Research aims

Anti-transgender prejudice is an increasingly prominent issue in the UK, evidenced by a recent rise in transgender hate crimes (Home Office, 2023) and declining trans-supportive attitudes among Britons (National Centre for Social Research, 2023). Approximately 262,000 people in the UK identify as a gender different to that assigned at birth (Office for National Statistics, 2023), emphasising the need to prioritise the comfort and protection of these individuals, including in digital spaces.

Pervasive use of artificial intelligence (AI) has significantly transformed digital spaces over recent years, benefitting multiple sectors such as finance, national security, and healthcare (West & Allen, 2018). However, the rise in AI-driven technology has also raised concerns regarding diversity-specifically, its failures to accurately represent marginalised communities like transgender and non-binary individuals. These communities face disproportionate challenges with AI, including a lack of inclusivity (Sink et al., 2018), gender bias (Scheuerman et al., 2019), surveillance (Katyal & Jung, 2021), and concerns regarding privacy and security of personal information (Tomasev et al., 2021). With growing reliance on AI algorithms, there is a heightened need to explore the experiences of transgender and non-binary users. Strategies must be developed preserve the privacy of these users, whilst still promoting inclusivity, representation, and empowerment.

The proposed PHD programme of research aims to empower transgender individuals through diversifying AI technologies and offering solutions for greater control over their digital identities, whilst minimising harm. The project will explore areas of AI that impact transgender and non-binary populations including gender bias, AI algorithms and visibility, privacy preservation and autonomy, and promoting inclusivity through user-centred design. This interdisciplinary programme combines insights from HCI and psychology to address these concerns and enhance the digital experiences of transgender and non-binary persons. Active involvement of marginalised users in the ethics surrounding advancements in AI will assist in improving the well-being and safety of transgender and non-binary users, both online and offline.

Literature review

AI algorithms often overlook non-cisgendered identities in their design (Schlesinger et al., 2017), trained by systems that lack diversity and work in binary gender terms (Baird & Schuller, 2020), presenting challenges for transgender and non-binary individuals in both design and application. Automatic Gender Recognition (AGR) can misgender trans and non-binary individuals due to its binary design (Scheuerman et al., 2019), potentially impacting wellbeing (e.g., Pease et al., 2022). Similarly, stereotypically feminised voice-activated AI (VAIs) (West et al., 2019) risk normalising gender disparities. While some researchers have aimed to develop ‘gender-neutral’ voices to represent non-cisgender individuals, this can cause further complications by framing transgender identity as problematic for cisgender norms (Linander et al., 2019) and reinforcing assumptions of gender neutrality (Rincón et al., 2021).

The implementation of AI has also raised concerns. Visibility is a complexity of transgender identity; while concealment offers a sense of safety for many, others may prioritize visibility, while remaining concerned of risks to personal safety (Rincón et al., 2021). Technology may aggravate such risks, with transgender individuals vulnerable to cyberbullying, outing, and doxing in online spaces (Lerner et al., 2020; Scheuerman et al., 2018). As AI algorithms often classify trans/non-binary individuals as ‘outliers’, there is also a heightened risk of surveillance and privacy invasion. Security measures must address the unique digital challenges faced by trans individuals. Prioritising autonomy over identity is crucial, as selective self-presentation of these individuals reflects a greater need for control over

personal data to maintain safety (Ovalle et al., 2023; Rincón et al., 2021). Lack of AI diversity can also manifest in real-world challenges transgender/non-binary individuals, with concerns regarding the use of AI in line to anti-trans social policies (e.g., implementing AGR technologies to police usage of public bathrooms, Keyes, 2018). Therefore, AI may exacerbate existing challenges faced by these individuals (e.g., violence and harassment, Powell, 2020; Wirtz et al., 2020).

Participatory, user-centered design is crucial for developing trans-inclusive technology (Friedman & Hendry, 2019). 'Trans technology' (Haimson et al., 2020) can enhance digital safety by prioritising designs that support transgender individuals' needs, and technical solutions should prioritise marginalised users through democratic, user-driven processes (Blackwell et al., 2017). Existing literature indicates a lack of input from trans/non-binary individuals in these design processes; a more collaborative and inclusive approach to AI design and implementation is therefore needed.

