

YUNHAI HAN

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EDUCATION BACKGROUND

University of California, San Diego (UCSD)

09/2019 - present

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

GPA: 3.846/4.00

· **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: 2nd of 594 (First six semesters)

FILED OF INTERESTS

Robot Manipulation and Control; State Estimation; Robot Perception and navigation.

RESEARCH PROJECTS

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

Differentiable Position-based dynamics framework for manipulating soft tissues

- Design a backpropagation algorithm for the inverse control task in PBD framework, which is inspired by the methods used in Neural network
- Compute the optimal control actions to manipulate the soft tissues so that it can be deformed into a target shape

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

- Write up the technical details and simulation results in Master's Thesis and passed the oral defense
- Plan to submit it to **58th annual allerton conference** as first-author

PUBLICATIONS

- 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

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

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

ICRA 2021
AIM 2021

Program Committee member(Reviewer)
Program Committee member(Reviewer)

TEACHING EXPERIENCE

MAE145: Rotbtic Estimation & Planning
Teaching Assitant

Winter. 2021

MAE146: Introduction to ML Algorithms
Teaching Assitant

Spring. 2021

TECHNICAL SKILLS

Programming	C/C++, Python, MATLAB/Simulink
Tool	STM32, ROS, Git, Linux, L ^A T _E X
Language	Proficient in English and Chinese