RAE 2020

Interactive Material Design for Ageing

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Interactive Material Design for Ageing

Descriptor (300 words)

This research investigates interactive material design for ageing within the context of environment and fashion. Technology was investigated from a design-led perspective with a co-design approach to link design, technology, and users. It is based on collaborations with the HKSKH Welfare Council and Parson's Openstyle Lab, and is involved with working with older participants in Hong Kong and New York.

Interactive Materials for Multi-Sensory Environments (MSEs)
In contrast to generic and obtrusive lighting products that are often used in current MSEs, this research is distinct in its use of Polymeric Optical Fibre (POF) textiles with sensors that offer interactive illumination with tactile familiarity and dual stimulation of sight and touch.

Interactive Materials for Universal Design
Existing universal clothing options are often limited to conventional or passive materials. This research investigates how the integration of interactive materials can contribute to the users' functional needs and well-being.

New developments were made in the area of textile design with technology integration and applications . Tan was awarded a HKD$1.25 million CreateSmart Initiative grant to further investigate these inquiries (2019). Related work included the following: a journal publication; a London Design Week exhibition (2018); an invited showcase and public talk at the HK Gerontech Expo (2018); a peer reviewed exhibition at Sheila C. Johnson Design Center, NY(2019) with exhibition book; invited public talks at TEDx, ArcinTex, Hongik University (S.Korea) with a showcase and public talk; a finalist award at the 7th APAC Eldercare Innovation Awards (Singapore); a television feature on PBS Newshour Weekend TV, USA (2018); and, a successful competitive bidding of 2 PhD students for project sustainability.

This research developed novel interactive textile design and design frameworks applicable for MSEs and fashion addressing the needs of the aging. The research process involved extensive testing, prototyping, consultation with NGOs, users, rehabilitation specialists, and engineers.

Contents

Jeanne Tan

Jeanne is a textiles and fashion designer. Her practice informs her research and vice versa. Her work investigates the interface of design and technology, integrating traditional craft and engineering as the syntax of the creation's narrative. Jeanne's research focuses on interactive textile design, hybrid design approaches and smart wearables.

Research Questions

This practice based research sets out to investigate:

- How different weave structures with conductive yarn can contribute to the seamless integration of technology for interactive textiles without compromising on tactility.
- How interactive textiles can engage with users via environments and wearables for rehabilitation and well-being.
- How collective creativity contribute to customized solutions and well being of the users.

What constitutes the research output/ body of work

This body of research comprises of the following outputs:
Interactive Textiles for Multi-Sensory Environments (MSEs)

- 2 interactive cushions entitled CAPI and SENSI
- 1 interactive wall panel entitled JOY. PEACE.GRACE.LIFE.
- 1 journal publication. Jeanne Tan, Ziqian Bai, Lan Ge, Li Shao & Amy Chen (2019) Design and fabrication of touch-sensitive polymeric optical fibre (POF) fabric, The Journal of The Textile Institute, DOI: 10.1080/00405000.2019.1606379
- Tan. J, Kim,H. & Toomey, A. (2018) Sensory Tactility: Designing interactive textiles for well-being. ICERI2018 Proceedings, pp. 7064-706, ISBN: 978-84-09-05948-5 DOI: 10.21125/iceri.2018.2696

Interactive Textiles for Universal Fashion

- 1 peer reviewed exhibition entitled “Universal Materiality” at Sheila C. Johnson Design Center, New York, USA, with exhibition book. http://hdl.handle.net/10397/78800
- 1 interactive textile wearable which serves as an exercise reminder.

