becoming increasingly common in school children. Children find playing computer games enjoyable and they are designed to obtain their attention for long periods of time. The NHS has responded to this addiction by opening their first specialist clinic to treat children and the World Health Organisation recognises this as a disorder. Computer games can affect children's behaviour, seriously impact their education, and have other negative consequences like spending less time reading, playing sport and socialising if they devote too much time on screen. Their behaviour to their friends can alter when playing online games. Loyalty, honesty, and trust disappear with children becoming devious, unkind, and aggressive, even to their close friends. Arguments develop in families when screen time ends with parents becoming frustrated when asking them to finish their game. Game designers cleverly design the games to maximise their profit, by encouraging and pressurising children to spend money on games, either to compete with their friends or to enhance their progression in the game. Several games have 'loot boxes' where the contents can only be viewed after payment, which represents a similarity to gambling. Each year the problem is growing, so are we as a society going to let this trend continue and not regulate these games? Action needs to be taken, sooner, rather than later.

## The Programming Language Barrier (136)

Emily Bamford *University of Liverpool*

Language is a strong defining characteristic of any culture. Language can bring people together, while at the same time be a barrier between us all. And the most prevalent language in the world is English, with 1.5 billion people speaking it across the globe, and 1 billion of those people speaking it as a second language. This prevalence of the English language is represented in the programming world also, with the top programming languages such as Python, C and Java, all being exclusively in English. With these languages being so universally used, it can be a huge obstacle for

anyone wanting to get into the world of programming, since programming can be difficult at the best of times, let alone if you don't understand what the actual words mean. However, there are solutions to this problem that are starting to take place. Citrine, for example, is a localized scripting language that allows people to code in their mother tongue. Founded in 2014, it already has 113 languages currently available to use, from the more commonly used languages, such as French, Spanish and Italian, to less widely used languages, such as Igbo, Samoan and Odia. The homepage for this website also allows users to translate the base code into their own language, so that the library of languages available can continue to increase. This is a revolutionary step towards being able to bring people together through the power of coding, without letting language get in the way.

# Using an anonymous employee voice system to understand, measure and monitor cyber security cultures in industry. (112)

Eve Jenkins *Northumbria University*

As technology has developed, the need for and importance of cyber security has done so as well, especially in organisations. Employees have direct contact with the business data and systems and are often seen as the biggest weakness in cyber security. It is therefore important that there is awareness of security responsibilities and behaviour effects among employees, which ultimately makes up the security culture. Currently, there is a plethora of research into what a good cyber culture looks like with common themes such as management support, training and employee awareness. However, there is less looking at how to measure and monitor the cyber culture. This is important so that areas for improvements can be identified, implemented and then progress observed over time, with continuous review and development. Research looking at measurement tools conclude there is no standardised approach, and current methods focus on quantitative questionnaire type approaches, not providing a holistic view of the culture. This project aims to investigate how a cyber dedicated anonymous employee voice system, can be used to understand and measure the current cyber security culture within an organisation. Employee voice systems have been found to enable the expression of employee behaviours and concerns and a specific cyber discussion channel has been seen to help increase open communication and cyber awareness. Additionally, anonymity has been found to increase the likelihood of employees voicing views and opinions. These factors together, should

enable managers to assess, monitor and improve cyber security culture in organisations.

## The Metaverse - Is this future were heading to more damaging than the current? (164)

Hasnat Lamina *Swansea University*

The metaverse. A term coined by sci-fi writer Neal Stephenson in the early 90s to describe, in simple terms a 3D virtual world. So how can a company take this term and make this world that we have been involving ourselves in for the past 30 years seem so..new? What does the future of this 'new' revolutionary metaverse that Meta (previously Facebook) is creating going to actually look like? And what impact will the future have on our already developing teens? For my poster, I will try to broadcast the contrast in people's opinions on what they believe the metaverse is going to be and the effects it will have on our youth versus the things the big tech companies are letting us know and the many benefits they are showing of the metaverse we are moving into. For my poster, I will try to broadcast the contrast in people's opinions on what they believe the metaverse is going to be and the effects it will have on our youth versus the things the big tech companies are letting us know and the many benefits they are showing of the metaverse we are moving into.