Proposed methodology

The proposed project will adopt a multi-phase, qualitative approach that examines multiple perspectives of AI inclusivity.

Phase One: Exploration of existing AI technologies and their inclusivity

- Comprehensive literature review to identify challenges in inclusivity, gender bias, visibility, and privacy preservation for trans users of AI.
- Identify instances of AI gender bias and inadequate considerations of transgender individuals' needs in AI systems.
- Conduct interviews with developers to understand perceptions of transgender inclusivity in AI, prioritisation of inclusivity, and proposed solutions to improve diversity.

Phase Two: Exploration of trans/non-binary user insights

- Interviews conducted with transgender and non-binary individuals to explore:
    - Personal experiences with AI (e.g., gender bias, amplification/suppression of identity).
    - Positives and negatives of AI.
    - Importance of digital visibility and autonomy in data disclosure.
    - Privacy concerns.
    - AI's impact on the transgender community and their desired future changes.

Phase Three: User-centred design

- Participatory user-design workshops; engagement in design activities
- Active involvement of transgender and non-binary participants in development, design, and testing of AI algorithms.
- Facilitating collaborative discussions with developers to incorporate recommendations into the design and development process.
- Develop a collaborative partnership between marginalised users and developers.

Feedback from these workshops will inform the development of new transgender-inclusive AI prototypes, addressing concerns raised in previous phases. Depending on constraints, iterative testing may be employed to refine existing or develop new algorithms that reflect findings. Findings will be shared with stakeholders and developers to offer guidance on the refinement of AI technologies for greater inclusivity for transgender and non-binary individuals in future.

Data gathered from each phase will be undergo appropriate analysis (e.g., thematic analysis for qualitative interviews).

Ethical and diversity implications

AI-related challenges such as bias and privacy disproportionately affect socially vulnerable communities. Transgender and non-binary individuals are already at an increased risk of threat and violence both on and offline, and the implementation of current AI technology may exacerbate the possibility of harm. Therefore, the safety and security of individuals in the proposed research must be prioritised. Confidentiality, anonymity, and data security will be upheld and access to support resources will be provided. Ethical considerations will also be made concerning the sensitivity of this research, acknowledging the potential of psychological harm for participants.

Given the exclusionary nature of existing HCI research regarding gender (Keyes, 2018), full involvement of transgender and non-binary individuals in the design and implementation of AI is crucial. The proposed project will make significant contributions to growing attempts to diversify AI technologies and HCI research. Recommendations will be delivered regarding how AI can work for transgender and non-binary individuals rather than against them, and centre new technological developments in line with their needs. Through this research, the relationship between transgender and non-binary digital citizens and AI technology can be improved, bridging gaps in existing research and facilitating trust. AI can thus be better attuned to help improve the lives of these marginalised communities, creating a widespread, positive societal impact.

Working Title: Artificial Intelligence and Machine Learning Biometrics as Field Intelligence and Criminal Evidence by Luke Chambers

Introduction and Research Significance: Artificial Intelligence (AI) has become intrinsic to our everyday lives over the past two decades and has radically altered many elements of our society - with policing and justice being no exception. We already know that AI and Machine Learning (ML) are capable of identifying people with biometrics such as (but not limited to) Facial Recognition and Gait Analysis - but what is relatively untested is the use of these and similar AI as short-term police intelligence or as evidence against suspects in criminal trials.

AI and ML is far from infallible, and has in fact shown to be subject to many of the same biases as the general population. AI is only as good as the data which feeds it, which means that many of the modern criticisms of our legal system and those who enforce it, such as criticisms of more focus on ethnic minority communities or on those from lower socio-economic backgrounds, will also be present in AI systems. The question is raised on whether AI and ML can be relied upon in an evidential role without violating the suspect's ECHR Article 6 Right to a Fair Trial, or even whether it can be considered a solid basis for the initiation of an investigation of any size which would violate a suspect's ECHR Article 8 Right to Privacy. Both of these Rights are absolutely vital for our democracy and our justice system, so investigation of these issues not only expands society's knowledge in this area but also contributes to our social structure as a whole.

