Dongxuan **Li**

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Research Interests

I seek to utilize wearable sensing to improve the performances of hand gesture-based human-machine interaction. To that end, I leverage deep learning to enhance the accuracy and robustness of hand gesture recognition. Potential benefits include facilitating widespread upper limb rehabilitation assessment outside the clinic and enhancing the intention decoding ability of prosthetic hands.

Education

Shanghai Jiao Tong University *Shanghai, China*

M.S. Candidate, Robotics Institute, Mechanical Engineering *July. 2021 - Jun. 2024*

- Advisor: Prof. Peter Bradley Shull
- GPA: 3.69/4.00
- Research Topic: Wearable Sensing, Rehabilitation, Myoelectric Control

National Taiwan University *Taipei, China*

Visiting Student *Sep. 2018 - Jan. 2019*

- GPA: 4.00/4.00

Chongqing University *Chongqing, China*

B.S., Mechanical Engineering *Sep. 2017 - July. 2021*

- GPA: 3.87/4.00 Ranking: **2/318**

Publications

1. **D Li**, P Kang, K Zhu, J Li, PB Shull. (2023) Feasibility of Wearable PPG for Simultaneous Hand Gesture and Force Level Classification. *IEEE Sensors Journal*, 23 (6), 6008-6017 DOI

2. **D Li**, P Kang, Yang Yu, PB Shull. Graph-driven Simultaneous and Proportional Estimation of wrist angle and grasp force via Hign-Density EMG. *IEEE Journal of Biomedical and Health Informatics*. Under Review.

3. T Sun, **D Li**, B Fan, T Tan, PB Shull. (2023) Real-time ground reaction force and knee extension moment estimation during drop landings via modular LSTM modeling and wearable IMUs. *IEEE Journal of Biomedical and Health Informatics*. DOI

4. H Wang, **D Li**, K Liang, PB Shull. (2023) Subject-Independent Ankle Joint Power Estimation with Two IMUs During Flat and Inclined Walking. *2023 IEEE-EMBS International Conference on Body Sensor Networks – Sensors and Systems for Digital Health*.

5. K Zhu, J Li, **D Li**, B Fan, PB Shull. IMU Shoulder Angle Estimation: Effects of Sensor-to-Segment Misalignment and Sensor Orientation Error. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. Under Review.

6. J Li, K Zhu, **D Li**, P Kang, PB Shull. 3D Knee and Hip Angle Estimation with Three Wearable IMUs via Transfer Learning During Yoga, Golf, Swimming, Badminton, and Dance. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*. Under Review.

7. T Sun, T Tan, **D Li**, Bernd Markert, PB Shull, Franz Bamer. Influence of Number of Subjects and Number of Trials on Knee Moment Estimation via Deep-learning Models and Wearable IMUs during Drop Landings. *IEEE Sensors Journal*. Under Review.

Research Experience

Multi-task Hand Gesture Interaction Research Based on Wearable Sensing *Shanghai, China*

Team Leader *Sep, 2021 - Present*

- Proposed a multi-task deep learning model driven by graphical high-density EMG that could extract spatial-temporal features and map them to wrist angle and grasp force simultaneously and proportionally.
- Investigated and analyzed the feasibility of wearable PPG for simultaneous hand gesture and force level classification based on machine learning methods.

Estimation of Kinematic and Kinetic Parameters in Multi-locomotions *Shanghai, China*
TEAM MEMBER *Sep, 2021 - Present*

- Conducted experiments and developed algorithms for real-time ground reaction force and knee extension moment estimation during drop landing.
- Developed algorithms for ankle joint power estimation and movement classification with two IMUs.
- Investigated transfer learning methods to improve knee angle estimation accuracy.

Stair-climbing Wheelchair Robot *Chongqing, China*
TEAM LEADER *May, 2018 - May, 2019*

- Designed and optimized the mechanical structure of a bio-inspired stair-climbing wheelchair (National Utility Model Patent).
- Conducted Load analysis of wheelchair mechanical structure based on finite element analysis.

Awards

COMPETITIONS

2020 **Honorable Mention**, Mathematical Contest in Modeling
2019 **1st Prize**, The National Mathematics Competition of Chongqing Division
2019 **1st Prize**, Undergraduate Mathematics Contest in Modeling of Chongqing Division
2019 **2nd Prize**, The Zhou Peiyuan Mechanics Competition of Chongqing Division
2019 **1st Prize**, The 13th ICAN National Innovation and Entrepreneurship Competition

SCHOLARSHIPS

2021 **The Academic Scholarship for Postgraduate Freshmen**, Shanghai Jiao Tong University
2019 **National Scholarship (Top 1%)**, The Ministry of Education of China
2018 **The First Class Scholarship**, Chongqing University

HONORS

2021 **Outstanding Graduates of Chongqing**, Chongqing Municipal Education Committee
2020 **Outstanding Student in Innovation**, Chongqing University
2019 **Excellent Student**, Chongqing University

Teaching

Design and Manufacture II (4 Units) for undergraduate students *Shanghai, China*
TEACHING ASSISTANT, SHANGHAI JIAO TONG UNIVERSITY *Sep, 2022 - Jan 2023*

- Assisted the professor in course preparation, homework grading, and class organizing.
- Guided undergraduate students to finish their final mechanical design project.

Undergraduate Freshmen Class Management *Chongqing, China*
HEAD TEACHER, CHONGQING UNIVERSITY *Sep, 2020 - Sep 2021*

- Organized regular class meetings and lectures for freshmen.
- Answered undergraduate students' questions regarding study and career development.

International Companions for Learning *Taipei, China*
TEACHER, NATIONAL TAIWAN UNIVERSITY *Sep, 2018 - Jan 2019*

- Conducted weekly online English teaching with local primary school students in Taiwan.

Skills

Programming Python, MATLAB, C
Libraries Tensorflow, Pytorch, Scikit-learn
Applications Vicon Nexus, Solidworks, AutoCAD, SPSS, LATEX
Languages English (IELTS Overall 7.5, Listening: 7.5, Reading: 9, Writing: 7, Speaking: 6.5), Chinese (Native)