

Post Title: User Modelling & Monitoring in Social Service Robotics

Location: Technological University Dublin – co-hosted with TCD

Anticipated Start Date: Spring 2023

Closing Date: 15 December 2022

Apply: <https://forms.gle/8NZZBwZWnzRR7syZ8>

Why ADAPT?

- **Contribute** to the ADAPT research agenda that pioneers and combines research in AI driven technologies: Robotics, Natural Language Processing, Video/Text/Image/Speech processing, digital engagement & HCI, semantic modeling, personalisation, privacy & data governance.
- **Work** with our interdisciplinary team of leading experts from the complementary fields of, Social Sciences, Communications, Commerce/Fintech, Ethics, Law, Health, Environment and Sustainability.
- **Leverage our success.** ADAPT's researchers have signed 43 collaborative research projects, 52 licence agreements and oversee 16 active commercialisation funds and 52 commercialisation awards. ADAPT has won 40 competitive EU research projects and obtained €18.5 million in non-exchequer non-commercial funding. Additionally, six spinout companies have been formed. ADAPT's researchers have produced over 1,500 journal and conference publications and nearly 100 PhD students have been trained.

As an ADAPT funded PhD researcher you will have access to a network of 85 global experts and over 250 staff as well as a wide multi-disciplinary ecosystem across 8 leading Irish universities. We can influence and inform your work, share our networks and collaborate with you to increase your impact, and accelerate your career opportunities. Specifically we offer:

1. Opportunity to build your profile at international conferences and global events.
2. A solid career pathway through formalised training & development, expert one-on-one supervision and exposure to top specialists.
3. A Fully funded, 4 year PhD postgraduate studentship which includes a stipend of (€18,500 per annum - non taxed), along with equipment, annual travel funding
4. Funding for annual student fees

Context

Next generation service robots offer the potential to provide efficient, flexible, and reliable performance across a range of environments that may be occupied with human users. This introduces challenges around enhancing the autonomous performance of the robot, such that it can monitor and model multiple users, making its behaviour more predictable and understandable to nearby observers. The performance of the robot must be robust to a range of different use-contexts and users, ranging from co-workers trained to use the robot to members of the public. Research in human-robot interaction, situated conversational systems, and even in the automotive space has

tended to focus exclusively on a direct user engaged in a task with the system, or on safety critical issues such as avoiding collisions. The middle ground of users that might complete tasks alongside service robots, or even users that may simply need to engage the robot during its own activities have been largely unexplored.

This PhD will look at the issue of user model construction and constructive task-oriented feedback in service robotics. The focus will be on real world deployments where the novelty factor will be minimized -- thus leading to richer real-world insights into the human-robot relationship. Rather than having to build a robot from scratch or rely on robots not capable of completing real world tasks, this work will where possible take advantage of existing robot platforms to address the specific challenges around modelling of multiple users in collaborative environments, and the benefits of merging the conversational modality with non-conversational communication channels. As such, the goal here is not to study interaction from a robot as human perspective, but instead from a robot perspective where the conversational and gestural modalities are just one form of interaction. This research will take a data driven approach with a focus on situated interaction. A work plan involving ethnographic studies, software and systems development, and end user studies is envisaged.

The position is best suited to a computer engineering or computer science student (or related) with a background in data science and NLP and with some experience of programming robots, preferably using the robot operating system (ROS).

Minimum qualifications:

Bachelor's Degree in Computer Engineering, Computer Science (or related field) with training in Natural Language Processing and or Deep Learning

Preferred qualifications:

- *Master's Degree in Machine Learning, Data Analytics, Human-Computer Interaction or related field*

Application Process

Each application should only consist of

1. Detailed curriculum vitae, including – if applicable – relevant publications;
2. Transcripts of degrees,
3. The name and email contacts of two academic referees,
4. A cover letter/letter of introduction (max 600 words). In the letter, applicants should include the following details:
 - a. An explanation of your interest in the research to be conducted and why you believe they are suitable for the position.
 - b. Details of your final year undergraduate project (if applicable)
 - c. Details of your MSc project (if applicable)
 - d. Details of any relevant modules previously taken, at undergraduate and/or Master level.
 - e. Details of any relevant work experience (if applicable).

Diversity

ADAPT is committed to achieving better diversity and gender representation at all levels of the organisation, across leadership, academic, operations, research staff and studentship levels. ADAPT is committed to the continued development of employment policies, procedures and practices that promote gender equality. On that basis we encourage and welcome talented people from all backgrounds to join ADAPT.

About the ADAPT Centre

ADAPT is the world-leading SFI research centre for AI Driven Digital Content Technology hosted by Trinity College Dublin. ADAPT's partner institutions include Dublin City University, University College Dublin, Technological University Dublin, Maynooth University, Munster Technological University, Athlone Institute of Technology, and the National University of Ireland Galway. ADAPT's research vision is to pioneer new forms of proactive, scalable, and integrated AI-driven Digital Content Technology that empower individuals and society to engage in digital experiences with control, inclusion, and accountability with the long term goal of a balanced digital society by 2030. ADAPT is pioneering new Human Centric AI techniques and technologies including personalisation, natural language processing, data analytics, intelligent machine translation human-computer interaction, as well as setting the standards for data governance, privacy and ethics for digital content.

Our Research Vision

Governments and civil society are starting to recognise the need for urgent and concerted action to address the societal impact of the accelerating pace of digital content technologies and the AI techniques that underpin them. ADAPT provides an ambitious, ground-breaking, integrated research programme that assembles three interlocking Strands that together are capable of addressing this challenge. Each of these complementary and reinforcing research Strands takes one of the different perspectives on the provision of personalised, immersive, multimodal digital engagement, i.e. the individual's experience and control of the engagement, the algorithms underlying digital content processing, and the balanced governance by enterprise and societal stakeholders.

Digitally Enhanced Engagement Strand

From the individual perspective, research within this Strand will deliver proactive agency techniques that sense, understand and proactively serve the needs of individual users to deliver relevant, contextualised and immersive multimodal experiences which also offer them meaningful control over the machine agency delivering those experiences.

Digital Content Transformation Strand

From the algorithmic perspective, new machine learning techniques will both enable more users to engage meaningfully with the increasing volumes of content globally in a more measurably effective manner, while ensuring the widest linguistic and cultural inclusion. It will enhance effective, robust integrated machine learning algorithms needed to provide multimodal content experiences with new levels of accuracy, multilingualism and explainability.

Transparent Digital Governance Strand

From the enterprise and societal perspective, new structured knowledge frameworks and associated practices for AI data governance will be required to balance the needs and values of individuals, organisations and society when it comes to rich digital experiences. This requires the advancement of research in the areas of data ethics, data quality, data protection, data value, data integration, and multi-stakeholder governance models.