

Pai Zheng

D.O.B.: 10th December 1988

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EDUCATION

- 10/2013 - present ***PhD Candidate in Mechanical Engineering***
(Oral defense scheduled on Sept. 29, 2017. Excellent thesis shortlisted)
Department of Mechanical Engineering, University of Auckland, New Zealand
- 09/2010 - 03/2013 ***Master Degree of Mechanical Engineering (1st place)***
School of Mechanical Engineering and Automation, Beihang University, China
- 02/2012 – 08/2012 ***Academic Exchange Programme (Erasmus Scholarship)***
Escuela Técnica Superior de Ingenieros Industriales (ESTII), Universidad Politécnica de Madrid, Spain
- 09/2006 - 07/2010 ***Dual Bachelor Degrees of Engineering (1st class honour)***
School of Material Science and Engineering (Major), Huazhong University of Science and Technology, China

School of Computer Science and Technology (Minor), Huazhong University of Science and Technology, China

AWARDS AND PRIZES

- Nanjing Overseas Talent Entrepreneurship Competition (Oceania) Winner's Prize (2017)
- 11th China 'Chunhui Cup' Innovation and Entrepreneurship Competition Winner's Prize (2016)
- 'Engineers in Clinic Residence' Project, University of Auckland Research Award (2015)
- University of Auckland and China Scholarship Council PhD programme Scholarship (2013 - 2017)
- 'Guanghua' Scholarship for Top Research Student in Beihang University Research Award (2013)
- European Union (EU) Erasmus Scholarship for Academic Exchange Scholarship (2012)
- Excellent Graduate of Huazhong University of Science and Technology Award (2010)

RESEARCH INTERESTS

My research interest lies in proposing and/or adopting **novel tools, methods, systems and technologies to enable personalised product design innovation**. How to effectively identify individual customer needs, decrease product development time span, reduce cost, and enhance user-experience in the context are critical to the success of end products. In order to achieve these goals, my previous work mainly focuses on the following **FOUR** aspects:

- Data-driven design innovation
- User-experience modelling
- Mass customisation and personalisation
- Intelligent decision making

RESEARCH EXPERIENCE

Project title: 'User-experience (UX) based Smart Product Co-design for Mass Personalisation' (No. 018044)
Duration: Oct. 2016 – present
Funding source: Department of Mechanical Engineering, University of Auckland, and approved by University of Auckland Human Participants Ethics Committee (UAHPEC)
Role: Lead researcher

- Undertook a 4-round human participation design study.
- Demonstrated the feasibility of the design study in enabling personalized SCP co-development.
- Acquired and analysed quantitative UX information during the co-design process of the product.
- Validated the effectiveness of the framework in eliciting latent needs in the co-development context.
- Captured user generated design data (e.g. breathe data) for smart, connected product design innovation.

Project title: 'UX-based Personalized Smart Wearable Device' (No. 10363749)
Duration: Oct. 2016 – Jan. 2017
Funding source: Department of Mechanical Engineering, University of Auckland
Industrial partner: Fisher & Paykel Healthcare Ltd.
Role: Lead researcher

- Developed an i-BRE smart respiratory mask prototype with smart functions (i.e. a mobile APP).
- Generated a data-driven mathematical model to detect different breathing patterns (e.g. running).
- Established a cloud-based Internet-of-Things (IoT) platform for real-time user breathing data monitoring.

Project title: 'One-of-a-Kind Product Development for Mass Personalisation in a Cloud-based Environment' (No. 201306020055)
Duration: Oct. 2013 – Sept. 2017
Funding source: University of Auckland and China Scholarship Council (CSC)
Industrial partner: Avanti Bikes, and Modo Curtains Ltd.
Role: Lead Researcher

- Proposed a generic UX-based cyber-physical product development framework.
- Implemented a cloud-based product configuration system prototype for commercial usage.
- Manage designer elicited or user generated design information in the product planning stage.
- Established a bi-level two-stage design process to enable product change modelling for personalisation.

Project title: 'NZ Accelerator' (<http://www.nzproductaccelerator.co.nz/en.html>)
Duration: 09/2016 – 08/2017
Funding source: Ministry of Business, Innovation and Employment of New Zealand
Role: Research assistant

- Mentored an undergraduate final year student in the 'IV project'.
- Assisted a PhD student in establishing the cyber-physical 3D printing process.
- Proposed a rough set-based fuzzy axiomatic design approach for additive manufacturing process selection.

Project title: 'Enabling Technology for Rapid Development of High Value-added Customised Products' (UOAX0723).
Duration: 10/2013 – 06/2014
Funding source: Foundation of Research, Science and Technology (FoRST) of New Zealand

Industrial partner: COMPAC Sorting Equipment Ltd.

