RAE2026

AI-Based Design Customisation of Insoles for Diabetic Patients

Prof Yick Kit Lun

UoA 38

11.2025

Contents

Descriptor

Funded by a local government investment totalling HK$3.6 million (2021–2024), this research addresses critical gaps in the design of custom-fabricated insoles for reducing high plantar pressure and preventing foot ulcers in diabetic patients. Prof Yick Kit Lun and her team demonstrate a novel AI-based framework that integrates foot biomechanics, dynamic 4D foot anthropometry data from over 100 diabetic patients, material analyses, pressure information, and AI-driven algorithms to address the complexities of individual foot shapes and enhance the custom fabrication of personalised diabetic insoles. They were all derived from a simple traditional footprint image. Clinicians can, therefore, precisely prescribe insoles with an optimal fit to meet the individual needs of patients and effectively control plantar pressure for rehabilitation treatment. This approach also eliminates the need for expensive sensors and repeated walking tests to assess insole performance.

This research offers a positive long-term impact on the customisation of insole interventions for diabetic patients. A design patent has been filed, and the findings have been disseminated widely, with publications in 12 journals, 5 conferences, 2 workshops, 1 online course, and 8 local and overseas exhibitions. The research garnered attention from various local TV media channels, newspapers, and social media platforms. It was also showcased at the symposium in Japan and the Innovations in Design Summit 2023. Subsequent collaborative research projects and seminars were initiated with Shenzhen University (China), the University of Hong Kong–Shenzhen Hospital, Hong Kong Community College, the local footwear industry, and health centres. In addition to industry sponsorships, two licensing agreements, five in-kind donations, and a contract research project with industry partners were generated. Furthermore, new InnoHK and Sports Science and Research Funding Scheme (SRFS) projects have been established to expand the research into sport-specific insole design, with HK$4.6 million and HK$5.2 million in funding secured for 2025-2030, respectively.

Prof Yick Kit Lun

Prof Yick specialises in ergonomic design to improve human well-being, focusing on patient clothing, activewear, and footwear. She integrates 3D anthropometry, biomechanical analysis, and material science to enhance comfort and functionality, particularly for vulnerable populations. Her research involves developing advanced manikin systems for bra evaluation (MCO1) and applying 4D motion analysis to optimise sports bra fit and support for elite athletes (MCO3), translating biomechanical data into a design enabling improved movement and power efficiency. She has also established robust methods to predict pressure distribution and combine foot biomechanics and dynamic anthropometry to design custom orthotic insoles for diabetic patients (MCO2).

Prof Yick's role in research projects is characterised by her ability to define design criteria, propose material innovations, and develop prototypes that address needs in sports, rehabilitation, and personalised care. She maintains scientific rigour by establishing objective assessment frameworks to evaluate prototype performance. In addition to government funding, her collaborative network includes the Hong Kong Intimate Apparel Industries' Association (HKIAIA), the Hong Kong Sports Institute, activewear brands, global testing and certification firms, healthcare institutions, Non-governmental Organizations (NGOs), and the Laboratory for Artificial Intelligence in Design under InnoHK. These partnerships reflect her commitment to interdisciplinary collaboration, ensuring that her work contributes to both academic advancement and practical benefits for the industry and society.

Prof Yick Kit Lun

Multidisciplinary Research

Co-investigators

DR LI NGA WUN | Academic lead in seamless knitting research, University of Technology Sydney

Knitwear Engineer

DR SHI QIUQIONG | Research assistant professor, The Hong Kong Polytechnic University

Biomechanical Engineer

DR LI SABRINA | Postdoctorlal fellow, The Hong Kong Polytechnic University

Footwear Ergonomic Engineer

Supporting and Collaborating Partners

DR·KONG

Royal College of Art

AiDLab
Laboratory for Artificial Intelligence in Design
人工智能設計研究所

OYG

CREATEHK

LEGACY
Innovation · Material · Solution

香港大学深圳医院
The University of Hong Kong - Shenzhen Hospital

INNOHK

HKSTP

保良局
PO LEUNG KUK

PYLON TECH

黃大仙地區康健中心
Wong Tai Sin District Health Centre

Dr Li NW, a knitwear engineer, designs advanced knitted fabrics and materials, optimising insole properties for effective pressure offloading, comfort, and durability in insole designs for diabetic patients.

Dr Shi Q, a biomechanical engineer, leads the biomechanical design and analysis of the insole performance, ensuring optimal pressure distribution, support, and functionality for diabetic patients through advanced evaluation methods and experiments.

Dr Li S, a footwear ergonomic engineer, specialises in designing insoles and footwear with optimal fit and comfort, ensuring ergonomic support, and addressing the specific needs of diabetic patients.

Research Questions

Although orthotic insoles are recognised as the standard first-line treatment for diabetic foot ulcers, there is a lack of scientific knowledge regarding the design and material parameters that govern dynamic fit and plantar pressure for effective therapy. The intricate anatomical structure of the foot, the specific demands for insole fit, the properties of insole materials, and the pressure distribution under dynamic conditions all pose great challenges in the anatomically engineered design of insoles. The research questions of this project are as follows:

- Compared to the traditional approach of insole prescription, which involves repeated walking tests and subjective assessments, is it possible to objectively predict the offloading performance of insoles?
- How can the 3D geometric features of the foot in dynamic situations be precisely characterised to improve the design and fit of orthotic insoles?
- What potential AI solutions exist for the custom design of insoles that would ensure a personalised fit and the precise control of plantar pressure for rehabilitation treatment?
- Given that traditional insole foams tend to trap heat and moisture within the footwear, what materials and structures could be employed to allow breathability, cushioning, and support for foot protection and wearing comfort?

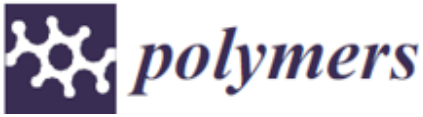
Research Outputs

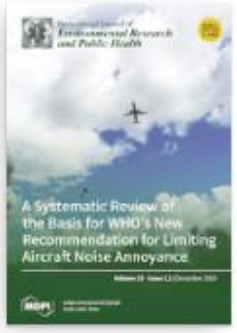
- A new approach to foot image processing, reorientation, and point cloud registration algorithms, enabling the automatic and objective characterisation of the anatomical features and key points of the foot in dynamic situations and the classification of foot types and deformation
- An AI-based method to predict plantar pressure distribution under insole conditions from traditional footprint images, streamlining the insole prescription process and enabling design tailored to individual needs
- The design of 3D knitted spacer inlay structures that offer excellent breathability, force reduction, and compression recovery, thereby improving the footwear microclimate for practical use
- The design of a personalised 3D arch support and heel pad using an auxetic structure and 3D printing technique, which can effectively boost cushioning, energy absorption, and foot protection through biomechanical experiments and finite element modelling

Research Outputs

The research is supported by local government funds (HK$3.6 million).

Category	Content
Journal Papers	Twelve top-tier journal papers were published.
Conference Papers	Five conference papers were published in international conferences.
Design Patent (China)	One patent of an AI-based framework for the customisation of the insole design was filed on 8th November 2022.



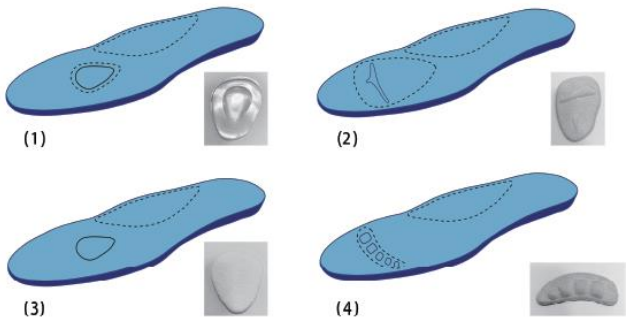


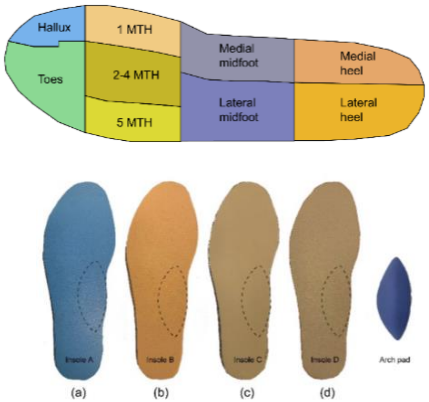
Research Outputs | 01 Journal Papers

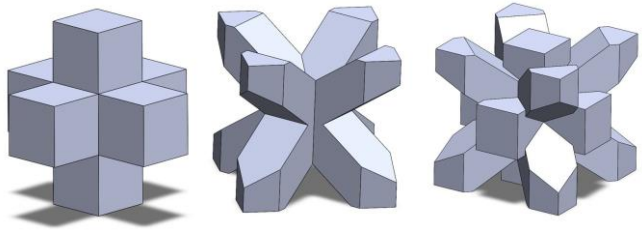
Year	Journal Articles
2025	Li, P.L., Xiao, Q.F., Yick, K.L.*, Liu, Q.L., Zhang, L.Y. (2025). A novel deep learning approach to classify 3D foot types of diabetic patients. *Scientific Reports*, 15(1), 13819-11
2024	Zhang, L.Y., Ma, Z.Q., Yick, Y.L.*, Li, P.L., Yip, J., Ng, S.P., Liu, Q. L. (2024). Prediction of Dynamic Plantar Pressure From Insole Intervention for Diabetic Patients Based on Patch-Based Multilayer Perceptron With Localization Embedding. *IEEE Access*, 12, 100355-100365
2024	Li, P.L., Yick, K.L.*, Zhang, L.Y., & Keung Y.C. (2024). Evaluation of age-related differences in foot anthropometry among women. *AATCC Journal of Research,* 11(1) suppl, 54-60
2023	Zhang, L.Y., Liu, Q., Yick, K.L.*, Yip, J., Ng, S.P. (2023). Analysis of diabetic foot deformation and plantar pressure distribution of women at different walking speeds. *International Journal of Environmental Research and Public Health*, 20 (4), 3688
2022	Zhang, L.Y., Yick, K.L.*, Li, P.L., Yip, J., & Ng, S.P. (2022). Foot deformation analysis with different load-bearing conditions to enhance diabetic footwear designs. *PLoS One, 17*(3), 0264233
2022	Shi, Q. Q., Li, P. L., Yick, K. L.*, Li, N.W., & Jiao, J. (2022). Effects of contoured insoles with different materials on plantar pressure offloading in diabetic elderly during gait. *Scientific Report,* 12 (1),15395-10.
2022	Li, N.W., Yick, K.L.*, & Yu, A. (2022). Novel weft-knitted spacer structure with silicone tube and foam inlays for cushioning insoles. *Journal of Industrial Textiles,* 51(4) suppl, 6463S-6483S
2022	Li, N.W., Yick, K.L.*, Yu, A., & Ning, S. (2022). Mechanical and Thermal Behaviours of Weft-Knitted Spacer Fabric Structure with Inlays for Insole Applications. *Polymers, 14*(3), 619.
2022	Leung, M. S.H., Yick, K.L.*, Sun, Y., Chow, L., & Ng, S.P. (2022). 3D printed auxetic heel pads for patients with diabetic mellitus. *Computers in biology and medicine, 146*, 105582-105582
2022	Ning, K., Yick, K.L.*, Yu, A., & Yip, J. (2022). Effects of textile-fabricated insole on foot skin temperature and humidity for enhancing footwear thermal comfort. *Applied Ergonomics, 104*, 103803-103803
2022	Li, P.L., Yick, K.L.*, Yip, J., & Ng, Z. (2022). Influence of Upper Footwear Material Properties on Foot Skin Temperature, Humidity and Perceived Comfort of Older Individuals. *International Journal of Environmental Research and Public Health*, 19(17), 10861
2022	Shi, Q. Q., Li, P. L., Yick, K. L.*, Jiao, J., & Liu, Q. L. (2022). Influence of contoured insoles with different materials on kinematics and kinetics changes in diabetic elderly during gait, *International Journal of Environmental Research and Public Health*, 19(19), 12502

Research Outputs | 02 Conference Papers

Year	Conferences
2023	Zhang, L., Yick, K.*, Yip, J., & Ng, S. (2023). The offloading effects of metatarsal pads: A comparison of metatarsal pad designs. The 92nd Textile World Conference 2023, University of Huddersfield, 3–6 July 2023, Huddersfield, UK.
2022	Zhang, L., Yick, K.*, Yip, J., & Ng, S. (2022). Offloading performance of insole materials during walking for diabetic patients. In: Gianni Montagna and Cristina Carvalho (eds), Human Factors for Apparel and Textile Engineering, AHFE International Conference, AHFE Open Access, vol 32, 24–28 July 2022, New York, USA.
2022	Leung, M.S.H., Yick, K.L.*, Sun, Y., & Ng, S.P. (2022). Numerical simulation of pressure distribution for structural design of diabetic foot insoles. AuxDefense 2022 – 3rd World Conference on Advanced Materials for Defense, 6–7 July 2022, Guimaraes, Portugal.
2022	Ning, K., Yick, K.L.*, Yu, A., & Yip, J. (2022) Thermal Comfort of 3D Spacer Fabric for Footwear Insole Application. The 15th Textile Bioengineering and Informatics Symposium, 5–8 September 2022, Liberec, Czech Republic.
2021	Li, P.L., Zhang, L.Y., Keung Y.C., & Yick, K.L.* (2021). Evaluation of age-related differences in foot anthropometry among women. The 3rd Artificial Intelligence on Fashion and Textile International Conference, 24–25 November 2021, Shanghai.







Research Outputs | 03 Patent

Patent in China

A design patent (202211391068.8) has been filed on 8 November 2022. The invention aims to provide an AI-based framework for plantar pressure detection and the customisation of insole design.

