Assistive Technology for Intellectual Disability and Autism Spectrum Disorders

www.assistid.eu
www.doctrid.ie
www.respect.ie
EU Marie Curie programme
Researchers work on individual projects

Based in universities
Engage with service providers & industry

Practical Research and Training
Real world impact

Wearable & Environmental sensors
Remote Management, Tx & Rehabilitation
Designing interactive sensory rooms
Affective Computing
Computer based learning tools
Video Modelling and Virtual Reality
Diagnostic platform for ASD
Interactive toys for children

ASSISTID
2014-2019

Doctrid
Daughters of Charity
Technology and Research into Disability

Respect
ASSISTID Overview

13 Fellows funded to date
20 applications currently under review

**Open for Incoming Applicants until 30th June 2016 (Interim Evaluation April 2016)**

**Incoming Fellowships:** 2 years
Can come from anywhere in the world into RoI universities

**Outgoing Fellowships:**
Must come from RoI and go to outside RoI (Northern Ireland, UK, US etc)
2 years at Outgoing Host + 1 year Return Phase to RoI Host

All Fellows employed by RoI universities.

**Collaborations with Daughters of Charity, special schools, other disability providers, industry**
**ASSISTID: Areas of Interest**

**Intellectual disability:**
A disability characterised by significant limitations in Intellectual functioning (reasoning, learning, problem solving) and adaptive behaviour, which covers a range of everyday social and practical skills. This disability originates before the age of 18.

**Autism:**
The presence of abnormal or impaired development that is manifest before the age of 3yrs
- Reciprocal social interaction
- Communication
- Restricted, stereotyped, repetitive behaviour

**Dementia**
Neurological process characterised by a decline in mental ability e.g. memory, personality

**Assistive Technology:**
How can Assistive Technology enhance the quality of life of people with intellectual disabilities, ASD, or dementia with ID?
AT development and application, assessment, modification, adoption, policy, ethics
Daughters of Charity Disability Support Services

Support people with moderate, severe or profound ID
Child → Old Age
Staff: ~1600
Service users: ~2,000

Roscrea
Limerick
The DOCTRID Research Institute: Mission

Evidence Based Research
Multidisciplinary
User involvement

Real world impact
Expert training

Improved service delivery
Community Living
Social Inclusion
The need for Research and Training in ID/ASD

Why now?

- Pomona Project 2008
- European Autism Action 2010 report

1-3% of population
~13M with ID or ASD in Europe

Social Model of Disability

Move to community living

PwID living longer-Dementia

Research and Training

Evidence base

Policy

Social Innovation

Assistive Technology is Key!
What is Assistive Technology (AT)?

Any product or technology based devices which support the functional needs of people with disabilities and maximises their quality of life

National Disability Authority report 2012
‘Increases in AT spending can reduce costs associated with hospital home and residential care’

‘AT is centrally important for disability policy as it is one of the more concrete ways that the barriers to participation in society can be overcome for people with disabilities’

UN Convention on the Rights of Persons with Disabilities (UNCRPD)
Member states are obligated to 'undertake or promote research and development of, and to promote the availability and use of new technologies, including information and communications, technologies, mobility aids, devices and assistive technologies'..

For people without a disability, technology makes things easier.
For people with a disability, technology makes things possible.
In Ireland, €1.5BN is spent annually by the HSE on disability services (~70% on staff costs)
In 2014, £15BN was spent in UK on Social Care for those over 65, and those with disabilities
(www.entelis.net)
AT can reduce costs and improve QOL
AT is transferrable across many sectors and end users
AT market worth €30BN (EdTech worth €38BN)
Tackling the Grand Challenge of Assistive Technologies

Bio-psycho-social model + Technology

Achieve true multidisciplinary research
Integrate AT into every day life/real settings: improve adoption, affordability
Use psychology to bring about lifestyle modification and behavioural change via AT
Inform policy changes to de-fragment design, development and delivery of AT
Ensure sustainability and scalability, of AT for maximum societal benefit
Importance of Universal design!!
Challenges and key considerations for researchers