Concise Critical Reflection on the Existing Literature:
There is an abundance of existing literature on the field of AI as well as almost as much on how AI affects and is affected by our laws.

Before considering any of these, it is important to lay one criticism down on the current literature and that it is often far too compartmentalised to achieve its true potential. For example, publications on anti-crime AI systems from the STEM-centric side of academia and practice tend to focus only on the inner workings of the AI systems. Publications from the Law side, on the other hand, tend to focus only on how these systems and their outputs affect and are affected by law. This weakness may seem slight, but the inner workings of the systems have a massive impact on whether or not they can be considered fair. A single slight alteration of how data is processed, or how an output is reached, can change entirely whether or not an AI system could be considered 'fair' or even 'accurate', and so research must balance technical detail with legal acumen and also a good sociological understanding not just of the justice system but those who use it.

I graduated from my BSc (Hons) Computer Science with Artificial Intelligence in 2020, and I am currently studying Space Law(LLM) with modules in AI law which gives me a good overlap between technical knowledge and an understanding of algorithms with how the law works in the cyber domain. Fortunately, there are some reliable and recent sources with a good overlap as well.

Artificial Intelligence, Computational Modelling and Criminal Proceedings by Serena Quattrocolo focuses on how AI can 'affect the investigation and adjudication of crime' with a significant focus on human rights under ECHR and how 'predictive justice' can impact judicial decision-making. It is an Italian work written in English, so does not directly correlate to the law of England and Wales but does correlate well with Europe-centric issues and laws. In the field of counter-terrorism, 'Data Mining Based Crime Analysis Mapping and Intrusion Detection' (Panja et al, 2020) provides a very good algorithmic overview of AI in policing, but suffers from a US-centric focus. The Law Society of England and Wales

published a report in 2019 on algorithm use in the criminal justice system, which provides a good oversight of the landscape as it was 2 years ago. The literature landscape in this area is very active. 'Predictive Policing and Artificial Intelligence' is set for release in February 2021 and looks from previews to provide some value as a source - although these same previews show it may suffer from the lack of technical detail discussed in the opening of this section.

Not all literature is academic, however. Many police forces have published content from proposals to meeting minutes which detail the potential future of AI in criminal justice, as well as debate on ethical and legal concerns. The West Midlands Police and Crime Commissioner Ethics Committee published minutes from a 2019 meeting which detailed concerns around human rights and data protection issues and a lack of privacy impact assessments. Think tanks such as The Royal United Services Institute (RUSI) also publish work in this area, with a 2020 report entitled *'Data Analytics and Algorithms in Policing in England and Wales'* offering insights into current weaknesses in Bias, Discrimination, and a current lack of ethical oversight. Opponents of unrestricted AI use by police are also useful sources of information. Human Rights charity Liberty regularly publishes well-researched articles on this subject area.

Review of Relevant Theoretical Framework:
This project will utilise a Socio-Legal theoretical framework using a primarily empirical focus, though due to the high level of interaction with, and impact on, society it is expected that a Realism framework will also need to be involved - particularly when analysing the human element. An inductive approach will be used to collect and analyse data so that potential frameworks can be developed. A significant literature review and high degree of legal research will form the basis of the legal theory involved around AI in criminal justice. Numerical research methods such as data gathering and statistical analysis means evidence of how widespread AI Biometrics are in law enforcement can be collated, though there will need to be awareness of potential bias from police areas with differing priorities.

Research Questions:
There are a number of questions to be asked and hopefully answered by this research. As a starting point these are:

1. To what extent should Biometric AI be trusted as a predictor of criminal behaviour, an instigator for investigation, or as evidence in trial?