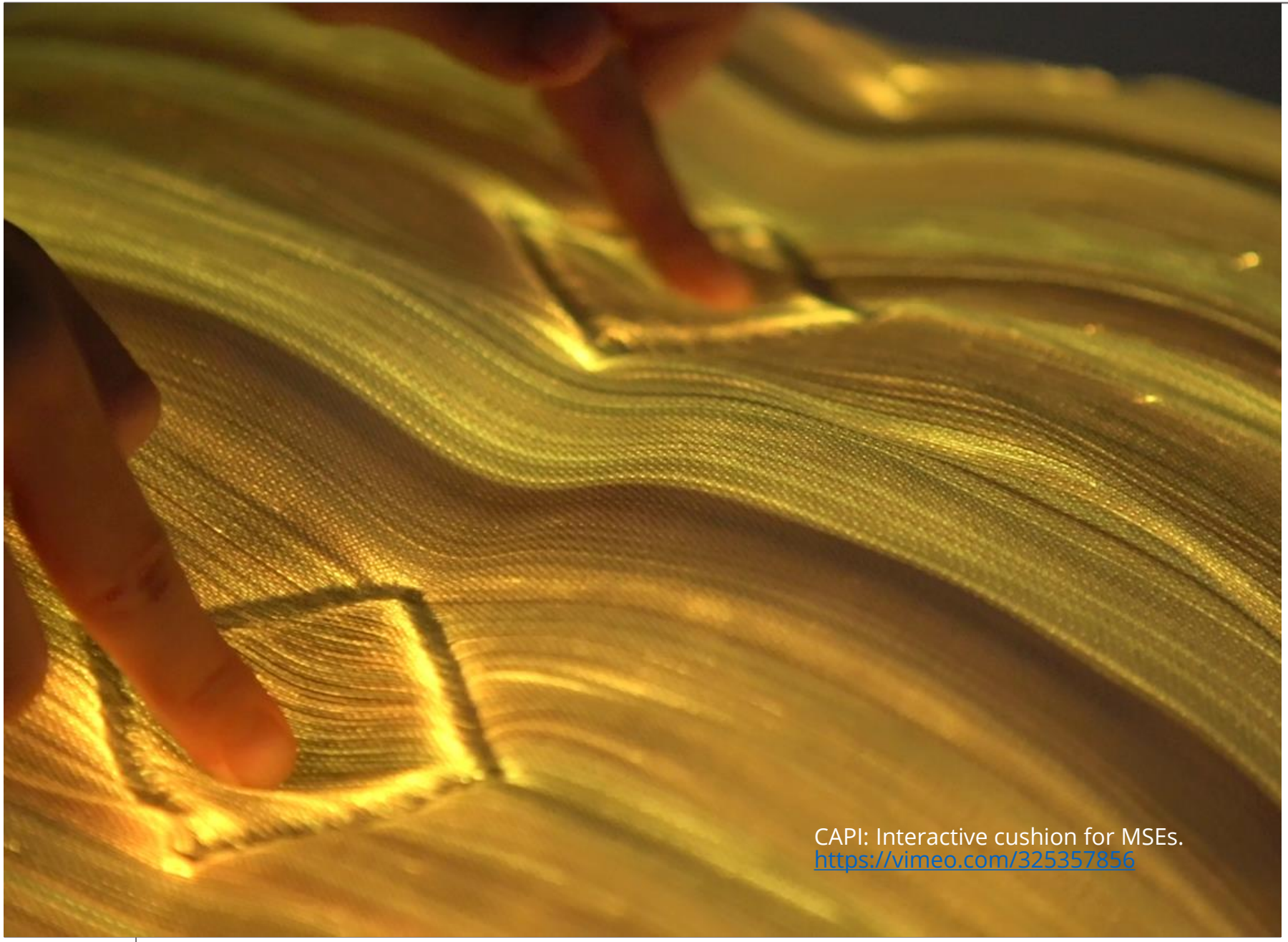
Tan’s contribution to the research are:

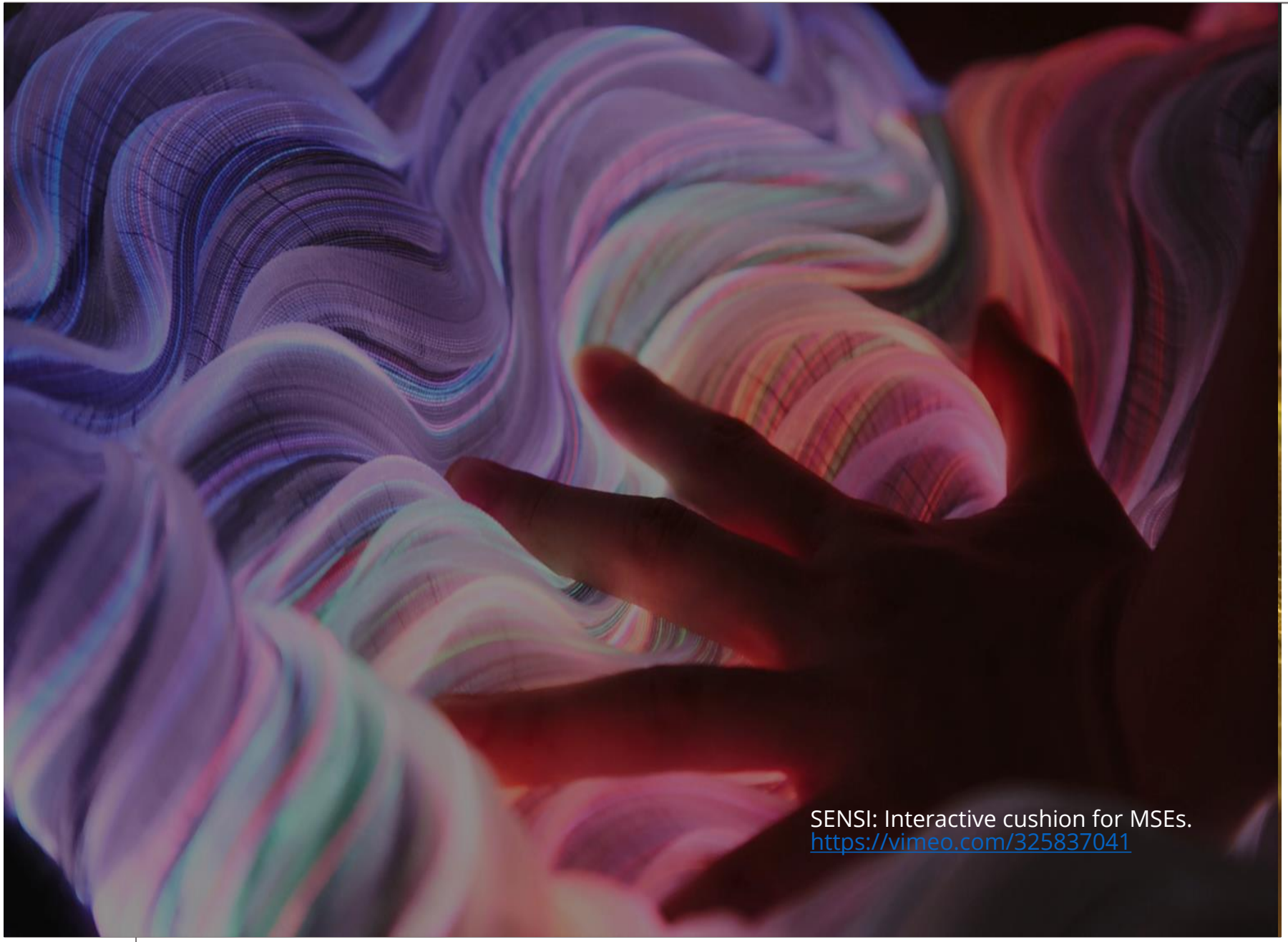
- The production of original interactive textile props for environment and interactive wearables for adaptive fashion.
- Expand possibilities for the utilization of interactive textiles for the rehabilitation and well being for aging and wellbeing.
- Design and fabrication of touch sensitive polymeric optical fibre textiles.

