

Improving the Quality of Life for the Ageing Population using a
Technology Enabled Garment System:

Smarter Outdoor Clothing for Active Ageing



The Design for Ageing Well research project is encouraging collaboration with industry partners, including fabric producers, garment manufacturers and technology providers to ensure the effective translation of the findings of academic research, to inform the eventual launch of commercial products for the rapidly growing active ageing market.

Little has been done to help designers understand the needs of the ageing, with particular focus on clothing and wearable technologies. To bring new products to an emerging market, many stakeholders in the product development chain, and in product launch, will benefit from the knowledge transfer of current research findings. In particular, co-design is a new approach in the fashion and electronics communities.

This co-design approach brings together researchers, industry partners and active ageing participants in the development of a clothing layering system comprising base, mid and outer layer garments that incorporates smart textiles and wearable technologies. Initial prototypes are being designed to address the user-needs identified and to demonstrate how the attributes of modern textiles

and novel garment manufacture may enhance the independence, safety, wellbeing and sense of adventure in the everyday lives of older wearers - with a focus on walking.

Industry collaboration to date has confirmed that initial research outcomes are of interest within 'the trade' from fibre producers to materials suppliers and garment brands as well as wearable electronics innovators. Adjustments have already been made to design features in commercial ranges as a result of user feedback. Further industry collaboration will be required to enable the initial demonstrator garments, with wearable technologies, to be interpreted into commercial products.

The outcomes of this research will be disseminated at conferences, and in workshops for the benefit of those involved in clothing, textiles, sports, electronics, business and marketing disciplines. The iterations in design and product development, and related technical processes, will be explained in an appropriate format to be easily understood by designers, manufacturers, retailers and other stakeholders in the product development chain.

Fit for the Future

Getting the right fit for a garment that you will be using frequently is of course very important, but what happens if the range of garments commercially available don't offer the active ageing what they need?

The silhouette and fit workshop was designed to try to give the project participants a chance to explain what their preferences were and to compare those preferences with samples of commercially available garments.

This was the first of two final co-design workshops seeking confirmation of selected design elements. This one concentrated on establishing the silhouette and fit for the 3 layers for men and women. These selected shapes will form the basis on which the remaining design details will be developed (pockets, fastenings etc).

The participants took part in a show and tell session, explaining what elements of their favoured garments they liked and what worked. Focusing on how design details can have an impact on the fit and silhouette helped the team to get a better understanding of the nuances of the participants needs and what may or may not be appropriate.

The participants then undertook a co-design exercise, using pre-determined templates to begin to draw up their ideal selection of base, mid and outer layer silhouettes based on the previous discussion and show and tell session.

The participants' design decision process was based on their existing preferences but using new knowledge of fabrics and design features accumulated throughout previous project workshops.

“The raglan sleeve looks more sporty, but I prefer a seam to show where my shoulder line is.”



Co-Design with the Active Ageing: Investigating, Evolving, Resolving

Advisory Group

The project advisory group consists of a group of keen active ageing walkers who have been recruited to oversee the project team. The advisory group members are distinct from the workshop participants as they do not play an active role in the co-design workshop process but act in an overall advisory capacity to ensure correct conduct throughout the project dealings with participants. The advisory group also provides one element of verification of findings which are extrapolated from the workshop process.



Photos: Laura Seppälä

Colour Workshops...

In the colour workshop, participants described their own general colour preferences drawn from either colour palettes of colours that worked together or those that reflected their fashion choices of their youth; the importance of colour in the maintenance of safety and, after lengthy discussion with the team of presenters, not only their choices of colour for each of the base, mid and outer layer garments but also specific textures and material finishes appropriate to each layer. Video, audio and paper based recordings of these decisions will aid the final co-design process in selecting colour and textures for materials for the final garment prototypes