2. Is Biometric AI evidence alone enough to warrant prosecution of a suspected offender?

3. Is there a difference between how Magistrates as lay judiciary and Judges as professional judiciary interpret and rely on Biometric AI evidence?

4. What kind of frameworks could be developed to mitigate the drawbacks and expand the benefits of Biometric AI in policing and criminal justice?

Many of these questions are likely to change in wording during the course of the project, but their focus - on AI's value or, perhaps more importantly, risk as a policing or evidential tool - will remain throughout the project.

Research Objectives:

1. Collate and publish up to date information on the usage, accuracy, statistical validity, and evidential validity of Biometric AI in policing and justice

2. Investigate the socio-legal benefits, risks, and consequences of Biometric AI's increased usage within policing and sentencing

3. Propose possible policing and justice frameworks which would mitigate issues identified in the project

Research Methods:
One of the major research methods will be the use of empirical research to collate the professional opinions of multiple stakeholders in the Biometric AI pipeline. This includes but is not limited to AI developers and researchers, police decision-makers, police officers, national security personnel, criminal lawyers, human rights campaigners, magistrates, and judges. Though the focus would be on the reliability, fairness and legality of the current and future Biometric AI landscape, their opinions would be valuable outside of this as background detail as to the human element of Biometric AI. No AI exists in a vacuum, especially one involved in society and justice, and therefore even the inter-department politics such as human rights groups being against AI for non-technological reasons may still hold research value. My goal would be to access 5 of each type of stakeholder for both a questionnaire and then a semi-flexible 15-minute interview aiming to expand on some of the reasons given as well as potentially unearthing reasoning or factors that I had not considered. By doing this I would accrue both qualitative and quantitative data. Furthermore, a significant literature review of both the criminal law perspective and the STEM perspective would need to be undertaken and used as a base for the research. There is no easy way to tell how many police forces are experimenting with Biometric AI, but a Freedom of Information request to each force should yield some results. Previous experience has shown that most forces respond quickly and in good detail to these requests.

Research Methodology:
For the empirical research, I will reach out to various agencies and individuals who are stakeholders in the subject of this project. This includes members of the justice system such as magistrates, police forces, national security interests, lawyers, and also campaigners and NGOs such as Liberty. Individuals with professional interest in this subject, or who are authorised by their organisation to speak on record on the topic, can then be interviewed about some of the issues identified. This not only helps framework development, but will also highlight issues I or other authors may have missed. The interview could take the form of a survey for statistical purposes, as well as a more open-answer session to help with additional background and research information.

Ethical Considerations:
It is likely that this project will involve analysis of criminal trials both concluded and ongoing, and so it will be important to make sure any ongoing issues are treated carefully in regards to defamation or jeopardizing trials. It is possible I may have to anonymize or change the names of some of the people I interview. I would have to be very careful with how this data is handled.

Potential Contribution to Knowledge:

AI within Law Enforcement is not new, however it is still in its infancy. This seemingly oxymoronic statement results from the exponential nature of AI, in that we are seeing the same technological progress each month or so now that we did each year a mere decade ago. It is not an unfair or hyperbolic statement to say that in a few years time Police, Courts, and Justice will have access to AI powers and abilities that would have been considered science fiction at the start of the century. For such technology to be used fairly, appropriately, and in line with our duties to the public as a Democracy, it is vital that there are sufficient frameworks in place to ensure that each and every individual who is a suspect of such technology receives a fair trial and does not have their right to privacy violated unnecessarily - only when based on solid evidence or reasonable suspicion. This PhD Research will help to ensure that the technologies being developed now and in the future are being used fairly and appropriately as would be expected in a free and fair society. It will highlight issues which may not currently be well explained or well known, and will expand current knowledge in an area of law which is currently very high in public interest, as well as important to our justice system. This research would also function as a foundation for others, both in academia and in society, to make better decisions about how these systems are deployed and regulated - as well as for those looking to expand on my findings.

