Shuyuan Wang
王 澍 原

Mobile: (667) 677-1741
Email: swang340@jhu.edu
Website: https://shuyuanwang7.github.io/
Address: Baltimore, MD 21218

Education Background

Sept. 2022 - present	**Johns Hopkins University (JHU)** Department of Mechanical Engineering Master of Science in Engineering (expected)
Jun. 2021 - Sept. 2021	**Tsinghua University (THU)** Department of Mechanical Engineering Visiting Student
Sept. 2018 - July. 2022	**Southern University of Science and Technology (SUSTech)** Department of Mechanical and Energy Engineering Bachelor in Robotics Engineering

Research Experiences

A ROS Platform for Weakly Electric Fish Experiment   *Aug. 2023 – present*
Advisor: Prof. Noah J. Cowan

Utilizing the Robot Operating System (ROS), I incorporated high-framerate video capture, real-time animal tracking, and stepper trajectory control into the experimental apparatus, which supports exploring stimulus prediction and active sensing behavior of weakly electric fish, the species known for their ability to sense the surroundings through electric fields.

Design of a Continuum Loop Actuated Wire (CLAW) Robot for Needle Steering   *Jan. 2023 – Aug. 2023*
Advisor: Prof. Iulian I. Iordachita   Prof. Russell H. Taylor

Highlighting the challenges in delicate retinal procedures, the continuum wire manipulator is designed as a precision-driven solution for navigating the subretinal injections. I proposed a compact robotic design with four degrees of freedom, which is tested and modeled with twist, curl, and yaw motion. A ROS interface is set for further integration with the Steady-Hand Eye Robot system.

An MR Conditional Robot for Lumbar Spinal Injection   *May 2023 – Aug. 2023*
Advisor: Prof. Iulian I. Iordachita

A body-mountable robot is devised for lumbar injection in Magnetic Resonance (MR) conditions. I facilitated remote needle navigation by implementing a MATLAB GUI, which integrates motor control, medical image feedback, and real-time computation. Designing a 3D Unet for fiducial marker localization and registration, surpassing traditional computer vision methods.
* I generalized the same 3D Unet architecture to a cGAN for multi-phase brain MRI synthesis, which achieved minimal pixel-wise loss among 8 competition groups.

A Stretchable, Flexible, Robust Electrostatic Adhesion Device   *Sept. 2019 – July 2022*
Advisor: Prof. Hongqiang Wang

I designed a new type of super-deformation and self-healing electrostatic adhesion device to address low adsorption efficiency and easy damage to electrodes in harsh environments. The combination of soft material, fluid electrode, and alternating interdigital structure ensures safe and reliable human-machine interaction in unpredictable environments.

Deep Learning on Point Cloud of Aerospace Components for 3D Classification 🔗   *Jun. 2021 - Sept. 2021*

Advisor: Prof. Yiming Rong 🔗   Prof. Gang Wang 🔗   Prof. Zhenguo Nie 🔗

To reduce the treatment costs due to the trial-and-error methods, I introduced a deep neural network, which automates pairing 3D space launch vehicle components with similar heat processes. Employing the PointNet architecture and enhancing depth with the ResNet framework outputs a remarkable 96.88% accuracy.

Origami-Inspired Soft Pneumatic Actuating Robot 🔗   *Mar. 2021 - May 2021*

Advisor: Prof. Hongqiang Wang 🔗

To overcome the terrain limitation, I designed a soft pneumatic robot, featuring a bionic cat-tongue actuation pad and origami-inspired supporting legs, which won the IEEE RoboSoft 2021 Locomotion Competition.

Academic Achievements

Publication

Journal
- Liu, D., Li, G., Wang, S., Liu, Z., Wang, Y., Connolly, L., ... & Iordachita, I. (2024). An magnetic resonance conditional robot for lumbar spinal injection: Development and preliminary validation. The International Journal of Medical Robotics and Computer Assisted Surgery, 20(1), e2618.