Interactive Material Design for Multi-Sensory Environments (MSE).

Sensory stimulation via multisensory environments (MSEs) has proved to be a positive intervention for dementia care (Bonora et al, 2011). Generic lighting props are currently used as props for typical MSEs, however, are they often physically foreign and obtrusive. Polymeric Optical Fibre (POF) textiles are integrated with sensors and other components to offer visual and touch interaction with tactile familiarity.

Based on a collaborative project with a local community service centre for older people (HKSKH Lok Man Alice Kwok Integrated Service Centre) this research investigates the development of interactive POF textile panels for MSEs via an interdisciplinary co-design process. The research explores how balancing collective creativity and technological expertise leads to enhanced designs of novel textile based MSE props specific to the needs of dementia users.


CAPI: Interactive cushion for MSEs.
https://vimeo.com/325357856



SENSI: Interactive cushion for MSEs.
https://vimeo.com/325837041

Users interacting with
JOY.PEACE.GRACE.LIFE.
https://vimeo.com/325614553

User Response to Joy. Peace. Grace. Life Interactive Wall Panel.

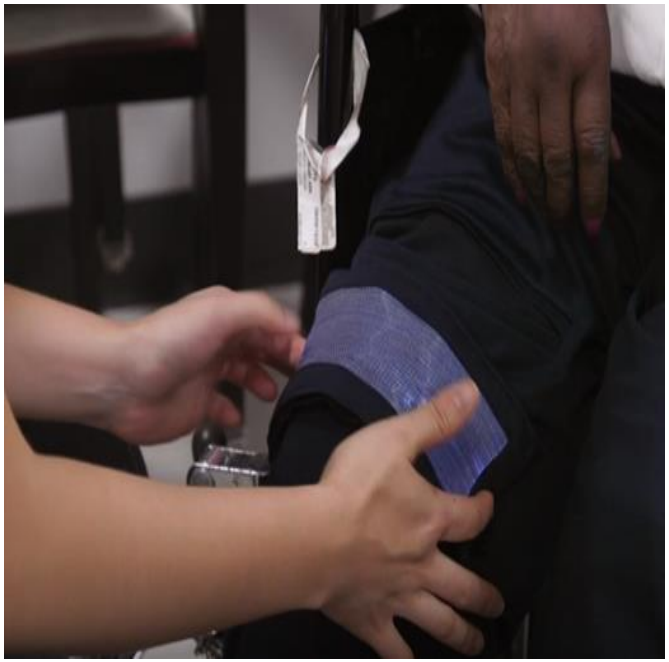
Video: https://vimeo.com/339303347

Interactive Textiles for Universal Design

This research investigates interdisciplinary co-design process for interactive wearables and universal fashion. It examines how textiles and technology can address the rehabilitative and wellbeing needs of users, namely people with disabilities and older people.

This collaborative study with OpenStyle Lab, Parsons School of Design, involved multidisciplinary practitioners (designers, engineers and occupational therapists) with participants from the Riverside Premier Rehabilitation and Healing Centre, New York. USA.

