Lang Qin

Master of Science in Engineering (M.S.E), Johns Hopkins University
Research Interests: Neuroscience, Deep learning, Biomedical Signal Processing
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EDUCATION

08/2022-Present Johns Hopkins Whiting School of Engineering, United States
Johns Hopkins University

- Degree: Master of Electrical and Computer Engineering
- Courses: Machine Learning for Signal Processing (A+), Introduction To Nonlinear Systems (A+), Models of the Neuron (A), Introduction to Neuro-Image Processing (A), etc.

09/2018-05/2022 Sino-UK Joint Education Program, China
Glasgow College, University of Electronic Science and Technology of China

- Degree: Bachelor of Engineering **GPA: 3.57/4.00 and 83.99/100.00**
- Courses: Introduction to Neural Networks (93/100), Calculus (95/100), Microelectronics Systems (92/100), Probability Theory and Mathematical Statistics (95/100), Signals and Systems (91/100), etc.
- Scholarship: Model Student Scholarship (5%), 12/2019

07/2019-08/2019 **Faculty of Medicine, The University of British Columbia, Canada**

- Vancouver Summer Program
- Courses: Pharmacology Through Case Studies (85/100); Primary Literature Analysis in Science and Medicine (93/100)
- Awards: Outstanding Learner (3%), 08/2019

PUBLICATIONS

Paper I: An End-to-End 12-Leading Electrocardiogram Diagnosis System Based on Deformable Convolutional Neural Network with Good Antinoise Ability, ***Lang Qin (The First Author)****, Yuntao Xie, Xinwen Liu, Xiangchi Yuan, and Huan Wang*, IEEE Transactions on Instrumentation and Measurement (VOL.70), 04/2021, https://ieeexplore.ieee.org/document/9406046

Paper II: Automatic 12-Leading Electrocardiogram Classification Network with Deformable Convolution, *Yuntao Xie,* ***Lang Qin (The Co-First Author)****, Hongcheng Tan, Xinyang Li, Bisen Liu and Huang Wang,* the 43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC 2021), 11/2021, https://ieeexplore.ieee.org/document/9630227

Paper III: Deep Learning in ECG Diagnosis: A Review, *Xinwen Liu, Huan Wang, Zongjin Li, and* ***Lang Qin***, Knowledge-Based Systems (vol.227), 09/2021, https://doi.org/10.1016/j.knosys.2021.107187

Paper IV: Predicting ICU Interventions: A Transparent Decision Support Model Based on Multivariate Time Series Graph Convolutional Neural Network, *Zhen Xu, Jinjin Guo,* ***Lang Qin (The Corresponding Author)****, Yuntao Xie, Yao Xiao, Xinran Lin, Qiming Li and Xinyang Li,* IEEE Journal of Biomedical and Health Informatics (Under Revision)

Paper V: Separation of fascicles for motor unit separability in reinnervated muscles for neuroprosthesis application, ***Lang Qin (The First Author)****, Siyu Wang, Kiara N. Quinn, Pierce Perkins, Sami Tuffaha and Nitish V. Thakor,* 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS 2024), 7/2024

Paper VI: Channel selection and wavelet transformation-based data compression preserve motor unit information, *Siyu Wang, Kiara N. Quinn, Ariel Slepyan,* ***Lang Qin*** *and Nitish V. Thakor,* 46th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBS 2024), 7/2024

RESEARCH EXPERIENCES

03/2019-07/2019 **Deep Learning and Mathematical Modeling Research** **Independent Research**

- Project I: Fingerprint recognition system based on artificial intelligence (Patent)
- Project II: Tumor image segmentation technology based on deep learning (Evaluated as Sichuan Province Technical, Innovative, and Entrepreneurial Talents Nurturing Project)

11/2019-04/2022 **Electrocardiogram (ECG) Diagnostic System** **Independent Research**

- Initiated Wisdom Stars Research Team, an eight-member student run research team
  - Led the team to complete multiple research projects with the outcome of publishing four papers in SCI journals (including one in IEEE and three on Knowledge-Based Systems) and several conference papers, centering around EMBC, MICCAI, etc.
  - Completed the structural design of the ECG Diagnostic System

