Dr. Benjamin Hou

Contact Info

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Personal Statement

A technology enthusiast always seeking new and innovative ideas for the betterment of mankind. Quick to grasp new ideas and concepts, and develop innovative and creative solutions to problems. Very capable of working on owns initiative, have demonstrated high levels of motivation required to meet the tightest of deadlines while maintaining strong ability to perform effectively.

Education

2015 - 2019 **Imperial College London**, UK
PhD in MACHINE LEARNING AND BIOMEDICAL IMAGE ANALYSIS,
Thesis: "Machine Learning for Medical Image Reconstruction and Synthesis"
Supervisor: Dr. Bernhard KAINZ

2011 - 2015 **Imperial College London**, UK
MEng, BEng and ACGI in ELECTRICAL AND ELECTRONIC ENGINEERING,
Thesis: "A Wireless Transceiver and GUI for a Chemical/Electrical Sensor"
Supervisor: Prof. Christofer TOUMAZOU
GRADE: 2:1 Honors

2004 - 2011 **Dame Alice Owen's School**, Potters Bar
A-Levels: Mathematics (A*), Further Mathematics (A*), Chemistry (A), Physics (A)
11 GCSEs: 8 subjects A*-A Grade. Passed Mathematics with A* and English with B

Work Experience

Current
JUN 2022

National Institues of Health, Bethesda MD
Research Fellow in Artificial Intelligence & Machine Learning for Medical Imaging
- Core focus on Natural Language Processing in Radiology and Imaging Sciences
- Secondary focus on image segmentation for clinical diagnosis in ascites and lymphoma

MAY 2022
OCT 2019

Imperial College London
Research Associate in Artificial Intelligence & Machine Learning for Medical Imaging
- Core focus on Natural Language Processing in Chest X-ray Diagnosis
- Teaching Assistant for Courses: EE1-07, CO112, CO120.3 and CO317
- Supervising various UG/MSc Machine Learning Projects

APR-SEP 2014

Imagination Technologies
PowerVR Software Simulation Team (Industrial Placement)
- Worked as part of the PowerVR GPU team
- Performed simulation and verification of various modules in PowerVR Series 6 GPU

JUL-SEP 2013

Imperial College London
Undergraduate Research Opportunity Placement (UROP)
- Evaluated laboratory teaching equipment and experiments from National Instruments
- Analyzed, rewrote and restructured 2nd Year UG laboratory exercises to ensure continuity and error free course notes in order to provide a world-class learning experience for 2nd Year students
- Collaborated with academics to designate roles and responsibilities for running course

AUG 2012	London Olympics 2012 Games Maker Volunteer
	Print Record Distribution (Technology Team)
	• Worked in the PRD Department at the London Olympic Stadium for Athletics
	• Distribution of race results to the relevant organisational units within the venue
AUG 2010	GlaxoSmithKline (Nuffield Bursary)
	Business Analyst (R&D-IT)
	• Project Title: Investigation and Simplification of Analyst Software
	• The project requires investigation of the current infrastructure and implement opportunities of consolidation or simplification around a software called Analyst to save money for the Business Unit and Company
FEB 2009	University of Hertfordshire
	Laboratory Co-ordinator
	• Project Title: A Virtual Network Project
	• The project entails the design of a virtual LAN environment to support lab exercises

PUBLICATIONS

Reviewer: IEEE-{TMI|TBME|JBHI|CYBE}, Elsevier-BBE, ICCV, MICCAI, MedNeurIPS

2023

1. P. Mukherjee*, B. Hou*, R. B. Lanfredi, and R. M. Summers, "Feasibility of using the privacy-preserving large language model vicuna for labeling radiology reports," *Radiology*, vol. 309, no. 1, p. e231147, 2023. PMID: 37815442
2. X. Zhao and B. Hou, "High-fidelity image synthesis from pulmonary nodule lesion maps using semantic diffusion model," in *Medical Imaging with Deep Learning, short paper track*, 2023
3. L. Liu, B. Hou, M. Nag, J. Liu, N. Hasani, T. Shen, Y. Zhu, F. Farhadi, T. Delie, M. A. Morris, B. Saboury, J. Xiao, and R. M. Summers, "Improving automatic segmentation of lymphoma with additional medical knowledge priors," in *2023 IEEE 20th International Symposium on Biomedical Imaging (ISBI)*, pp. 1–4, 2023
4. B. Hou, "High-fidelity diabetic retina fundus image synthesis from freestyle lesion maps," *Biomed. Opt. Express*, vol. 14, pp. 533–549, Feb 2023
5. M. K. Nag, J. Liu, S. Y. Shin, B. Hou, L. Liu, P. J. Pickhardt, J.-M. Lee, and R. M. Summers, "Improved ascites segmentation with bladder identification using anatomical location residual U-Net," in *Medical Imaging 2023: Computer-Aided Diagnosis* (K. M. Iftekharuddin and W. Chen, eds.), vol. 12465, p. 1246517, International Society for Optics and Photonics, SPIE, 2023