Role: Research assistant

- Documented and analysed user functional requirements of fruit sorting machines.
- Developed a generic product family design method for high value-added customised product.

Project title: 'Computer-aided Design Process and Knowledge-based System in Mechanical Eng.'

Duration: 02/2012 – 08/2012

Funding source: Universidad Politécnica de Madrid, Spain

Industrial partner: Airbus.

Role: Research assistant

- Integrated conceptual design tools and MOKA methodology with the CATIA-v5 system.
- Conducted a knowledge-based application on the large aircraft (Airbus 320) empennage *y-bolt* design.

Project title: 'Key Technologies for i-Plane Aircraft Platform Development' (No. 2009AA043306)

Duration: 09/2010 – 01/2012

Funding source: National High Technology Research and Development Program of China

Role: Research assistant

- Developed a web application for i-Plane aircraft platform work plan monitoring.
- Obtained a patent for heterogeneous bill-of-materials (BOM) query in complex product system.

PUBLICATIONS

Patent

- Zhao G., **Zheng P.**, Yan G. R., and Wu B. B. A customised method for complex product, heterogeneous bill-of-materials (BOM) query (2012). *Chinese Patent No. CN102426587A*.

Peer-Reviewed Journal Publications

- **Zheng P.**, Yu, S. Q., Wang, Y. B., Zhong, R. Y., and Xu, X. User-experience based smart wearable product development for mass personalization: a case study (2017). *Procedia CIRP*, 63: 2-7.
- **Zheng P.**, Yu S.Q., Liu C., and Xu X. Personalized product configuration framework in an adaptable open architecture product platform (2017). *Journal of Manufacturing Systems*, 43: 422-435.
- **Zheng P.**, Lu Y., Xu X., and Xie S. Q. A system framework for OKP product planning in a cloud-based design environment (2017). *Robotics and Computer-Integrated Manufacturing*, 45: 73-85.
- **Zheng P.**, Wang Y. B., Xu X., and Xie S. Q. A novel weighted rough Set based fuzzy axiomatic design approach for the selection of AM process (2017). *International Journal of Advanced Manufacturing Technology*, 91 (5-8): 1977-1990.
- **Zheng P.**, Xu X., Xie S. Q. A weighted interval rough number based method to determining relative importance ratings of customer requirements in QFD product planning (2016). *Journal of Intelligent Manufacturing*, 1-14.
- **Zheng P.**, Torres, V. H., Ríos, J., and Zhao, G. Integration of conceptual design and MOKA into CATIA v5: a knowledge-based application for an aircraft *y-bolt* component (2013). *Applied Mechanics and Materials*, 271, 974-980.
- Zhou L. Z., **Zheng P.**, Xu X. and Zhou W. A novel AHP-TOPSIS integrated method for case-based retrieval in mechanical product design (2017). *International Journal of Product Development*. Accepted.

Book Chapter

- **Zheng P.**, Xu X., Xie S. Q., Integrate product planning process of OKP companies in the cloud manufacturing environment, in: *Advances in Production Management Systems: Innovative Production Management Towards Sustainable Growth*, Springer, 2015: 420-426.

Peer-Reviewed International Conference Papers

- **Zheng P.**, Yu, S. Q. and Xu, X. A personalized attribute determination process in a cloud-based adaptable product configurator, in: *ASME 2017 12th International Manufacturing Science and Engineering Conference collocated with the JSME/ASME 2017 6th International Conference on Materials and Processing*, 4-8 June, 2017, Los Angeles, U.S.
- **Zheng P.**, Xu X., and Xie S. Q. A weighted preference graph approach to analyze incomplete customer preference information in QFD product planning, in: *Industrial Engineering and Engineering Management (IEEM), 2016 IEEE International Conference on. IEEE*, 4-7 December, 2016, Bali, Indonesia: 1070-1074.
- **Zheng P.**, Xu X., and Xie S.Q., A rough set based QFD approach to analyze customer requirements of OKP companies in cloud manufacturing environment, in: *International Conference of Innovative Design and Manufacturing (ICIDM)*, 24-26 January, 2016, Auckland, New Zealand.
- **Zheng P.** and Xie S. Q., A rough set based fuzzy axiomatic design approach in evaluating customer-centric design alternatives, in: *Industrial Engineering and Engineering Management (IEEM), 2015 IEEE International Conference on*, 7-10 December, 2015, Singapore: 544-548. (*Best paper award shortlisted*)
- **Zheng P.**, Zhao G, Torres V H and Ríos, J. A knowledge-based approach to integrate Fuzzy Conceptual Design Tools and MOKA into a CAD system, in: *Computing and Convergence Technology (ICCCT), 2012 7th International Conference on. IEEE*, 3-5 December, 2012, Seoul, Korea: 1285-1291.
- Lin T., **Zheng P.** and Xu X. Cloud-connected smart wearables: a case study, in: *2017 International Conference on Computer and Industrial Engineering, CIE47 Proceedings*, 11-13 October, 2017, Lisbon, Portugal. (*Accepted and best paper award shortlisted.*)
- Yu, S. Q., **Zheng P.**, Yu C. Y., and Xu, X. Product-service family enabled product configuration system for cloud manufacturing, in: *ASME 2017 12th International Manufacturing Science and Engineering Conference collocated with the JSME/ASME 2017 6th International Conference on Materials and Processing*, 4-8 June, Los Angeles, U.S.
- Yuan L., Yu, S. Q., **Zheng P.**, Qiu L. M., Wang Y. B. and Xu X. VR-based product personalization process for smart products, in: *27th International Conference on Flexible Automation and Intelligent Manufacturing (FAIM)*, 27-30 June, Modena, Italy.
- Zeng F. F., Li B. M., **Zheng P.** and Xie S. Q. A modularized generic product model in support of product family modeling in one-of-a-kind production, in: *Mechatronics and Automation (ICMA), 2014 IEEE International Conference on. IEEE*, 3-6 August, 2014, Tianjin, China: 786-791.