Co-design process with older participants from the Riverside Premier Rehabilitation and Healing Centre, New York. USA.



Interactive textile wearable strip that serves as an exercise reminder. This is vital for rehabilitation as wheelchair bound users often forget to move for log periods of time. Any exercise performed by the elderly increases their ability to regulate body temperature, circulation and positively affects their metabolism.

Research Field and Key Works Referenced

This research utillises interdisciplinary practice and co-design approach to explore interactive textile design for multi-sensory environments (MSE) and universal design.

While the current market offer options in MSE props aging users, they are often generic and do not necessary offer solutions appropriate to the needs of the users. There are much evidence supporting the benefits of multi-sensory therapy (Hope & Waterman, 2004)), however, studies had found little research on the design approach and processes of MSEs, especially within the context of interactive textiles for sensory therapy. The primary reason for this was that most of the rehabilitation facilities rely on specialist suppliers to set up the rooms, with little staff involvement, resulting in inappropriate MSEs designs (Jakob & Collier, 2014;2017).

Within the context of universal design for wearables and clothing, it is found that there is a disconnected relationship between designers, carers and users is also found within the context of adaptive clothing. There are little consideration whether the designs reflect the identity, physical and stylistic needs of the users. Unmet clothing needs prevent people with disabilities from actively participating in important life experiences and negatively affect their overall well-being (Kabel, Dimka and McBee-Black, 2017).The research emphasis was to explore relevant technology for aging users rather than utilize the product design to showcase the most advance technology which may not be appropriate to the user.

This research served to show insights into the interactive material design process for MSE and universal design. It investigates co-design methods (Sanders & Stapers, 2008), integration of sensors and sensory functions for multi-sensory stimulation, integration of technology for wearables to enhance rehabilitation and well-being. The research was conducted via systematic design practice comprising of extensive tests, experiments and developments.

References for Interactive Material Design for Multi-Sensory Environments.

1) World Health Organization (2017) A report about dementia.. Retrieved from http://www.who.int/news-room/fact-sheets/detail/dementia.

2) Bonora, A., Menabue, G., Monzami,M., Panaroni,S., Turci, M., Chatat,R. & Fabbo, A. (2011) Analysis of the effectiveness of the intervention of multisensory stimulation (Snoelezen room): Experience of Alzheimer's disease special care unit. Alzheimer's & Dementia, vol. 7, no. 4, pp (4) pp. S648.

3) Jakob, A. & Collier, L. (2014) How to make a sensory room for people living with dementia: A guide book. DOI: 10.13140/2.1.1864.5283.

4) Hope, K.W. & Waterman,H.A. (2004). Using multi-sensory environments (MSEs) with people with dementia. Dementia, vol. 3, no. 1, pp. 45-68.

5) Jakob, A. & Collier, L. (2017). Sensory enrichment for people living with dementia: Increasing the benefits of multisensory environments in dementia care through design. Design for Health, vol. 1, no. 1, pp. 115-133.

6) Sanders, E.B.N. & Stappers,P.J. (2008) Co-creation and the new landscapes of design. CoDesign, vol. 4, no. 1, pp. 5-18.

7) Kenning, G & Treadaway, C. (2017) Conversations at the edge of play: Media, communication and cultural intersections with dementia. Continuum Journal of Media & Cultural Studies, vol. 31, no. 6, pp. 868-880.

References for Interactive Material Design for Multi-Sensory Environments (MSE).

1) Brogin, B., Weiss, D.C., Marchi, S., Okimoto, M.L.R. and de Oliveria, S.T. (2016) Clothing Custom Design: Qualitative and Anthropometric Data Collection of a Person with Multiple Sclerosis. In: Rebelo F., Soares M. (eds) Advances in Ergonomics in Design. Advances in Intelligent Systems and Computing, vol 485. Springer, Cham.

2) Chang, H.J., Hodges, N. and Yurchisin, J. (2014) Consumers With with Disabilities: A Qualitative Exploration of Clothing Selection and Use Among Female College Students. Clothing and Textiles Research Journal 32(1)34-48.

3) Gwozdz, W., Nielsen, K. S., Gupta, S., & Gentry, J. (2017). The Relationship between Fashion and Style Orientation and Well-being. Stockholm: Mistra Future Fashion. Mistra Future Fashion Report, No. 2017:5

4) Kabel, A., Dimka, J. and Mcbee-Black,K. (2016) Clothing-related barriers Barriers experienced Experienced by people People with mobility Mobility disabilities Disabilities and impairmentsImpairments. Applied Ergonomics 59 (2017)165-169.

5) Sanders, E.B.N. and Stappers, P.J. (2008) Co-creation and the new New landscapes Landscapes of Ddesign, Co-Design, 4:1, 5-18.

6) Tan, J. (2015) Photonic Fabrics for Fashion and Interiors. In Tao, X.M. (Ed.) Handbook of Smart Textiles. (1005-1033) New York: Springer.