- Participated in the 6th China International College Students' 'Internet +' Innovation and Entrepreneurship Competition with another two schoolmates
  - Developed an ECG artificial intelligence diagnostic system based on DCN, which was able to automatically diagnose eight types of heart diseases with an accuracy rate of 86.3%
  - Was mainly responsible for the overall management of the project, network structure design, mathematical theory derivation, presentation, oral defense, etc.
  - **Won the Bronze Prize (National Level)**
  - Completed the software and website design of the ECG Diagnostic System to conclude the project
- Completed entrepreneurial proposals and sought possible investments
  - Was invited to the 2020 Convention on Exchange of Overseas Talents and the 22nd Guangzhou Convention of Overseas Chinese Scholars in Science and Technology
  - Negotiated with **Shanghai Pudong Software Park Investment Management Co., Ltd. (**https://www.spspvc.com.cn/**)**, a renowned investment corporation in the Pan-Asia-Pacific Region, for business cooperation (I gave it up because of academic study)

06/2021-07/2021 **Research at the ICU Center of Sichuan Provincial People's Hospital**
- Spent one month in this hospital as Doctor Hua Jiang's assistant, the Chief Physician at the Emergent and Critical Care Clinical Medicine Research Center
  - Observed and recorded real problems faced by the doctors and patients by making ward round
  - Conducted clinical research on stress hyperglycemia based on deep learning and digital twin (Under evaluation of Sichuan Province Technical, Innovative, and Entrepreneurial Talents Nurturing Project)
  - Inspired me to research the subsequent AI intervention in the ICU scenario

09/2021-09/2022 **UESTC-Sichuan Dadu River Electric Power Co., Ltd. Collaborative Project**
- Led a team of three to develop systems for hydropower measuring point data monitoring, intelligent archiving, check-in recognition in the conference, etc. (Paid 11,200 Yuan/Month)

04/2022-Present **Artificial Intelligence Intervention in the ICU Scenario Independent Research**
- Leading a team of seven to leverage the GCN (graph convolution) and Transformer as the basic architecture to solve problems in the fields that few researchers have studied
  - Proposer of the project, responsible for the basic model and controlling the progress of the project. Independently responsible for the algorithm design of the interpretability
  - **Patent: Lang, Qin. 2023. ICU auxiliary intervention means prediction method based on deep learning. CN. Patent Application 202211267598.1, filed January 2023. Patent Pending**
- Negotiated with UESTC officials and they agreed to provide a lab to support our research
- Participated in the 8th China International College Students' 'Internet +' Innovation and Entrepreneurship Competition with my team.
  - **Won the Bronze Prize (National Level)**

04/2023-Present **Investigation on Motor Unit Regeneration Advisor: Prof. Nithish Thakor**
- Exploring better neural reinnervation strategies based on VDMT surgery - using nerve fiber bifurcation to avoid competing effects
- Leading a team of four to complete multiple research projects of AI-based spike sorting (AISS). Attempts to solve existing problems such as high false positives and chronic monitoring, etc.

COURSE PROJECTS

02/2021-06/2021 **Team Design Project Advisor: Dr. Abdullah Al-Khalidi**
- Led a team of ten to complete mainboard design, power system design, and system engineering related tasks so that the intelligent vehicle could perform functions like line tracing, feeding fish, going up and down the slope, etc.
- Was mainly responsible for project management, algorithm design, budget control, and report writing

09/2021-05/2022 **Graduation Project Advisor: Prof. Xiaofan Zhang**
- Multi-round Dialogue System in Medical Scene Based on Entity Extraction (Simulated medical inquiry of dialogue system based on NLP)

EXTRACURRICULAR ACTIVITIES

09/2018-12/2020 Journalist Team, Glasgow College, UESTC
09/2018-12/2020 Sports Department, Student Council, Glasgow College, UESTC
09/2018-12/2020 Student Affairs Office, Student Council, Glasgow College, UESTC

ADDITIONAL EXPERIENCES

12/2020 **Worked as a reviewer in the 2nd International Conference on Artificial Intelligence, Information Processing and Cloud Computing (AIIPCC2021)**
07/2021 Won the Provincial- 2nd Grade Prize in the 2021 China-U.S. Young Maker Competition
10/2021 Won the Third-Grade Prize in the 2021 China Mobile Maker (Entrepreneurial) Marathon

12/2021 Won the Third-Grade Prize in the UESTC Innovative and Entrepreneurial Training Plan

TECHNICAL SKILLS

C, Python, MATLAB, PyTorch, etc.

INTERESTS

Archery: The Second Grade Prize in Sichuan Province (Group Category)
Performing Arts: Played the lead actor in a TV series produced by SCTV-7, a local TV station
Writing: The Second Grade Prize in the National *Shengtao Ye* Cup Writing Competition
APP Development: Developed a chatbot independently