

Human-centred Computing Projects 2026-27

Contents

Exploring the Diversity of Data Storytelling: A Comparative Analysis Across Cultures, Disciplines, and Media	2
Understanding the Complexity of Negotiations	3
Exploring Interactive Multi-Dimensional Approaches to Patient Communication in Oral Health Education	4
Computational Argumentation for Interactive Explainable AI	5
Addressing the Privacy Challenges of Interactive GenAI for Teenagers	6
Adaptive and Inclusive Cybersecurity Education	7
Sustainable and Privacy-Preserving Biometrics in Education	8
Designing for user-to-user consent and safety in online platforms	9
Immersive Visual Analytics for Exploration, Debugging and Understanding of Quantum Algorithms and Machine Learning Models	10
Visualisation for Quantum Computing	11
Investigating Human Perception through Quantum Cognition	12

Exploring the Diversity of Data Storytelling: A Comparative Analysis Across Cultures, Disciplines, and Media

Supervisor: Alfie Abdul-Rahman

Areas: Human-centred computing (human-computer interaction), Natural Language Processing

(Back to [Scholarship Not Allocated](#))

Project Description

Data storytelling has become a vital practice for interpreting and communicating complex information, combining data analysis, narrative techniques, and visual representation. Yet the diversity of data storytelling approaches across cultures, disciplines, and media remains underexplored. This PhD project will investigate how cultural, disciplinary, and media-related factors—alongside technological mediation through natural language processing (NLP)—shape the design, ethics, and reception of data stories. It will integrate feminist and decolonial perspectives to critically examine questions of power, inclusivity, and representation in the creation and communication of data narratives.

Current research often isolates technical, narrative, or communicative dimensions of data storytelling, with limited attention to cross-cultural and cross-disciplinary comparisons. As NLP techniques such as summarisation, translation, and generative storytelling are increasingly deployed, they raise pressing questions about whose voices are amplified or silenced, and how automation may reproduce or resist systemic biases. Incorporating feminist and decolonial approaches makes it possible to interrogate epistemic injustices in data storytelling—asking not only how stories are told, but also whose knowledge counts.

This project will offer both theoretical and practical contributions. Empirically, it will conduct comparative analyses of data storytelling practices across cultural and disciplinary contexts, and across multiple media platforms (digital journalism, scientific publishing, social media, public exhibitions). Practically, it will develop a Data Storytelling Diversity Toolkit: a set of methodological guidelines, design heuristics, and computational tools (leveraging NLP) to support the creation of inclusive, ethical, and context-sensitive data narratives.

Possible Research Questions

- How do cultural and disciplinary contexts influence the form, ethics, and reception of data stories?
- How do different media platforms (e.g., news outlets, academic publishing, social media, public art) mediate the communication and engagement of data narratives?
- In what ways can NLP techniques (summarisation, sentiment analysis, translation, generative text) both support and constrain inclusive approaches to data storytelling?
- How can feminist and decolonial perspectives reveal power dynamics in whose stories are told, who tells them, and how they are received?
- What frameworks can evaluate the inclusivity, ethical responsibility, and audience impact of data stories?
- How can these insights be consolidated into a practical toolkit that guides researchers, journalists, and practitioners in designing equitable and culturally sensitive data storytelling practices?

Expected Contributions

- A cross-cultural and cross-disciplinary framework for analysing data storytelling.
- A critical integration of NLP, feminist, and decolonial approaches to data narrative design and evaluation.
- Case studies of data storytelling across multiple cultural and media settings.
- A Data Storytelling Diversity Toolkit, combining:
 - o methodological guidelines for comparative analysis,
 - o design heuristics informed by feminist and decolonial theory, and
 - o prototype NLP-based tools for inclusive and multilingual data narratives.
- Practical recommendations for creating ethical, inclusive, and context-sensitive data stories.

Understanding the Complexity of Negotiations

Supervisor: Alfie Abdul-Rahman

Areas: Human-centred computing (human-computer interaction), Natural Language Processing, Systems (software engineering, programming)

(Back to [Scholarship Not Allocated](#))

Project Description

Negotiated texts are the outcome of formal decision-making processes in which groups of actors deliberate, draft, and refine documents over time. Many foundational texts of the modern world—including international treaties such as the Universal Declaration of Human Rights or the Treaty of Versailles, and constitutions such as that drafted by the American states in 1787—were not authored by individuals but produced through complex collective negotiation. Even relatively short documents of this kind often embody thousands of individual proposals, revisions, and decisions, reflecting a dense history of interactions among negotiating parties.