## MIND SERIES: Reflect, Learn, Grow! (168)

Hodo Sulaiman *Goldsmiths University of London*

Hi, I am a first-generation university student keen to get into the UX/UI industry. Dissertation project - Mind Series is a mobile app where it will focus on the user's wellbeing by having different features, i.e., 'mood tracker to help users learn about themselves, self-manage symptoms through the mindful mood feature, potentially improving their mood, 'push notification affirmations, 'journal page so that users can report their thoughts, behaviours, and feelings and reflect on their past journal logs. 'Inspiration feed with chat feature allows users to share their good news/post inspirational content and help uplift others and chat to other users privately. When presented with an opportunity to affirm (state emphatically or publicly) a critical value, the chances of a person rationalising his decisions are decreased, which leads to the assumption that defence mechanisms such as rationalisation and other defence mechanisms are reduced because of thoughts that are self-affirming in nature. Value affirmations also tend to decrease chronic naturalistic stress

and acute stress in individuals and, therefore, play a crucial role in enhancing their academic performances. (Sherman, David K. 2013) An individual who develops self-actualisation experience the same kind of situations and stressful events as any other individual, but self-actualisation allows them to effectively deal with these situations or stressful events without developing any symptoms of anxiety or depression. (Vitters', J. 2004) Here is a link to my high fidelity prototype, which I am actively working on:
https://www.figma.com/file/PyUhsz10VtIByVPrOyY9hv/improvee?node-id=2%3A2

# Predicting user preferences with the use of Touch Dynamics biometrics (129)

Maida Alamgir *Manchester Metropolitan University*

Predicting customers preferences accurately requires the collection of detailed personal information. This could lead to privacy issues and concerns. With the increased use of touch screen devices in our daily tasks, we may be able to exploit touch dynamics biometrics to predict customer demographic information such as age group and gender. This information can be utilised to improve business decisions without the need to collect detailed personal information from a user, which reduces privacy concerns. Touch dynamics biometrics is the process of measuring and analysing human-computer interactions using fingers on touchscreen devices. This technology captures and evaluates the time-based and pressure-based features when users interact with touch screen devices to perform specific touch tasks like swipe patterns on a browser website and typing on a digital keyboard while entering a password. It is traditionally used to increase the security of mobile devices by combining with passcodes, but we are proposing to also use it to predict user demographic information such as age group and gender to better understand user personal preferences without compromising user privacy. By obtaining demographic information businesses can better target customers usage patterns and preferences. As result, the business can make better decisions which lead to making more profits or having a higher return on investment. This information can be used in a variety of innovative ways which include parental control, recommender systems, enhanced security, fraud protection, and device adaptability. In this poster, the main focus will be the recommender system and device adaptability.

# Cryptocurrency ' the fuel for cybercrime? (143)

Maria Alamgir *Manchester Metropolitan University*

Cryptocurrency is a form of decentralised and anonymous digital currency. It uses digital files as the medium of exchange and the transactions are secured through encryption and blockchain technology. Cryptocurrency was introduced in 2009 and has since gained popularity over traditional fiat money (i.e. cash) particularly over the past few years. The acceptance of cryptocurrency is growing from the creative sectors such as gaming industry, film industry and fashion industry to everyday business sectors like travel industries, healthcare, retails markets and food industry. Due to the anonymous nature of cryptocurrency, criminals can easily avoid detection by hiding behind presumed anonymity and privacy. As a result, the variety of financial crimes (money laundering, tax evasion, ransomware and etc.) has increased. This directly affects law enforcement by reducing the resource to fight other crimes. The invention of cryptocurrency ATM machines encourages criminals to conduct their illegal activities undetected, with currently 101 functioning crypto machines in the UK alone. This machine allows users to purchase bitcoins or exchange deposited cash for bitcoins. Then, due to the decentralised nature of cryptocurrency there are no central control authorities and governments over decision-making, encouraging criminals to operate undetected. As a result, cryptocurrency has become the 'virtual wallet' allowing criminals to get smarter because transactions are harder to track. Cryptocurrency is predicted to continue be popular among criminals, making individuals less confident about investing in digital currency. In this poster, we will focus our discussion on types of crimes that are fuelled by cryptocurrencies.