**Challenge: AT can be too complex**
Different Levels of cognitive ability-ability to understand the world. Attention, Auditory/Visual Perception, Problem solving skills, Memory, Concept of time/numbers

**Challenge: Lack of AT Assessment Tool for ID**
In particular moderate/severe

**Challenge: General**
Training
Lack of awareness
Funding
Ethics
Technical support/maintenance
Meet our ASSISTID Fellows

Dr Pauline Frizelle
Oxford & UCC

Dr Sean O'Neill
DCU

Dr Cathy Dalton
UU & UCD

Dr Bryan Boyle
TCD

Dr Shawn Gilroy
NUIG

Dr Ken Kerr
UU & UCD

Dr Fiachra O’Brochtaín
QUB & DCU

Dr June Chen
NUIG

Ram Prasad Krishnamoorthy
DCU

Dr Anita Yakkundi
UCD

Dr Enrique Garcia Nunez
UCC

Dr John Owuor
TCD

Dr Yurgos Politis
UCD
SmartPrompt: Increasing Independence in Adults with Autism Using Discreet Smartphone Prompting
Dr Sean O’Neill. DCU. School of Nursing & Human Science & INSIGHT Centre for Data Analytics, School of Computing

- **Young adults** (16-24) with ASD and/or ID **transitioning** from (often intensive) schooling or therapy to **less** supported environments have difficulty.

- Heavily reliant upon carers and others for assistance with daily tasks.

**There is a need to be able to use smartphones for organisation** and **scheduling** of life events that are both personalised and structured; **free from caregiver reliance** (Putnam & Chong, 2008).

Sensor Technology combined with....

Behaviour Modification

- Goal Setting
- Self-monitoring
- Self-initiation
- Feedback

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*Images of smartphones with various if/then statements:*

- Nearly home? Direct message the person who should know
- Email your new iPhone photos to yourself
- Backup your contacts to a Google Spreadsheet
ARLABA. Automated Reinforced Learning and behavioural Analysis for Autism
Dr Ram Prasad Krishnamoorthy. DCU, School of Electronic Engineering

CAL: Computer Assisted Learning

- ID/ASD children show less hesitation towards using CAL tools.
- CAL has influenced in improving both language and social skills.

Limitations

- Synthesised face and voice: Inappropriate expression and voice.
- Does not adapt itself automatically in real-time.
Biometrics: Face Recognition

- System keeps track of end user specific preferences.

Online evaluation: Lip-motion analysis

- Quantify learning: compare lip-motions between end user and tutor.

Online evaluation: Eye-gaze analysis

- Behaviour analysis: capture eye-gaze during teaching session to understand specific behaviour.
CoVE: An examination of the potential of Collaborative Virtual Environments for children on the Autism Spectrum
Dr Bryan Boyle. Knowledge and Data Engineering Group, TCD
Moderate to severe ASD (4-12yo)
Non-verbal
Learn and practice social skills (eye-gaze, turn taking, empathy, joint attention)
Participatory design
Low cost platform

Virtual learning for people with ASD/ID
Dr Yurgos Politis, Michigan State University, School of Rehabilitation

Teaching academic, social and other skills through the use of a Virtual World (VW).
Individual Education Plans tailored to each student
15-18 yo. Moderate ASD with ID
Unique: Unified Interfaces, Networks and Signal Processing for interactive toys
Dr Enrique Garcia Nunez, UCC. (Computer Science, Applied Psychology, Early Childhood Studies)
iCanRead: an inclusion programme for comprehension and reading  
Dr Anita Yakkundi, UCD SmartLab and Centre for Behaviour Analysis, QUB

MimioSprout is a web-based software designed to teaching reading and comprehension. The project aims to adapt the programme to teach students with moderate ASD or ID. Interactive touch screen, eye gaze control, content modification

The role of AT in social inclusion-an overview of the Irish landscape.
Dr John Owuor-Centre for Global Health, TCD

• What are the barriers to use of AT by individuals with ID or ASD?
• What role can AT play in increasing social inclusion?
• What is the policy around AT provision?
Thank you!
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