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发文日：

2022 年 11 月 08 日

申请号或专利号：202211391068.8　　发文序号：2022110801684320

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申请号：202211391068.8

申请日：2022 年 11 月 07 日

申请人：人工智能设计研究所有限公司, 香港理工大学, 皇家艺术学院

发明创造名称：足底压力检测方法及装置、存储介质及电子设备

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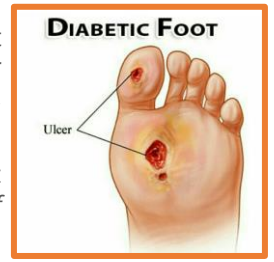
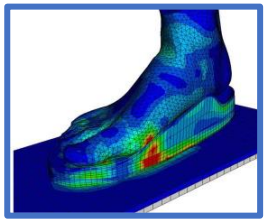
Research Field and Key References

- 537 million people worldwide lived with diabetes in 2021 (IDF 2022).
- Customised insoles are used to accommodate the foot deformation and offload abnormal plantar pressures for diabetic patients (van Netten et al. 2018).
- However, the pressure-relieving performance is still not effectively controlled. In fact, 50–86% of lower limb amputations among patients with diabetes are preceded by foot ulcers (Armstrong et al. 2017).
- Analyses on foot anthropometry and biomechanics have been limited to static conditions and the modelling of plantar pressure to evaluate the fit and performance of orthotic insoles (Xidias et al. 2015; Zhang et al. 2007).
- Insole materials that can increase heat dissipation could reduce the risk of foot ulcers (Messaoud et al. 2015).
- Auxetic structures are increasingly used in personal protection equipment for cushioning and anti-impact purposes (Bhullar et al. 2017; Ho et al. 2014).
- Advanced methods have been proposed to optimise the design of custom orthotics insoles (Anggoro et al. 2021; Ipaki et al. 2021).

- International Diabetes Federation (2022). Diabetes_Aid NG. www.idf.org/diabetes.
- van Netten, J.J., Lazzarini, P.A., Armstrong, D.G., Bus, S.A., et al. (2018). Diabetic foot Australia guideline on footwear for people with diabetes. *Journal of Foot and Ankle Research*, 11(2), 2.
- Armstrong, D.G., Boulton, D.J.M., & Bus, S.A. (2017). Diabetic foot ulcers and their recurrence. *The New England Journal of Medicine*, 376(24), 2367–2375.
- Xidias, E., et al., Foot plantar pressure estimation using artificial neural networks. The 12th IFIP WG 5.1 International Conference on Product Lifecycle Management, PLM 2015, Doha, 19-21 October 2015, Qatar.
- Zhang, M., et al. (2007). Computational modeling the foot-insole interface. *Studies in Computational Intelligence*, 55, 311–321.
- Messaoud, M., et al. (2015). Physical and mechanical characteristics of recyclable insole product based on new 3D textile structure developed by the use of a vertical-lapping process. *Journal of Industrial Textiles*, 44(4), 497.
- Ho, D.T., et al. (2014). Negative Poisson's ratios in metal nanoplates. *Nature Communications*, 5(1), 3255.
- Bhullar, S.K., et al. (2017). Design and fabrication of auxetic PCL nanofiber membranes for biomedical applications. *Materials Science & Engineering C,* 81, 334–340.
- Anggoro, P.W., et al. (2021). Advanced design and manufacturing of custom orthotics insoles based on hybrid Taguchi-response surface method. *Heliyon*, 7(3), e06481–e06481.
- Ipaki, B., et al. (2021). Optimal design method for orthopaedic footwear insole customisation based on anthropometric data and NURBS system. *Journal of Design Research*, 19(1–3), 59–81.





Knowledge Gap

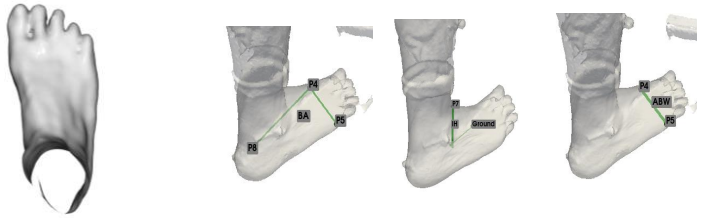
Custom-designed diabetic insoles are essential in hospitals and clinics for reducing high plantar pressure and the risk of foot ulcers. The choice of insole materials is tailored to individual foot shapes, needs, and deformities, making the fabrication process intricate, time-intensive, and error-prone. Evaluating insole performance requires expensive pressure sensors and repeated walking tests. Traditional insole materials often retain heat and moisture, leading to discomfort and increased shear stress.

- The conventional custom design and fabrication of diabetic insoles present significant challenges for clinicians to consider the anatomical and biomechanical differences amongst patients to manage plantar pressure effectively.
- The analyses of foot anthropometry and biomechanics are typically limited to static conditions, resulting in imprecise predictions and modelling of the foot-insole interface, which complicates the 3D engineered design of orthotic insoles.
- The lack of reliable methods for capturing 3D foot images in dynamic situations and measuring the continuous deformation of foot shape during various stances
- Despite the many potential applications of 3D textiles, auxetic materials, and 3D printing technology in personal protective devices for better conformability, improved energy absorption, breathability, and comfort, most of the reported research is still in its infancy. Practical use in customising designs for rehabilitation and meeting individual patient needs is particularly scarce.
- Advanced AI models that incorporate dynamic foot anthropometry and material selection for predicting plantar pressure under insole conditions have yet to be proposed to streamline the customisation of insole design.

Research Methods, Prototypes, and Materials

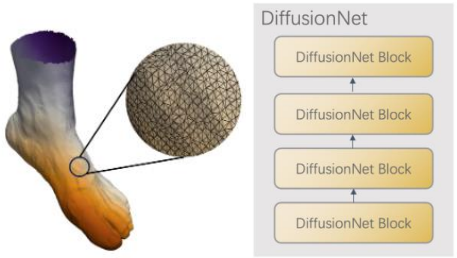
Framework of the AI-Assisted Customisation of Insole Design

The formation of the framework comprises **five phases**, including **a novel deep-learning model** to classify 3D foot types from dynamic images for customised insole fit and geometry and **a multilayer perceptron (MLP) neural network with an embedding technique** for optimal structural and material design, enabling clinicians to confidently prescribe effective, personalised orthotic insoles for patients.



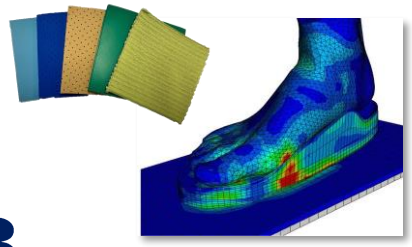
1

4D scans of dynamic foot shapes and the automatic extraction of key features



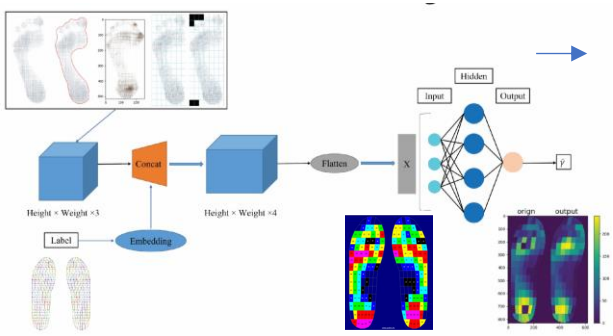
2

Deep learning model for the foot type classification



3

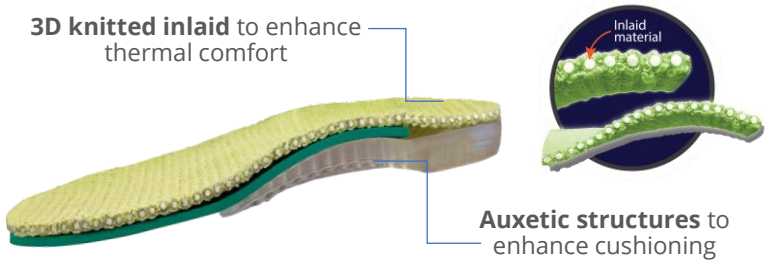
Analyses of foot biomechanics and finite element modelling of the foot-insole interface



4

MLP neural network model for the prediction of plantar pressure

3D knitted inlaid to enhance thermal comfort



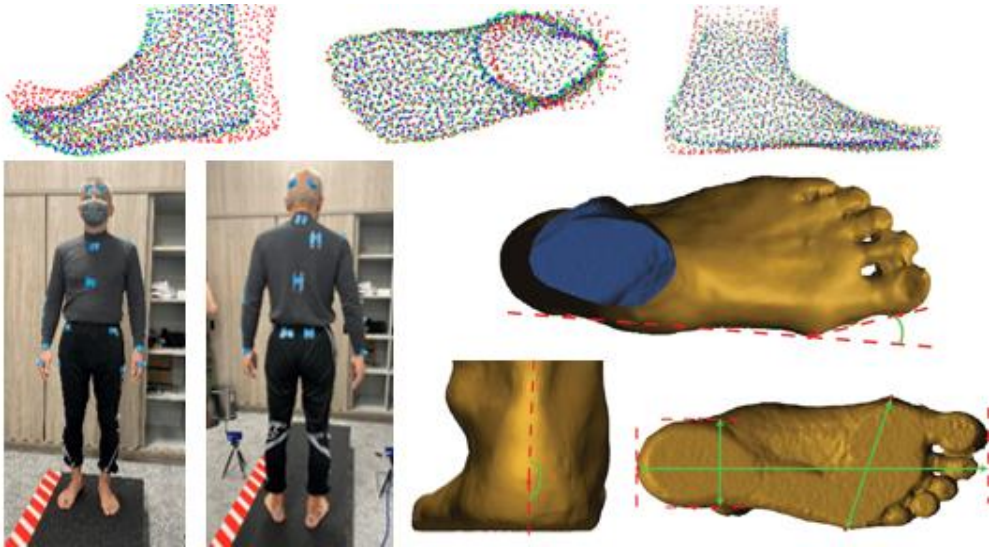
Auxetic structures to enhance cushioning

5

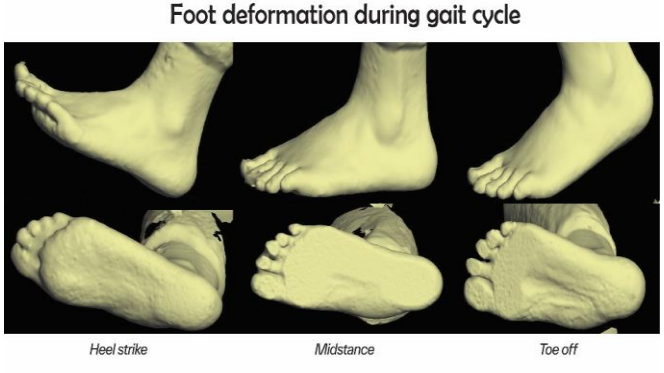
Structural and material design for personalised orthotic insoles

Phase I: 4D Dynamic Foot Scanning for Key Features

The changes in foot shape and anthropometry during walking are analysed to improve the anatomical 3D design of the arch support, heel pads, and the overall fit of insoles.



Over **100** diabetic subjects participated in dynamic foot scanning and gait analysis.

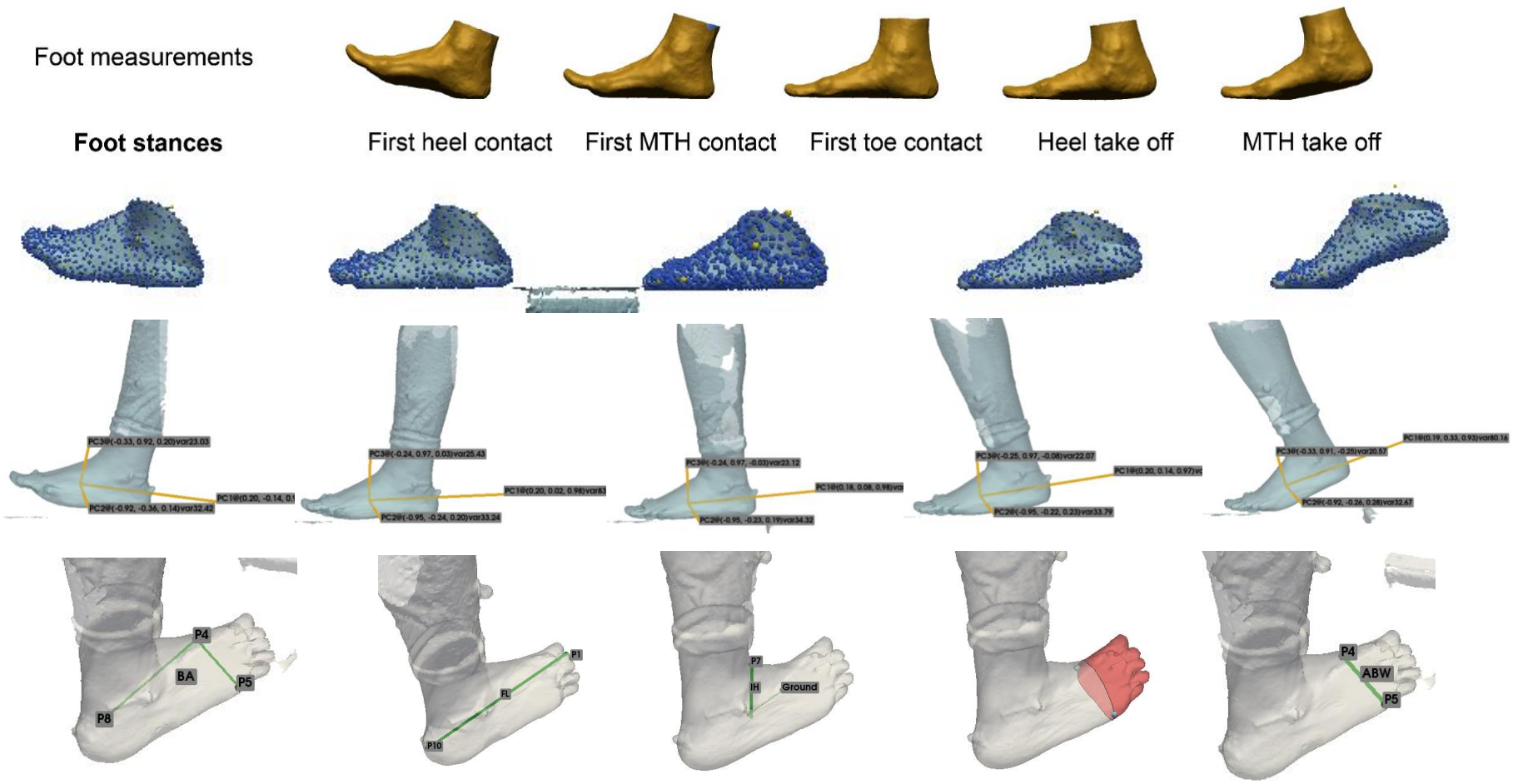


Related Publications

- Li PL, Yick KL, Zhang LY & Keung YC. (2024). Evaluation of age-related differences in foot anthropometry among women. AATCC Journal of Research,11(1) suppl, 54-60.
- Zhang L, Liu Q, Yick KL, Yip J, Ng SP. (2023). Analysis of diabetic foot deformation and plantar pressure distribution of women at different walking speeds. International Journal of Environmental Research and Public Health, 20 (4), 3688.
- Zhang L, Yick KL, Li PL, Yip J, Ng SP. (2022). Foot deformation analysis with different load-bearing conditions to enhance diabetic footwear designs. PLoS One. 17(3): e0264233