Technical Development

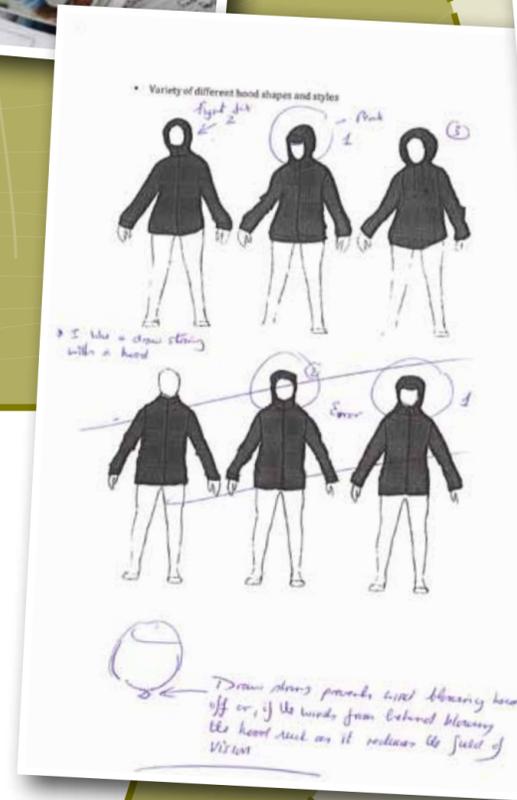
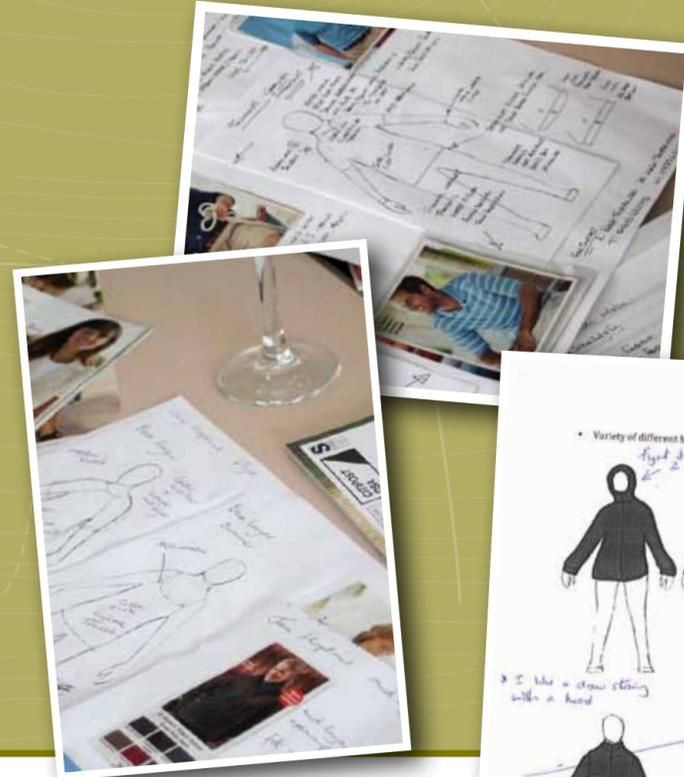
Technical development has included creation and testing of experimental sensor placement rigs combined with bespoke analysis software tools to measure differences in sensor output quality determined by placement and body shape and size. The work has also included first round of prototype interface development using an off the shelf smartphone as the processing and display hub for the system.



Interface design: William Burns

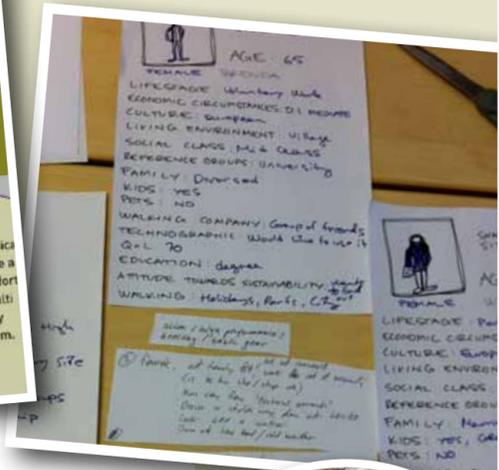
Garment Silhouette and fit Development

A silhouette and fit workshop focused on examining the participants own garments, establishing what they felt was most appropriate for their own personal comfort and comparing their preferences with samples of commercially available garments. The participants engaged in a practical co-design session, using pre-prepared templates to design the silhouette and fit profiles for their ideal base, mid and outerlayer garments. The participants design decision process was based on their existing preferences but using new knowledge of fabrics and design features accumulated throughout the project workshops.



Personas as Part of the Design Process

Personas have been developed by the research team as part of the process of matching user needs to potential garment design solutions. The use of personas helps to bring more focus to the design process from within the complexities of matching the user needs with the range of styling and functional options available to the garment designers.



Illustrations: Laura Seppälä

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» WEARABLE FUTURES: INCLUSIVE DESIGN » NOVEMBER 2011 CONFERENCE

The one day conference, with an evening reception the night before, will take place in the Wellcome Trust building in Euston.

» **Arrival and evening reception** » **Wednesday 2nd November**

» **Conference** » **Thursday 3rd November**

This event will bring together academic, industry and user group communities engaged in the hybrid area of Smart Clothes and Wearable Technology, building on the success of the Wearable Futures Conference, held at the university in 2005.

In particular this conference will promote a design-led approach to addressing a significant gap that has been identified in the area of design of contemporary clothing and textiles that may enhance the autonomy, independence, and sense of enjoyment and wellbeing of the Active Ageing.

Findings from current research in 'Design for Ageing Well' will stimulate discussion with regard to new strategies for new routes to a rapidly growing market, with end users at the centre of all discussions.

The conference welcomes industry involvement at keynote and delegate level, providing excellent opportunity for development of future collaborative research and knowledge transfer opportunities.