2022

1. B. Hou, M. K. Nag, J.-M. Lee, C. Koh, and R. M. Summers, "Segmentation of ascites on abdominal ct scans for the assessment of ovarian cancer," *MedNeurIPS Workshop*, 2022
2. L. Schmidtke, B. Hou, A. Vlontzos, and B. Kainz, "Self-supervised 3d human pose estimation in static video via neural rendering," in *ECCV Workshops (3)*, vol. 13803 of *Lecture Notes in Computer Science*, pp. 704–713, Springer, 2022
3. H. M. Schlüter, J. Tan, B. Hou, and B. Kainz, "Natural synthetic anomalies for self-supervised anomaly detection and localization," in *ECCV (31)*, vol. 13691 of *Lecture Notes in Computer Science*, pp. 474–489, Springer, 2022
4. J. Tan, B. Hou, J. Batten, H. Qiu, and B. Kainz, "Detecting outliers with foreign patch interpolation," *Machine Learning for Biomedical Imaging*, vol. 1, 2022
5. D. Zimmerer, P. M. Full, F. Isensee, P. Jäger, T. Adler, J. Petersen, G. Köhler, T. Roß, A. Reinke, A. Kascenas, B. S. Jensen, A. Q. O'Neil, J. Tan, B. Hou, J. Batten, H. Qiu, B. Kainz, N. Shvetsova, I. Fedulova, D. V. Dylov, B. Yu, J. Zhai, J. Hu, R. Si, S. Zhou, S. Wang, X. Li, X. Chen, Y. Zhao, S. N. Marimont, G. Tarroni, V. Saase, L. Maier-Hein, and K. H. Maier-Hein, "MOOD 2020: A public benchmark for out-of-distribution detection and localization on medical images," *IEEE Trans. Medical Imaging*, vol. 41, no. 10, pp. 2728–2738, 2022

2021

1. B. Hou, G. Kaissis, R. M. Summers, and B. Kainz, "RATCHET: medical transformer for chest x-ray diagnosis and reporting," in *MICCAI (7)*, vol. 12907 of *Lecture Notes in Computer Science*, pp. 293–303, Springer, 2021

2. J. Tan, T. Kart, B. Hou, J. Batten, and B. Kainz, "Metadetector: Detecting outliers by learning to learn from self-supervision," in *MIDOG/MOOD/Learn2Reg@MICCAI*, vol. 13166 of *Lecture Notes in Computer Science*, pp. 119–126, Springer, 2021

3. J. Tan, B. Hou, T. Day, J. M. Simpson, D. Rueckert, and B. Kainz, "Detecting outliers with poisson image interpolation," in *MICCAI (5)*, vol. 12905 of *Lecture Notes in Computer Science*, pp. 581–591, Springer, 2021

4. H. Reynaud, A. Vlontzos, B. Hou, A. Beqiri, P. Leeson, and B. Kainz, "Ultrasound video transformers for cardiac ejection fraction estimation," in *MICCAI (6)*, vol. 12906 of *Lecture Notes in Computer Science*, pp. 495–505, Springer, 2021

5. J.-H. Son, A. Alansary, D. Rueckert, B. Kainz, and B. Hou, "Synthesis of diabetic retina fundus images using semantic label generation," in *Medical Imaging with Deep Learning*, Lübeck, 2021

2020

1. A. Vlontzos, S. Budd, B. Hou, D. Rueckert, and B. Kainz, "3d probabilistic segmentation and volumetry from 2d projection images," in *TIA@MICCAI*, vol. 12502 of *Lecture Notes in Computer Science*, pp. 48–57, Springer, 2020

2. N. Miolane, N. Guigui, A. L. Brigant, J. Mathe, B. Hou, Y. Thanwerdas, S. Heyder, O. Peltre, N. Koep, H. Zaatiti, H. Hajri, Y. Cabanes, T. Gerald, P. Chauchat, C. Shewmake, D. Brooks, B. Kainz, C. Donnat, S. Holmes, and X. Pennec, "Geomstats: A python package for riemannian geometry in machine learning," *Journal of Machine Learning Research*, vol. 21, no. 223, pp. 1–9, 2020