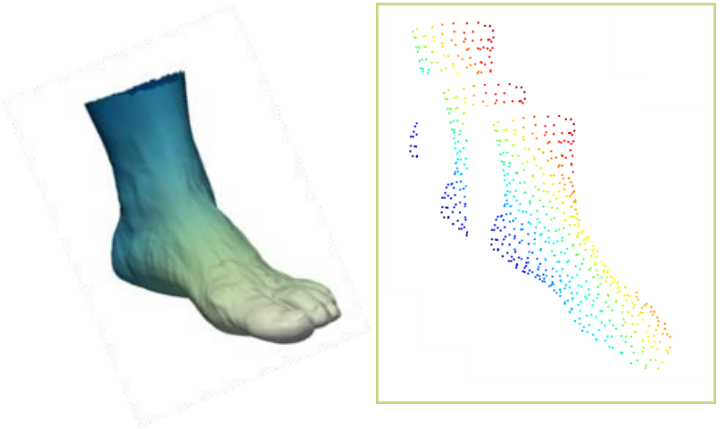
Phase I: 4D Dynamic Foot Scanning for Key Features

The **algorithms** are designed to **automatically extract foot measurements and features** from dynamic foot images during a gait cycle.

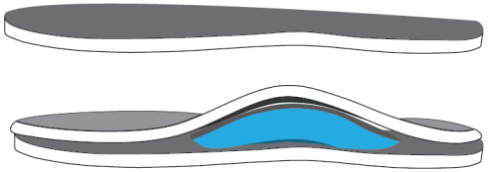


Phase II: Deep-Learning Model for Foot Type Classification

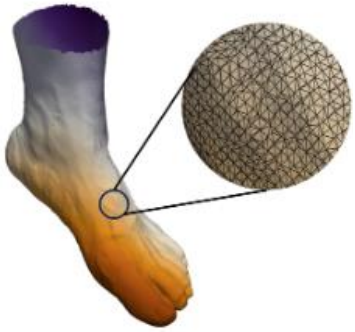
Foot measurements are utilised in a classification model, which offers an accuracy of over 90%, based on **DiffusionNet with a self-attention mechanism**. This model ensures improved fit, comfort, and support for insole designs in both static and dynamic situations.

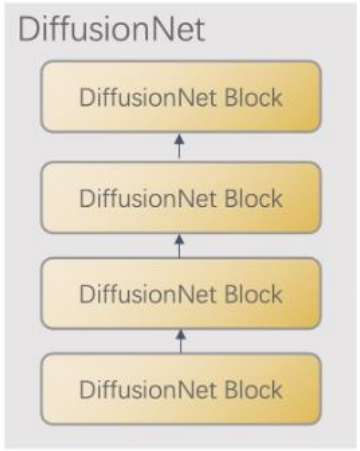


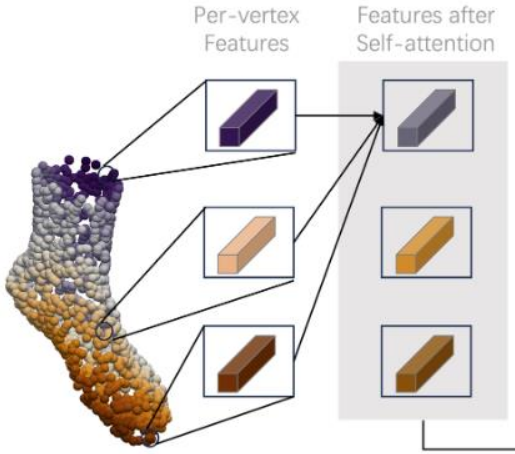
3D foot shapes represented by mesh or point cloud

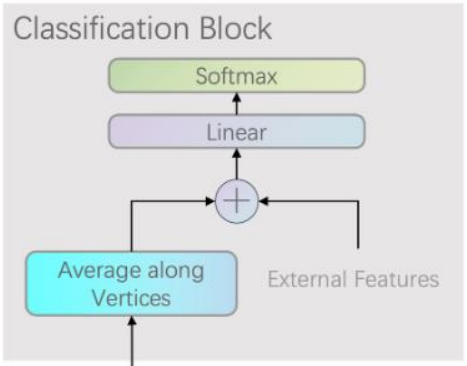


Recommendation of insole geometry based on foot type



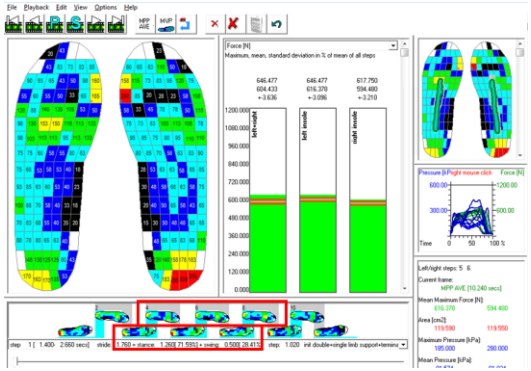


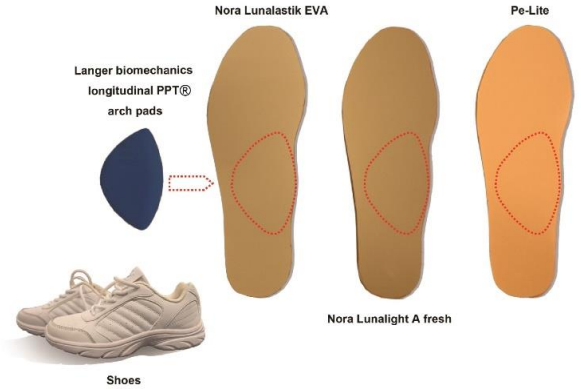


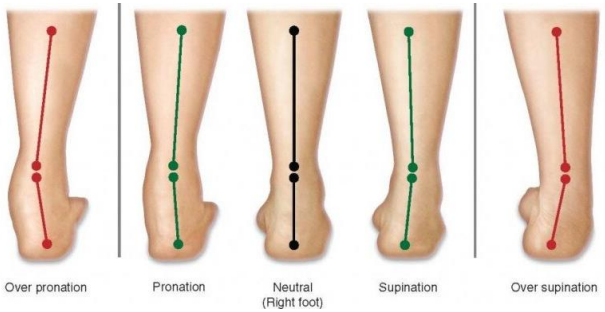


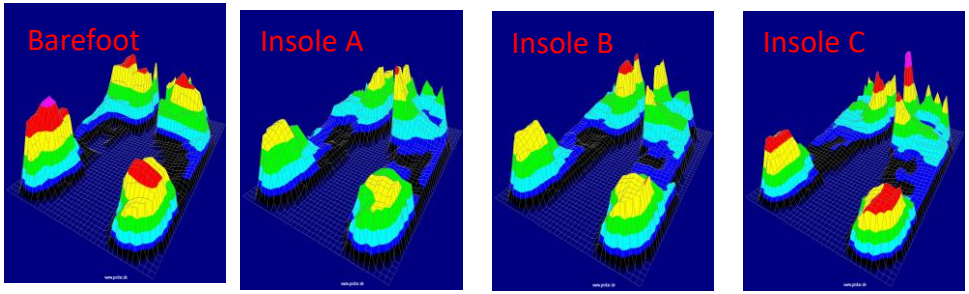
Phase III: Analyses of Foot Biomechanics and Finite Element Models

The **distribution of plantar pressures** and **foot biomechanics** in response to different insole materials is systematically investigated for the design and training of an AI-based model to predict the offloading performance of orthotic insoles.









Findings

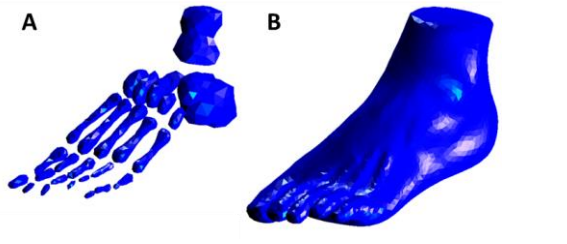
- Key foot changes that affect the custom design of insoles are identified.
- Soft insole materials with good energy absorption offer good cushioning (offloading) to the rearfoot and metatarsal head (MTH) regions while walking.

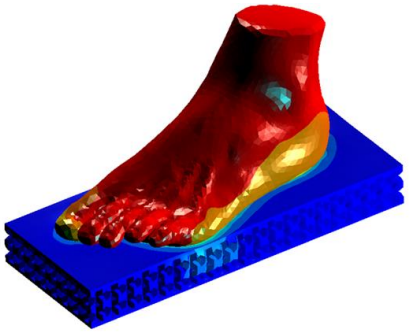
Related Publications

- Shi QQ, Li PL, Yick KL, Li NW & Jiao J. (2022). Effects of contoured insoles with different materials on plantar pressure offloading in diabetic elderly during gait. Scientific Report, 12(1),15395-10.
- Shi G, Li PL, Yick KL, Li NW, Jiao J. (2022). Influence of contoured insoles with different materials on kinematics and kinetics changes in diabetic elderly during gait. International Journal of Environmental Research and Public Health. 19(19), 12502.

Phase III: Analyses of Foot Biomechanics and Finite Element Models

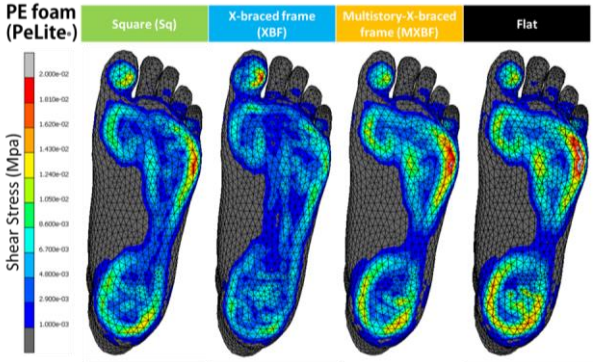
The finite element model has been developed to simulate foot-insole pressure distribution and deformation, considering changes in insole materials and structures. It integrates with the AI-based prediction model to minimise the need for repeated walking tests, enhancing insole design optimisation through advanced computational techniques.

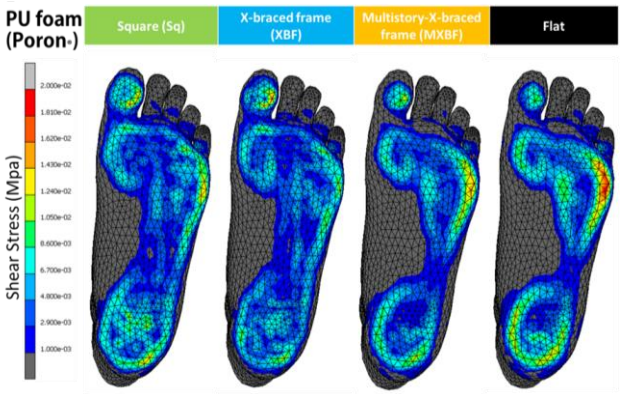


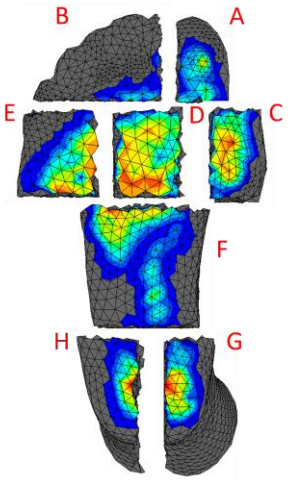


Findings

- **Finite element analysis** is proposed to replace repeated walking tests when **new** insole materials are used.
- The effects of insole material properties on plantar pressure distribution can be precisely simulated.



