Guanyu CHEN

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EDUCATION

University of California, Los Angeles Los Angeles, CA
- PhD student in Mechanical Engineering at Bionics Lab *09/2023-present*
- Specialize in control of robotics at Henry Samueli School of Engineering

University of Pennsylvania Philadelphia, PA
- **Degree:** Master of Science in Mechanical Engineering and Applied Mechanics *09/2020-05/2022*
- School of Engineering and Applied Science
- **GPA:** 3.97/4.0

Southwest Jiaotong University (SWJTU) Chengdu, Sichuan
- **Degree:** Bachelor in Mechanical Engineering 09/2016-07/2020

  GPA: 3.94/4.0 **Core GPA:** 3.99/4.0 **Ranking:** 1/43

Relevant Courses

Undergraduate: Mechatronics and Measurement Systems Additive Manufacturing Design and Manufacture Vibration and Control Theory Finite Element Methods of Analysis Thermofluids Vehicle Engineering

Graduate: Applied Machine Learning Introduction to Robotics Control of Systems Distributive Control Introduction to MEMS and NEMS Design of Mechatronic Systems Advanced Dynamics Learning in Robotics

TECHNICAL SKILLS

SOLIDWORKS/UG MATLAB & Simulink C/C++ Python Linux Ansys Workbench Abaqus LabView 3d Printing Laser Cutting MS Office Adobe Premiere Motion Capture

ACADEMIC EXPERIENCE

Exoskeleton-Based Upper-Limb Rehabilitation at Bionics Lab| *Supervised by Prof. Jacob Rosen* *11/2021-06/2023*
- Developed a novel assist-as-needed algorithm that establishes an effort transmission cycle across different joints to naturally apply assistive and resistive effort on the severely and mildly impaired joints.
- Developed a control scheme based on constrained admittance controller, created the virtual tunnel at kinematics level to form the effort transmission cycle, and achieved the minimal assistance at the low-level controller.

Origami Swimmer Project in the GRASP Lab| *Supervised by Prof. Cynthia Sung* *11/2021-06/2023*
- Modified the design of the actuation system and wrote control code to make the actuation system more reliable.
- Derived the theoretical volume of the magic-ball-based swimmer using a constrained Delaunay function.
- Characterized the relationship between the experimental volume of the robot and its length.
- Characterized the drag coefficient of a scaled-down robot at different states:
  - Applied computer vision to extract the aspect ratio of the robot to ensure the shape consistency between the scaled-down model and the regular-sized one.
  - Converted the swimming speed of the robot to the wind speed in the wind tunnel using the Reynolds number.
- Investigated the influence of the combinations of different origami patterns and actuation settings on the thrust the robot can generate through analysis of variance.

Simultaneous Localization and Mapping (SLAM) Using the Humanoid THOR Built at Penn and UCLA *03/2023*
- Applied a particle filter with a low-variance resampling method to estimate the pose of the humanoid in Python.
- The estimated pose and the robot's cone of vision were used to update the likelihood of the occupation of the gridified map, after which the map was constructed based on that.
- After discovering the drawbacks of the low-variance resampling filter, a boids-inspired resampling method was proposed for an eye-tracking project.

Mechatronic Design and Fabrication of an Omnidirectional Vehicle| *Team Leader* *11/2021-12/2021*
- Designed the mechanical structure of the vehicle and the circuits for distance sensors, phototransistors, a Vive Lighthouse laser tracker signal receiver, a gripper, and steering systems.
- Fabricated the self-automated vehicle and wrote code to make it capable of traversing along walls without collision, tracking IR signals, positioning itself via the laser tracker, and being remotely controlled through a webpage.

Individual Engineering Project| *Graduation Thesis Supervised by Prof. Fang Liu* *09/2019-04/2020*
- Topic: Mechanism design and dynamics simulation of an insulator measurement robot on the high voltage transmission network.

- Designed the entire body including the robot base, crawling mechanism, and measurement mechanism among others.
- Built a kinematic model to discover the relationship between the rotational speed of the motors and the crawling speed of the robot.
- Built a dynamic model to investigate the force the robot exerts on the insulator surface and the torques that the motors are required to supply when the robot crawls at a certain speed.
- Implemented a finite element analysis to calculate the safety factor under different working conditions.

PUBLICATIONS

Guanyu Chen, et al. *Kinematic modeling and formability analysis of revolved bodies formed by origami waterbomb units based on a chain-like layer-building method*, 2024, Taylor & Francis: Advanced Robotics

Guanyu Chen, et al. *Drag Coefficient Characterization of the Origami Magic Ball*, 2023, ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE2023)

Zongheng Hong, Tao Yu, **Guanyu Chen**, et al. *Simulation Analysis on the Blade Airfoil of Small Wind Turbine*, 2019, IOP Conference Series: Earth and Environmental Science, **295** 012079

CHN PATENTS

Shunyi Wang, Kai Wei, Guanyu Chen, et al. *A Mechanical Structure Combining the Functions of Collision Prevention, Wave Elimination and Power Generation of Bridge Piers*, ZL 201910620619.5 07/2020

Guanyu Chen. *An Electromagnetic Rotor Without Rotating Shaft*, ZL 201822225037.0 12/2018

Guanyu Chen. *O-type Engine: Cylinder and Connecting Rod System*, ZL 201821272428.1 *08/2018*

Guanyu Chen and Haolin Li. *Rain-proof Bike Saddle*, ZL 201820717466.7 *05/2018*

INTERNSHIP

Beijing Jvchuangyi Technology Co., Ltd.| *Product Developer* *07/2019-08/2019*

- Designed and developed teaching aids that can transform between a simple geometric structure comprised of cubes and a more complicated spatial structure with only one or a few degrees of freedom.

Sichuan Shenkun Electro-hydraulic Control Technology Co., Ltd. (Subsidiary of CASC)| *Technician* *06/2018*

- Inspected the compatibility of engineering drawings of the parts from different companies.
- Completed modeling a steering engine's shell and an air inlet of a certain aircraft type among others.
- Added margins on raw materials according to engineering drawings before sending them into the CNC.

HONOR & PRIZE

- Outstanding Graduate Award *2020*
- Dean's List *2019*
- Special Scholarship *2018-2019*
- Elegant Star of National Scholarship *2018*
- Merit Student Award *2016-2019*
- Best Student in Mathematics Joint Prize *2017*
- National Scholarship *2017*
- Outstanding Team and Individual Award in Summer Social Practice *2017*
- Comprehensive Development Scholarship *2016-2017*