YUNHAI HAN

(858)214-4416 ⋄ y8han@eng.ucsd.edu ⋄ https://y8han.github.io

EDUCATION BACKGROUND

University of California, San Diego (UCSD) 09/2019 - present
M.S. in Dynamics & Controls, Mechanical and Aerosapce 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^{nd} of 594 (First six semesters)

FILED OF INTERESTS

Robot Perception; Robot Manipulation and Control; State Estimation;

RESEARCH PROJECTS

Auto-calibration Method for Urban Autonomous Driving Applications

- Present a system for dynamic camera calibration based on recognition of stop signs
- Camera intrinsic parameters are tracked over time and converges to stable values within a short time
- Experimental results show improved performance compared with other methods
- Submitted a paper to **IEEE RA-L with ICRA** 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 deformation energy for the control and planning task using implicit Euler energy
- 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.
- Submitted a paper to **ICRA** 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

PAPERS

- 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 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 single inverted pendulum system using PID controller of the DC motor with speed reducer
- 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

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

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

SELECTED GRADUATE COURSES

Introduction to Robotics(A+); Numerical Optimization(A+); Sensing & Estimation Robotics(A); Nonlinear Control(A+); Robot Motion Planning(A)

TECHNICAL SKILLS

Programming	C/C++, Python, MATLAB/Simulink
Tool	STM32, ROS, Git, Linux, LaTeX
Language	Proficient in English and Chinese