# Light Up Code (167)

Marta Adamska *Lancaster University*

In the digital age, programming is an almost essential skill to have. It is helpful to broaden horizons at work but also allows to develop new interests and challenge yourself in your free time. There are many more advantages to programming that it might seem at the beginning ' learning new ways of thinking and becoming more creative are just some of them. But many are not keen to try it because they often consider it as something complex, irrelevant and, what is worst ' boring. Because I thoroughly disagree with all of those statements, I decided to explore how to change those views. In this poster, I want to discuss why people are discouraged from programming and unconventional ways of teaching (or at least raising the profile) of computer science to people of all ages. The main focus of the research is on interactive light displays that allow the users to engage with

multiple activities. I would also like to introduce the idea of controlling such displays with blocks of code. This might be an engaging and appealing way of exposing people to creative programming and might be considered an artistic experience. Finally, I would like to verify if these methods work and if more people are willing to try and incorporate programming into their daily lives.

## CSI or CS-AI? Using Machine Learning to classify blood spatters. (106)

Molly Ives *University of Bath*

There are a huge number of elements that feed into crime scene investigation, including dusting for fingerprints, searching for gunshot residue and bullet casing, and analysing any bodily fluids left at the scene. Crime Scene Examiners (CSEs) have historically failed to be called to key crime scenes, resulting in cases taking far longer to investigate than necessary. In fact, Saulsbury et al reported in 1994 that some of the main factors for CSEs not being called to a crime scene were: the weather (17%), availability of officers (16%) and time constraints (3%). With developments in modern technology, it is clear that many areas within crime scene investigation can be streamlined, thus requiring fewer CSEs and saving valuable time. In particular, this poster will look at automatic blood spatter analysis. Blood spatters are left at a scene due to a victim being injured, usually by a gunshot or a blunt force, causing the blood to spatter. The way in which the blood is distributed on a wall or other surface can tell us a lot about the events of the crime. For example, experts can analyse the size, shape, distribution and location of the bloodstains to approximate what caused the wounds, from which direction the victim was wounded and distance from the wall or surface, among other useful attributes. This poster will detail the research and progress of my final year dissertation, regarding the development of a Machine Learning algorithm to investigate how accurately we can classify images of blood spatters.

## AI can help us eliminate bias in sports! ... or can it? (127)

Nika Karsanova *Aberystwyth University*

Sports like figure skating suffer the most from human bias since routines cannot be judged using quantifiable measures of distance, time, or length. Instead, final rankings are determined by the subjective qualities of

presentation, and interpretation, as well as the execution of performed elements. As a result, it is common for scores to vary depending on factors such as the skater's nationality. Bias can be observed further through favouritism of one participant over the others, neglect and manipulation of rules, bribes, politics, and corruption. To combat existing bias, there is a lot of discussion about using machine learning and computer vision for the evaluation of athletes' performances. Modern AI techniques already assisted in the judging of gymnastics at the Tokyo Olympics. And, they also help companies out there analyse broadcast footage of basketball games to gather statistics on the players' skills. In figure skating, by using methods like image and video analysis, pose estimation, and rule-based machine learning, systems can be developed to grade the execution of technical content such as jumping passes, step sequences, and spins. If these are successful, they could be expanded further to score the artistic side of skating through the analysis of program music, transitions, composition, and more. This poster will tackle the issues that could be solved by the successful integration of new technologies into the judging process. It will also talk about the problems they can introduce and argue whether AI is really the next big thing in sports judging.

## Is XR Revolutionizing the World of Sports? (156)

Rabia Khawar *Manchester Metropolitan University*

Extended Reality (XR) is the combination of Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR) experience combine together. It's a state-of-the-art technology that blurs the line between the real and digital world and extends them to the user's background and beyond to create more personalised and engaging visual experience. Users can experience XR by using headset, glasses or even smartphones. The XR market is growing fast in many business areas, for example medical, military and tourism sectors, but the gaming and sports sector are the main driver of this new technology. XR fits really well for a dynamic sector such as sports. In sports like badminton and tennis, for example, it is now an indispensable element to determine whether the ball bounces on or off the court. This is known as Hawk-Eye and it allows us to have more information on the trajectory of the ball. The same system is used in other sports, such as football and volleyball. Fans can now follow their favourite team even more closely by using XR to get closer to the team and have a 360-degree experience. Juventus in collaboration with Oculus, has created Juventus VR, where fans can find themselves next to players while they train, play the match, or even celebrate in the locker room. During these difficult times for sport XR can be used not only as an alternative but can be the key player to make fan's experience more engaging and interactive.