Research Plan/Timetable:

Year 1: Conduct and write literature review and secure research participants

Year 2: Undertake research with participants via questionnaires and interviews

Year 3: Complete data analysis, edit previously written research, compile and distribute findings

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PhD Proposal – The University as a Platform: Co-creating Community Infrastructure (RDF23/CIS/DOW)

Applicant – David Clark

Proposed Title - Exploring the role of the university as a broker in citizen-led encounters with AI-driven surveillance technologies

Overview

The increasing use of AI-powered tools has brought forth new opportunities in various aspects of modern society. However, it has also raised concerns from different voices, predicting potential ramifications for entire professions, civil liberties and ways of life. For instance, a study by Buolamwini and Gebru (2018) has highlighted the ethical implications of AI automation, specifically addressing fairness and potential discrimination based on race, nationality or gender. As such, those most adversely affected belong to marginalised communities often living in identified areas of multiple deprivation and facing material threats to their standard of living such as the worst effects of poverty. Additionally, Fontes et al (2022) conducted research on the deployment of Facial Recognition Technology (FRT) and assessed its impacts in terms of function, consent and societal implications. These studies underscore the importance of keeping AI systems in the best interests of the public and promoting awareness and education among marginalised groups to ensure their inclusion in the ongoing discussions surrounding AI ethics. It is not clear, however, on whom this responsibility falls and with commercial interests enjoying increasing successes with their AI-driven tools (e.g. OpenAI's ChatGPT LLM[1]) it seems unlikely they can be relied upon to prioritise the inclusion of marginal voices over the expansion of profit margins. Rather, there is an urgency to explore the potential for other organisations already working with communities, for example, HEIs, to broker the investigation and understanding of AI tools in collaboration with citizen partners.

Objectives

The objectives of this PhD will be explored by carrying out a case study approach. The case studies are outlined below:

Case Study One – *Researching the problem with communities*

How the implementation of AI in camera surveillance impacts the perception of surveillance in communities experiencing multiple deprivations. This case study investigates how an individual's level of digital literacy affects their attitudes and experiences with AI surveillance technologies.

Case Study Two – *Creating encounters with AI community surveillance*

Designing a platform to create citizen encounters with AI surveillance technologies, building awareness of AI-driven technology for citizen community safety. This study will allow participants to contribute to the design, for example through the use of Design Fiction (Blythe et al., 2016), and interact with the platform educating and informing them of interactions with surveillance technology and exploring data implications.

Case Study Three – *Supporting communities to research AI encounters*

Creating and evaluating a trustworthy process which empowers communities to create new encounters with AI-driven surveillance technologies for themselves. In this case study a framework will be developed that evolves the role of AI research expertise in such processes and transforms the relationship between citizens and the university (Olivier & Wright, 2015). This framework will be evaluated to explore its efficacy in comprising one facet of the university

[1] https://openai.com/

as a platform, specifically supporting citizen-led research into the future of AI tools that impact citizen safety.

Rationale

AI encroachment, especially in the realm of surveillance, raises significant concerns that will impact society as a whole. Marginalised groups, often excluded from the benefits of AI, face increased exposure to these technologies due to limited access and knowledge. Biases within AI classification systems, such as predicting criminality based on facial features (Wu and Zhang, 2016) or detecting sexuality from face images (Wang and Kosinski, 2018), perpetuate patterns of racial and gender bias, deepening inequalities within marginalised communities. Urgent revaluation of these systems is needed (West et al., 2019) to address these issues raise awareness around the potential impact of AI systems and ensure those impacted are aware, educated and equitably represented in their design (Hayes, 2011).