7) Jun, G. and Liao, J. (2018) Style for All: Designing Fashion Tech for Disability. Construct3D 2018, Atlanta, GA, 5-8 October.

8) Barthes, R., Stafford, A., & Carter, M. (2006). The Language of Ffashion. Oxford [England]: Berg.

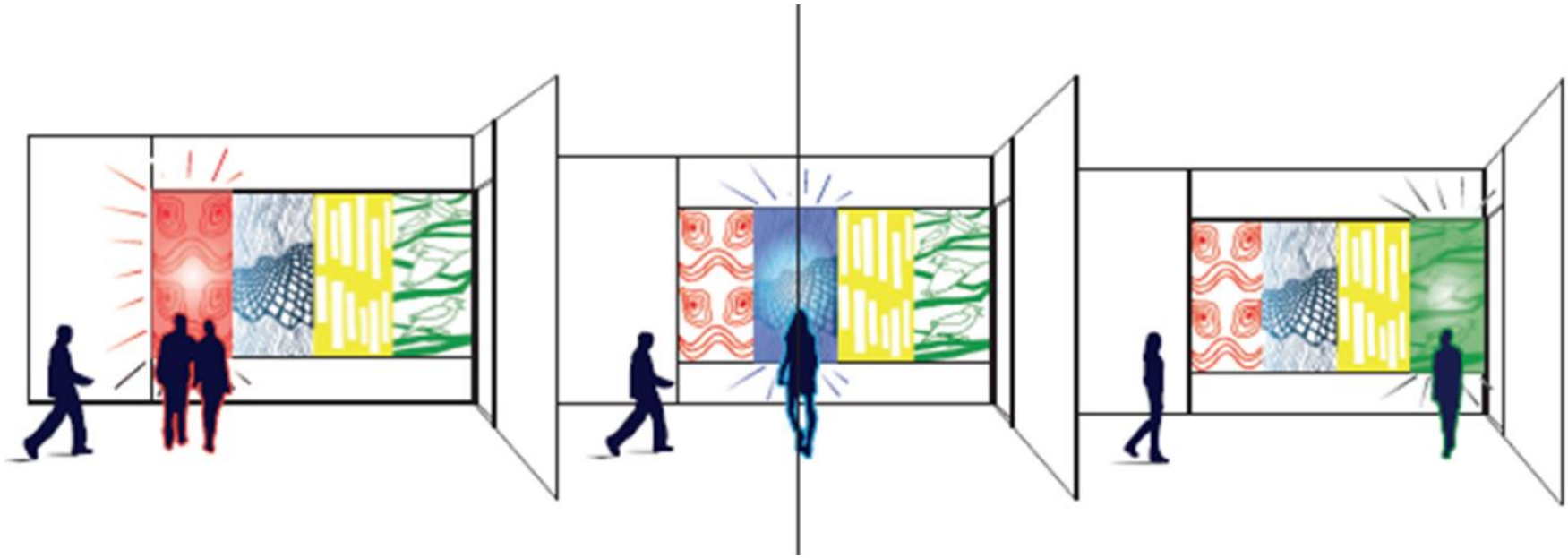
Research Methods and Materials

This collaborative research is practice based. The research process involved extensive testing, prototyping and co-designing with NGOs, users, rehabilitation specialists, and engineers.

The project involved stakeholders from Hong Kong Sheng Kung Hui Lok Man Alice Kwok Integrated Service Centre and Riverside Premier Rehabilitation and Healing Centre, New York. USA.

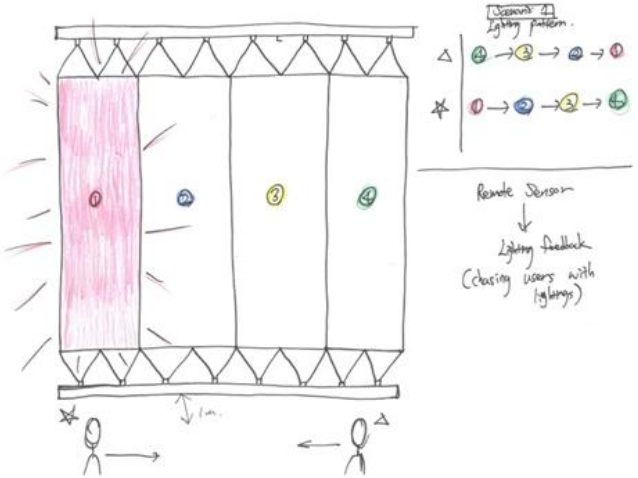
Design and development process of interactive textile MSE props.
https://vimeo.com/325600858

Research Methods and Materials



The creative themes were joy, peace, grace and life. Joy was represented by an abstract motif of a traditional Chinese lion dance. Peace was represented by waves in the sea. Grace was represented by wind chimes and life was represented by a bird motif. The chosen themes and designs were relevant to the stakeholders' cultural backgrounds and life experiences. Some of the users have challenges in hearing, sight and mobility, thus the panels had been designed with interactive functions that are initiated by user proximity and touch. The Joy and Life panels will emit lion dance music bird chirping sounds when touch. The surface embroidery with feathers, yarns and sequins also provide tactile stimulation.