# Travel Swiper | Swiping Your Way to Safe Solo Female Travelling (177)

Radina Kraeva *University of Strathclyde*

The overbearing and constant concerns over safety during solo travelling are unique to the female perspective. And this is doesn't influenced by how experiences a solo traveller may be. Based on a 2020 Solo Female Travel Trends report, 73% of solo female travellers worry about their safety. Experience travelling solo reduces this fear from 79% among women who have travelled solo less than 5 times to 64% for those who have travelled more than 10 times on their own. Women are also the driving force of the solo travel boom based on the Agoda Solo Travel Trends Survey from 2018. Safety is also one of the main barriers stopping women from going on solo trips. The lack of credible sources on real safety data per destination and the general trend of the travel industry's marketing strategies to advertise a destination to look safer than it actually is are predominant concerns for solo female travellers. This poster aims to showcase a User Experience (UX) research study inspecting the creation of a disruptive travel itinerary cross-platform mobile application using Tinder's swiping methodology having the female solo traveller perspective as the main pain-point. Furthermore integrating a community aspect of a peer-reviewing system for rating the safety of visited locations. Aiming to create a data-driven solution that enables female solo travellers to take control over their own narrative.

# Towards Continuous Security Testing and Verification (152)

Sara Elkehya *University of Liverpool*

With the onset of the pandemic and shifts towards remote working models, came a rise in the number of enterprises adopting the DevOps methodology to minimise delivery times of new features. However, there also came an increase in the number of cyberattacks which have rightfully raised questions about application security. A Continuous Delivery Pipeline (CDP) forms a significant part of modern DevOps and comprises the automation of the building, testing, and deployment stages of the software delivery process. In recent years, the area of implementing security practices within the DevOps process, termed 'DevSecOps', has gained attention, concentrating on addressing security related concerns and testing within the CDP. Current research within this area predominantly focuses on the integration of static code analysis and dynamic testing methods, presenting

a gap for interactive testing methods. This thesis will address this imbalance by adding quantitative research within this area and evaluating the impact of integrating these approaches into a CDP. Two pipelines are presented, integrating technologies for interactive testing approaches and the former testing approaches respectively. An empirical analysis is conducted on the generated results and the overheads introduced into each pipeline. The paper will then go on to address the issues with introducing external technologies into a CDP, and present a framework for verifying the integrity of assets throughout the delivery process to provide strong attestations for organisations and their developers. The intended purpose of this research is to provide guidelines for developers to make informed decisions for securing their continuous delivery process.

## Delivery Routing and Trailer Loading System For An Inverness Based Haulage Company (125)

Sarah Cleland *University of Stirling*

The day-to-day planning of a haulage company encompasses two complex tasks ' routing and loading. The routing aspect is a Travelling Salesperson Problem (TSP) which requires choosing destinations in a logical order to produce the lowest travelling cost. The loading part is a Knapsack Problem which is constrained by the law and limits of the space and weight allowed of the trailer. A computer-aided approach can identify near optimal solutions. The two problems interlink as the trailer must be loaded in a logical order for the route ' once the drive arrives at their delivery point, it can be time consuming to have to dig around in the trailer to find what is being delivered. The problem is also amplified when considering the priority attached to the delivery ' certain delivery points are only open between certain times, and some require them first thing in the morning. These problems are all delicately balanced with the tricky Highland geography of small roads that are unsuitable for HGVs which requires even more consideration. Narrow roads, low bridges and weight limits on small roads and bridges potentially reduces the available routes. The size of trailer or vehicle can be changed to a smaller one, but this will reduce the volume of goods that can be transported that day.