Publications from the project to date:

Bougourd J & McCann J, 'Factors affecting the design of cold weather performance clothing', in *Textiles for Cold Weather Apparel*, Chapter 8, Woodhead Publications Ltd, 2009 ISBN: 9781845694111

McCann J, Conference Presentation, 'Design for Ageing Well: Improving the quality of life of the active ageing using a technology enabled garment system', Smart Fabrics Conference Presentation, Miami, Florida, April 14th – April 16th, 2010

Cleland, C. Nugent, D. Finlay. Design for aging well: Intelligent technologies for smart garments, Shimmer Research Sponsored Event Titled: Wireless Sensing Research and Connected Health Activities in Ireland, 11th May 2010

Ian Cleland, C. Nugent, D. Finlay, R. Armitage, J. McCann. Intelligent Technologies for Smart Garments, International Conference on Personalised Health pHealth 2010, Berlin May 2010

Altemeyer B, McCann J, Nugent C, Stevens K, Taylor D. Effective Communication Between Researchers and Older Users in Developing Design-led Fit For Purpose Products. International Society for Gerontechnology's 7th World Conference, Vancouver, Canada, 27-30 May, 2010, Vancouver

Benton, S., Manning, B., and Altemeyer, B. Behavioural Prototyping for increased life satisfaction. International Society for Gerontechnology's 7th World Conference, Vancouver, Canada, 27-30 May, 2010, Vancouver

Bocherding P, McCann J. Introducing Design Students to the Experience of User Engagement to Identify Design Innovation for the Active Ageing. International Society for Gerontechnology's 7th World Conference, Vancouver, Canada, 27-30, 2010, Vancouver.

McCann, J (presentation: Altemeyer, B.). Design for ageing well: Improving the quality of life for the ageing population using a technology-enabled garment system. International Society for Gerontechnology's 7th World Conference, Vancouver, Canada.: May 27-30, 2010, Vancouver

McCann J, Conference Presentation, 'How may innovative sports textiles improve the quality of life for the active ageing?', Centexbel International Congress: Innovations in Sports Textiles, Ghent, June 24th – 25th, 2010

Ian Cleland, C. Nugent, D. Finlay. Assessment of accelerometer technology for integration within smart clothing, The Microscopical Society of Ireland and Northern Ireland Biomedical Engineering Society Joint Annual Symposium, 25th - 27th August 2010

Benton, S., Manning, B., and Altemeyer, B. Effektive Kommunikation zwischen interdisziplinären Forschern und älteren Nutzern in der Entwicklung designorientierter und zweckmäßiger Produkte. DGGG Kongress in Berlin, Germany, 15. - 17. September 2010. Virchow Klinikum der Charité Berlin

Jennifer Bougourd, Jane McCann, Katy Stevens. Communicating the Benefits of Smart Textiles for Functional Clothing through User-Centred Design. Textile Institute Centenary Conference, 3-4 November, 2010

Benton, S., Manning, B., and Altemeyer, B. Behavioural prototyping: making interactive and intelligent systems meaningful for the user. INCoS Conference, 24-26th of November 2010, Thessaloniki, Greece

Taylor D. Communication of a Cross Disciplinary Shared Language through Design: Developing Smart Clothes and Wearable Technology with the Active Ageing. University of Wales, Newport PhD Conference, December 2010

Benton, S., Manning, B., and Altemeyer, B. Behavioural Prototyping for increased life satisfaction. University of Westminster research forum. LSE Postgraduate Conference

Ian Cleland, C. Nugent, D. Finlay, R Armitage. Optimal placement of accelerometers within the constraints of a smart garment system, The 10th IEEE International Conference on Information Technology and Applications in Biomedicine 2010

Paul McCullagh, M. Beattie. C. Nugent. Pervasive Technology to Facilitate Wellness. The 3rd International Conference on Pervasive Technologies Related to Assistive Environments, Samos, Greece 2010

McCann J, Design Fit for Purpose: Sustainable Functional Clothing Development 5th International Conference on Design Principles and Practices, Rome, 2-4 Feb, 2011.

Taylor D. Developing a Visual Language to Enhance Knowledge Transfer in the Design of Smart Clothes and Wearable Technology for the Active Ageing. Design Principles and Practices, Rome. February 2010

Smart Textiles for Protection for the Elderly, Smart Textiles for Protection, Woodhead Publishing Ltd.

Benton, S., Manning, B., and Altemeyer, B. Sustainable Social Innovation by Design: Breaking down the Boundaries. Include 2011 The Role of Inclusive Design in Making Social Innovation Happen. 18-20 April 2011

Bougourd J, McCann J, Stevens K. Design for Ageing Well: Product that is Fit for Purpose Driven by User Engagement. Include 2011 The Role of Inclusive Design in Making Social Innovation Happen. 18-20 April 2011

Taylor D. Bridging the methodological gaps through cross-disciplinary dialogue in the design of smart clothes and wearable technology for the active ageing. Include 2011 The Role of Inclusive Design in Making Social Innovation Happen. 18-20 April 2011

Wang L. The Importance of Research Requirements of Older Users for Clothing Design Education in China. Include 2011 The Role of Inclusive Design in Making Social Innovation Happen. 18-20 April 2011