To understand such processes, it is essential to track the involvement of delegations and assess their influence on the development of negotiated texts. Traditional close reading can provide detailed insights, while distance reading and computational methods such as machine learning enable the analysis of patterns across large corpora. However, to fully capture the complexity of negotiations, these approaches need to be integrated with innovative visual analytics methods that make it possible to explore the interplay of events, actors, and evolving drafts at scale.

This project will apply a visual analytics approach to illuminate the complexity of negotiations and the influence of delegations throughout the drafting process. It will combine computational text analysis, natural language processing, and advanced visualization to bridge formal records (such as meeting minutes and draft revisions) with informal archival materials (e.g., private diaries, correspondence, or social media records in contemporary contexts).

Possible Research Questions

- How can new static and interactive visualizations be designed to support data discovery and insight generation in large datasets of negotiation events represented as interacting timelines?
- What novel approaches can reveal the evolution of complex, technical documents over extended periods of negotiation?
- How can indexing and retrieval methods for negotiation datasets be improved, and how can their results be presented in more intuitive and interpretable displays?
- In what ways can natural language processing be used to link information from informal archives (e.g., diaries, letters, or social media feeds) with the formal records of a negotiation, thereby enriching our understanding of the decision-making process?

Expected Contributions

- A visual analytics framework for analysing negotiation processes at multiple scales.
- New visualization techniques for representing evolving texts, timelines, and actor interactions.
- Computational tools for indexing, linking, and exploring negotiation-related datasets.
- Methodological insights into integrating close reading, distance reading, and machine learning with visual exploration.
- Case studies demonstrating how these methods enhance our understanding of historical and contemporary negotiated texts.

Exploring Interactive Multi-Dimensional Approaches to Patient Communication in Oral Health Education

Supervisor: Informatics: Dr Alfie Abdul-Rahman & Dr Lin Gui FoDOCS: Dr Melanie Nasseripour & Dr Ana Angelova

Areas: Artificial Intelligence, Machine learning / Deep learning, Human-centred computing (human-computer interaction), Natural Language Processing, Systems (software engineering, programming)

(Back to [Scholarship Not Allocated](#))

Project Description

This joint project between the Department of Informatics and the Faculty of Dentistry, Oral & Craniofacial Sciences (FoDOCS) seeks to transform how patient communication is taught in oral health education. Effective patient-clinician communication is central to encouraging oral hygiene practices, supporting behaviour change, and demonstrating professionalism. However, conventional training methods are resource-intensive, requiring significant time, staff, and cost to deliver authentic clinical practice scenarios.

To address these challenges, the project proposes the design and evaluation of interactive, multi-dimensional learning environments, with a particular emphasis on immersive Virtual Reality (VR). VR offers an unparalleled ability to create engaging, realistic, and repeatable patient encounters where students can practice communication skills in a safe but lifelike clinical setting. Complementary approaches—including text-to-text and voice-to-voice communication systems—will expand accessibility, providing adaptable tools for different learners and educational contexts.

Generative Language Models (GLMs) will be harnessed to generate customised patient cases and conversational responses, ensuring that scenarios adapt dynamically to student inputs. These responsive simulations allow students to repeatedly practice communication tasks such as explaining oral hygiene, negotiating dietary changes, or discussing treatment options, thereby reinforcing learning and professional skill development.

Research Questions

- How can immersive VR be designed to simulate realistic patient-clinician interactions that enhance students' communication, empathy, and professionalism?
- What are the comparative benefits and limitations of VR, text-based, and voice-based simulation approaches in oral health education?
- In what ways can GLMs be integrated to generate personalised, contextually relevant, and adaptive patient scenarios that respond in real time to learners' actions?
- How do students perceive and engage with VR-based versus non-immersive approaches, and how does this affect learning outcomes?
- What metrics and evaluation frameworks can be developed to measure improvements in communication competence, confidence, and behaviour change skills using immersive and multi-dimensional tools?
- How can these approaches be scaled sustainably across curricula and adapted to different cultural and institutional contexts in oral health education?