# Slime Mold: Its unique properties and potential in problem solving (178)

Sophie Janssens *Aberystwyth University*

Nature inspired algorithms are a family of algorithms that take mechanisms found in nature and apply them to solving problems. Biological systems, physical systems and chemical systems are all examples of nature inspired algorithms. Swarm Intelligence is a popular subset of biological systems, with algorithms based on the behaviour of bees, ants, and fireflies. While many algorithms are based on biological systems some take inspiration from physical and chemical systems, such as the Gao-Liu-Peng algorithm for maximal flow, which models the flow of electrical charge. In this poster, I will investigate the eukaryotic slime mold, its unique intriguing behaviours, and its potential in nature inspired algorithms. Despite its misleading name, it is in fact not a mold, but classified as a protist, a taxonomic group used to describe everything that is not animal, plant, or fungus. They live freely as single cells; however, also aggregate to form reproductive multicellular structures. Slime mold exhibits fascinating behaviours which have already inspired a few algorithms for solving several problems, from Traveling Salesman Problem (TSP) to classical engineering problems. It has the incredible ability to find efficient solutions in complex environments. Slime mold has been observed solving mazes, mimicking transportation networks, and selecting the healthiest most advantageous food, all without the use of a brain or nervous system. It has been seen solving a TSP based on the Tokyo rail system, in which major cities were represented as food. The solution that the slime produced was remarkably similar to the current rail system, is found to be even more efficient. In this poster I will investigate the eukaryotic slime mold, its unique interesting behaviours, and potential in nature inspired algorithms. Despite its misleading name, it is in fact not a mold, but classified as a protists, a taxonomic group used to describe everything that is not animal plant or fungus, everything we don't understand. They live freely as single cells, however, also aggregate to form reproductive multicellular structures. Slime mold exhibits fascinating behaviours which have already inspired a few algorithms for solving several problems, from TSP to classical engineering problems. It has the incredible ability to find efficient solutions in complex environments. Slime mold has been observed solving mazes, mimicking transportation networks and selecting the healthiest most advantages food, all without the use of a brain or nervous system. It has been seen solving TSP, based on the Tokyo rail system with major cities represented as food. The model that was discovered is a more efficient system then the current implementation.

## 'Nothing is stopping them BUT nothing is aimed at them' (147)

Syeda Moontaha Ferdous *Canterbury Christ Church University*

Have you ever wondered what's stopping women from joining the IT industry? Why there is a preconceived perception it's for awkward males? Through surveys, polls, and discussions I will get into the root of finding what the real problem is and how it can be tackled and altered. Even though many initiatives have been launched, it is clear that nothing has vastly changed. As a result, the poster will detail how I plan to raise awareness of this topic and find methods on how to make IT a fun, interactive, and exciting subject for all genders. This could be through creating a website that caters to everyone's needs so there is no unconscious bias or highlighting more female role models in this industry. It is very well known that a picture is worth a thousand words, so, I will use this as the basis for my poster. In my opinion, nothing is impossible if we all work together and spread the word.

# MSc (or final year for integrated masters courses)

## "I'd Blush If I Could": verbal abuse of AI-based voice assistants (134)

Alys Byrde *Birmingham City University*

Verbal abuse of AI-based voice assistants: coding servility as female Voice assistants are AI-based software that can interpret human speech and respond conversationally to provide content and services. The way people interface with technology is in the process of changing from text to voice. As human'computer interaction becomes increasingly hands-free, the research firm Gartner predicts that many people will have more conversations with digital assistants than with their spouse. Voice assistants are programmed to sustain more human-like interaction. Alexa, Cortana and Siri all have female-gendered names and have female-default voices. At least 5% of interactions with voice assistants are unambiguously sexually explicit. Initially, programmed responses to harassment were evasive or playful. If you called Siri a 'slut' she would respond with 'I'd blush if I could.' Sexual requests from men met with more flirtatious responses than those from women, coding Siri as heterosexual. I look at how voice assistants'

responses to sexual harassment have been reprogrammed in response to public objections in the wake of the #MeToo movement and revisit the contention in some academic literature that people prefer a female voice. I explore how the gendered stereotype of obliging docile female assistants does not just reflect gender bias but could be responsible for reinforcing and spreading sexist tropes. Finally, I consider how as AI becomes more skilled in prosody the expectation of matched emotional response could lead to technology impersonating women establishing gender norms for emotional expression by human women.

## Federated learning for advertisement timing (174)

Andreea Zaharia *University of Cambridge*

The timing of advertisements affects both the user experience and the effectiveness of the ads. In a setup where advertisements are served via push notifications, timing can quickly become a decisive factor. We propose a novel approach to ad serving, based on in-browser federated learning, for predicting the optimal advertisement opportunities from past-behaviour modelling, while preserving the users' privacy. Valid advertisement opportunities have to respect constraints imposed by system preferences and permissions. Out of these valid opportunities, the best ones are those that maximise the likelihood of the user positively interacting with the ad, while minimising user disruption and hence improving the user experience. This poster presents a lightweight machine learning model run on a custom federated infrastructure that enables learning from users' interaction data and their past engagement with ad notifications, without any data collection or privacy invasion. By training the model locally and securely aggregating the parameters, the users' data never leave their devices. This project constitutes both a research and an engineering effort, aiming to deploy a prototype of this custom federated learning model in the Brave Browser. Brave is an open-source privacy-focused browser based on Chromium, with its own advertisement serving system based on push notifications. The prototype implementation, written in C++ to integrate the codebase of Brave, heavily relies on the Flower federated learning framework. Flower scales to a large number of distributed heterogeneous clients, which makes it suitable for production applications and large-scale deployment to real users.

