Open Call -Recruiting experienced Computer Science and/or Engineering Researchers with a genuine interdisciplinary experience or interest in Arts and Humanities.





Trinity College Dublin The University of Dublin



Trinity Long Room Hub Arts & Humanities Research Institute

About Human +

HUMAN+ is an international and interdisciplinary fellowship programme jointly led by ADAPT, the Science Foundation Ireland Centre for Digital Media Technology & AI and the Trinity Long Room Hub at Trinity College Dublin. The programme is supported by the prestigious European Commission (EC) Horizon 2020 Marie Skłodowska-Curie COFUND Action.

HUMAN+ will connect computer science researchers with arts and humanities researchers and enterprise to forge a human-centric approach to technology development allowing for interdisciplinary research, integrating insights from the arts, humanities and computer sciences as well as enterprise.

We want to recruit 9 experienced researchers from a Computer Science and Engineering background for a 2-year post-doctoral programme and unique research and training space that focuses on the development of computing technology with insights informed by the Arts and Humanities.

Successful researchers will work with ADAPT's renowned Principal Investigators in the following project areas:

- Automated Personalisation techniques
- Conversational AI & chatbot technology for technology enhanced education
- **Computer Graphics Immersive Virtual Reality**
- Enhancing scholarly research in the humanities using knowledge graph technology.
- Using 3D modelling approaches for the analysis and communication of traditional craft skills in early modern architecture

Benefits of the programme

Human+ is a full research training and career development programme. At the start of the fellowship, a Personal Career Development Plan will be developed to support fellows in achieving their short and long-term career goals and prepare them for their future career trajectory. HUMAN+ is designed to provide a structured training programme in domain-specific areas and transferable skills, its components include:

- Future Labs
- Supervised Interdisciplinary and intersectoral research project
- Complementary advanced research and transferable skills training
- HUMAN+ Summer/Winter Schools
- Intersectoral and interdisciplinary transfer of knowledge (through secondments and/or short visits to industry partners)
- Specific training in communication and outreach activities
- Compulsory induction training delivered by ADAPT and the Trinity Long Room Hub that includes research ethics, gendered innovations training, Open Science and research practices at the start of all fellowships

Eligibility Criteria

- Applicants must have a relevant background to the strand of the programme they wish to apply to. E.g. Computer Science & Engineering (Strand 2).
- Applicants may be of any nationality and must agree to the programme's Terms & Conditions.
- Applicants must comply with the Transnational Mobility Rule: at the application deadline, applicants must NOT have resided or carried out their main activity (work, studies, etc.) in Ireland for more than 12 months in the 3 years immediately prior to the call deadline (please visit our website for the current call deadline www.humanplus.ie) .
- Applicants must, at the time of the call deadlines, be an Experienced Researcher, i.e. in possession of a doctoral degree or have at least four years of full-time equivalent (FTE) research experience. FTE research experience is measured from the date when a researcher obtained the

degree which would formally entitle them to embark on a doctorate, either in the country in which the researcher is recruited or seconded, irrespective of whether or not a doctorate is or was ever envisaged.

- Applicants must be fluent in English (written and spoken).
- Applicants are required to produce evidence of genuine interdisciplinary experience or interest regarding the scope of the programme.

Automated Personalisation techniques



Advancing personalised experiences from being reactive with limited scope and under immediate, and often limited, user control to becoming proactive and exhibiting increasing levels of autonomy and agency presents many research challenges. Tackling these challenges offers significant potential in realizing augmented human experiences by adapting to individual needs, preferences and contexts. A basic example of such proactivity would be a personalized service that automatically responds to instant messages on the user's behalf, e.g. automatically sending a delivery driver your Eircode, address and pin for their favourite navigation app following a "Where are you?" message.

Such automated behaviour has the potential to save the user a significant amount of time and could dramatically limit the intrusiveness of 'push' style technologies, but it raises considerable questions and challenges: When and how should an automated agent respond on a user's behalf? How can the user maintain oversight and control of such communications? What does it mean to be the recipient of such an automated, albeit tailored, response? This fellowship builds on mature personalisation work carried out in ADAPT. Specifically, it will build upon EmPushy (https://empushy.com/), a framework for generating, based on Machine Learning techniques, realistic notifications that a user's mobile device might receive. This tuneable framework can generate a stream of notifications tailored to different situations and contexts. These notifications can be the basis of proactive, intelligent and personalised interventions.