Expected Contributions

- Development of a VR-based immersive training system for patient communication in oral health education.
- Comparative evaluation of VR, text, and voice-based simulations, identifying best practices for different learning settings.
- Integration of GLMs for adaptive, customised case study generation.
- A multi-dimensional toolkit for cost-effective, scalable communication training.
- Evidence-based recommendations for embedding immersive and interactive communication training within oral health curricula.

Computational Argumentation for Interactive Explainable AI

Supervisor: Antonio Rago

Areas: Artificial Intelligence, Machine learning / Deep learning, Human-centred computing (human-computer interaction), Natural Language Processing

(Back to [Scholarship Not Allocated](#))

Project Description

Context:

Computational argumentation has been shown to be an effective formalism for extracting the relevant information from AI models and providing faithful, transparent and interactive explanations to users in a variety of formats, such as those which are conversational [1]. Argumentative explanations have been shown to be useful when applied different AI models, including large language models [2], classification methods [3,4] and recommender systems [1,5]. Recently, a general framework based on argumentation has been introduced [6] that is claimed to be able to not only model interactive explanations provided by AI models, but also the reasoning processes and cognitive biases in humans. However, these claims have currently been verified only by theoretical analysis and evaluations based on simulations, without the user studies which would provide conclusive evidence of the approach's capabilities.

Aims and Methodology:

The aim of this project is to investigate the ability of argumentative approaches, perhaps inspired by [6], to model human reasoning in interactive explanations for a range of AI models in different applications. The student will define instances of argumentative technologies as methods for explaining AI models, e.g. large language models or image classifiers. The methods will then be implemented, giving novel tools for interactive explanations which shifts the decision making towards the user, as in novel Evaluative AI paradigm [7]. The method will then be evaluated by means of machine-centric properties, such as faithfulness, using publicly available datasets in domains such as engineering and healthcare. The project will then explore the evaluation by user-centric properties of explainable AI, such as user satisfaction or trust, as in [1]. The student will then undertake user studies, which may be crowdsourced via Prolific (<https://www.prolific.com>). The study of interactive explanation for AI models is fertile ground, not least with the rise of large language models, and we believe that this project could have significant impact on the research landscape, particularly given the cutting-edge proposals of [7].

Requirements:

An interest (or, preferably, experience in) in the theory of computational logic and argumentation will be essential, as well as the implementation and analysis of machine learning models and explainable AI methods. This work will follow much of the argumentation-related work shown here: <https://antoniorago.github.io/publications/>

References

References:

- [1] Argumentative Explanations for Interactive Recommendations; Rago et al.; AIJ 2021. <https://www.sciencedirect.com/science/article/pii/S0004370221000576>
- [2] Argumentative Large Language Models for Explainable and Contestable Claim Verification; Freedman et al.; AAAI 2025. <https://doi.org/10.1609/aaai.v39i14.33637>
- [3] Data-Empowered Argumentation for Dialectically Explainable Predictions; Cocarascu et al.; ECAI 2020. <http://ebooks.iospress.nl/publication/55172>
- [4] A Little of That Human Touch: Achieving Human-Centric Explainable AI via Argumentation; Rago; IJCAI 2024. <https://www.ijcai.org/proceedings/2024/983>
- [5] Argumentation-Based Recommendations: Fantastic Explanations and How to Find Them; Rago et al.; IJCAI 2018. <https://www.ijcai.org/proceedings/2018/269>
- [6] Interactive Explanations by Conflict Resolution via Argumentative Exchanges; Rago et al.; KR 2023. <https://proceedings.kr.org/2023/57/>
- [7] Explainable AI is Dead, Long Live Explainable AI!: Hypothesis-driven Decision Support using Evaluative AI; Miller; FAccT 2023. <https://dl.acm.org/doi/10.1145/3593013.3594001>

Addressing the Privacy Challenges of Interactive GenAI for Teenagers

Supervisor: Ruba Abu-Salma

Areas: Cybersecurity, Human-centred computing (human-computer interaction)

(Back to [Scholarship Not Allocated](#))

Project Description

Teenagers are among the fastest early adopters of Generative AI (GenAI) and remain optimistic about its potential benefits across diverse domains. However, they are also more likely to overshare sensitive personal information, making them particularly vulnerable. This highlights the need for targeted protections that extend beyond generalized AI ethics frameworks. For example, LLM-based chatbots can expose teenagers to age-inappropriate content, normalize or encourage risky or unethical behaviors, and raise concerns about surveillance. These risks have serious implications for teenagers' psychological and socio-emotional development.