# CoVacSenti ' a Sentiment Analysis System for the COVID-19 Vaccine Based on Twitter (117)

Anna Weir *Cardiff University*

The British COVID-19 pandemic management strategy is based primarily on vaccination. However, initial uptake was slower than expected and, as of November 2021, 21.3% of the population remain unvaccinated. An understanding of attitudes towards COVID vaccination and the factors that influence public opinion is essential in improving ongoing booster jab schemes. This project created CoVacSenti ' a sentiment analysis program to determine the British population's attitudes towards COVID vaccination using Twitter data. Tweets across 19 months of the pandemic were processed using a Multinomial Na'ive Bayes algorithm with 79.4% accuracy. The impacts of pandemic milestones on daily sentiments were analysed using a Fisher's Exact test, and a dashboard was created to display results. CoVacSenti determined that 55.6% of all tweets regarding COVID vaccination were negative, but the proportion of positive and negative tweets varied over time. The start and end of lockdowns and the vaccine rollout to the 40+ age band were pivotal events that caused significant changes in sentiment. Additionally, sentiments towards the AstraZeneca vaccine were more negative than those towards other brands offered in the UK. These findings are applicable to modern pandemic management and reflect the need for sentiment analysis algorithms to be specific to their contexts due to the polarity of key phrases and inaccurate conclusions that may be drawn from summarising findings over time. This project created CoVacSenti ' a sentiment analysis program to determine the attitudes of the British population towards COVID vaccination using Twitter data. Tweets across 19 months of the pandemic were processed using a Multinomial Na'ive Bayes algorithm with 79.4% accuracy. The impacts of pandemic milestones on daily sentiments were analysed using a Fisher's Exact test, and a dashboard was created to display results. The results showed that 55.6% of all tweets were negative, but the proportion of positive and negative tweets varied over time. Sentiments towards the AstraZeneca vaccine were lower than all other types of vaccine offered in the UK. The start and end of lockdowns and the vaccine rollout to the 40+ age band were pivotal events that caused significant changes in daily sentiment. These findings are applicable to modern pandemic management and reflect the need for sentiment analysis algorithms to be specific to their contexts due to the polarity of key phrases and inaccurate conclusions that may be drawn from summarising findings over time.

# The Battle for Normal- or how computational propaganda is shaping our lives (157)

Caroline Platts *Cardiff Metropolitan University*

Computational propaganda (CP) is defined by the Oxford Internet Institute (2019) as 'digital misinformation and manipulation' which uses 'algorithms, automation, and human curation to purposefully manage and distribute misleading information over social media'. By using bots to automate activity on social media platforms what trends, what is amplified, and who is trolled, can be manipulated. Different from previous forms of propaganda in its scale and pervasiveness, it has a measurable effect on democratic discourse and processes. The rate and reach of this 'seeded' activity is new. Micro-targeting is a successful CP strategy, involving segmenting and studying selected parts of a population. Topics that these groups find salient are then surreptitiously inserted into other similar individual's social media. Many disciplines are reporting the pernicious effects of CP and identify a research gap ' there is a need for a multi-disciplinary and societal response to this ' a social-data science response. This research aims to explore through secondary data some of the effects and scale of CP. Then, by modelling the segmenting, ethnographic and focus group methods employed by political technologists, consider could micro-targeting be used for good? Could evidence about computational propaganda be distilled and succinctly presented in different ways, to targeted groups, to increase critical awareness of it? Are there statistics or topics which will mobilise, repel, or galvanise social media users? What would achieve 'cut through' to motivate people to resist this? Answers to these questions, would be a step towards addressing the research gap of providing a social-data science response.

# Taking an agile design sprint approach to UX for an innovative menopause health tracking app (109)

Claire Mann *Nottingham Trent University*

How we do know our ideas for the functionality of a piece of technology, in particular an app, are what our users are really looking for? Understanding user needs is vital to good technology design and uptake. However good user design engagement can be costly and time consuming and often the process does not engage with user experience until a product prototype has been developed for review. By contrast design sprint theory is an agile process to understand user experience both broadly and at depth in a short

timescale before preparing and testing a product prototype. This process engages the user at the heart of technology development which gives the product the best chance for success. The design sprint 5 phase framework allows for agile, team-based development with the users iteratively engaged at multiple time points in a short time span. It is an opportunity to focus on critical business questions from the perspective of the users. This work presents a design sprint process used to inform development of a health tracking app targeting women in menopause. The poster outlines the ways UX impacted on each stage of development from design through to prototype and testing. Finally, the outcomes of a UX design sprint are demonstrated as a fully tested prototype centered around and driven by user experiences. The iterative review of the design sprint process demonstrates how it is an effective framework to understand user experience and inform technology design.

