

# YUNHAI HAN

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## EDUCATION BACKGROUND

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**University of California, San Diego (UCSD)**

09/2019 - present

*M.S. in Dynamics & Controls, Mechanical and Aerospace Engineering*

*GPA: 3.909/4.00*

· **Relevant Course:** Robotics

**Yanshan University**

09/2015 - 07/2019

*B.S. in Mechatronics, Mechanical Engineering*

*GPA: 3.761/4.5, Major GPA: 3.804/4.5*

· **Relevant Course:** Mechatronics

*Ranking: 2<sup>nd</sup> of 594 (First six semesters)*

## FILED OF INTERESTS

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Robot Perception; Robot Manipulation and Control; State Estimation.

## RESEARCH PROJECTS

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### **Auto-calibration Method for Urban Autonomous Driving Applications**

- Present a system for dynamic camera calibration based on recognition of stop signs
- Track camera intrinsic parameters with clear convergences to stable values
- Published a paper at **ICRA 2021** as first-author

### **Surgical Simulation Framework for Tool-Tissue Interaction**

- Propose a framework that continuously tracks the motion of tool and simulates the soft tissue deformation under the tool-tissue interactions
- Compute the implicit Euler energy for the future control and planning task
- Published a paper at **IROS Workshop (Cognitive Robotic Surgery)** as first-author and gave a spotlight presentation

### ***Real-to-Sim* Registration of Deformable Soft Tissue with Position-Based Dynamics**

- Propose an online, continuous, registration method to bridge from 3D visual perception to position-based dynamics modeling of soft tissues
- Account for differences between the simulation and the real, live surgical scenes
- Published a paper at **ICRA 2021** as third-author

### **Numerical verification of the differential privacy for a novel moving-horizon estimator**

- Design a differential privacy test framework for distributional sensing systems using numerical verification method
- Capable of being easily extended to other estimators for the verification of the claimed differential privacy
- Plan to submit it to **58th annual allerton conference** as first-author

## PUBLICATIONS

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- Han. Y, Liu. Y, Paz. D, and Christensen. I. H, "Auto-calibration Method Using Stop Signs for Urban Autonomous Driving Applications", arXiv:2010.07441

- Han. Y, Liu. F and M. C. YIP, "A 2D Surgical Simulation Framework for Tool-Tissue Interaction", arXiv:2010.13936
- Liu. F, Li. Z, Han. Y, J Lu, F Richter and M. C. YIP, "Real-to-Sim Registration of Deformable Soft Tissue with Position-Based Dynamics for Surgical Robot Autonomy", arXiv:2011.00800

## SELECED GROUP PROJECTS

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### RoboMaster Competition

- Design and build a squad of multi-purpose robots from scratch that are capable of completing different tasks required for the competition
- Responsible for the system design of visual components(including object tracking and monocular vision) and the PID stability adjustment of the gimbal unit on the mobile tank (to prevent bumps and collisions during movement)
- Divide the whole task into several modules for each group member as the leader of vision group

### National Undergraduate Electronic Design Contest (China)

- Design and build a single inverted pendulum system using PID controller of the DC motor
- Design and build a wind panel control device that is capable of maintaining the panel at a target degree or rotating it at a constant angular velocity by controlling the motors on both sides (PID feedback)
- Design and build a plate-ball control system that enables the ball to move across the plate through several target points by adjusting the pitch angle of the plate using vision-feedback control (with a camera fixed above the plate)

## AWARDS & HONORS

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### AWARDS

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|-----------|---|-------------------------------------|
| · 06/2016 | China Undergraduate Mathematical Contest in Modelling (CUMCM) | <i>Second Prize</i>                 |
| · 03/2017 | Zhou Peiyuan Mechanics Competition                            | <i>National Excellence Award</i>    |
| · 05/2017 | National Undergraduate Electronic Design Contest              | <i>Successful Entry Certificate</i> |
| · 09/2017 | Asia-Pacific Mathematical contest in modeling (APMCM)         | <i>Second Prize</i>                 |
| · 01/2018 | Mathematical Contest in Modeling (MCM/ICM)                    | <i>Honorable Mention</i>            |
| · 08/2018 | RM RoboMasters  | <i>Second Prize</i>                 |

### HONORS

- 11/2017 National Scholarship from Chinese Ministry of Education
- 07/2018 Certificate for Attendance of CDIO 2018 Academy (Japan)
- 06/2019 Certificate of Excellent Graduate in Hebei Province

## PROFESSIONAL SERVICE

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### ICRA 2021

Program Committee member(Reviewer)

## TEACHING EXPERIENCE

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**MAE145: Rotbtic Estimation & Planning**  
 Teaching Assitant  
**MAE146: Introduction to ML Algorithms**  
 Teaching Assitant

Winter. 2021

Spring. 2021

TECHNICAL SKILLS

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Programming	C/C++, Python, MATLAB/Simulink
Tool	STM32, ROS, Git, Linux, L <sup>A</sup> T <sub>E</sub> X
Language	Proficient in English and Chinese