This project therefore aims to examine how privacy concerns influence teenagers' trust in GenAI, and what signals of privacy and trust they seek. Drawing on empirical evidence of teenagers' perspectives and lived experiences, we will co-design and evaluate with them new interaction design mechanisms centered on trust and privacy (e.g., privacy communication strategies, disclosures).

Adaptive and Inclusive Cybersecurity Education

Supervisor: Tasmina Islam

Areas: Artificial Intelligence, Machine learning / Deep learning, Cybersecurity, Human-centred computing (human-computer interaction), Natural Language Processing

(Back to [Scholarship Not Allocated](#))

Project Description

Cybersecurity awareness is essential in a digital society, yet current initiatives are often generic and fail to address the needs of underrepresented groups such as children, minority communities, and people with disabilities. This project proposes to design adaptive awareness environments that apply artificial intelligence to deliver personalised, culturally relevant, and accessible cybersecurity training.

Participants will engage with interactive simulations of cyber threats (e.g., phishing, ransomware, data leakage) enhanced by generative AI, which can create customised attack narratives and provide context-aware, real-time feedback. Alongside the development of adaptive systems, the project will employ interviews and focus groups, combined with behavioural analytics and surveys, to understand user needs, evaluate effectiveness, and identify different types of cybersecurity users (e.g., risk-takers, cautious users, or overconfident participants). It will also explore new ways of measuring awareness outcomes, introducing resilience-based metrics such as detection speed, recovery performance, and transfer of skills across scenarios.

By combining technical innovation with human-centred research, this work seeks to establish a scalable framework for evidence-driven cybersecurity awareness, empowering diverse populations to navigate digital risks safely. Prospective students can discuss options with the supervisor.

References

1. Segupta, S., Varma, U., & Islam, T. (2025). Empowering Cybersecurity Education: A Review of Adaptive Learning Paradigms and Practical Implications. In Joint Proceedings of IS-EUD 2025: 10th International Symposium on End-User Development, 16-18 June 2025, Munich, Germany.: 3rd International Workshop on Cyber Security Education for Industry and Academia.
2. Hedges, M., & Islam, T. (2024). VirSec - Immersive Security Training within Virtual Reality. In 17th International Conference on Advanced Visual Interfaces: 2nd International Workshop on CyberSecurity Education for Industry and Academia (CSE4IA 2024)
3. Islam, T & Zou, Y 2023, ChildSecurity: A Web-based Game to Raise Awareness of Cybersecurity and Privacy in Children. in Cybersecurity Challenges in the Age of AI, Space Communications and Cyborgs.

Sustainable and Privacy-Preserving Biometrics in Education

Supervisor: Tasmina Islam

Areas: Artificial Intelligence, Machine learning / Deep learning, Computer vision, Human-centred computing (human-computer interaction), Education

(Back to [Scholarship Not Allocated](#))

Project Description

The growth of online and hybrid education has created new challenges for ensuring fairness and security in assessment. Traditional remote proctoring systems often depend on continuous webcam monitoring, raising concerns around privacy, accessibility, and environmental sustainability due to the energy and storage demands of video-heavy approaches.

This project aims to explore the design of sustainable and privacy-preserving biometric systems for education. The project will investigate how AI-driven biometric authentication methods can provide continuous but unobtrusive identity verification in online assessment while addressing three key issues:

Privacy-preserving authentication: developing methods that protect raw biometric data through on-device processing, secure template storage, or federated approaches.

Fairness and accessibility: auditing performance across diverse student groups and learning environments, ensuring transparency and inclusivity.

Ecological sustainability: benchmarking against conventional proctoring to quantify and reduce energy use, bandwidth, and carbon footprint.

The project will deliver prototype systems and evaluation frameworks that consider accuracy, fairness, privacy, and ecological impact together. The outcomes will contribute to the development of responsible, inclusive, and environmentally conscious online assessment technologies.

