School of Computing, Engineering, and the Built Environment
Edinburgh Napier University

PHD STUDENT PROJECT

Funding and application details

Funding status: Self funded students only

Application instructions:
Detailed instructions are available at https://blogs.napier.ac.uk/scebe-research/available-phd-student-projects/

Prospective candidates are encouraged to contact the Director of Studies (see details below) to discuss the project and their suitability for it.

Project details

Supervisory Team:
- DIRECTOR OF STUDY: Dimitrios Darzentas (Email: D.Darzentas@napier.ac.uk)
- 2ND SUPERVISOR:

Subject Group: Applied informatics

Research Areas: Computer Vision, Human Computer Interaction, Internet of Things, Machine Learning, Videogames, Digital Media, Other

Project Title: Designing Meaningful Mixed Reality Experiences

Project description:
The aim of this research project is to investigate the design of Mixed Reality Experiences, with the long-term objective of investigating how they can be designed, developed and deployed in engaging, impactful, and ultimately more meaningful ways, in any given application context.

The creation of a Mixed Reality (MR) experience is by its nature a transdisciplinary challenge, and the application context influences the design significantly. The research can encompass aspects of Design, Technology, Human-Computer

Interaction (HCI), User Experience Design (UxD), Service Design, and application-specific issues, among many others.

For effective implementation, designers need to apply a holistic approach, taking into consideration the stakeholders, the capabilities and limitations of the chosen technology, the human-centred design, the socio-cultural challenges, and more. Therefore, we welcome diverse perspectives and approaches to the research. Candidates with experience and knowledge of multiple and varied disciplines, and interdisciplinary ways of working, are strongly encouraged.

The intent is for the project to be application focused. Therefore, a suitable application area should be chosen, which can draw from a broad range including Digital Cultural Heritage, Creative Industries, Performance, Games & Playful Interactions, Accessibility, Wellbeing, Health, Sustainability, or a combination thereof. The application area can also include others that are of interest to the candidate, especially if they have prior work or resources in that area.

A candidate may choose to focus on the broader conceptual challenge of meaningful experience design, an ongoing transdisciplinary challenge which underpins the entire project.

Or, depending on the background and preference of the candidate, the research approach may narrow the scope to a particular challenge of MR experience design & development, beyond the wider exploration of meaningful design.

Some examples of scoping could include:

 A tighter focus on Computer Vision and MR interaction design, by looking into interaction challenges such as the use of 3D Object Recognition and Tracking to facilitate tangible interactions in Mixed Reality Experiences. This could enable more natural interactions with physical objects that can act as immersive interfaces for MR experiences.

This example would suit a candidate interested in Computer Vision and machine learning.

Or a focus on exploring the barriers to inclusive MR experiences. This could be along the lines of accessibility, inclusivity, or socio-economic and cultural perspectives.

This example could suit a candidate from a variety of backgrounds, including design, psychology or sociology.

Or An initiative to drive a novel combination of MR and an existing experience, intended for health and wellbeing, cultural heritage or performance and art.

This example could suit a candidate with a health, creative industries or cultural heritage background and a keen interest in in utilising creative and immersive technology.

Over the course of the project, the candidate will evaluate and determine which approach and/or technology is most suitable for their focus, and ideally develop a process that can be adopted by end-users in the chosen application area. The process should be co-designed and evaluated by practitioners of the chosen application area to drive real-world impact.

References:
[1] Benford, Steve, Adrian Hazzard, Alan Chamberlain, Kevin Glover, Chris Greenhalgh, Liming Xu, Michaela Hoare, and Dimitrios Darzentas. 2016. Accountable Artefacts: The Case of the Carolan Guitar . In Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems, 1163

75. CHI 16. New York, NY, USA: ACM.
https://doi.org/10.1145/2858036.2858306.

[2] Benford, Steve, Kadja Manninen, Sarah Martindale, Adrian Hazzard, Juan Pablo Martinez Avila, Paul Tennent, Jocelyn Spence, et al. 2023. Infrastructures for Virtual Volunteering at Online Music Festivals . Proceedings of the ACM on Human-Computer Interaction 7 (CSCW1): 65:1-65:26. https://doi.org/10.1145/3579498.

[3] Benford, Steve, Anders Sundnes L vlie, Karin Ryding, Paulina Rajkowska, Edgar Bodiaj, Dimitrios Paris Darzentas, Harriet Cameron, Jocelyn Spence, Joy Egede, and Bogdan Spanjevic. 2022. Sensitive Pictures: Emotional Interpretation in the Museum . In Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems, 1 16.