Submitted Journal Papers/Status

- **Zheng P.**, Xu X., Lin T. J., Yu S. Q. Development of a data-driven design model for personalized smart, connected product co-development. *Computers & Industrial Engineering*. Submitted.
- **Zheng P.**, Wang, H. H., Sang, Z. Q., Zhong, R. Y., Liu, Y. K., Liu, C., Mubarok, K., Yu, S. Q., and Xu, X. Smart manufacturing systems for Industry 4.0 - a conceptual framework. *Frontiers in Mechanical Engineering*. First revision.
- Wang, Y. B., Blache R., **Zheng P.** and Xu X. A knowledge management system to support design for additive manufacturing using Bayesian networks. *ASME Journal of Mechanical Design*. First revision.

Drafts in writing

- Smart open architecture product: a new paradigm.

- User generated data driven design for personalised product innovation: a people analytics perspective.
- A Bayesian network-based game theory in the ETO-based open architecture product configuration system

RESEARCH SUPERVISION

- Summer Research Scholarship Student (Tzu-Jui Lin, University of Auckland)
Research Title: “Cloud-based Smart Wearable Device Applications: A Case Study”,
Role: Joint supervision with Professor Xun Xu.

TEACHING EXPERIENCE

- 03/2017 – 08/2017 Graduate Research Assistant (GRA) in ‘IV project’, i.e. undergraduate final year student project, entitled ‘Reconfigurable Platform for 3D Printers’.
- 03/2016 - 07/2016 Tutor in the undergraduate course of ‘MechEng 235, Design and Manufacture 1’.
- 09/2011 - 01/2012 Tutor in the undergraduate course of ‘Mechanisms and Machine Theory’.
- 07/2011 – 08/2011 Instructor for overseas graduate students participating in the International Graduate Summer School (IGSS), in Beihang University.

TECHNICAL SKILLS

- **CAD Software:** Solidworks, CATIA v5, Creo 3;
- **Web Development:** Javascript, PHP, HTML;
- **Cloud Deployment:** Amazon Web Service EC2;
- **Embedded System Toolkit:** Aduino Uno/101, Raspberry Pi 3 Model B, Metawear;
- **Programming Language:** JAVA, C, Matlab;
- **HCI Facilities:** Gazepoint GP3, G-tec EEG;
- **Data-mining Toolkit:** Weka, GeNIe;

INTERNATIONAL ASSOCIATION MEMBERSHIP

- Student Member, ASME, USA, since 2015
- Student Member, IEEE, USA, since 2015

JOURNAL/CONFERENCE REFEREES

- Journal of Intelligent Manufacturing
- International Journal of Production Research
- Multimedia Tools and Applications
- 2017 CIE Conference: 47th International Conference on Computers & Industrial Engineering
- 2017 Procedia CIRP: The 50th CIRP Conference on Manufacturing Systems.
- 2017 SME NAMRC: 45th North American Manufacturing Research Conference
- 2016 IEEE/ASME 12th International Conference on Mechatronic & Embedded Systems Applications
- 2016 ASME 12th International Conference on Innovative Design and Manufacturing

HOBBIES

Travel (16 countries); Taekwondo; Basketball; Swimming; Chess.

ACADEMIC REFEREES

Available upon request