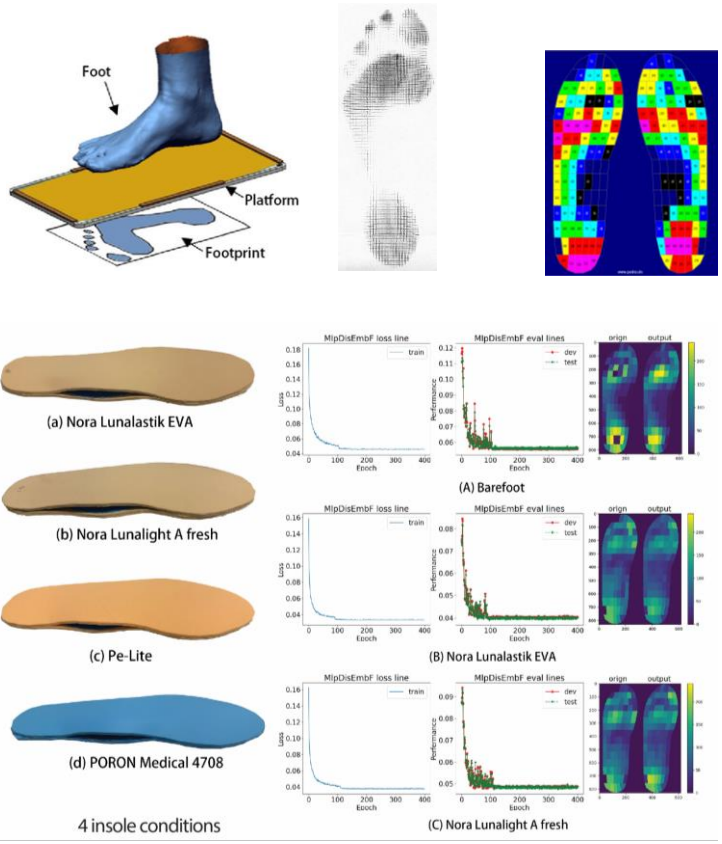


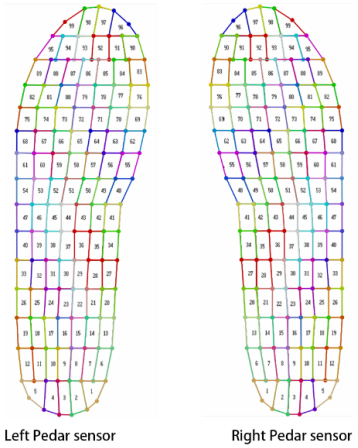


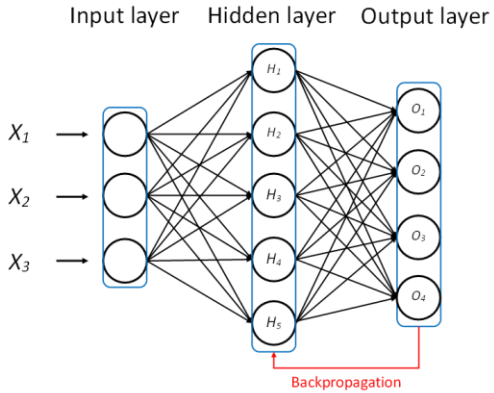
Force (N)		
	Prediction	Human
A	21.75	17.1
B	3.38	30.5
C	40.71	12.7
D	127.18	50.6
E	78.33	33.1
F	109.21	135.4
G	30.57	54.8
H	41.62	87.4

Phase IV: AI-Based Framework for Prediction of Plantar Pressures

The AI-based framework adopts an **MLP neural network model** with an embedding technique for training. It aims to predict changes in static and dynamic plantar pressures under various insole materials from conventional 2D footprint images.







Patent

Yick K.L., Zhang L.Y., Ma Z.Q. & Li P.L. (Filed 2022). Plantar pressure evaluation method, design and framework. (CN Patent No. 202211391068.8). China National Intellectual Property Administration.

Publication

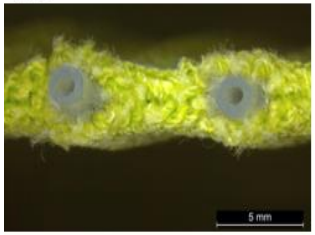
Zhang LY, Ma ZQ, Yick YL, Li PL, Yip J, Ng SP, Liu QL. (2024). Prediction of Dynamic Plantar Pressure From Insole Intervention for Diabetic Patients Based on Patch-Based Multilayer Perceptron With Localization Embedding. IEEE Access, 12, 100355-100365

Phase V: Structural and Material Design of Insoles

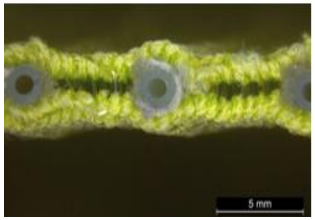
Insole Top Layer

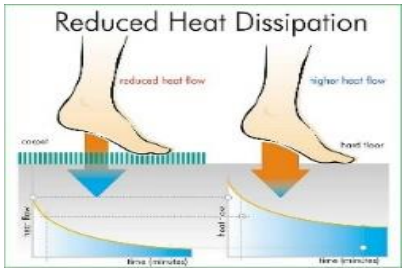
A **3D spacer knitted structure**, including inlay insertion, has been designed for foot accommodation and comfort. The choice, location, and connective pattern of yarns that control the air gap and cushioning of impact forces can be flexibly changed in response to the needs of patients.

TR1

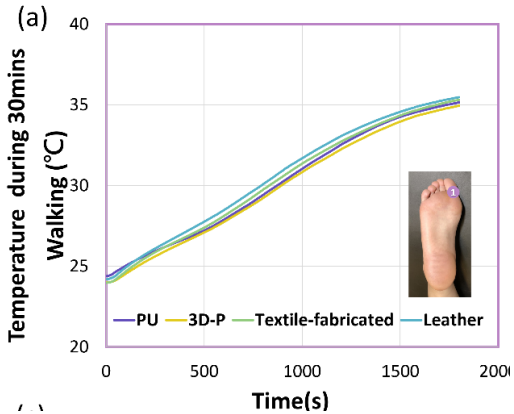


TR2





Fabric	AS1	AS2	BC1	BC2	BS1	BS2
Structure	A	B	C	D	E	F
Knitting notation						
Image						



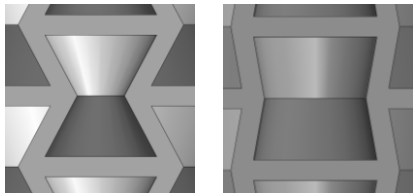
Related Publications

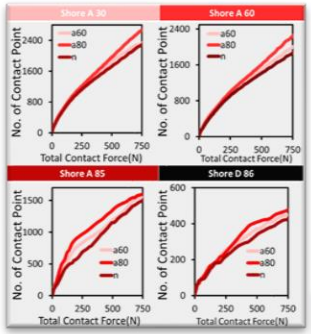
- Li NW, Yick KL, Yu A. (2022). Novel weft-knitted spacer structure with silicone tube and foam inlays for cushioning insoles. Journal of Industrial Textiles. 51(4) suppl, 463S-6483S
- Li NW, Yick KL, Yu A, Ning S. (2022). Mechanical and thermal behaviour of weft-knitted spacer structure with inlays for insole application. *Polymers*,14(3), 619.
- Ning S, Yick KL, Yu A, Yip J. (2022). Effects of textile-fabricated insole on foot skin temperature and humidity for enhancing footwear thermal comfort. Applied Ergonomics, 104, 103803.
- Ning, K., Yick, K.L.*, Yu, A., & Yip, J. Thermal Comfort of 3D Spacer Fabric for Footwear Insole Application. The 15th Textile Bioengineering and Informatics Symposium, 5–8 September 2022, Liberec, Czech Republic.

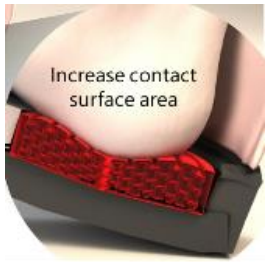
Phase V: Structural and Material Design of Insoles

Heel Pad Design

It features a **3D auxetic structural design, specifically a re-entrant honeycomb structure**, to increase the contact area and reduce peak contact force and plantar pressures.

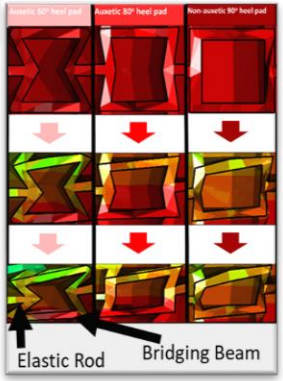


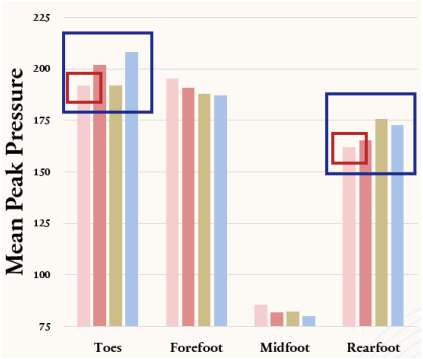


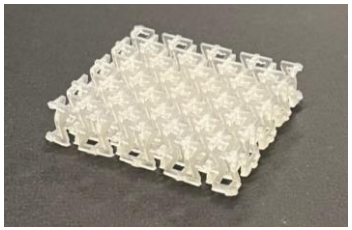


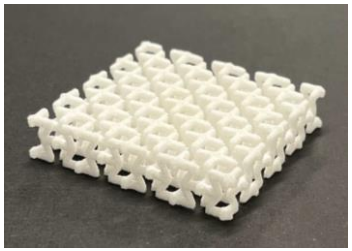
Findings

- **In-shoe foot humidity** is significantly reduced by inlaid spacer fabric.
- The **contact area** in relation to peak contact force and **mean pressure** under auxetic structures is improved in both biomechanical experiments and finite element models.







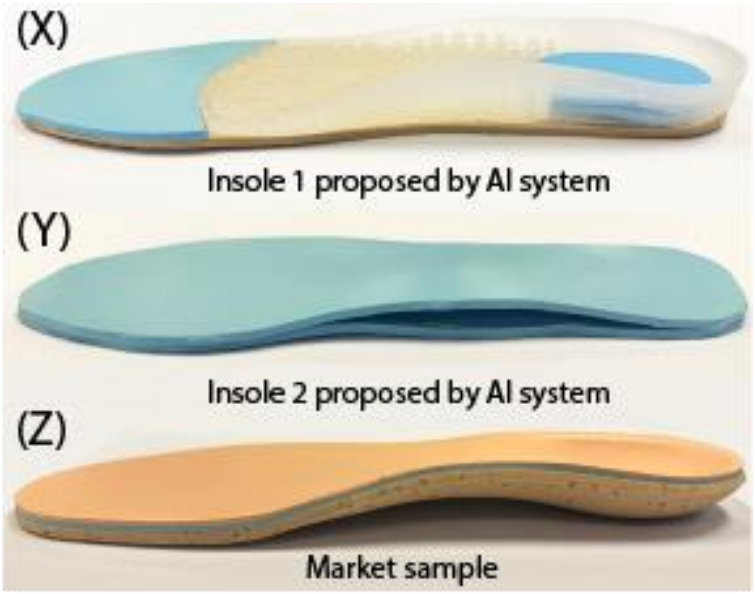


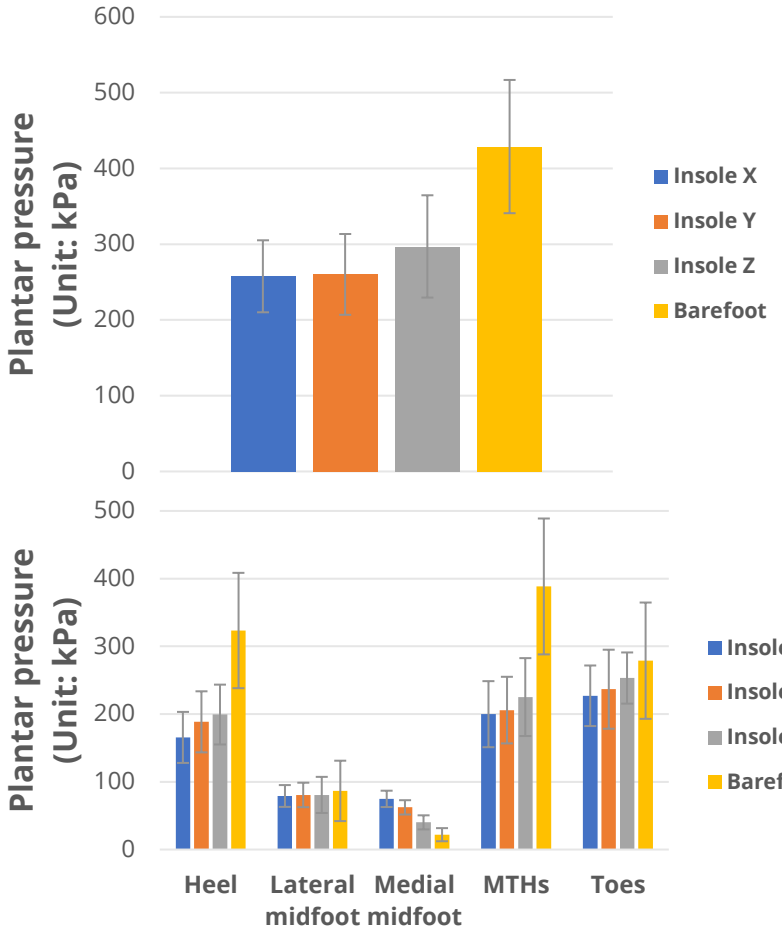
Related Publications

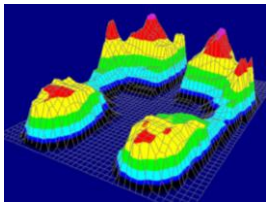
- Leung, M.S.H., Yick, K.L., Sun, Y., Chow, L., & Ng, S.P. (2022). 3D printed auxetic heel pads for patients with diabetic mellitus. *Computers in Biology and Medicine*, 146, 105582.
- Leung, M.S.H., Yick, K.L.*, Sun, Y., & Ng, S.P. (2022). Numerical simulation of pressure distribution for structural design of diabetic foot insoles. AuxDefense 2022 – 3rd World Conference on Advanced Materials for Defense, 6–7 July 2022, Guimaraes, Portugal.