Conference
- **Wang, S.**, Usevitch, D., Armand, M., & Iordachita, I. The Continuum Loop Actuated Wire (CLAW) – a Low-Cost Disposable Manipulator for Subretinal Injection. *International Conference on Robotics and Automation (ICRA)*. IEEE. (to be submitted)
- Liu, Z., **Wang, S.**, Liu, D., Li, G., & Iordachita, I. Autonomous Marker Localization for Lumbar Epidural Steroid Injection Robot. *IEEE International Conference on Robotic Computing (IRC)*. IEEE. (to be submitted)
- Fu, Y., **Wang, S.,** Fan, D., & Wang, H. (2019). A Soft and Robust Electroadhesive Device. *The 7th International Conference on Smart Materials and Nanotechnology in Engineering* 🔗

Grants
- National Undergraduate Training Program for Innovation and Entrepreneurship (202114325012): *Self-healing Mechanism of the Soft Electrostatic Adhesion Actuator.* PI: **Shuyuan Wang**. Time: 2021 – 2022.
- "Climbing Program" Special Funds for the Cultivation of Guangdong Province College Students' Scientific and Technological Innovation Special Funds (pdjh2021c0044): *Mechanism and Processing Method of Stretchable Soft Electrostatic Adhesion Unit.* PI: **Shuyuan Wang**. Time: 2020 – 2022.
- Collegial Undergraduate Training Program for Innovation and Entrepreneurship (2021X17): *In-Fiber Mach–Zehnder Interferometer Based on Er Doped Up-Taper and Peanut-Shaped Fiber Structure in Fiber Ring Laser.* PI: Shengjie Zhou. Time: 2021 – 2022.

Awards
- IEEE 4th International Conference on Soft Robotics Locomotion Competition Winner: *Origami-Inspired Soft Pneumatic Actuating Robot.* 2021
- "Challenge Cup" College Student Curricular Academic Science and Technology Works Competition Best Paper Award: *The Mechanism of a Stretchable Self-healing Electroadhesion Unit.* 2021
- Department of Mechanical and Energy Engineering Project Exhibition Outstanding Award (Top 3 of 113 teams): *A Bionic Hierarchical Electrostatic Adhesion Robot "Cell".* 2021

- Department of Mechanical and Energy Engineering Project Exhibition Second Prize Award (Top 20 of 113 teams): *Self-propelled Trolley Robot Processed by Computer Numerical Control (CNC).* 2021

Work Experience

Teaching Assistant   *Aug. 2023 – Dec. 2023*
EN.530.616 Introduction to Linear System Theory
Faculty: Prof. Louis L. Whitcomb
Duty: Leads office hours, gives lectures, and grades assignments.

Honors

Scholarships

2021	• First Class of the Merit Student Scholarship *(Top 2% at SUSTech)*
	• Excellent Student Service Scholarship *(Top 5 of 150 Students)*
2020	• Progress Scholarship
	• Advanced Sports Team Scholarship
2019	• Excellent Student Service Scholarship *(Top 5 of 150 Students)*
	• Popular Class Scholarship
	• Advanced Sports Team Scholarship
2018	• Third Class of the Merit Student Scholarship *(Top 10% at SUSTech)*

Honors

2022	• Outstanding Graduate Award of Southern University of Science and Technology
2021	• College Basketball Tournament Championship
	• Excellent Class Service *(Top 7 of 1050 Students)*
2020	• College Basketball Tournament Runner-Up
	• Excellent Youth Student *(Top 5% at SUSTech)*
2019	• Outstanding Intern of Advanced Actuators & Robotics Lab
	• College Basketball Tournament Championship
	• College Drama Contest Third Prize Award
	• Best Volunteer Award of SUSTech Emergency Rescue Association
2018	• Best Freshman Award
	• 31 Volunteer Hours
	• Class President *(2018 - 2022)*

Skills

Laboratory Experience
Soft Robots, Advanced Actuation, Motor Control, Sensorimotor, Deep Learning, Robot Operation System (ROS), Biomechanics, Medical Image Analysis, Mechanical Design and Fabrication, Embedded System, Convex Optimization, Legged Locomotion

Software Skills
Programming Language: Python, Java, C++, HTML
Engineering Programming: MATLAB, Robot Operating System, LabVIEW, Arduino
Machine Learning: PyTorch
Mechanical Design: SOLIDWORKS, AutoCAD, 3D Print, Photocuring
Simulation: CoppeliaSim (V-REP), Gazebo, Rviz, Drake, COMSOL
Visualization: 3D Slicer, MIPAV, OriginLab, Adobe Illustrator, Adobe Premiere