Wenqiang Lai

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Education

Imperial College London *London, UK*
MSc in Applied Machine Learning *Oct 2021 - Oct 2022*

- Graduated with Merit
- Awarded Distinction for the Master thesis
- **Courses:** Machine Learning, Deep Learning, Probability and Stochastic Processes, Computer Vision and Pattern Recognition, Digital Image Processing, Self-Organising Multi-Agent Systems, Human-Centered Robotics and Adaptive Signal Processing and Machine Intelligence

University of Manchester *Manchester, UK*
BEng in Mechatronic Engineering *Sept 2018 - June 2021*

- Graduated with First-Class Honours
- Awarded 83% for the Final Year Project
- **Relevant Courses:** Mobile Robots and Autonomous Systems, Mechatronic Analysis and Design, Control Systems I & II, Applied Mechanics and Industrial Robotics

Publications

[1] **Wenqiang Lai**, Qihan Yang, Ye Mao, Endong Sun and Jiangnan Ye. Knowledge Distilled Ensemble Model for sEMG-based Silent Speech Interface. (Submitted to IEEE EUROCON 2023).

University Projects

1. Fall Detection using a Networked UWB Radar System *London, UK*
Supervisor: Prof T. Constandinou *Jan 2022 - Sept 2022*

- Delivered a real-time indoor fall detection system based on deep learning methods.
- Generated a dataset consisting of fall/non-fall samples from 10 subjects.
- Evaluated popular machine/deep learning methods (e.g., ResNet) in terms of classification accuracy, inference time and memory footprint.
- The best-performing method achieved a **test accuracy of 98.3%** with an **inference time of 4.63 ms** and **model size of 141 KB**.

2. Silent Speech Interface based on sEMG Sensors *London, UK*
Advisors: Prof K. Mikolajczyk and Dr A. Spiers *Oct 2021 - May 2022*

- Built a **robust and affordable (< £100)** silent speech interface (SSI) from scratch.
- Generated a dataset consisting of EMG data samples from 5 subjects.
- Trained popular machine/deep learning methods and evaluated their performance.
- Best-performing model achieved **86.1% test accuracy** on both PC and microcontroller.
- **Ranked first** among all groups from the same course.

3. Knowledge Distilled Ensemble Model for sEMG-based Silent Speech Interface *London, UK*
Advisors: Prof K. Mikolajczyk and Dr A. Spiers *June 2022 - Sept 2022*

- Extended previous work on SSI by using more sophisticated sEMG sensors to classify 26 NATO phonetic words.
- Proposed a deep learning method, which distills the knowledge from an ensemble voting classifier consisting of multiple 1D ResNet18.
- Best-performing method achieved **85.9% test accuracy**.
- Awarded **best student paper** in IEEE Student Paper Contest at 2022 IEEE ACDS conference.

4. Human-centred Robotics: CareBot *London, UK*
Advisor: Prof Y. Demiris *Jan 2022 - Apr 2022*

- Developed a robot to provide daily assistance (sending fall alert and help finding objects) to the elderly.
- Developed and deployed **navigation, fall detection & object finding modules** on Pepper.
- Pre-trained YOLOv4-tiny and MoveNet used to perform object detection and fall detection due to their superior speed.
- Used ROS to provide inter-module communication & distributed computing, MongoDB for data storage and Docker to ease development process.
- Presented the work in a live demo and compiled a technical report; awarded the **highest grade** amongst competitors.

5. Self-Organising Multi-Agent Systems: Simulation of *El hoyo* *London, UK*
Advisor: Prof J. Pitt *Jan 2022 - Apr 2022*

- Investigated the social behaviour of intelligent agents under resource constraints.
- Designed and implemented a type of agent based on **reinforcement learning (Policy Hill Climbing)** in Golang.
- Resulting agent **beat all other types of implementation** w.r.t. self-organising ability.

6. Deep Learning for Human Activity Recognition Optimised for Microcontroller *Manchester, UK*
Supervisor: Dr A. Casson *Sept 2020 - Apr 2021*

- Delivered an end-to-end system capable of recognising 6 human activities using wearable inertial sensors.
- Built & evaluated a set of CNN-based models using TensorFlow2.
- Compressed the best-performing model using quantization, making it **14.6x faster** and **3.9x smaller**.
- Successfully deployed the model on an Arduino with **only 1MB** CPU flash.

7. Autonomous Driving Embbeded System *Manchester, UK*
Advisor: Dr E. Alsusa *Sept 2019 - Mar 2020*

- Delivered a line-following buggy from scratch.
- Developed the control system based on PID algorithm to compensate sensor errors.
- Regretfully, this project was interrupted by COVID19 pandemic.

Work Experience

Huawei Technologies Co., Ltd. *Guangdong, China*
Software Engineer Intern *Jul 2021 - Sept 2021*

- Worked in the R&D team to deliver 5G signalling system using C++ based on Huawei cloud service engine.
- Ran meetings with senior engineers and managers regularly to ensure efficient development.
- Wrote scripts in Lua for policy management module (used less than 50% of allocated time).

Skills

Programming Python (Pandas, PyTorch, NumPy, Scikit-learn. etc.), C/C++, Go, Lua.
Miscellaneous Linux, Shell (Bash/Zsh), Docker, ROS, LaTeX(Overleaf), Microsoft Office, Git.
Soft Skills Time Management, Teamwork, Problem-solving, Engaging Presentation, Report Writing

Achievements

2023 **Top 5 Student Paper**, Student Paper Contest IEEE Region 8 *Italy*
2022 **Best Student Paper**, Local Student Paper Contest in Imperial College London *United Kingdom*
2018 **Gold Award**, UKMT Junior Mathematical Challenge *United Kingdom*

Languages

English Professional proficiency
Chinese Native proficiency
Italian Bilingual proficiency

References available upon request.