3. N. Miolane, N. Guigui, H. Zaatiti, C. Shewmake, H. Hajri, D. Brooks, A. Le Brigant, J. Mathe, B. Hou, Y. Thanwerdas, S. Heyder, O. Peltre, N. Koep, Y. Cabanes, T. Gerald, P. Chauchat, B. Kainz, C. Donnat, S. Holmes, and X. Pennec, "Introduction to Geometric Learning in Python with Geomstats," in *SciPy 2020 - 19th Python in Science Conference* (M. Agarwal, C. Calloway, D. Niederhut, and D. Shupe, eds.), (Austin, Texas, United States), pp. 48–57, July 2020

2019

1. B. Hou, A. Vlontzos, A. Alansary, D. Rueckert, and B. Kainz, "Flexible conditional image generation of missing data with learned mental maps," in *MLMIR@MICCAI*, vol. 11905 of *Lecture Notes in Computer Science*, pp. 139–150, Springer, 2019

2. H. Qiu, C. Qin, L. L. Folgoc, B. Hou, J. Schlemper, and D. Rueckert, "Deep learning for cardiac motion estimation: Supervised vs. unsupervised training," in *STACOM@MICCAI*, vol. 12009 of *Lecture Notes in Computer Science*, pp. 186–194, Springer, 2019

3. A. Alansary, O. Oktay, Y. Li, L. L. Folgoc, B. Hou, G. Vaillant, K. Kamnitsas, A. Vlontzos, B. Glocker, B. Kainz, and D. Rueckert, "Evaluating reinforcement learning agents for anatomical landmark detection," *Medical Image Anal.*, vol. 53, pp. 156–164, 2019

4. Q. Meng, J. Housden, J. Matthew, D. Rueckert, J. A. Schnabel, B. Kainz, M. Sinclair, V. A. Zimmer, B. Hou, M. Rajchl, N. Toussaint, O. Oktay, J. Schlemper, and A. Gómez, "Weakly supervised estimation of shadow confidence maps in fetal ultrasound imaging," *IEEE Trans. Medical Imaging*, vol. 38, no. 12, pp. 2755–2767, 2019

2018

1. A. Alansary, O. Oktay, Y. Li, L. Le Folgoc, B. Hou, G. Vaillant, B. Glocker, B. Kainz, and D. Rueckert, "Evaluating reinforcement learning agents for anatomical landmark detection," in *Medical Imaging with Deep Learning*, Amsterdam, 2018

2. B. Hou, N. Miolane, B. Khanal, M. C. H. Lee, A. Alansary, S. G. McDonagh, J. V. Hajnal, D. Rueckert, B. Glocker, and B. Kainz, "Computing CNN loss and gradients for pose estimation with riemannian geometry," in *MICCAI (1)*, vol. 11070 of *Lecture Notes in Computer Science*, pp. 756–764, Springer, 2018

3. Y. Li, B. Khanal, B. Hou, A. Alansary, J. J. Cerrolaza, M. Sinclair, J. Matthew, C. Gupta, C. L. Knight, B. Kainz, and D. Rueckert, "Standard plane detection in 3d fetal ultrasound using an iterative transformation network," in *MICCAI (1)*, vol. 11070 of *Lecture Notes in Computer Science*, pp. 392–400, Springer, 2018

4. B. Hou, B. Khanal, A. Alansary, S. G. McDonagh, A. Davidson, M. A. Rutherford, J. V. Hajnal, D. Rueckert, B. Glocker, and B. Kainz, "3-d reconstruction in canonical co-ordinate space from arbitrarily oriented 2-d images," *IEEE Trans. Medical Imaging*, vol. 37, no. 8, pp. 1737–1750, 2018

5. A. Alansary, L. L. Folgoc, G. Vaillant, O. Oktay, Y. Li, W. Bai, J. Passerat-Palmbach, R. Guerrero, K. Kamnitsas, B. Hou, S. G. McDonagh, B. Glocker, B. Kainz, and D. Rueckert, "Automatic view planning with multi-scale deep reinforcement learning agents," in *MICCAI (1)*, vol. 11070 of *Lecture Notes in Computer Science*, pp. 277–285, Springer, 2018

6. Q. Meng, C. F. Baumgartner, M. Sinclair, J. Housden, M. Rajchl, A. Gómez, B. Hou, N. Toussaint, V. A. M. Zimmer, J. Tan, J. Matthew, D. Rueckert, J. A. Schnabel, and B. Kainz, "Automatic shadow detection in 2d ultrasound images," in *DATRA/PIPPI@MICCAI*, vol. 11076 of *Lecture Notes in Computer Science*, pp. 66–75, Springer, 2018