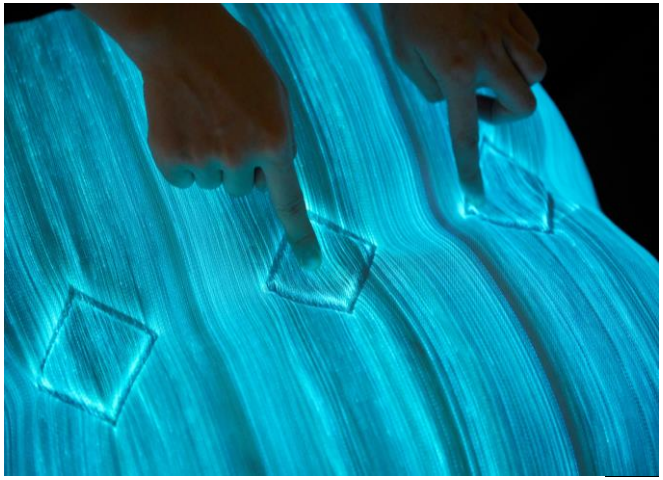
Research Methods and Materials

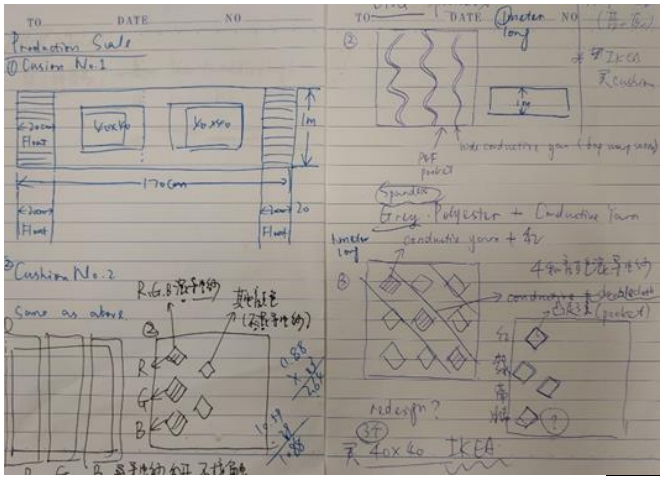


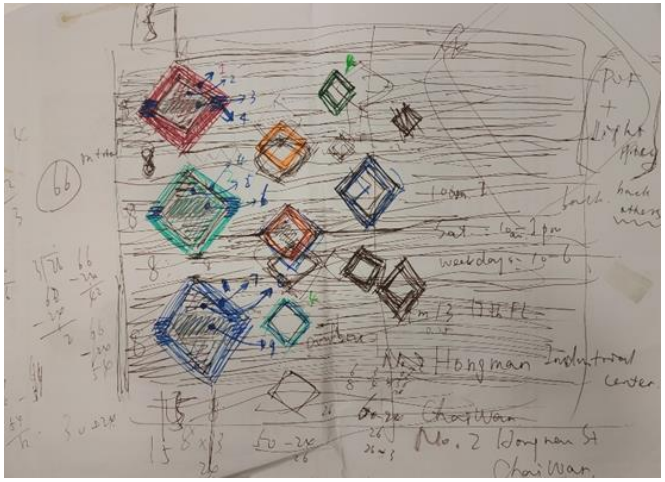
Co-design process with stakeholders at Hong Kong Sheng Kung Hui Lok Man Alice Kwok Integrated Service Centre .

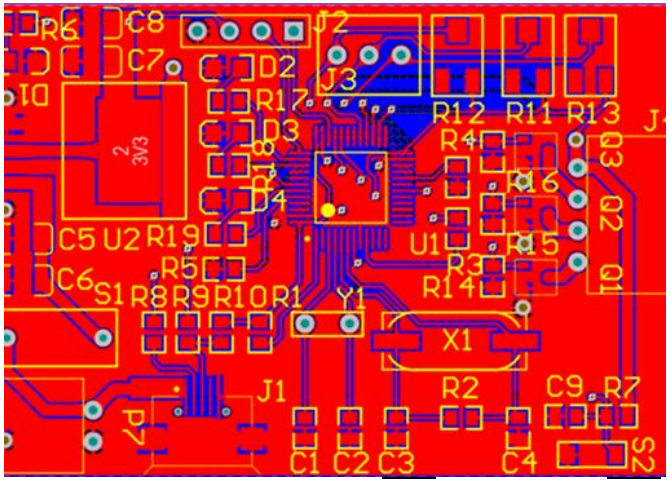
Design and material development for Joy. Peace. Grace Life.