Owen Conlan an Associate Professor in Computer Science in the School of Computer Science and Statistics, Director of Postgraduate Teaching and Learning (SCSS) and Codirector of the Trinity Centre for Digital Humanities. The goal of his lab is to empower users in understanding and interacting with complex information and media. He has a specific focus on user control over personalised AI-driven systems and this is moving towards such systems proactively

Supervisor - Professor Owen Conlan





performing autonomous activities on behalf of users. He is a recognised thought leader in the field of personalisation (180+ publications; h- index of 26; 2800+ citations), promoting new creative approaches to personalisation, specifically the multimodel, metadata driven approach, the cross-site personalisation approach, the four-phase approach for explorative personalisation and approaches to support metacognition and self-regulation. He is also at the forefront of promoting comparative evaluation techniques in the personalisation research field. Owen is one of seven founding PIs of ADAPT, a large-scale, multi-institution research centre in Digital Content Technology, led from Trinity College Dublin.

Conversational AI & chatbot technology for

technology enhanced education



Supervisor – Professor Vinny Wade

The research we are driving in the Human+ project is in next generation personalisation technology for learning, from learner modelling to inform the learning, to new forms of personalised educational technologies.

As a direct result of the COVID-19 crisis, we have had to fast forward into a new way of living from virtual meetings to remote working to socialising digitally. Education is similarly being transformed. Classes have moved online and those of us in education have had to address new digital ways of learning that we can integrate with our learners.

One technology that has the potential to impact us in a significant way is in the area of Personalisation & Digital Personal Assistants. We are familiar with Siri and Alexa helping us at home, whether it be allowing us to schedule our appointments or do things in leisure like playing music, but now we are looking at how we can really address our learning needs in a substantial way via next generation person assistants. Our research suggests that we need to investigate new techniques for deep machine learning approaches in educational personal assistants and personalisation in order to provide a significant improvement in learning in both the workplace and at home.

Professor Vincent Wade is Director of the ADAPT Centre for Digital Media Technology and holds the Professorial Chair of Computer Science (Est. 1990) in School of Computer Science and Statistics, Trinity College Dublin as well as a Personal Chair in Artificial Intelligence. His research focuses on intelligent systems, AI and Personalisation. He was awarded Fellowship of

Trinity College for his contribution to research and has published over three hundred and fifty scientific papers in peer reviewed international journals and conferences. In 2018, he was awarded the Provost Innovation Award, the highest accolade the university can bestow for international research impact. As Director of ADAPT, Vincent heads a world leading research centre in digital media technology (text, video, speech, image, VR/AR) and AI. ADAPT pioneers research in media analytics, advanced machine learning, machine translation, media personalisation, speech and multimodal interaction, and ethics and privacy in media. Vincent is the co-founder of a successful TCD spin-out company called EmpowerTheUser which specialises in video based simulation technology and immersive learning analytics. Other awards won by Professor Wade include the European Language Label Award for innovation in Language Learning Technology (2010). He also holds multiple patents and invention disclosures in the area of personalisation and digital content technologies.

Computer Graphics / Immersive Virtual Reality



This research area is about combining expertise in Computer Graphics, Perception, and Film Studies to study perception of embodied virtual humans in virtual reality and develop new algorithms to improve future immersive virtual reality experiences. A new frontier of virtual production has arrived. Due to recent advances in real-time rendering, filmmakers are moving away from greenscreens and post-production visual effects (VFX) to creating VFX live on-set. This advancement means that creatives are now getting closer and closer to the final product early-on in the creative process. Thanks to the development of more comfortable and affordable hardware, VR headsets are now becoming common place on film-sets. For example, the recent The Lion King (2019, Disney) movie pushed the boundaries of filmmaking by using LED walls projecting virtual environments, with directors,

cinematographers, and lighters having access to scenes in real-time via VR headsets, allowing creative decisions to be made immediately, thus sparking creativity early in the process. These advancements are expected to continue and to completely transform the art of filmmaking for future generations. This project is a collaboration between researchers in computer graphics and film studies and aims to investigate the perception of lighting in virtual production environments and how it can be used to enhance the appeal of digital characters as well as increase emotional response from viewers towards that character's performance. Through a series of real-time perceptual experiments in immersive virtual reality, participants will embody virtual characters and rate levels of appeal and emotional intensity of the environments. Physiological measures such as skin conductance and evetracking will be used in addition to subjective measures.

Dr. Rachel McDonnell is an Associate Professor at the School of Computer Science, Trinity College Dublin. She was recently elected a fellow of Trinity College for significant research achievement in 2020. She has also been a member of a number of editorial boards and international program committees (regularly serving on the committees at the top conferences such as ACM SIGGRAPH, Eurographics, and IEEE Virtual Reality). She has also been program chair for ACM Symposium on Applied Perception in 2011. Her main research interests are Computer Graphics, Perception, Virtual Humans and Virtual Reality. She combines research in cutting-edge computer graphics and investigating the perception of virtual characters to both deepen our understanding of how virtual humans are perceived, and directly provide new algorithms and guidelines for industry developers on where to focus their efforts.

Supervisor - Professor Rachel McDonnell

Enhancing scholarly research in the humanities using

knowledge graph technology.