Phase V: Structural and Material Design of Insoles

In comparison to conventional diabetic insoles, **insoles created using this AI-assisted approach** demonstrated a significant 40% reduction in peak plantar pressure, along with improved perceived fit and comfort.



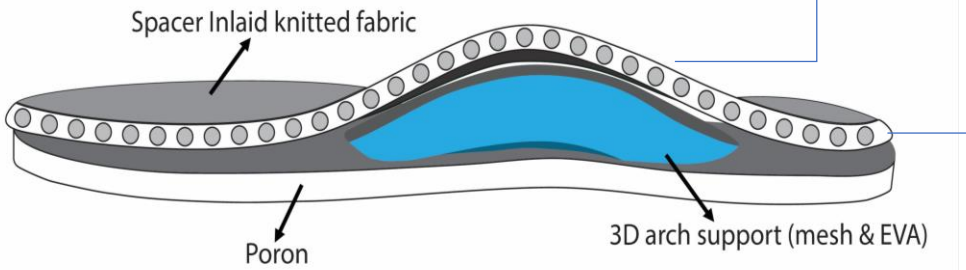




Customised Insoles for Diabetic Patients – Prototype I

January 2022

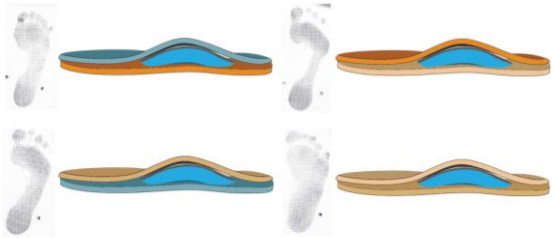
3D spacer knitted structure



Cushioning permeable to heat and moisture

Features

- Insole behaviour and plantar pressures are initially predicted by using the AI-assisted system with reference to the patient's footprint image.
- The inlaid spacer fabric of suitable yarn structure and orientation is used to replace traditional foams as the accommodation layer of the insole that offers good air permeability, as well as personalised cushioning and shock absorption.



Customised Insoles for Diabetic Patients – Prototype II

October 2022

Contoured heel pad design in an auxetic re-entrant structure

Enhanced heel contact and pressure distribution

Features

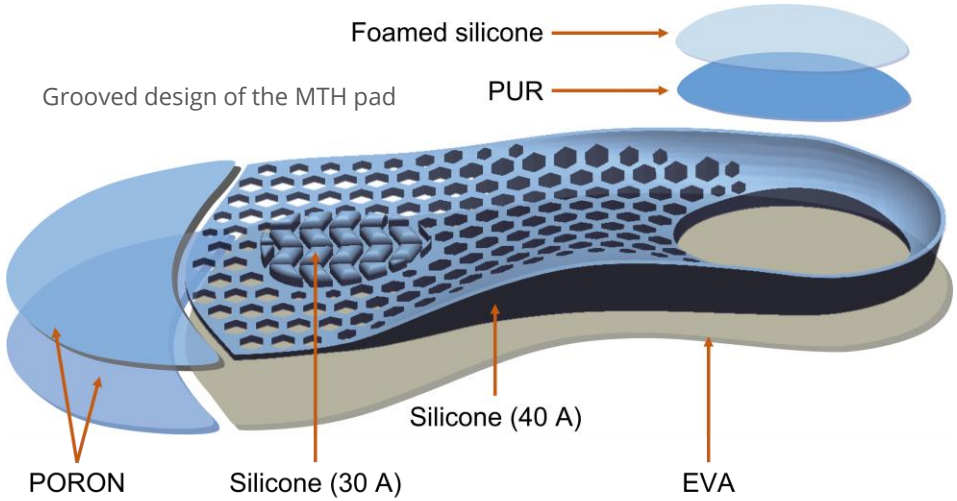
- A heel pad design with an auxetic re-entrant structure and excellent porosity increases the contact area and reduces plantar pressures.
- The 3D plantar shape in dynamic situations provides useful information in the anatomical design of the 3D arch support.
- With 3D printing technology, the personalised half-insole design has an optimal fit, and the cushioning and support can be formulated by algorithmically tuning material properties, lattice structures, and zonal reinforcement based on patient-specific biomechanical data.

3D printing technology for customisation

Customised 3D geometry for individual patients

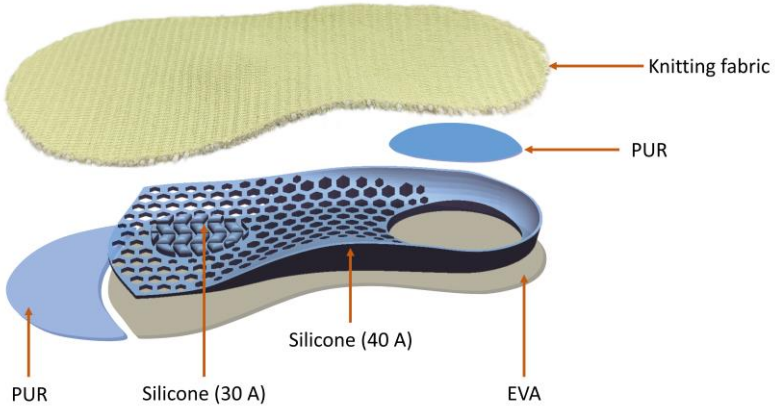
Customised Insoles for Diabetic Patients – Prototype III

August 2023



Representative foot shapes identified using deep learning to allow personalised insole design for mass production

3D spacer knitted structure



Features

- A half insole with the grooved design of the MTH pad and 3D arch support for improved porosity, contact area, and the redistribution of plantar pressure.
- Based on the deep-learning approach, the representative foot shapes are identified to facilitate the personalised design of a half insole with an optimal fit, cushioning, and support for mass production.

Research Outcomes, Findings, and Further Research

Research Outcomes

The AI-based framework developed in this research enables the objective prediction of insole offloading performance, allowing clinicians to confidently select suitable materials and structures for a personalised insole design. By integrating dynamic foot shape classification and pressure prediction, the system supports the prescription of orthotic insoles with optimal fit, comfort, and rehabilitation benefits for diabetic patients.

Findings

The results show that forefoot width increases by 10% while walking, and foot rotation occurs with flattened arches, highlighting the need for soft, stretchable insole materials. Inlaid spacer insoles significantly reduce foot skin humidity, while auxetic heel pads lower peak contact force and mean pressure, enhancing overall foot protection and comfort.

Future Research

Future research will combine dynamic foot scanning, deep learning, and digital twin models in the AI framework to enhance sports insole customisation, offering cost-effective, tailored foot support and effective performance by addressing athletes' unique anatomical and biomechanical needs.

Research Dissemination

Category	Content
Video	Video of AI-based design customisation of insoles
Exhibitions and and International Expos	The research outputs have been showcased in more than 10 exhibitions and international expos.
Industry Visits	An advanced dynamic foot scanning and design approach was introduced to industry and university partners, associations, and NGOs, among others.
Community Workshops or Seminars	1. A foot care seminar for Wong Tai Sin District Health Centre 2. AI x Ergonomics workshops for the community and industry partners
Media Interviews	Research outputs were reported on different TV programmes and social media platforms.
Research Collaborations	1. Research collaboration with the University of Hong Kong–Shenzhen Hospital and Shenzhen University 2. Research project with the Hong Kong Community College, University Grants Committee (Faculty Development Scheme) Funding Scheme (HK$1 million) 3. Research collaborations and in-kind donations (HK$330,000) 4. Research project with the Laboratory for Artificial Intelligence in Design under InnoHK (HK$4.6 million) 5. Research project with the Hong Kong Sports Institute (HKSI) under SRFS (HK$5.2 million)
Industry Collaboration	Contract research with Legacy Innovation Development Limited
Ideation Meetings	Regular ideation meetings with research teams from the Royal College of Art (RCA) in the UK
Licensing Agreements	A Memorandum of Understanding (MoU) and two licensing agreements with Legacy Innovation Development Limited
Fashion X AI MOOC	A Massive Open Online Course (MOOC) module launched in July 2023
Contacting Local Hospitals and Overseas Collaborators	Research inquiries received from the Podiatry Department of Queen Mary Hospital in Hong Kong and swissbiomechanics AG in Switzerland
Appendices	In-kind sponsorship letters, testimonials, and compliment letters from the local healthcare centre

Research Dissemination | 01 Video

Video of the AI-Based Design Customisation of Insoles

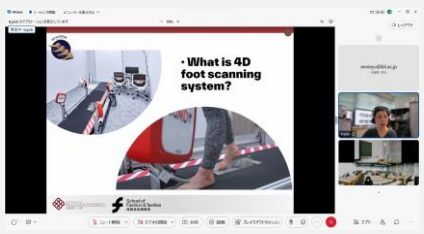
Research Dissemination | 02 Exhibitions and International Exhibitions

The research and footwear prototypes were showcased at various exhibitions, such as The Mills Fabrica in July 2022 and the **Asia Summit on Global Health (ASGH)** in November 2022. More than 22,000 onsite and online participants from over 50 countries and regions participated in ASGH.

An online presentation was given at Fibro-Symposium 2022, Kyoto Institute of Technology (Japan).

Research outputs were exhibited at **FASHION X AI: 2022–2023 International Salon** at The Mills Fabrica (Hong Kong) and The Mills (London, UK) in 2023 through AiDLab, PolyU, and the RCA, as well as **The Jinjiang Footwear & Sports Industry Expo** in April 2023.

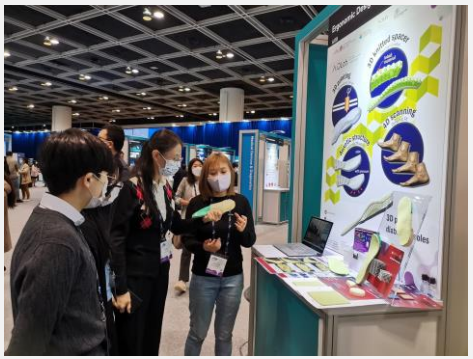
The Mills Fabrica



Fibro-Symposium 2022

FASHION X AI: 2022–2023 International Salon

The Jinjiang Footwear & Sports Industry Expo



Asia Summit on Global Health 2022

Research Dissemination | 02 Exhibitions and International Expos

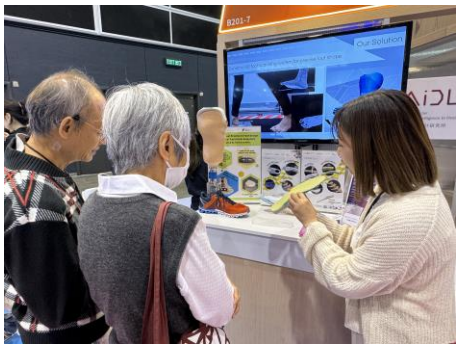
The footwear prototypes were also presented at the **AiDLab Innovations in Design Summit, TDC Fashion InStyle Exhibition, and Intertextile Shanghai Apparel Fabrics (Autumn Edition)** in August 2023; **Gerontech and Innovation Expo cum Summit** in November 2023; **Culture x AI Hong Kong Fashion Designers Show** in London in July 2024; and **Culture x AI 2024–2025: Culture and Future Mode** in January 2025.

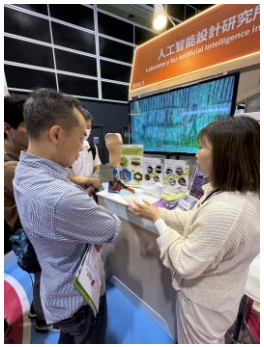
Culture X AI Exhibition

TDC Fashion InStyle Exhibition

Intertextile Shanghai Apparel Fabrics 2023

AiDLab Innovation in Design Summit 2023



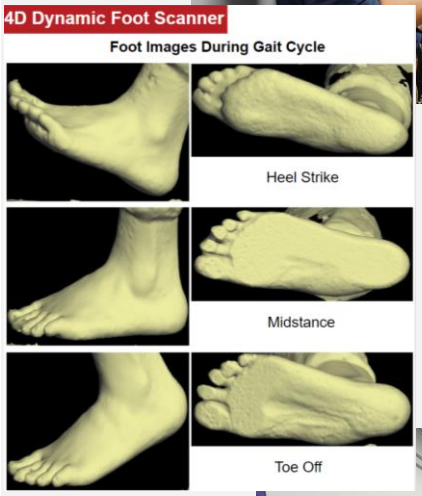


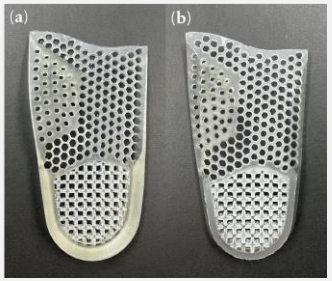
Gerontech and Innovation Expo cum Summit

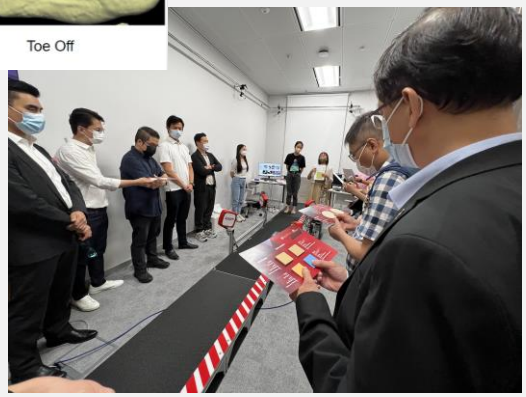
Research Dissemination | 03 Industry Visits

Dynamic foot scanning technology used in 3D insole design was introduced to industry partners and NGOs, among others.

