Education and training

The GRaCE team puts a great deal of importance on disseminating expertise about mental health risk and safety management and how it can be supported by digital software. Activities this year include:

1. Presentations to mental health practitioners and organisations about how GRaCE works and what it can do for them.
2. Half and full day training sessions for mental health practitioners. These focus on the holistic and connected process of assessing risks, making risk formulations, and creating appropriate management plans. These sessions also show how the GRaCE technology supports the process.
3. Education programmes for members of the public that show how myGRaCE can help them understand and address issues associated with mental health problems. For example, we are part of the Coventry and Warwickshire Recovery and Wellbeing Academy summer and winter programme this year.
4. GRaCE internships at Aston University.
5. Students from the Nuffield Research Placements programme and we are due to have two for 2017.
6. Support for hackathons and other competitions that are very helpful to undergraduate students learning about digital technologies and marketing them.
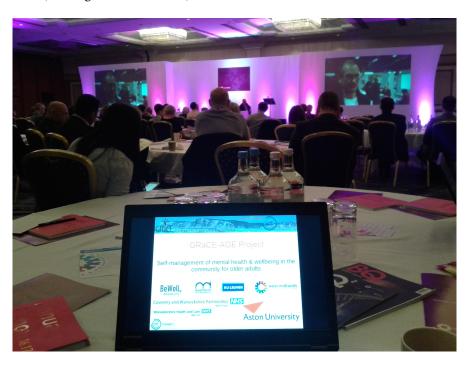
WMAHSN activities

The West Midlands Academic Health Science Network (WMAHSN) is a member of the EIT Health Knowledge and Information Communities that is funding GRaCE-AGE.

GRaCE and GRaCE-AGE exhibited at Meridian LIVE, an interactive event hosted by the WMAHSN to showcase innovators from across the healthcare sector. The event took place on Wednesday 15 February at the Edgbaston Stadium in Birmingham, home to Warwickshire County Cricket Club. Meridian LIVE included exhibition stands from a number of organisations from across the healthcare sector, including one for GRaCE.

Dr Buckingham said that "The Meridian event is a fantastic opportunity to discuss ideas and shared objectives with other innnovative healthcare organisations. We have already made some significant new contacts and I am very grateful to Meridian for its support and access to connections within the region."

See the weblink for more information and a video interview with Dr Buckingham (starting at 5.18 minutes):

The WMAHSN Annual Stakeholder Event in July celebrated its achievements over the last year at the Hilton Hotel in the Birmingham NEC. GRaCE-AGE is one of the flagship EIT Health projects and was featured in the celebration video shown to the audience. Some snappy photography captured the moment when an interview with the principal investigator of GRaCE-AGE was being shown.

The event was an excellent opportunity to meet other innovative researchers and one of our new partners for 2018, Christopher Golby from Evolyst, was presenting his work. We are very pleased to have his company on board.

Publications

IDENTIFYING ACTIVITIES OF DAILY LIVING There is rising interest in monitoring and improving human well-being at home using different types of sensors including microphones. In the context of Ambient Assisted Living (AAL) sensors can track activities in the home of older adults to help ensure they are keeping safe and well. Recently, acoustic detection and classification of scenes and events has gained interest in the scientific community and led to numerous public databases for a wide range of applications. In this paper we introduce a database recorded in one living home, over a period of one week using an acoustic sensor network. We present the recording and annotation procedure, the database content and a discussion on a baseline detection benchmark. The database is publicly released to provide a common ground for future research.

Gert Dekkers, Steven Lauwereins, Bart Thoen, Mulu Weldegebreal Adhana, Henk Brouckxon, Bertold Van den Bergh, Toon van Waterschoot, Bart Vanrumste, Marian Verhelst, Peter Karsmakers. (2017). The SINS database for detection of daily activities in a home environment using an acoustic sensor network. *Detection and Classification of Acoustic Scenes and Events*, 16 November 2017, Munich, Germany.

DETECTING FALLS More than thirty percent of people over 65 years fall at least once a year and are often not able to get up again. Camera-based fall detection systems can help by triggering an alarm when falls occur. However, they often have high false-alarm rates and this paper shows three ways of lowering them. In one case, these reduced the number of false alarms by a factor of 7 while in another one the ability to detect true falls increased higher than the false-alarm rate.

Glen Debard, Marc Mertens, Toon Goedemé, Tinne Tuytelaars, and Bart Vanrumste. (2017). Three Ways to Improve the Performance of Real-Life Camera-Based Fall Detection Systems. *Journal of Sensors*, Volume 2017, 15 pages, https://doi.org/10.1155/2017/8241910

FUZZY KNOWLEDGE AND REASONING The GRaCE-AGE team have been working on ways of making decisions easy to understand and explain. This paper presents research on a new hierarchical fuzzy rule-based model. It uses a simplified and effective method for supporting the elicitation of the fuzzy rules and adapting uncertainty propagation that can be intuitively understood by human experts. Nasser Amaitik has tested the model on predicting leaks in water pipes and Christopher Buckingham is determining the model's generality and usefulness for evaluating mental health risks.

N. M. Amaitik and C. D. Buckingham (2017). Developing a hierarchical fuzzy rule-based model with weighted linguistic rules: A case study of water pipes condition prediction. *2017 Computing Conference*, pp. 3040. doi: 10.1109/SAI.2017.8252078.

Outputs for 2017

1. *GRaCE-AGE web-based software system* that includes the social network "canopy of care" functionality linking clininicans, carers, and older adults. It will have automated input from wearable and environmental sensors and be available on mobile platforms.
2. *Sensors:* new contactless sensors that increase user friendliness and the range of data collected.
3. *Education and training:* Another ATHENS (Advanced Technology Higher Education Network/SOCRATES) session; continuing professional development of mental-health practitioners; and engagement with students from schools and universities.
4. *Population language pack specification* that provides a generic solution for any language and an initial instantiation for the Dutch language.
5. *Peer-reviewed research and/or conference papers* with a target of two.
6. *News* will be released as individual stories throughout the year directly on the GRaCE-AGE website, as now. Twice a year, a more formal publications will be produced that can be printed and distributed.
7. *Commercial licencing agreement and protocol* for GRaCE-AGE will be firmed up as part of the evolving business strategy.

Contact Information:
Dr Christopher Buckingham
c.d.buckingham@aston.ac.uk
http://www.egrist.org/grace-age