Xu SHANG

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EDUCATION

University of Michigan *Sep, 2019 - present*
Master in Mechanical Engineering (Expected) *Ann Arbor, MI, USA*
GPA: 4.0/4.0

Shanghai Jiao Tong University *Sep, 2015 - Aug, 2019*
University of Michigan - Shanghai Jiao Tong University Joint Institute *ShangHai, China*
B.S. in Mechanical Engineering
GPA: 3.7/4.0 **Rank:** 3/52

OBJECTIVE

To apply for a **PhD position relevant to Robotics**, specifically in **control of dynamic systems**. (2021 Fall Semester entry)

RESEARCH

Biped Robotics Lab (`https://www.biped.solutions/`) January 2020 - Present
Advisor: *Prof. Jessy Grizzle (Dpt. of EECS)* *Ann Arbor, MI, USA*

- Implemented a walking controller in C++ for a biped robot and validated it in simulation (MuJoCo and Simscape Multibody) and hardware
- Added a low-level passivity control method to decrease the tracking error
- Combined invariant extended Kalman filter with the controller in Robot Operating System to decrease the error in velocity tracking
- Developed UDP communication structure in C++, Python, and MATLAB to simplify communication between controllers and simulators for validation and efficiency
- Writing a manuscript about comparing the performance of different simulators(MATLAB vs. MuJoCo) and different low-level tracking methods(PD vs. Passivity)

Automotive excavator September 2018 - December 2018
Advisor: *Prof. Mian Li (Dpt. of MechE)* *ShangHai, China*

- Received Gold award for 2018 Capstone Design
- Constructed an excavator using three hydraulic rods and combined with PID systems and angle transducers
- Realized the excavator's repeated process of digging and heaping with Robot Operating System

Robot Motion planning September 2019 - December 2019
Advisor: *Prof. Chad Jenkins (Dpt. of EECS)* *MI, Ann Arbor, USA*

- Modeled and controlled the robot by applying inverse kinematics and forward kinematics with Javascript
- Applied RRT, RRT-Connect and RRT-Star algorithms to realize the motion planning of the robot

PROJECTS

Inverted Pendulum System September 2019 - December 2019
Advisor: *Prof. Shorya Awtar (Dpt. of MechE)* *MI, Ann Arbor, USA*

- Designed the classical controller(PID, Lead-leg) and the state-space controller with MATLAB

· Applied the controller into the physical system to realize the balance of the inverted pendulum with LabView and myRio

Active Materials and Intelligent Structures Lab September 2017 - September 2018
Advisor: *Prof. Yanfeng Shen (Dpt. of MechE)* *ShangHai, China*

· Pinpointed the location and potential damage of the structure by analyzing wave frequency vs. wavelength plot
· Designed meta-materials and eliminated special frequency waves with ANSYS

VR technology application into drawing target outline in CT simulation September 2018 - August 2019
ShangHai, China

· Patent
· Solved the problem of repeating drawing the target outline with the VR technology

WORK EXPERIENCE

Biomedical Manufacturing and Design Lab September 2019 - December 2019
Lab Assistant (Dpt. of MechE) *MI, Ann Arbor, USA*

· Designed the complicated PCB circuit with Eagle

Rockwell Automation May 2019 - June 2019
Testing engineer *ShangHai, China*

· Tested the function of the transformer by checking the return value with Python

TECHNICAL STRENGTHS

Computer Languages	C++, C, MATLAB, Javascript, Python
Application Softwares	CATIA, Unigraphics NX, LabView, AutoCAD, ANSYS, Eagle, Mujoco
Framework	Robot Operating System
Languages	Chinese, English

VOLUNTEER WORK AND OTHER ACTIVITIES

Volunteer teaching group December 2016 - January 2017
Member *YunNan, China*

· Taught physics and soccer

Shanghai Jiao Tong University racing team March 2018 - August 2019
Member *ShangHai, China*

· Designed and repaired the carbon outer shell