

# Luoyan Zhong

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## EDUCATION

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### University of Science and Technology of China (USTC)

September 2020 - June 2024 (expected)

*B.E. at School of Information Science and Technology, Major: Automation*

- **Overall GPA:** 3.98/4.3 (91.41/100). Ranking: 1/80
- **Selected Courses:** Basic Circuit Theory (96); Linear Electronic Circuits (91); Digital Logic Circuits(90); Nonlinear Electronic Circuits (95); Sensor Principles and Technology (93); Actuator Technology (97); Principles of Automatic Control (98); Computer Control (95); Design and Practice of Robot (A)
- **Intern Program:** B.S. intern in Computer Science at Cornell University (July 2023 - Jan 2024 expected)

## PUBLICATIONS

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1. **CushSense: Soft, Stretchable, and Comfortable Tactile Sensing Skin for Physical Human-Robot Interaction**  
Boxin Xu\*, **Luoyan Zhong\***, Grace Zhang, Xiaoyu Liang, Diego Virtue, Rishabh Madan, Tapomayukh Bhattacharjee.  
Submitted to 2024 IEEE International Conference on Robotics and Automation (**ICRA 2024**), under review
2. **RABBIT:A Robot-Assisted Bed Bathing System with Multimodal Perception and Integrated Compliance**  
Rishabh Madan\*, Skyler Valdez\*, David Kim, Sujie Fang, **Luoyan Zhong**, Diego Virtue, Tapomayukh Bhattacharjee  
Accepted by the 19th Annual ACM/IEEE Conference on Human Robot Interaction (**HRI 2024**)

## RESEARCH EXPERIENCES

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### Sensor Development and Application on Assistive Robotics

July 2023 – Present

*Cornell University, supervised by Prof. Tapomayukh Bhattacharjee.*

- **Whole-Arm Tactile Sensing Skin** ([code](#)) ([website](#))  
Developed a soft, stretchable, and comfortable tactile sensing skin
  - \* Contributed to the fabrication, circuit soldering and debugging of the skin
  - \* Designed the CDC board and implemented a well-organized wiring to alleviate crosstalk issue
  - \* Made a stretchable and tight outer layer to secure the taxel's position while enhancing the aesthetics of the skin
  - \* Conducted experiments about sensor characteristics and performance evaluation
  - \* Conducted experiments to validate the math model and adjusted it by considering the changes of the relative permittivity
  - \* Led a user study with 15 participants to evaluate the comfort and safety level of the skin
- **Robot-Assisted Bed Bathing System** ([website](#))  
Developed a robot-assisted bed bathing system with multimodal perception and integrated compliance
  - \* Conducted a literature review on compliance control and robot-assisted bathing system
  - \* Contributed to the fabrication of the end-effector with integrated springs and soft sponges
  - \* Performed a user study involving 12 participants, including an individual with multiple sclerosis
- **Assistive Device** ([presentation](#))  
Collaboration of human, assistive device, and a robot in operational/optimized transferring tasks
  - \* Modify a Hoyer lift to enable autonomous motion and perception through a web-based interface (ongoing)
- **Robot-Assisted Dressing**  
Develop control strategies for a robotic manipulator towards full-body dressing for manikins, and extend the technology towards safe dressing for care recipients with mobility limitations
  - \* Do the simulation in the RCareWorld (ongoing)  
(*RCareWorld is a human-centric simulation world for physical and social robot caregiving*)

### GG-CNN Implementation for Real-World Robot Grasping

January 2023 – June 2023

*USTC, supervised by Prof. Zhen Kan*

- Conducted a literature review on classic grasping strategies and read their source code
- Implemented GG-CNN on the robot arm Franka and conducted grasping tasks
- Integrated and fine-tuned the algorithm to ensure compatibility with the specific hardware and environment constraints

## TALKS & WORKSHOPS

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### NERC 2023: Northeast Robotics Colloquium

November 2023

Hosted by Yale University

### Robot Skin Workshop

August 2023

Hosted by [Hybrid Body Lab](#) from Cornell University and [Textiles Lab](#) from Carnegie Mellon University

## COMPETITION

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### RoboGame: Designed a Robocar from Scratch To Compete in a Curling Game

May 2022 – October 2022

USTC, supervised by Prof. [Erbaog Dong](#) ([code](#))

- Designed and built the main structure of the robocar using aluminum extrusion profiles and some 3D-printed components
- Executing the action of pushing out the curling stone using a pneumatic method
- Designed and fabricated a tracking disc to assist the robocar in reaching specific locations based on ground markings
- Utilized mecanum wheels to enable agile movement for the robocar and employed PID motion control algorithm
- Designed and printed PCB boards to enable system integration and easier wiring

## SELECTED COURSEWORK

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### Deep Learning Practice

September 2022 – January 2023

USTC, supervised by Prof. [Yueyi Zhang](#), Prof. [Xinwei Zheng](#), and Prof. [Zhiwei Xiong](#)

- Python Crawler & GUI ([code](#))
  - \* Implemented a crawler to gather information of tutors in USTC using Python
- Basic architecture of Deep Learning network ([code](#))
  - \* Learned basic components of CNN and its backpropagation process, and explored classic networks
  - \* Explored Evolutionary process of CNN by analyzing and comparing LeNet, AlexNet, ResNet
  - \* Made some changes to the structure of ResNet
- Reproduced the method proposed in [Oriented R-CNN](#) ([code](#))
  - \* Reproduced the network to generate high-quality oriented proposals which achieves 75.87% mAP, 15.1FPS on DOTA and 96.50% mAP on HRSC2016
  - \* Attempted different loss functions in the network, such as SmoothL1Loss and FocalLoss, to gain better performance
  - \* Explored alternative methods to represent the oriented proposals

### Electronic Design Practice

February 2021 – June 2021, September 2021 – January 2022

USTC, supervised by Prof. [Wei Lu](#)

- Explored STM32 through a series of projects ([website](#))
  - \* Implemented several fun projects using a self-designed minimum system board, including chasing light, breathing lamp, distance sensor, sound and light controlled LED, attitude-controlled mini fan, and a power bank designed from scratch
- Designed and fabricated a robotic vacuum cleaner from scratch ([website](#))
  - \* Built the overall structure through 3D printing
  - \* Implemented low-level control using PWM wave and differential steering
  - \* Employed ultrasonic sensors to detect obstacles and applied a randomized path planning algorithm for obstacle avoidance

## SKILLS

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**Languages:** C, C++, Python

**Systems/Tools:** ROS, Linux

**Software:** Altium Designer, Arduino, VS Code, MATLAB, Autodesk Fusion 360 (beginner)

**English:** TOEFL: 101 (R: 28, L:25, S:24, W:24), GRE: 152(V) + 169(Q) + 3.0

## AWARDS

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Outstanding Student Scholarship (freshman), USTC, 2020

African Alumni Association Zhili Zhou Scholarship 1/286, evaluating students' innovative spirit), USTC, 2021

13th National Mathematics Competition for College Students (FIRST PRIZE), 2021

China National Scholarship, 2022 (Highest-level governmental scholarship, 0.2% award ratio)

## EXTRA-CURRICULAR

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Athlete, **RANKED FIRST** at 4x100m in the sports meeting held by USTC

Athlete, **RANKED FIRST** at the marathon, especially for the meritocracy classes, held by USTC

Class Administrator, offering comments on the talent training program, and organizing lectures and conferences to help classmates explore academic possibilities