- Hong Kong Sheng Kung Hui Welfare Council
- Esquel Group
- Hong Kong Trade Development Council (HKTDC) Garment Advisory Committee
- Hong Kong Catholic Diocesan Council (Secondary Section) Science Education Committee (HKCDCSEC)
- The Hong Kong Japanese Chamber of Commerce (textile group members)
- CMA Testing Centre
- Royal College of Art (RCA)
- Industry associations, including Hong Kong Intimate Apparel Industries' Association (HKIAIA), Hong Kong Knitwear Exporters & Manufacturers Association (HKKEMA), and so on







Institute of Active Ageing 活齡學院

INNOHK

AiDLab
Laboratory for Artificial Intelligence in Design
人工智能設計研究所

Research Dissemination | 04 Community Workshops or Seminars

A foot care seminar was held in the **Wong Tai Sin District Health Centre** in October 2022 to promote orthotic footwear and insoles for diabetic patients and to increase their awareness of daily foot care. In fact, 27 diabetic patients were enrolled in the seminar.

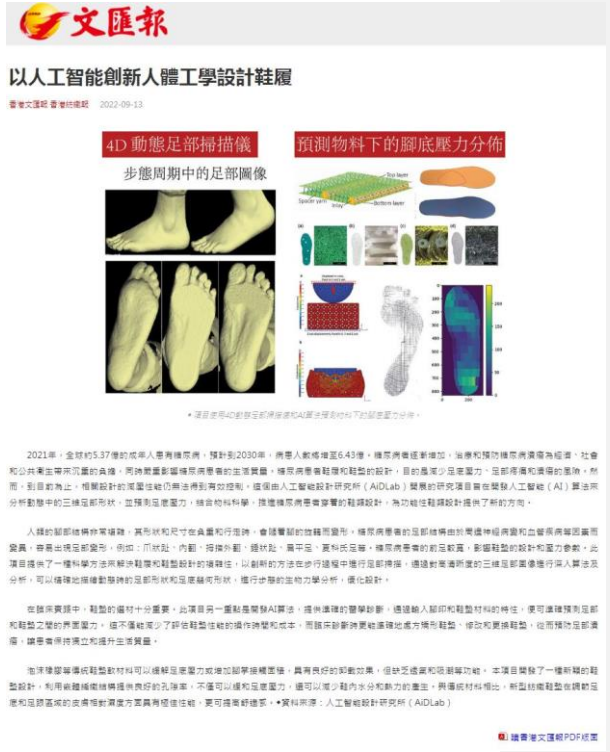
AI x Ergonomics workshops were organised in May 2023, to which over 40 participants were registered.

黃大仙
地區康健中心
Wong Tai Sin
District Health Centre

Strategic Partners:
HKSTP
the mills
南豐作坊 the mills fabrica

Research Dissemination | 05 Media Interviews

Media interviews were invited by **Television Broadcasts Limited (TVB) Innovation GPS** (TV programme) on 3 November 2022 and at **Radio Television Hong Kong** (RTHK's TV programme) in October 2022. Research outputs were also shared on different social media platforms (such as YouTube), newsletters, and newspapers, among others.



文匯報

以人工智能創新人體工學設計鞋履

香港文匯報 香港經濟報 2022-09-13

4D 動態足部掃描儀

步態周期中的足部圖像

預測物料下的腳底壓力分佈

項目使用 4D 動態足部掃描儀和 AI 算法預測物料下的腳底壓力分佈。

2021年，全球約5.37億的成年人患有糖尿病，預計到2030年，病患人數將增至6.43億，糖尿病者逐漸增加，治療和預防糖尿病導致的經濟，社會和公共衛生帶來沉重的負擔，同時嚴重影響糖尿病患者的生活質量，糖尿病患者鞋履和鞋墊的設計，目的是減少足底壓力、足部疼痛和潰瘍的風險，然而，到目前為止，相關設計的減壓性能仍無法得到有效控制，這個由人工智能設計研究所（AiDLab）開展的研究項目旨在開發人工智能（AI）算法來分析動態中的三維足部形狀，並預測足底壓力，結合物料學，推進糖尿病患者穿著的鞋類設計，為功能性鞋類設計提供了新的方向。

人類的腳部結構非常複雜，其形狀和尺寸在負重和行走時，會隨着腳的放鬆而變形。糖尿病患者的足部結構由於周邊神經病變和血管疾病等因素而變異，容易出現足部變形，例如：爪狀趾、內翻、拇指外翻、錘狀趾、扁平足、夏科氏足等，糖尿病患者的鞋墊和鞋履的設計和壓力參數，此項目提供了一種科學方法來解決鞋履和鞋墊設計的複雜性，以創新的方法在步行過程中進行足部掃描，通過對高清晰度的三維足部圖像進行深入算法及分析，可以精確地描繪動態時的足部形狀和足底幾何形狀，進行步態的生物力學分析，優化設計。

在臨床實踐中，鞋墊的選材十分重要，此項目另一重點是開發AI算法，提供準確的醫學診斷，通過輸入腳印和鞋墊材料的特性，便可準確預測足部和鞋墊之間的界面壓力，從而減少了評估鞋墊性能的操作時間和成本，而臨床診斷時更能準確地處方矯形鞋墊、修改和更換鞋墊，從而預防足部潰瘍，讓患者保持獨立和提升生活質量。

泡沫橡膠等傳統鞋墊軟材料可以緩解足底壓力或增加腳掌接觸面積，具有良好的卸載效果，但缺乏透氣和吸潮等功能，本項目開發了一種新穎的鞋墊設計，利用嵌體編織結構提供良好的孔隙率，不僅可以緩和足底壓力，還可以減少鞋內水分和熱力的產生，與傳統材料相比，新型納織鞋墊在調節足底和足跟區域的皮膚相對濕度方面具有極佳性能，更可提高舒適感。●資料來源：人工智能設計研究所（AiDLab）

讀香港文匯報PDF版面

B4 香港經濟報 WEN WEI PO

慶回歸 紡織及製衣界 創新科技手套阻病毒

以人工智能創新人體工學設計鞋履

2021年，全球約5.37億的成年人患有糖尿病，預計到2030年，病患人數將增至6.43億，糖尿病者逐漸增加，治療和預防糖尿病導致的經濟，社會和公共衛生帶來沉重的負擔，同時嚴重影響糖尿病患者的生活質量。糖尿病患者鞋履和鞋墊的設計，目的是減少足底壓力、足部疼痛和潰瘍的風險，然而，到目前為止，相關設計的減壓性能仍無法得到有效控制，這個由人工智能設計研究所（AiDLab）開展的研究項目旨在開發人工智能（AI）算法來分析動態中的三維足部形狀，並預測足底壓力，結合物料學，推進糖尿病患者穿着的鞋類設計，為功能性鞋類設計提供了新的方向。

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項目使用4D動態足部掃描儀和AI算法預測物料下的腳底壓力分佈。

資料來源：人工智能設計研究所（AiDLab）

A newspaper from Hong Kong Wen Wei Po
https://www.tkww.hk/epaper/view/newsDetail/1569385291276488704.html

Research Dissemination | 06 Research Collaborations

Research collaborations were established with the **University of Hong Kong–Shenzhen Hospital** and **Shenzhen University**. The proposed insole solution is extended to improve in-shoe comfort, breathability, cushioning, and foot protection for soccer and badminton teams.

Granted in collaboration with **the Hong Kong Community College**, research funding (HK$1 million) was secured to develop mycelium-based composites to enhance the mechanical and thermal properties for diabetic foot insoles, under the support of the UGC (FDS) Funding Scheme (2024–2026).

New InnoHK and SRFS projects have been established to expand the research into sport-specific insole design, with HK$4.6 million and HK$5.2 million in funding secured for 2025-2030, respectively.

香港大学深圳医院
The University of Hong Kong - Shenzhen Hospital

深圳大學
SHENZHEN UNIVERSITY

Research Dissemination | 06 Research Collaborations

A research collaboration was established with **Dr. Kong Footcare Limited** to support the project on an AI-based approach to designing customised orthotic insoles for children with flat feet.

Dr. Kong Footcare Limited is a global footwear company with retail stores across 12 countries or regions, including about 50 in Hong Kong and 800 in mainland China. The company offers professional footcare, foot-healthy shoes, footcare accessories, and foot assessment services.

In fact, **HK$330,000 in in-kind donations** was received for insole and footwear research collaborations.

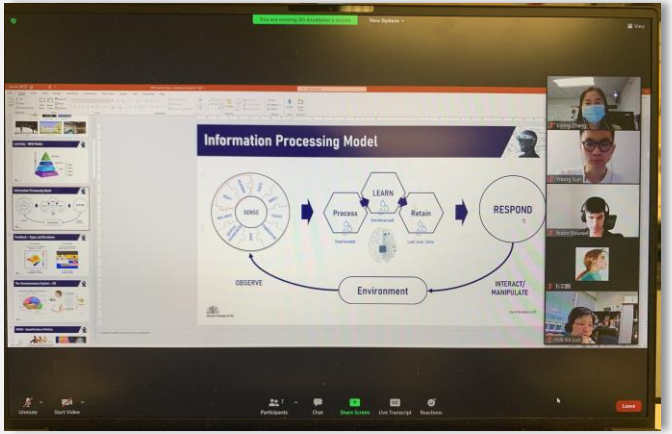
Research Dissemination | 07 Industry Collaboration

Industry Collaboration (February 2024)

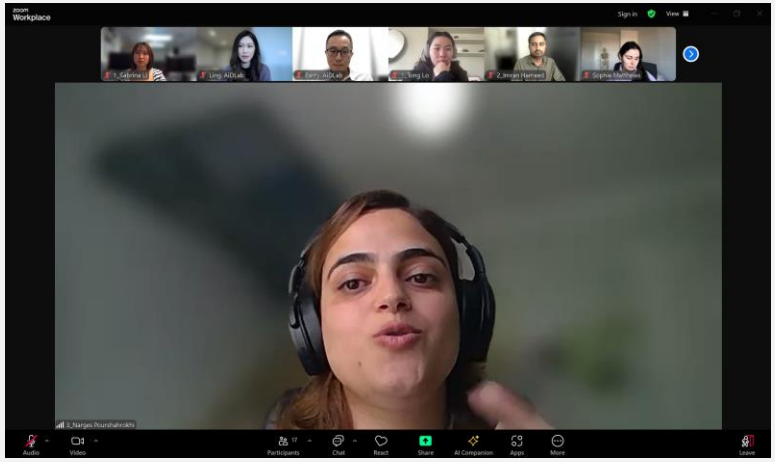
An industry collaboration was established with **Legacy Innovation Development Limited,** a leading insole manufacturer and material supplier, to support the development of diabetic insoles using the AI-assisted insole design system. The newly developed insoles have been launched in the market through an online shop with positive feedback from end users. Additionally, through foot care workshops, orthotic insoles were donated to diabetic patients via **Po Leung Kuk District Health Centres.** The company is also trying to extend its application to **elite athletes**.

Research Dissemination | 08 Ideation Meetings

Ideation meetings were held regularly with the **RCA in the UK** to exchange research ideas, experiences, and challenges between the teams of PolyU, the RCA, and AiDLab.



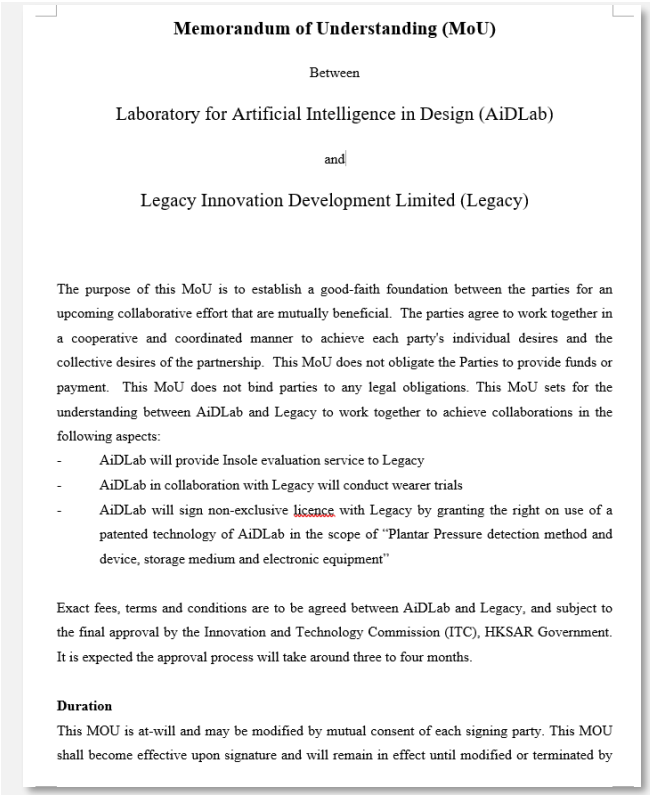
Royal College of Art



Research Dissemination | 09 Licensing Agreement

MoU and Licensing Agreement

An MoU and two licensing agreements were signed with **Legacy Innovation Development Limited** to improve the footwear insole design for individuals with specific footwear needs, such as the development of diabetic insoles and balance-enhancing geriatric slippers. Legacy Innovation Development Limited is a leading supplier of composite materials, offering design and manufacturing services to the sports and consumer product industries.