Supervisor - Professor Declan O'Sullivan

With the ever-increasing availability of data in distributed locations and from diverse sources, the deployment of Knowledge Graphs (KG) for integration and exploration to support: scholarly research in the humanities area or business users in enterprises is inevitable. The Fellow will identify, propose, and develop domain-specific requirements for creating, engaging with, and interrogating knowledge graphs from a non-computer scientist's perspective.

A knowledge graph (KG) is usually defined as a set of interconnected typed entities and their attributes and relationships. The types and relations are provided by socalled ontologies. KGs have been successfully adopted in

many domains, both in academia and enterprise settings-enabling one to integrate heterogeneous data sources to facilitate research, business analytics, fraud detection, and so on. With Linked Data, entities across different datasets are related using Web standards. While KGs are typically developed in a multidisciplinary manner, the creation and consumption of these KGs often rely on computer science practitioners. The uptake of KG technologies is hampered in both enterprises and academic/ cultural institutions alike, by the lack of domain or task-specific tooling for subject matter experts. The research challenge is to enable the further mainstreaming of KGs by providing adequate support for subject matter experts themselves as drivers and users of KGs.Generalized requirements for domainspecific methods, techniques, and tools for both humanities and non-humanities subject matter experts (e.g. financial analysts) will be identified, and then demonstrated. Informed by the research areas of historians, the Fellow will apply their research in two distinct specialties in that discipline; medieval and modern history. The Fellow will collaborate closely with the Beyond 2022 project www. beyond2022.ie) which is already developing a KG to support humanities research.

In parallel it is planned through the co-funding of an enterprise, to apply the proposed solution to a use case identified by the enterprise partner. The Fellow will thus identify, propose, and develop domainspecific requirements for creating, engaging with, and interrogating knowledge graphs from a noncomputer scientist's perspective.

Research areas of the project include: knowledge engineering, human-computer interaction, and information in Web and database systems.

Prof. Declan O'Sullivan is a Professor in Computer Science at Trinity College Dublin (http://scss.tcd.ie) and elected as a TCD Fellow in 2019 in recognition of the impact of his research and his contributions to his discipline and college. He is a Principal Investigator at the SFI ADAPT Research Centre in Digital Media Technology (http://www.adaptcentre.ie) where he leads up the strand of research called Transparent Digital Governance, covering research in data governance, data integration, data ethics, data protection and data value. His own research focuses on enabling more automatic data integration, and current projects include: working with Ordnance Survey Ireland on making their geospatial data available as Linked Open Data (data.geohive.ie); working with medical professionals to integrate diverse data sets (e.g. FAIRVASC www.fairvasc.eu); and working with humanities researchers to link and publish data from diverse collections and archives (e.g. the Beyond 2022 project www.beyond2022.ie). In addition, he has several research collaborations with industry, most recently Huawei and Accenture. Before joining Trinity in 2001, he worked for several years on distributed data projects with IONA Technologies and Broadcom Eireann research.

Using 3D modelling approaches for the analysis and communication of traditional craft skills in early modern architecture



Architectural craft skills of the early modern period have been effectively written out of history, valued for the perfected endresult rather than the means of production. This non-verbal, tacit form of knowledge requires inventive and dynamic methods of scholarly analysis. Digital humanities offer a penetrating means of capturing, analyzing and communicating traditional craft skills in architecture. Current research on craftsmanship in architecture at TCD (www.craftvalue.org) seeks to unpick historic processes and render them intelligible to a new audience, for example how were the oak staircases and Corinthian pilasters of the Old Library created, how were tools held and used, how was the skill acquired and developed? In a changed context when declining craft skill is

increasingly valued and sustained, digital re-creation of historic practices offer an appropriate, time-lapsed, virtual means of capturing the dynamic and transitory nature of craftsmanship which resists traditional academic analysis. Thus, new frontiers in 3D visualisation can open entirely original avenues to the tangible and intangible cultural heritage of the past.

Professor Anil Kokaram, graduated in 1993 with the PhD in Signal processing from the Cambridge University Engineering Department, UK. He is now a Professor and Fellow at Trinity College Dublin, Ireland. From 2011-2017 he was the lead of the Media Algorithms Team at YouTube/Google. Before that, he founded a media DSP group at Trinity www.sigmedia.tv working in the broad areas of DSP for Video Processing, Bayesian Inference and motion estimation. He has published over 100 refereed papers in these areas. A former Associate Editor of the IEEE Transactions on Video Technology and IEEE Transactions on Image Processing, Anil was the founder of GreenParrotPictures who produced video enhancement software later acquired by Google in 2011. In 2007 he was honoured with a Science and Engineering Academy Award (Oscar) from the American Academy of Motion Picture Arts and Sciences for his work in video processing for post-production applications. He was also awarded Fellow of Engineers Ireland 2007.

Supervisor - Professor Anil Kokaram



For more information:

Please visit our website - www.humanplus.ie or contact the Project Manager - humanplus@tcd.ie

