

Chenyu Gu

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RESEARCH INTERESTS

Medical & Surgical Robotics:

- Surgical robots, wearable and rehabilitation robotics, minimally invasive systems, data-driven robotics control.

Medical Devices & Digital Health:

- Wearable/portable devices, surgical navigation, tele-rehabilitation.

Biomechanics & Physiological Signals:

- Gait and locomotion analysis, motion tracking, multi-modal sensing and analysis.

EDUCATION

Georgia Institute of Technology

Atlanta, United States

M.S. in Bioengineering (ECE); GPA: 4.00/4.00

Aug 2024 – Present

Relevant coursework: Digital Control System, Finite Element Analysis.

Advisor: Dr. Jaydev Desai

Southern University of Science and Technology

Shenzhen, China

B.S. in Intelligent Medical Engineering; GPA: 3.82/4.00

Aug 2020 – Jun 2024

Relevant coursework: Medical Robotics, Principles of Electrical Circuits, Signals and Systems, Digital Signal Processing, Medical Imaging, Machine Learning, Neural Engineering, BCI.

Advisor: Dr. Mingming Zhang

KTH Royal Institute of Technology

Stockholm, Sweden

Exchange student in Electrical Engineering and Computer Science

Sep 2023 – Jan 2024

Relevant coursework: Principles of Wireless Sensor Networks, Social Robotics.

Advisor: Dr. Seraina Dual

PUBLICATIONS & PATENTS

- **C. Gu**, T. A. Brumfiel, N. Malhotra, and J. P. Desai, “Design and Modeling of a Polymer-based Hydraulic Continuum Robot for Minimal Invasive Surgery,” International Symposium on Medical Robotics (ISMR), 2026. (**Under review**)
- **Chenyu Gu**, Weicong Lin, Xinyi He, Lei Zhang, Mingming Zhang, “IMU-based motion capture system for rehabilitation applications: A systematic review,” *Biomimetic Intelligence and Robotics*, vol. 3, no. 2, p. 100097, 2023. DOI: 10.1016/j.birob.2023.100097. (Annual Best Paper Award) (**IF: 5.4**)
- **Chenyu Gu**, Yangyi Yu, Xinyi He, Lei Zhang, Zhen Xi, Yudong Liu, Guangheng Li, and Mingming Zhang, “A Portable Inertial Navigation System for Total Hip Arthroplasty Targeting Direct Anterior Approach,” in *IEEE Transactions on Instrumentation and Measurement*, doi: 10.1109/TIM.2025.3548784. (**IF: 5.9**)
- Li Guangheng, Zhang Mingming, Yu Yangyi, and **Chenyu Gu**. A joint replacement simulation device and a joint replacement simulation method. China CN118634071A, filed July 9, 2024, and issued September 13, 2024.
- Zhang Mingming, and **Chenyu Gu**. Human motion capture method, system and storage medium. China CN118870291A, filed July 9, 2024, and issued October 29, 2024.

RESEARCH EXPERIENCE

Design, modeling, and control of a hydraulically actuated robot

Atlanta, United States

Project Leader in RoboMed Lab Skills: CAD Modeling, Robotics Modeling & Control

Oct 2024 – Present

- Design and develop the overall architecture and structure of the hydraulic robotic system aiming for non-conductive, MRI safe environment.
- Formulate the physical model for the hydraulic robot and refine it with a data-driven model.
- Implement position feedback for accurate control and validate the model and control with experiment results.

Mechanism and actuation design of COAST Guidewire Robot

Atlanta, United States

Project Assistant in RoboMed Lab Skills: Circuit & PCB Design

Jul 2025 – Present

- Contributed to the development of a modified COAST robotic guidewire enabling active stiffness control to enhance steerability and safety in minimally invasive cardiovascular interventions.

- Led the electrical development of the system, including PCB and circuit design, wiring, and integration of sensors, actuators to enable precise robotic functionality.

Navigation System for Surgeries

Shenzhen, China

Project Leader in Brain-robot Rehabilitation Lab Skills: Software & Hardware Design

Feb 2023 – Jun 2024

- Designed a surgery navigation system with both hardware and software, enabling real-time tracking.
- Conduct experiments to validate the system's effectiveness in both validity and reliability.

Movement Analysis using IMU Sensors

Stockholm, Sweden

Visiting Student in Intelligent Heart Technology Lab Skills: Kalman Filter & Sensor Fusion

Oct 2023 – Jan 2024

- Extracted gait parameters and human center of mass to explore the relationship between human movement and cardiovascular function.
- Deployed a Kalman filter for orientation estimation, calibrated IMU angles, and developed algorithms for gait/COM extraction.

Motion Capture for Rehabilitation

Shenzhen, China

Project Leader in Brain-robot Rehabilitation Lab Skills: Signal Processing, Deep Learning

Apr 2022 – May 2024

- Integrated UWB technology and IMU to develop a motion capture system for human motion recovery.
- Developed Unity visualization and Python code for signal transmission, and applied deep learning for sparse motion capture.
- Evaluated the system's effectiveness on healthy subjects during rehabilitation exercises.

Center of Mass Estimation and Rehabilitation Applications

Shenzhen, China

Project Assistant in Brain-robot Rehabilitation Lab Skills: Data Analysis, Acquisition

Oct 2022 – Aug 2023

- Used IMU-based motion capture and Opensim to estimate the 3D center of mass for rehabilitation applications.
- Analyzed the center of mass to extract motion features and perform rehabilitation assessments.

WORKING & TEACHING EXPERIENCE

Graduate Teaching Assistant at Georgia Tech

Atlanta, United States

GTA for Machine Learning (CS 7641)

Fall 2025

- Held weekly office hours and review sessions to clarify concepts in supervised/unsupervised learning, reinforcement learning, and optimization.
- Grading homework assignments, projects, and exams for over 300 graduate students.

Department of Orthopedics, First People's Hospital

Shenzhen, China

Research Assistant

Jun 2023 – Aug 2023

- Conducted a clinical investigation to identify suitable navigation and measurement devices to support orthopedic surgeries.
- Performed clinical validation in the operating room and evaluated the functionality and reliability of the device.

Rehabilitation Center, Second People's Hospital

Shenzhen, China

Student Assistant

Aug 2022

- Assisted doctors in rehabilitation evaluations and facility setup for patient rehabilitation.
- Acquired familiarity with basic rehabilitation facilities and procedures.

AWARDS & ACHIEVEMENTS

Excellent Graduation Thesis Award (Top 10)

Jul 2024

"Internet Plus" Innovation and Entrepreneurship Competition

Aug 2023, Jul 2022

Excellent Team of "Sycamore Tree" Competition

May 2022

RoboMaster 2021 Robotics Mecha Master Super Competition (First Prize)

Sep 2021

"Fu Turui" Fellowship, Dept. of Biomedical Engineering (Top 3)

Oct 2021

First Prize Scholarship for Freshmen (Top 4)

Sep 2020

SKILLS & KNOWLEDGE

- **Laboratory:** FEM analysis, 3D printing, PCB design, Oscilloscope, Signal generator, Motion capture.
- **Programming:** Python (Data analysis and PyTorch), C (Embedded system), MATLAB, Simulink, Rust, Java.
- **Software:** ANSYS, Opensim, SolidWorks, Arduino, EasyEDA/Altium, Unity, Blender.
- **Tools:** Git, Neovim, Docker, Jupyter, VS Code, Adobe PS, Final Cut Pro, Microsoft Office.
- **Languages:** Chinese (Native speaker), English (Proficient), Japanese and French (Elementary).