Designing for user-to-user consent and safety in online platforms

Supervisor: Kovila Coopamootoo

Areas: Cybersecurity, Human-centred computing (human-computer interaction)

(Back to [Scholarship Not Allocated](#))

Project Description

The practice of sharing private, sensitive or intimate content is prevalent online and is digitally-mediated by online platforms such as dating apps, messaging or communication platforms, or online social networks. However, users of such platforms are mostly left to manage the risks associated with un-consensual behaviours, such as further content distribution, manipulation, storage or unsolicited exchange, on their own. Such risks include privacy violations, broken interpersonal trust, or online harms, such as extortion, image-based sexual abuse, as well as reputation damage and associated social harms.

While the UK's Online Safety Act 2023 has established offences for the un-consensual exchange of intimate content, there is still a lack of platform design supporting (1) consent conversations, specifications and the enforcing of boundaries; and (2) what happens when users change their mind or relationships break down and wish to modify or revoke consent.

This PhD project will investigate users' consent needs in online platforms, and design and evaluate consent mechanisms for user-to-user consent. The project is the intersection of privacy / security and human-computer interaction, and potentially AI.

References

- Geeng, C. et al., 2020. Usable sexurity: Studying People's concerns and strategies when sexting.
<https://www.usenix.org/conference/soups2020/presentation/geeng>
- Qin, L. et al., 2024. "Did they consent to that?": Safer digital intimacy via proactive protection against image-based sexual abuse.
<https://arxiv.org/html/2403.04659v1>
- Qin et al., 2023. Towards safer intimate futures: recommendations for tech platforms to reduce image based sexual abuse.
https://www.eswalliance.org/toward_safer_intimate_futures_recommendations_tech_platforms_reduce_image_based_abuse
- Im et al., 2024. Yes: Affirmative consent as a theoretical framework for understanding and imagining social platforms.
<https://dl.acm.org/doi/abs/10.1145/3411764.3445778>

Immersive Visual Analytics for Exploration, Debugging and Understanding of Quantum Algorithms and Machine Learning Models

Supervisor: Rita Borgo / Mohammad Reza Mousavi

Areas: Human-centred computing (human-computer interaction), Quantum Computing, Virtual Reality/Augmented Reality

(Back to [Scholarship Not Allocated](#))

Project Description

This PhD project investigates how immersive and interactive visual analytics can support the development and understanding of quantum computing systems. As quantum algorithms and machine learning models grow in complexity, their behaviour becomes increasingly difficult to interpret with traditional tools. The project aims to bridge this gap by designing novel visual and immersive environments that make the inner workings of quantum programs more accessible and comprehensible.

The research will explore techniques for visualising state space dynamics and quantum evolution, combining these with VR/AR interfaces to support spatial exploration and intuitive interaction. Such tools have the potential to transform how researchers debug, train, and interpret quantum systems, improving transparency, interpretability, and trust in quantum software.

Visualisation for Quantum Computing

Supervisor: Rita Borgo / Mohammad Reza Mousavi

Areas: Human-centred computing (human-computer interaction), Quantum Computing, Visualization

(Back to [Scholarship Not Allocated](#))

Project Description

Quantum computing represents a profound shift in how information is processed and analysed, but its development is constrained by the difficulty of understanding and debugging quantum programs. Quantum algorithms and quantum machine learning (QML) models operate in high-dimensional Hilbert spaces, with entangled and probabilistic states that are challenging to interpret using classical tools. This creates a critical need for human-centred approaches that make quantum processes more transparent, interpretable, and usable.

This PhD project will investigate the design of novel visualisation and visual analytics methods to support quantum software development and research. Key directions include techniques for visualising quantum state evolution, entanglement, and interference patterns; approaches to debugging and verifying quantum programs through visual diagnostics.

Investigating Human Perception through Quantum Cognition

Supervisor: Rita Borgo / Andrew Meso

Areas: Computer vision, Human-centred computing (human-computer interaction), Quantum Computing

(Back to [Scholarship Not Allocated](#))

Project Description

This PhD project explores a novel application of quantum cognitive theory to the study of Bertin's retinal variables, fundamental visual encodings such as colour, shape, size, and position. While traditional models treat these variables as independent channels processed in isolation, emerging evidence suggests that perception may instead involve non-classical, quantum-like dynamics. This research aims to investigate whether interpretations of visual encodings exhibit phenomena such as superposition, interference, and contextuality.