Yujing "Bryant" Zhou
Curriculum Vitae

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Education

The University of Texas at Austin   2020 – Present
> Master's student in the Mechanical Engineering Department
> GPA: 4.0/4.0

B.S. in Mechanical Engineering, Bucknell University   2016 – 2020
> Minors in Mathematics and German
> GPA: 3.81/4.0

Research Experience

Zero-Sum Dynamic Game Solver for Nonlinear Systems (Current Project)
- Generalizing a LQ problem to a system with arbitrary complexity and the control in a simple LQ form.
- Exploring the robust control and path-integral methods to solve this problem.

Encrypted Long Short-term Memory (LSTM) Over the Homomorphic Space
- Represented the LSTM cell in a nonlinear model structure that combines a linear time-invariant dynamical system with a sector-bounded nonlinear operator.
- Implemented encrypted operations over the homomorphic space.

Motor Speed Control using Extremum Seeking-based Ultra-local Model Predictive Control
- Proposed the extremum-seeking-based ultra-local model predictive control (ES-ULMPC), which is a model-free version of the MPC.
- Demonstrated the effectiveness of the proposed method by its application to the electric motor speed control.

Lane Detection using Extremum Seeking Method
- Applied extremum seeking control to design a color filter in the HSV color space for lane detection application under different lighting conditions.
- Demonstrated the effectiveness of the proposed method by a lane-following experiment with a scaled car in an indoor track setting.

Lane Detection using Model-Free Control
- Applied model-free control to design a color filter in the HSV color space for lane detection application under different lighting conditions.
- Performed simulation studies to test the effectiveness of the proposed method with the assumption of straight-lane-following.

Eliciting Emergency Driver Responses with In-Vehicle Stimuli
- Constructed inverse vehicle dynamics model with Taylor series approximation to express the appropriate steering angle as a function of vehicle's velocity and position.
- Prepared simulator testing for human subjects and approved by IRB, but the experiment was not able to finish due to the unforeseen COVID-19 disease.

Stroke-Hand-Recovery Device
- Prototyped different compliant building blocks for finger joints and manufactured them using both 3D printing and vacuum forming.

Resin-Extrusion 3D Printer
- Designed and constructed a desktop-scale mini-extruder-based 3-D printer, which can use soft and pelletized materials such as thermoplastic elastomers to save material cost.
- Prototype can print soft objects with simple shapes, such as cubes or tetrahedrons, and hard objects with more complex shapes, such as cubes with indented letters on each surface.
- Project website: https://confluence.bucknell.edu/display/RMEFAM

Publications

Journal Publications

J1. **Y. Zhou**, Z. Wang, and J. Wang, "Illumination-Resilient Lane Detection by Threshold Self-adjustment Using Newton-based Extremum Seeking," *IEEE Transactions on Intelligent Transportation Systems* (Under Review)

Conference Publications

C1. **Y. Zhou**, Z. Wang, and J. Wang, "Real-Time Adaptive Threshold Adjustment for Lane Detection Application under Different Lighting Conditions Using Model-Free Control," *Proceedings of the 2021 Modeling, Estimation and Control Conference (MECC), Austin, Texas, Oct. 2021* (Accepted)

C2. **Y. Zhou**, Z. Wang, X. Zhou, H. Shen, and J. Wang, "Extremum-Seeking-Based Ultra-Local Model Predictive Control and Its Application to Electric Motor Speed Control," *2022 American Control Conference* (Under Review)

Academic Service

Reviewer for the 2021 Modeling, Estimation and Control Conference (MECC)

Teaching Experience

ME 366J Mechanical Engineering Design Methodology   06/2021 – 08/2021

Undergraduate course at the University of Texas at Austin

ME 302 Engineering Design Graphics   08/2020 – 12/2020 & 01/2021 – 05/2021

Undergraduate course at the University of Texas at Austin

ME 216 Computational Analysis   01/2019 – 05/2019

Undergraduate course at Bucknell University

Skills

Programming: MATLAB; C++; Python; LaTeX; LabView

Software: SOLIDWORKS; Master Cam; Abaqus; AutoCAD; Motion Gen; Working Model 2D

Language: Mandarin (native); English (fluent); German (basic)

Relevant Coursework

The University of Texas at Austin – Graduate Courses

Autonomous Robots; Convex Optimization; Analytical Method; Probability and Stochastic Processes; Intro to Modern Control; Vehicle Systems Dynamics and Control; Real Time Control System Labs; Stochastic Systems, Estimations, and Control; Propulsion Systems and Control.

Bucknell university – Undergraduate Courses

Engineering Courses: Computational Analysis, Mechanics, Dynamics, Senior Design, System Dynamics, Mechanism Design

Math Courses: Calculus III, Differential Equations, Linear Algebra, Probability