Conducting research on the role of the university as a broker in trustworthy AI is crucial due to its potential impact on different groups, especially when considering marginalised communities that are often voiceless in such processes. This investigation is timely, since modern, civic universities are increasingly tasked with finding new ways to work with the communities in which they are situated (Goddard et al., 2016) and are measured against the UKRI's Knowledge Exchange Framework[2] to assess their success in this regard. This speaks the universities research growth and the research work done at a regional level. Moreover, universities can serve as brokers, fostering collaboration, dialogue and co-creation between communities, local government and academic researchers (Dow et al., 2018). Concurrently, recent research in HCI demonstrates how citizen engagement with their data can impact trust, inclusivity and individual agency (Bowyer et al., 2022). This represents an upskilling of local government and community members that is crucial in enabling marginalised groups to understand and utilise their data effectively. By adopting an inclusive design method and engaging in action research, universities can empower marginalised communities to shape the AI research agenda and develop technologies that better serve their needs and help them understand the technologies better. The collaborative effort allows for the equitable inclusion of diverse perspectives, whilst ensuring AI systems are designed ethically, equitably and with community understanding that both empowers and educates.

The outputs of this research will contribute new knowledge to top tier, international venues in Human-Computer Interaction, such as the CHI Conference, whilst providing insight impacting the ethical design of AI-driven tools more broadly. Importantly, this project seeks to provide a practical framework that affords new citizen-led research opportunities that are produced collaboratively between communities and Higher Education Institutions.

Methodology

This research will take a case study approach which allows for significant interaction with research participants providing an in-depth picture (Bloomberg & Volpe, 2019). Additionally providing an opportunity to investigate complex phenomena with a high level of detail and depth (Yin, R.K 2009). To ensure for a comprehensive analysis of a rich and diverse data set involving community partners, the project will employ a mixed methods approach, integrating quantitative and qualitative data collection and analysis techniques as both combined provide considerable value and depth (Bryman, 2006). Furthermore, the research will adopt an Action Research (AR) framework to emphasise the collaboration between research, community members and stakeholders promoting mutual learning and shared decision-making. AR use in Human-Computer Interaction (HCI) research offers methodological approaches when conducting collaborative research (Hayes, 2011). Finally, participatory design principles will be incorporated into the research methodology, as described by Björgvinsson et al. (2010). Emphasising the active involvement of community members in the research.

[2] https://kef.ac.uk/

The methodologies aim to generate a comprehensive understanding of the role of the university as a broker in trustworthy AI.

Skills Development

- AI tools discussion and evaluation.
- Mixed methods research methods.
- Academic Writing.
- Understanding of ethical and responsible practices.

Personal Motivation

My personal motivations for this project come from my passion around the potential AI brings and its ability to positively impact society. However, I firmly believe that this technology must be developed and used ethically and fairly, working for people rather than against them. I enjoy collaborating with others who share this passion and are committed to leveraging this technology for good. My experience and passion for this can be seen in my undergraduate project looking at attitudes towards the use of AI in surveillance, titled 'AI Surveillance: Big Brother's Nerdy Cousin? Investigating Public Attitudes on the Use of AI in Surveillance Technology'. This opportunity to contribute to the Ph.D. position would allow me to further explore these important issues whilst evaluating the university as a platform, working with local organisations to leverage the universities position locally.

Timeline

A provisional timeline for the project, including the three case studies and the writing up and publication of the findings of these can be found below. Subject to adjustments based on the specific requirements of each task and the progress made during the research process. To be in line with conference submissions.

Timeframe		Anticipated Activities
Year One	Months 1-6	- Finding relevant literature and preparing for literature review. - Identify local groups (charities, organisations, councils) to work with and start to build relationships.
	Months 7-8	- Composing literature review. - Maintain relationship with local groups. - Design fact finding questionnaires and interviews.
	Months 9-12	- Carry out fact finding study. - Maintain relationship with local groups. - Analysis of fact-finding data - Compose related thesis chapters
Year Two	Months 1-6	- Commence case study 1 (problem research) - Design and carry out community-based research activity - Write-up case study findings for conference submission.
	Months 6-12	- Commence case study 2 (event/interaction type) - Write-up case study findings for conference submission. - Compose related thesis chapters
Year Three	Months 1-9	- Commence case study 3 (framework design/evaluation) - Build design framework and evaluate for AI encounters in the future and understandable/explainable AI (XAI). - Analyse and write-up for thesis.
	Months 10-12	- Compose Introduction & Conclusion chapters - Final thesis assembly - Viva Preparation &Delivery

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