7. B. Khanal, A. Gómez, N. Toussaint, S. G. McDonagh, V. A. M. Zimmer, E. Skelton, J. Matthew, D. Grzech, R. Wright, C. Gupta, B. Hou, D. Rueckert, J. A. Schnabel, and B. Kainz, "Echofusion: Tracking and reconstruction of objects in 4d freehand ultrasound imaging without external trackers," in *DATRA/PIPPI@MICCAI*, vol. 11076 of *Lecture Notes in Computer Science*, pp. 117–127, Springer, 2018

2017

1. B. Hou, A. Alansary, S. G. McDonagh, A. Davidson, M. A. Rutherford, J. V. Hajnal, D. Rueckert, B. Glocker, and B. Kainz, "Predicting slice-to-volume transformation in presence of arbitrary subject motion," in *MICCAI (2)*, vol. 10434 of *Lecture Notes in Computer Science*, pp. 296–304, Springer, 2017

2. S. G. McDonagh, B. Hou, A. Alansary, O. Oktay, K. Kamnitsas, M. A. Rutherford, J. V. Hajnal, and B. Kainz, "Context-sensitive super-resolution for fast fetal magnetic resonance imaging," in *CMMI/RAMBO/SWITCH@MICCAI*, vol. 10555 of *Lecture Notes in Computer Science*, pp. 116–126, Springer, 2017

3. K. B. Mirza, C. Zuliani, B. Hou, F. S. Ng, N. S. Peters, and C. Toumazou, "Injection moulded microneedle sensor for real-time wireless ph monitoring," in *EMBC*, pp. 189–192, IEEE, 2017

INVITED TALKS

- **2022** - National Institutes of Health - "Multi-modal Learning with Chest Radiographs"
- **2020** - {U|I|K}CL Bio-imaging Symposia - "A.I. in Retinopathy Healthcare"
- **2019** - {U|I}CL Bio-imaging Symposia - "Generative Modelling in Medical Image"
- **2017** - Harbin Engineering University XinHai Forum - "Deep Learning in Medical Image Analysis"

AWARDS AND ACCOMPLISHMENTS

National Institutes of Health
- **2023** - Recipient of NIH Clinical Center CEO Awards
- **2023** - Winner of Fellows Award for Research Excellence (FARE)

Imperial College London
- **2022** - Team FIT - 1st Place Fetal Tissue Annotation and Segmentation Challenge (FeTA) at MICCAI
- **2021** - Virtual TCS New York City Marathon (Rank: 813 of 5117, Time: 3hr 45min 24sec)
- **2020** - Team FPI - 1st Place Medical Out-of-Distribution (MOOD) Analysis Challenge
- **2019** - MICCAI Student Travel Award for Outstanding Paper
- **2018** - 2nd Place Google Poster Competition
- **2017** - 2nd Place Google Poster Competition
- **2015** - Runners Up for Human Centered Design of Assistive and Rehabilitative Devices Group Project
- **2013** - Dialog Semiconductors Prize for Best 2nd Year Electronic Engineering Group Project
- **2012** - Farnell Prize (First Place) for 1st Year Electronic Engineering EE-Bug Group Project

Dame Alice Owens School
- **2012** - Selected to be an Olympic Volunteer (Games Maker)
- **2011** - Secondary School Prize for services to the school
- **2011** - Student lead research project to deploy student wireless hotspot
- **2010** - Nuffield Bursary Science Scheme at GlaxoSmithKline
- **2007** - Edge Hill University Mathematics Competition UK National Finalist

SKILLS

Software Engineering
- Proficient programmer in C/C++, Python and MATLAB
- Knowledgeable of TensorFlow and PyTorch Neural Network Libraries
- Knowledgeable of 3rd party libraries such as Intel TBB, OpenCL, OpenGL, SystemC, FFTW, Qt Framework, as well as cross-platform development via use of the CMake build system
- Experienced in algorithm development for Machine Learning and High Performance Computing

Hardware Engineering

- High experience in creating and fast prototyping hardware with Arduino, mbed and XBee, including writing device firmware for various Atmel AVR and ARM microprocessor
- Knowledgeable, with experience, in VHDL programming and FPGA development
- Have proficient soldering and design skills for PCBs, ProtoBoard and copper plane

Languages

- English and Chinese (Mandarin)

Miscellaneous

- Experienced with all kinds of computer Operating Systems (Windows, Mac and Linux)
- Proficient user of Office Applications and LaTeX
- Hands on experience with building, maintaining and troubleshooting computers and networks
- Enjoy other activities such as film, photography, piano, culinary, archery and triathlon

REFERENCES

References are available upon request.