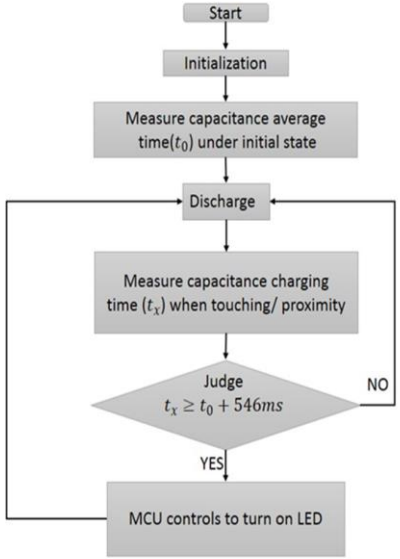
Research Methods and Materials



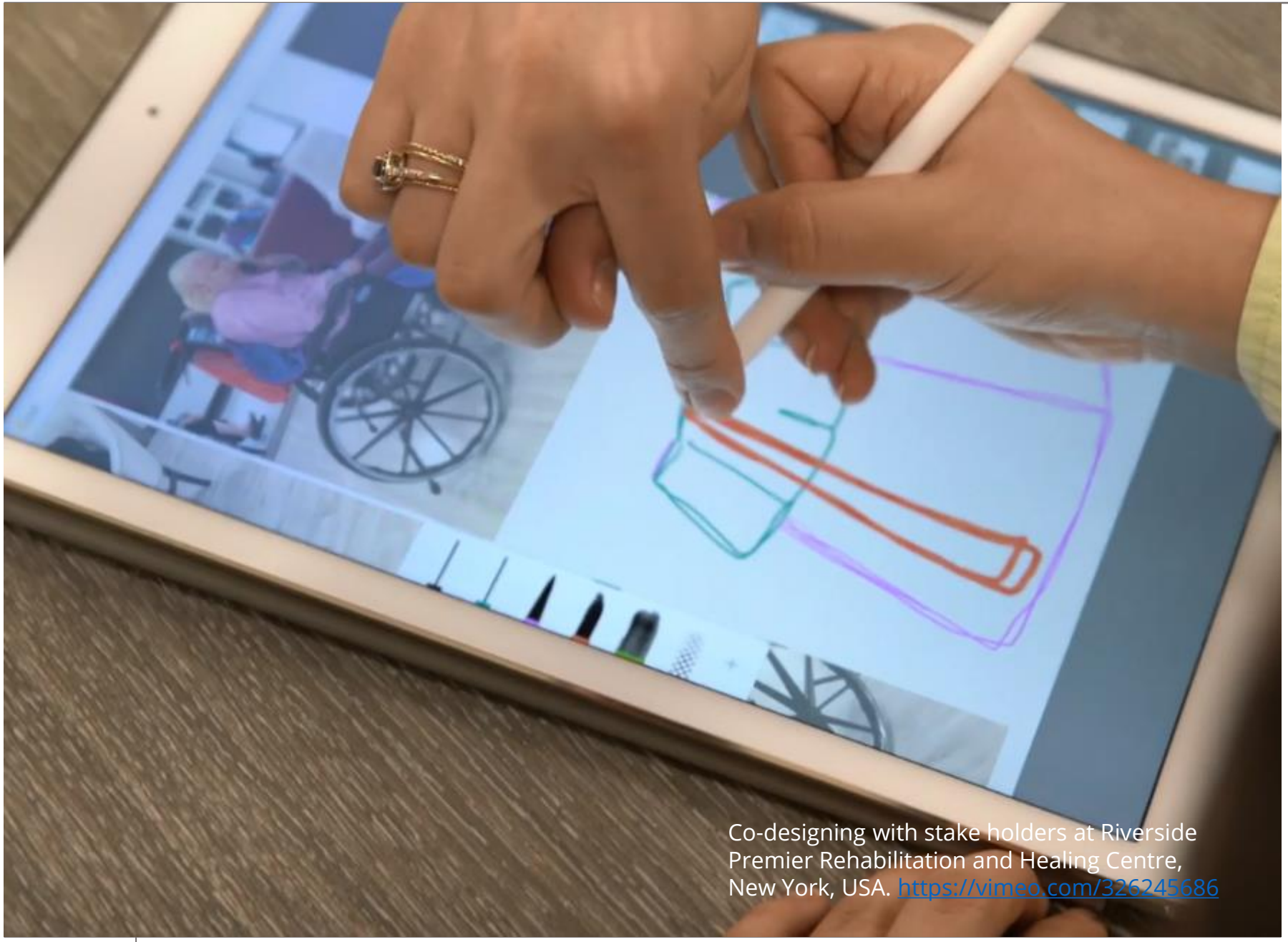






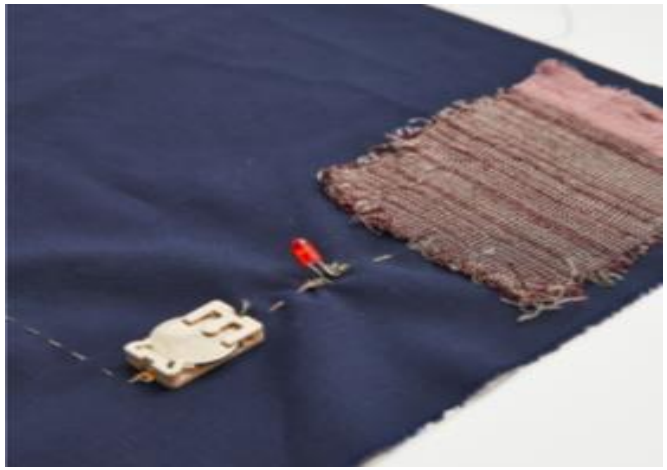


Textile and component design development for CAPI and SENSI.



Co-designing with stake holders at Riverside Premier Rehabilitation and Healing Centre, New York, USA. https://vimeo.com/326245686

Research Methods and Materials



Textile and component design development for wearables in New York.

Research Conclusion

- Material design considering weave structure, components and materials had led to interactive textiles that provide familiar tactile quality and encourage user engagement with application in MSEs and wearables.
- The co-design process actively engages users, creating an effective bridge between designers, users and stakeholders and enables specific development of design solutions pertinent to their needs.
- It is vital to consider ease of use and appropriate integration within the context of the user needs and environment rather than the most advanced technology when designing interactive products and adaptive apparel.

Dissemination

(1 Journal Publication, 3 Invited Exhibitions, 4 Invited Public Talks, 1 Peer Reviewed Exhibition with Exhibition Book, 1 Conference Proceeding)

Year	Journal Publication
2019	Jeanne Tan, Ziqian Bai, Lan Ge, Li Shao & Amy Chen (2019) Design and fabrication of touch-sensitive polymeric optical fibre (POF) fabric, The Journal of The Textile Institute, DOI: 10.1080/00405000.2019.1606379

Dissemination

Year	Invited Exhibitions
2018	Tan, J., (2018) CAPI and SENSI. Exhibited at “Design <> Research” exhibition as part of the London Design Festival. London: Battersea Power Station’s Village Hall. 21-23 September 2018.
2018	Tan, J., Kim, H. (2018) Peace. Grace. Life. with CAPI and SENSI. Exhibited at Gerontech and Innovation Expo cum Summit organized by the Government of the Hong Kong Special Administrative Region, the Hong Kong Council of Social Service and the Hong Kong Science and Technology Parks Corporation. Hong Kong Convention & Exhibition Centre.22-25 November 2018.