## Unlearning Bias - Automatic Removal of Domain Information From Neural Networks (121)

Darcy Murphy *University of Manchester*

In medical machine learning, models trained on one dataset often have much poorer performance on a new dataset. This severely limits the possibility of training models for general use as assistive diagnostic tools. When using a neural network, one approach to this problem is called 'unlearning', where we train a secondary network that is used to penalise the main network for retaining information about which dataset an example is from. Unlearning has the potential to train models with a more robust and clinically relevant set of features, and has given significant performance increases when applied to MRI and ECG data. The performance increases are particularly notable when looking at a completely novel dataset which the model didn't see during training. Unlearning has been described as a 'de-biasing' technique, and this is where caution needs to be applied. There are many sources of bias, some more obvious than others, and a one-size-fits-all approach will never be sufficient. For example, if there are two datasets of ECG recordings, and one is a gender balanced mix of healthy examples and one is mostly men with heart disease, the model may learn a spurious association between how men's hearts generally look and how heart disease looks, leading to underdiagnosis of women. Unlearning can help prevent a model from learning this spurious correlation, but won't be able to fix the issue of mislabelled examples stemming from women being systematically underdiagnosed with heart disease.

# Friend from a far (171)

Dunya Lakmanaarachchi *University of Edinburgh*

The onset of Covid affected all sectors of lives globally, one such being expats living abroad taking care of loved ones back home. In 2020 terms, this was over 250 million people across the globe, mostly originating from Asia living in the US and Europe. As the pandemic continues to affect these countries socially and economically, expats have the continuous struggle to take care of loved ones, from a distance. Their needs range from finding inaccessible food or affordable medicine from the capital and shipping to a remote city, to getting an uninterrupted power supply or a security system installed back home, where the needs are technologically constrained or logistically complicated. The key execution challenge here is the time difference, limiting effective communication and personal time to search, call and arrange things back home, without interrupting day-to-day work with the added financial pressure of running multiple households on top. My idea Friend from a far is a virtual assistant, a Programmable Personal Assistant, who takes care of these needs remotely by following user instructions/decisions, making the relevant calls, and short-listing/ordering the relevant goods/services back home. Virtual Assistants have been in the industry for over quarter century, gaining new skills continuously, such as improvised language processing, self-learning and decision making. Primarily deployed by platforms/suppliers to assist human consumers/users, Friend from a far extends this interaction, by deploying a Programmable Personal Assistant, to represent users to deal with human or platform suppliers, through delegated (pre-configured) communication, decision-making and purchasing responsibilities.

# Introducing Social Robotics with Adaptive Personality (172)

Katherine Strachan *Durham University*

Until recently, comprehensive social robotics were a distant dream of a science fictional future. However, with the advent of Attention, and complex language models such as BERT and GPT3, the aim of designing and creating an intuitive, comprehensive social robotics system has been propelled into the reaches of reality. With the unfortunate onslaught of the COVID-19 global pandemic, socialisation and interaction has become something precious and sought by many as we endure isolating conditions. Social robotics presents a solution to protecting mental health during times of hardship, by providing interaction that we instinctively, as humans, crave. This poster aims to present a social robot with an adaptive personality to

match its conversational partner, with the goal of providing human-like company to aid with the mental health of the user. By using sentiment analysis, question generation, and fine-tuned dialog models such as GPT3, the robot in this study aims to curve its interests in the direction of the user's own, to provide a friendly, interactive interface for conversation. With these techniques, further work may be done to expand these concepts to those who suffer from isolation in everyday life, whether due to mental health, disability or age, as examples.