[4] Darzentas, Dimitrios, Harriet Cameron, Hanne Wagner, Peter Craigon, Edgar Bodiaj, Jocelyn Spence, Paul Tennent, and Steve Benford. 2022. Data-Inspired Co-Design for Museum and Gallery Visitor Experiences . AI EDAM 36: e3. https://doi.org/10.1017/S0890060421000317.

[5] Darzentas, Dimitrios, Martin Flintham, and Steve Benford. 2018. Object-Focused Mixed Reality Storytelling: Technology-Driven Content Creation and Dissemination for Engaging User Experiences . In Proceedings of the 22nd Pan-Hellenic Conference on Informatics, 278 81. PCI 18. Athens, Greece: Association for Computing Machinery. https://doi.org/10.1145/3291533.3291588.

[6] Darzentas, Dimitrios, Adrian Hazzard, Michael Brown, Martin Flintham, and Steve Benford. 2016. Harnessing the Digital Records of Everyday Things . In Design Research Society 2016. http://eprints.nottingham.ac.uk/37688/.

[7] Darzentas, Dimitrios Paris, Michael A. Brown, Martin Flintham, and Steve Benford. 2015. The Data Driven Lives of Wargaming Miniatures . In Proceedings of the 33rd Annual ACM Conference on Human Factors in Computing Systems, 2427 36. CHI 15. New York, NY, USA: ACM. https://doi.org/10.1145/2702123.2702377.

[8] Darzentas, Dimitrios, Raphael Velt, Richard Wetzel, Peter J. Craigon, Hanne G. Wagner, Lachlan D. Urquhart, and Steve Benford. 2019. Card Mapper: Enabling Data-Driven Reflections on Ideation Cards . In Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, 1 15. CHI 19. Glasgow, Scotland Uk: Association for Computing Machinery. https://doi.org/10.1145/3290605.3300801.

[9] Spence, Jocelyn, Dimitrios Darzentas, Harriet Cameron, Yitong Huang, Matt Adams, Ju Row Farr, Nick Tandavanitj, and Steve Benford. 2021. Gifting in Museums: Using Multiple Time Orientations to Heighten Present-Moment Engagement . Human Computer Interaction 0 (0): 1 31. https://doi.org/10.1080/07370024.2021.1923496.

[10] Spence, Jocelyn, Dimitrios Paris Darzentas, Yitong Huang, Harriet R. Cameron, Eleanor Beestin, and Steve Benford. 2020. VRtefacts: Performative Substitutional Reality with Museum Objects . In Proceedings of the 2020 ACM Designing Interactive Systems Conference, 627 40. DIS 20. New York, NY, USA: Association for Computing Machinery. https://doi.org/10.1145/3357236.3395459.

[11] Spence, Jocelyn, Boriana Koleva, Steve Benford, Dimitrios Darzentas, Martin Flintham, Kevin Glover, Hanne Wagner, Rebecca Gibson, and Emily Thorn. 2023. More Than a Clich : Experiencing Hybrid Gifting in the Wild . ACM Transactions on Computer-Human Interaction, January. https://doi.org/10.1145/3577015.

[12] Tennent, Paul, Sarah Martindale, Steve Benford, Dimitrios Darzentas, Pat Brundell, and Mat Collishaw. 2020. Thresholds: Embedding Virtual Reality in

the Museum . Journal on Computing and Cultural Heritage (JOCCH) 13 (2): 1 35.

Candidate characteristics

Education:

A first-class honours degree, or a distinction at master level, or equivalent achievements in Computer Science, Applied Informatics, a similar field, or relevant to their chosen application context.

Subject knowledge:

Good fundamental knowledge of suitable Research Methods and ideally Mixed Reality Technologies, with knowledge and skills from their chosen application area.

Essential attributes:
- Experience of fundamental Design, User Experience Design or Applied Computer Science
- Competent in the interdisciplinary application of research methods and creative tools
- Knowledge of their chosen application area, or of the design of Mixed Reality Experiences
- Good written and oral communication skills
- Strong motivation, with evidence of independent research skills relevant to the project
- Good time management

Desirable attributes:
- Application-specific attributes will be considered, and a strong interest in, and experience of, designing and developing interactive experiences, or similarly aligned practice experience is very welcome. In addition, experience utilising mixed methods fo