Gerontech and Innovation Expo cum Summit

Dissemination

Year	Invited Public Talks
2019	Tan,J. (2019) Universal Interactivity: Material Design for Aging. ArcInTex International Network Meeting Symposium hosted by the Industrial Design Department of Xi'an Jiaotong-Liverpool University in Suzhou, Suzhou, China.16-17 April 2019. https://2019.arcintex.com/
2019	Tan,J. (2019) Designing for all. Tedx Youth@VictoriaHarbour. Cyberport3,Hong Kong 16 February 2019.
2018	Tan, J. & Law, K.Y. (2018) Joy.Grace. Peace. Life. Co-designing Multi-sensory Wall Panel. Gerontech and Innovation Expo cum Summit organized by the Government of the Hong Kong Special AdministrativeRegion, the Hong Kong Council of Social Service and the Hong Kong Science and Technology Parks Corporation. Hong Kong: Hong Kong Convention & Exhibition Centre.22 November 2018.
2018	Tan, J. (2018) Techstyle and Well-being. Hongik University, Seoul, South Korea.19 October 2018.


TEDx


Gerontech and Innovation Expo cum Summit

Dissemination

Year	Peer Reviewed International Exhibition and Exhibition Book
2019	Tan, J., & Jun, G. (2019) Universal Materiality. Exhibited at Arnold and Sheila Aronson Galleries, Sheila C. Johnson Design Center.2-24 February 2019. Peer reviewed by Prof Zhang Ying Chun. Chair Professor of Fashion Design, Tsing Hua University, China.
2018	Tan, J., & Jun, G. (2018) Universal Materiality.ISBN:978-962-367-830-8 http://hdl.handle.net/10397/78800

Dissemination

Year	Conference
2019	Tan. J, Kim,H. & Toomey, A. (2018) Sensory Tactility: Designing interactive textiles for well-being. ICERI2018 Proceedings, pp. 7064-7068, ISBN: 978-84-09-05948-5

Media

Year	International Media
2019	Television Feature. Designing accessible fashion for people with disabilities on PBS Newshour Weekend (Public Broadcasting Service, USA) on 14 October 2018. Video: https://www.pbs.org/newshour/show/designing-accessible-fashion-for-people-with-disabilities

Award

Year	Finalist Award
2019	Finalist. 7th Eldercare Innovation Awards 2019. Singapore, May 2019.