## Space Tech- The Next Generation (How to get where no one has gone before) (169)

Prabha, Thirthahalli Venkatesh *Lancaster University*

Every year thousands of satellites are launched into space and every year we learn more about our final frontier. It's only a matter of time before we send people to explore new worlds and create new bases for humanity. But how great would it be to bring along little helpers on these space missions? It's time to think about artificial intelligence in space. Building new structures, underground mining, sample collection, communication, detecting space debris, navigation or even basic human assistance - the use for smart robots in space in unbounded. Current literature presents several examples for this. CIMON-2, the multi-talented astronaut assistant deployed on the International Space Station can follow voice commands for navigation and task completion. ClearSpace-1 is set to launch in 2025 to start clearing up a ton of debris in Low Earth orbit. Archinaut is developing a self-assembling manufacturing unit in space. NASA has an open challenge for detection and classification of comets from spacecraft images. Based on my interests in space tech and takeaways from the Data Science master's , this poster will outline my project to explore and design one possible fully-functional autonomous future in space using artificial intelligence and smart agents.

## Can a machine vary its recommendations as a user's interests evolves? (176)

Syeda Ayela Gilani *University of Strathclyde*

Covid-19 has forced most of the world to introduce technology into their work. As the digitization continues, more and more data is being reeled in. Data that is being collected but not peeled enough to extract its maximum fruit. That is where machine learning and data science are being used in

building ground-breaking technological changes. One such important technology is the use of recommender systems. Organizations want to give their clients what they want or could want and help them make decisions in minimal time. These organizations have loads of documents that clients search through to find what they need. Considering the amount of click throughs that a user needs to go through, this is a very time-taking task. This is where companies can deploy recommender systems within their search systems that returns top results as the documents the user would be looking for. Models can be trained on existing data and then tested and re-trained continuously to perfect the trained model. Techniques such as the ones under NLP or precisely BERT can have very good results in bringing out the full potential of these recommender systems. However, it must be taken into consideration that the model shouldn't be very dependent on the data or it may become biased to a user, not only limiting user's thought process but also swerving them away from a data object when their interests evolve. This project will explore various machine learning models for recommender systems while swerving around the pot-holes that limit creativity.' ' '

# Analyzing sentiments in health and care records using Artificial Intelligence (175)

Tahnia Sabah *University Of Strathclyde*

Several countries struggle to provide proper mental and physical healthcare to its residents due to insufficient infrastructure. We don't have a lack of data in health care. Thanks to electronic records these days, we have enormous number of records of patients both written or electronically saved. We can analyze this data and help carers and professionals to make decisions about a patient's care. Help them make decision about what treatments they might need and how their lifestyle impacts their health. This can also help patients to have a guidance regarding making lifestyle choices so they can have a better-quality life. This project will mostly be useful for recurring patients or chronically ill patients and mental health related issues where timely check up on the patient is crucial and via the use of AI, we can automate this. This also has use at care homes. Carer and professionals can save time and utilize that time of providing better care for the patients. The system will pre analyze the heath records using machine learning and then by detecting patterns, key words or sentiment in health record we can classify the patients in categories using CNN. By building simple models to predict what actions should be taken based on the patterns found in each patient's health record. The aim of this project is to make proper utilization of the health care records and help professionals to make quicker and more efficient decisions.

# Applying Machine Learning and Computer Vision Models to Video-Based Marker-Less Tracking Systems (181)

Zoe Broad *University of Bath*

Performance enhancement has a wide range of applications such as for athletes, blue collar workers, or those in rehabilitation. Three-dimensional ('3D') motion capture systems are commonly used to facilitate high-quality analysis and assessment of participants' movement. However, this approach is both labour- and cost-intensive. For example, a 3D motion analysis system can require a 12-camera laboratory setup alongside an L-frame and wand for calibration. Furthermore, reflective markers are placed on the participant's body to identify their relevant Anatomical and Segment Points ('ASPs'). For a lower-limb and trunk assessment, this could include forty-five marker placements which requires in-depth anatomy knowledge to ensure accuracy. Although several systems exist for assessing human posture in the literature, the only system that fully automates the identification of ASPs was developed by Moreira et al. (2020). Software solutions that automate this process could assist health professionals with their clinical interpretations. The reduction of equipment would also mean that the health professional could conduct assessments anywhere and at any time. Furthermore, these advances would aid individuals who cannot afford regular visits to private hospitals or clinics. Moreira et al.'s software uses an open source library launched by Google, named TensorFlow, which includes robust machine learning algorithms and PoseNet computer vision models. However, this solution is limited to 2D skeletal tracking performed on a series of images. Furthermore, this system only identifies 17 ASPs which is significantly less than the 45 aforementioned. Therefore, this abstract advocates the development of a comprehensive video-based marker-less tracking system.