Memorandum of Understanding (MoU)

Between

Laboratory for Artificial Intelligence in Design (AiDLab)

and

Legacy Innovation Development Limited (Legacy)

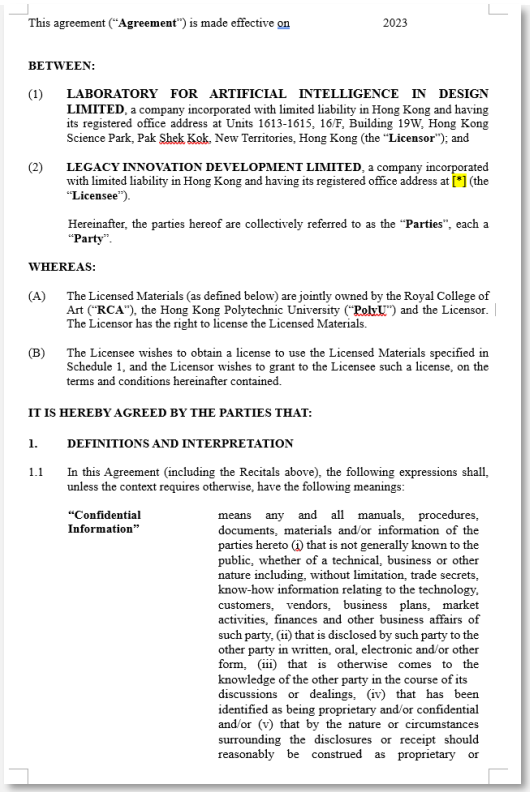
The purpose of this MoU is to establish a good-faith foundation between the parties for an upcoming collaborative effort that are mutually beneficial. The parties agree to work together in a cooperative and coordinated manner to achieve each party's individual desires and the collective desires of the partnership. This MoU does not obligate the Parties to provide funds or payment. This MoU does not bind parties to any legal obligations. This MoU sets for the understanding between AiDLab and Legacy to work together to achieve collaborations in the following aspects:

- AiDLab will provide Insole evaluation service to Legacy
- AiDLab in collaboration with Legacy will conduct wearer trials
- AiDLab will sign non-exclusive licence with Legacy by granting the right on use of a patented technology of AiDLab in the scope of "Plantar Pressure detection method and device, storage medium and electronic equipment"

Exact fees, terms and conditions are to be agreed between AiDLab and Legacy, and subject to the final approval by the Innovation and Technology Commission (ITC), HKSAR Government. It is expected the approval process will take around three to four months.

Duration

This MOU is at-will and may be modified by mutual consent of each signing party. This MOU shall become effective upon signature and will remain in effect until modified or terminated by



This agreement ("**Agreement**") is made effective on 2023

BETWEEN:

(1) **LABORATORY FOR ARTIFICIAL INTELLIGENCE IN DESIGN LIMITED**, a company incorporated with limited liability in Hong Kong and having its registered office address at Units 1613-1615, 16/F, Building 19W, Hong Kong Science Park, Pak Shek Kok, New Territories, Hong Kong (the "**Licensor**"); and

(2) **LEGACY INNOVATION DEVELOPMENT LIMITED**, a company incorporated with limited liability in Hong Kong and having its registered office address at [*] (the "**Licensee**").

Hereinafter, the parties hereof are collectively referred to as the "**Parties**", each a "**Party**".

WHEREAS:

(A) The Licensed Materials (as defined below) are jointly owned by the Royal College of Art ("**RCA**"), the Hong Kong Polytechnic University ("**PolyU**") and the Licensor. The Licensor has the right to license the Licensed Materials.

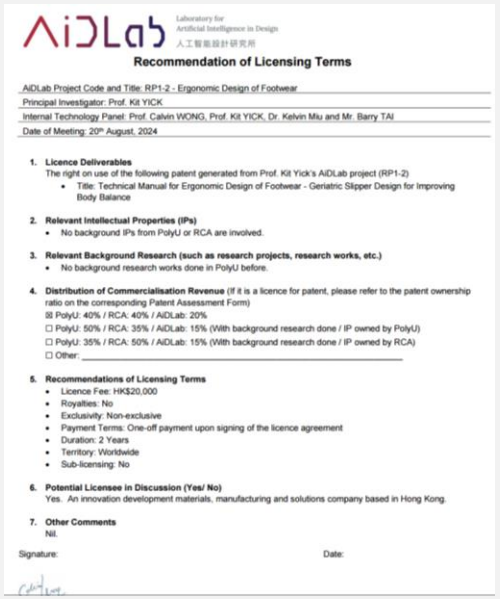
(B) The Licensee wishes to obtain a license to use the Licensed Materials specified in Schedule 1, and the Licensor wishes to grant to the Licensee such a license, on the terms and conditions hereinafter contained.

IT IS HEREBY AGREED BY THE PARTIES THAT:

1. DEFINITIONS AND INTERPRETATION

1.1 In this Agreement (including the Recitals above), the following expressions shall, unless the context requires otherwise, have the following meanings:

"Confidential Information" means any and all manuals, procedures, documents, materials and/or information of the parties hereto (i) that is not generally known to the public, whether of a technical, business or other nature including, without limitation, trade secrets, know-how information relating to the technology, customers, vendors, business plans, market activities, finances and other business affairs of such party, (ii) that is disclosed by such party to the other party in written, oral, electronic and/or other form, (iii) that is otherwise comes to the knowledge of the other party in the course of its discussions or dealings, (iv) that has been identified as being proprietary and/or confidential and/or (v) that by the nature or circumstances surrounding the disclosures or receipt should reasonably be construed as proprietary or



AiDLab Laboratory for Artificial Intelligence in Design 人工智能設計研究所

Recommendation of Licensing Terms

AiDLab Project Code and Title: RP1-2 - Ergonomic Design of Footwear
Principal Investigator: Prof. Kit YICK
Internal Technology Panel: Prof. Calvin WONG, Prof. Kit YICK, Dr. Kelvin Miu and Mr. Barry TAI
Date of Meeting: 20th August, 2024

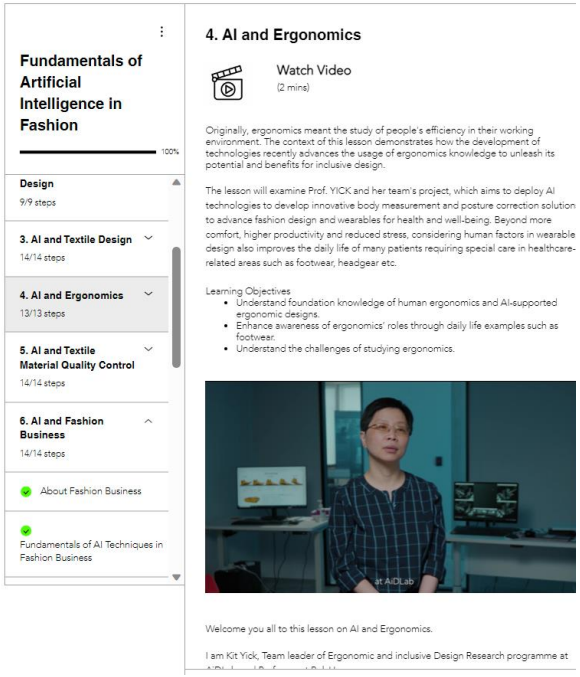
1. **Licence Deliverables**
   The right on use of the following patent generated from Prof. Kit Yick's AiDLab project (RP1-2)
   - Title: Technical Manual for Ergonomic Design of Footwear - Geriatric Slipper Design for Improving Body Balance
2. **Relevant Intellectual Properties (IPs)**
   - No background IPs from PolyU or RCA are involved.
3. **Relevant Background Research (such as research projects, research works, etc.)**
   - No background research works done in PolyU before.
4. **Distribution of Commercialisation Revenue** (If it is a licence for patent, please refer to the patent ownership ratio on the corresponding Patent Assessment Form)
   ☒ PolyU: 40% / RCA: 40% / AiDLab: 20%
   ☐ PolyU: 50% / RCA: 35% / AiDLab: 15% (With background research done / IP owned by PolyU)
   ☐ PolyU: 35% / RCA: 50% / AiDLab: 15% (With background research done / IP owned by RCA)
   ☐ Other: _____
5. **Recommendations of Licensing Terms**
   - Licence Fee: HK$20,000
   - Royalties: No
   - Exclusivity: Non-exclusive
   - Payment Terms: One-off payment upon signing of the licence agreement
   - Duration: 2 Years
   - Territory: Worldwide
   - Sub-licensing: No
6. **Potential Licensee in Discussion (Yes/ No)**
   Yes. An innovation development materials, manufacturing and solutions company based in Hong Kong.
7. **Other Comments**
   Nil.

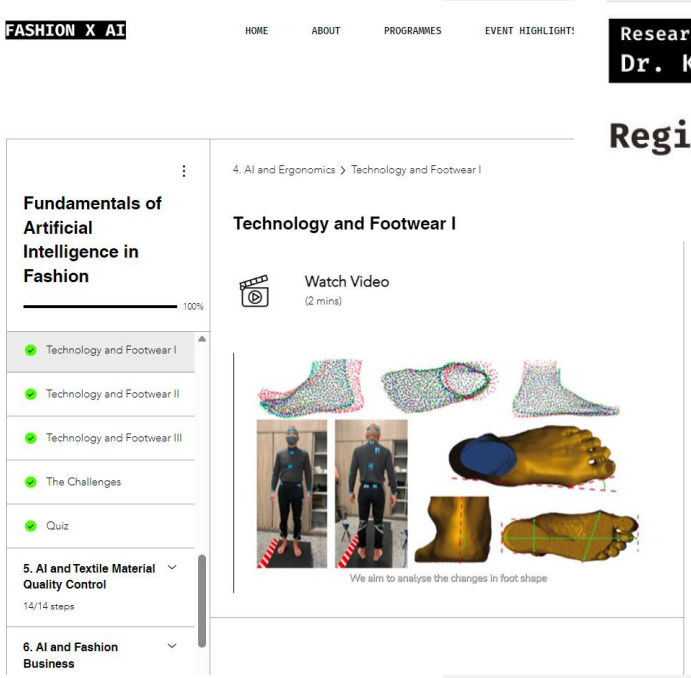
Signature: Date:

Research Dissemination | 010 Fashion x AI: MOOC

AI x Ergonomics: MOOC

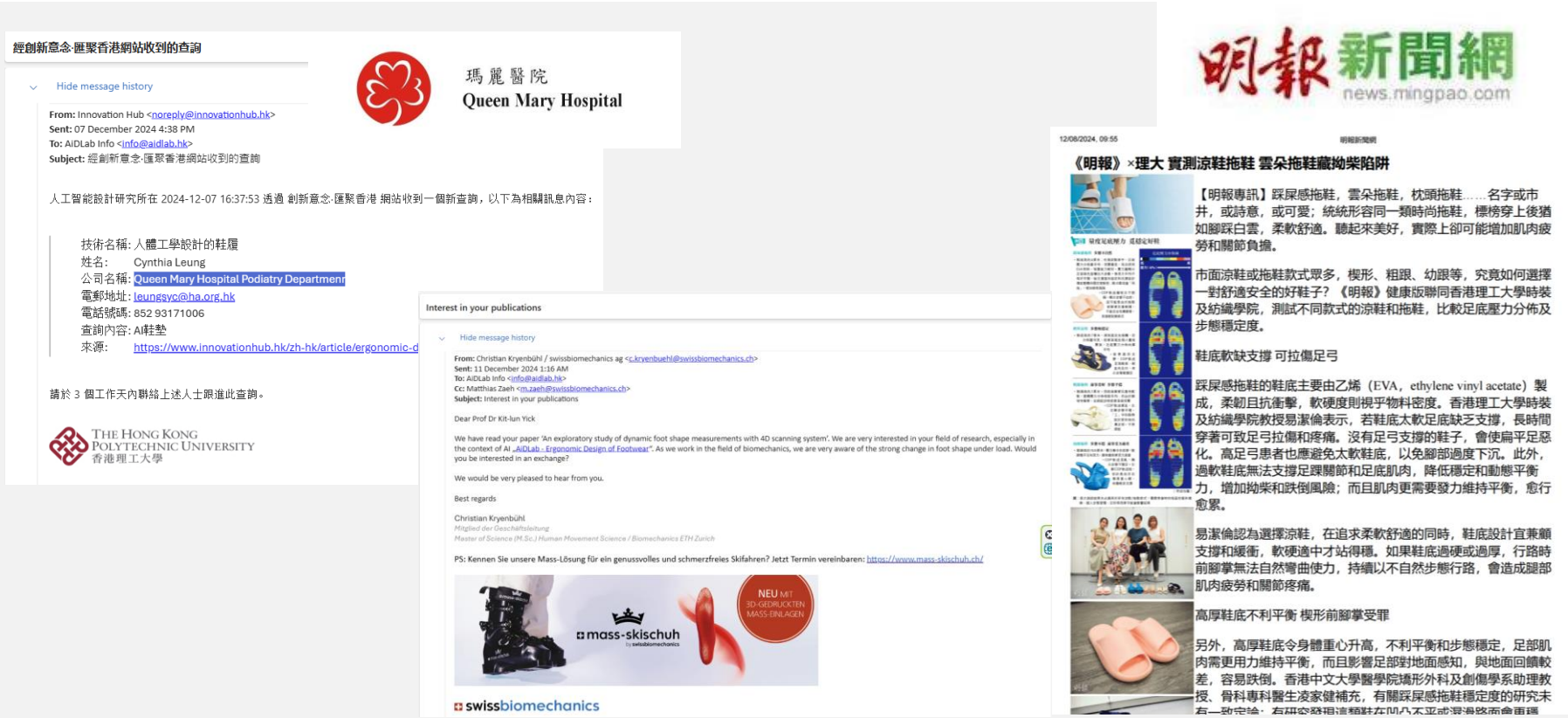
A MOOC module of AI and footwear design under Fashion x AI was launched in July 2023. Over **300** people registered for the online courses. Examples of ergonomic designs, the challenges in studying ergonomics, AI-supported ergonomic designs, and the latest technology for footwear design, among other topics, were discussed.



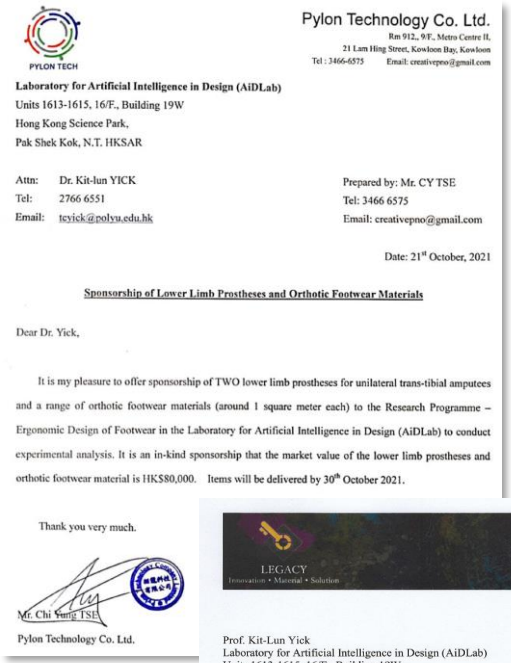


Research Dissemination | 011 Contacting Local Hospitals, Media, and an Overseas Footwear Company

The project not only attracted interest from local footwear companies but also received research inquiries from the Podiatry Department of **Queen Mary Hospital** in Hong Kong, a **local newspaper (MingPao)** for footwear biomechanics evaluation, and **swissbiomechanics** AG, a Swiss company specialising in biomechanical analysis and orthotic solutions.



Appendices I | In-Kind Sponsorships From Industry Partners



Pylon Technology Co. Ltd.
Rm 912., 9/F., Metro Centre II,
21 Lam Hing Street, Kowloon Bay, Kowloon
Tel : 3466-6575 Email: creativepro@gmail.com

Laboratory for Artificial Intelligence in Design (AiDLab)
Units 1613-1615, 16/F., Building 19W
Hong Kong Science Park,
Pak Shek Kok, N.T. HKSAR

Attn: Dr. Kit-lun YICK
Tel: 2766 6551
Email: tcyick@polyu.edu.hk

Prepared by: Mr. CY TSE
Tel: 3466 6575
Email: creativepro@gmail.com

Date: 21st October, 2021

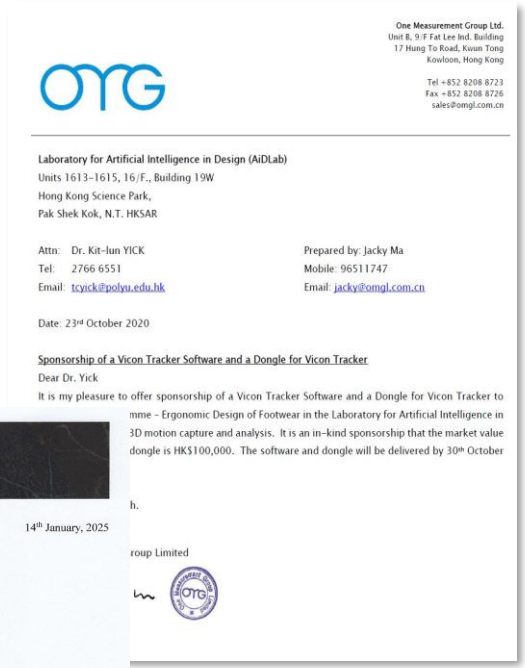
Sponsorship of Lower Limb Prostheses and Orthotic Footwear Materials

Dear Dr. Yick,

It is my pleasure to offer sponsorship of TWO lower limb prostheses for unilateral trans-tibial amputees and a range of orthotic footwear materials (around 1 square meter each) to the Research Programme – Ergonomic Design of Footwear in the Laboratory for Artificial Intelligence in Design (AiDLab) to conduct experimental analysis. It is an in-kind sponsorship that the market value of the lower limb prostheses and orthotic footwear material is HK$80,000. Items will be delivered by 30th October 2021.

Thank you very much.

Mr. Chi Yung TSE
Pylon Technology Co. Ltd.



One Measurement Group Ltd.
Unit B, 9/F Fat Lee Ind. Building
17 Hung To Road, Kwun Tong
Kowloon, Hong Kong
Tel +852 8208 8723
Fax +852 8208 8726
sales@omgl.com.cn

Laboratory for Artificial Intelligence in Design (AiDLab)
Units 1613-1615, 16/F., Building 19W
Hong Kong Science Park,
Pak Shek Kok, N.T. HKSAR

Attn: Dr. Kit-lun YICK
Tel: 2766 6551
Email: tcyick@polyu.edu.hk

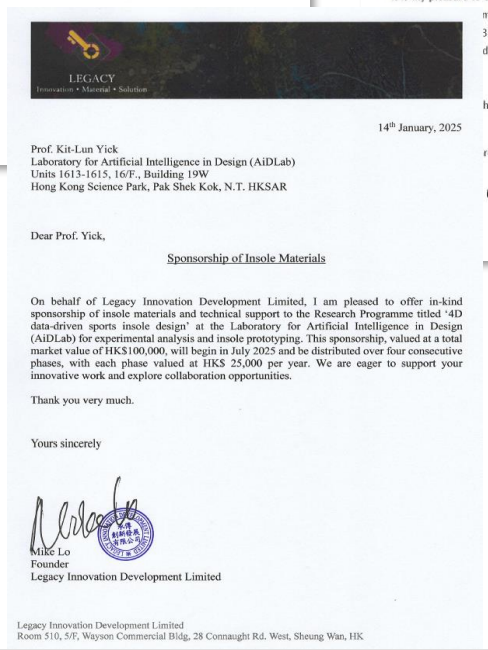
Prepared by: Jacky Ma
Mobile: 96511747
Email: jacky@omgl.com.cn

Date: 23rd October 2020

Sponsorship of a Vicon Tracker Software and a Dongle for Vicon Tracker

Dear Dr. Yick

It is my pleasure to offer sponsorship of a Vicon Tracker Software and a Dongle for Vicon Tracker to
mme – Ergonomic Design of Footwear in the Laboratory for Artificial Intelligence in
3D motion capture and analysis. It is an in-kind sponsorship that the market value
dongle is HK$100,000. The software and dongle will be delivered by 30th October
h.
roup Limited



LEGACY
Innovation • Material • Solution

14th January, 2025

Prof. Kit-Lun Yick
Laboratory for Artificial Intelligence in Design (AiDLab)
Units 1613-1615, 16/F., Building 19W
Hong Kong Science Park, Pak Shek Kok, N.T. HKSAR

Dear Prof. Yick,

Sponsorship of Insole Materials

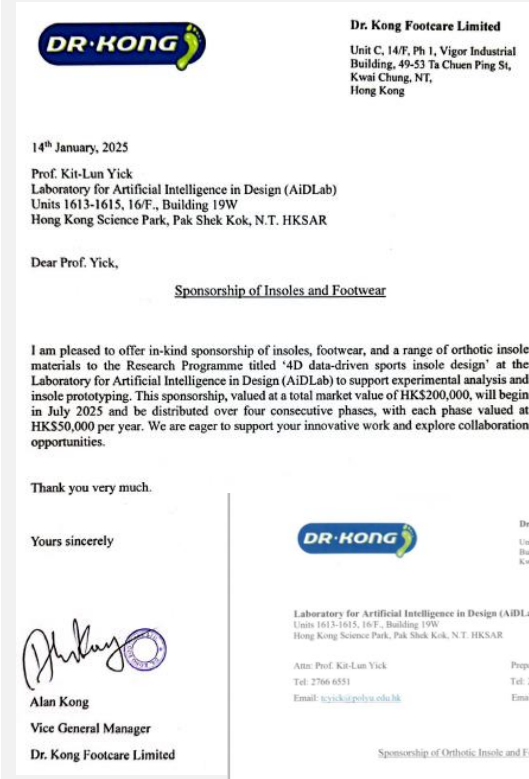
On behalf of Legacy Innovation Development Limited, I am pleased to offer in-kind sponsorship of insole materials and technical support to the Research Programme titled '4D data-driven sports insole design' at the Laboratory for Artificial Intelligence in Design (AiDLab) for experimental analysis and insole prototyping. This sponsorship, valued at a total market value of HK$100,000, will begin in July 2025 and be distributed over four consecutive phases, with each phase valued at HK$ 25,000 per year. We are eager to support your innovative work and explore collaboration opportunities.

Thank you very much.

Yours sincerely

Mike Lo
Founder
Legacy Innovation Development Limited

Legacy Innovation Development Limited
Room 510, 5/F, Wayson Commercial Bldg, 28 Connaught Rd. West, Sheung Wan, HK



Dr. Kong Footcare Limited
Unit C, 14/F, Ph 1, Vigor Industrial Building, 49-53 Ta Chuen Ping St, Kwai Chung, NT, Hong Kong

14th January, 2025

Prof. Kit-Lun Yick
Laboratory for Artificial Intelligence in Design (AiDLab)
Units 1613-1615, 16/F., Building 19W
Hong Kong Science Park, Pak Shek Kok, N.T. HKSAR

Dear Prof. Yick,

Sponsorship of Insoles and Footwear

I am pleased to offer in-kind sponsorship of insoles, footwear, and a range of orthotic insole materials to the Research Programme titled '4D data-driven sports insole design' at the Laboratory for Artificial Intelligence in Design (AiDLab) to support experimental analysis and insole prototyping. This sponsorship, valued at a total market value of HK$200,000, will begin in July 2025 and be distributed over four consecutive phases, with each phase valued at HK$50,000 per year. We are eager to support your innovative work and explore collaboration opportunities.

Thank you very much.

Yours sincerely

Alan Kong
Vice General Manager
Dr. Kong Footcare Limited

Dr. Kong Footcare Limited
Unit C, 14/F, Ph 1, Vigor Industrial Building, 49-53 Ta Chuen Ping St, Kwai Chung, NT, HK

Laboratory for Artificial Intelligence in Design (AiDLab)
Units 1613-1615, 16/F., Building 19W
Hong Kong Science Park, Pak Shek Kok, N.T. HKSAR

Attn: Prof. Kit-Lun Yick
Tel: 2766 6551
Email: tcyick@polyu.edu.hk

Prepared by: Ian Leung
Tel: 2744 2638
Email: ian.leung@dr-kong.com.hk

Date: 18th April 2024

Sponsorship of Orthotic Insole and Footwear

Dear Prof. Yick,

It is my pleasure to offer in-kind sponsorship of orthotic insoles and footwear for flat foot children and a range of orthotic insole materials to the Research Programme - Ergonomic Design of Footwear in the Laboratory for Artificial Intelligence in Design (AiDLab) to conduct experimental analysis. It is an in-kind sponsorship that the market value of the materials, orthotic insoles and footwear is HK$150,000.

Thank you very much.

Yours sincerely

Ian Leung
Dr. Kong Footcare Limited

Appendices II | 02 Testimonials From Industry Partners and a Compliment Certificate From a Local Healthcare Centre

LEGACY
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Testimonials

Legacy Innovation Development Limited, as one of the leading providers for Composites Material and Product manufacturing, we are pleased to have had the opportunity to collaborate with Professor Yick Kit Lun, School of Fashion and Textiles, The Hong Kong Polytechnic University, on the AI-based footwear project. This research has revolutionized the way for our company adopt in insole design and development, providing us with invaluable insights into foot biomechanics and plantar pressure distribution in developing and assessing insole designs.

This collaboration allowed our company to objectively evaluate and improve insole designs for optimal fit, support, and comfort, enabling us to make necessary adjustments to insole designs for different foot types of diabetic patients. The project's AI-based approach has been scientifically in enhancing our product design process. This has not only improved the quality of our products, but also enhanced the well-being of the end-users.

The AI-based footwear project has contributed to our business development. Our customers appreciate the quantitative approach to better understanding the performance of the insole designs, and this has led to our customer loyalty and repeat purchases. Moreover, the project has positioned us as a company that seamlessly bends scientific research and customer well being with aesthetic design.

Yours faithfully,

Mike Lo
Founder
Legacy Innovation Development Limited
7 March 2024

LEGACY
Innovation · Material · Solution

Prof. Kit Lun Yick,
Laboratory for Artificial Intelligence in Design,
Unit 1613-15, 19W,
Hong Kong Science Park,
Pak Shek Kok, NT.,
Hong Kong

16 September 2024

Testimonial
AI-Based Insole Development System

We are delighted to provide this letter to endorse AI-based insole development system and confirm its value to us as an innovative technology that is enabling the customization of our existing insole design for diabetic patients and improving the quality of our products.

As one of the leading providers for composites material and product manufacturing in Hong Kong, with services to the sports, watch components, Auto parts, 3C parts and consumer product industries. This AI-based method has revolutionized the way for our company adopt in insole design and development, providing us with invaluable insights into foot biomechanics and plantar pressure distribution in developing and assessing insole designs.

In collaboration with Prof. Yick on the AI-based footwear project, we are confident to objectively evaluate and improve the insole designs of our products with optimal fit, support, and comfort, and enabling us to make necessary adjustments to insole designs for different foot types of diabetic patients. The project's AI-based approach has been scientifically in enhancing our product design process. This has not only improved the quality of our products, but also enhanced the well-being of the end-users.

Compared with the traditional method for insole development, this artificial intelligence-based technology has contributed to our business development. Our customers appreciate the quantitative approach to better understanding the performance of the insole designs, and this has led to our customer loyalty and repeat purchases. Moreover, the AI-based system has positioned us as a company that seamlessly bends scientific research and customer well being with aesthetic design.

Yours Sincerely

Mike Lo
Founder
Legacy Innovation Development Limited
Email: mikelo@legacy-innovation.com

保良局
PO LEUNG KUK

保良局 PO LEUNG KUK 方樹福堂 F.S.F.T. 兒童及青少年發展中心 Children & Youth Development Centre

感謝狀
Certificate of Appreciation

現將頒此狀予
This is presented to

Prof. Yick Kit Lun
School of Fashion and Textiles
The Hong Kong Polytechnic University
RP 1-2 Ergonomic Design of Footwear

以感謝其熱心公益，提供健康講座及糖尿病相關服務予保良局方樹福堂兒童及青少年發展中心
Thanks for provide Health talks and diabetes counseling services to
Po Leung Kuk F.S.F.T. Children & Youth Development Centre

二零二四年二月二十九日
29th Februray, 2024