Zhengang Zhong

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RESEARCH INTERESTS

Optimal Control, Nonlinear Control, Industrial Networks and Fieldbus, Embedded System

EDUCATION

Technische Universität Dresden (TU Dresden) — Dresden, Germany
Diplom of Engineering in Mechatronics — Sept 2016 - June 2020
Thesis: Comparative studies on model predictive control
GPA: 1.5/1
Coursework: Nonlinear Control, Flatness-based Control, Control Theory, Robotics

Zhejiang University of Technology — Hangzhou, China
B. Eng. in Mechanical Engineering & Automation — Sept 2012 - June 2016
Thesis: Humanoid wrist joint design
GPA: 3.7/4
Coursework: Principles and Application of Microcomputer, Digital Circuit, Mechanical Design

GRE: Verbal 163, Quantitative 168, Writing 3
TOEFL: 104

RESEARCH EXPERIENCE

Institute of Control Theory, TU Dresden — Dresden, Germany
Graduate Thesis — June 2019 - Jan 2020

- NMPC strategies research. Examined nominal and robust stability of NMPC strategies and compared the performance of strategies by simulating example systems on a self-developed Python modelling framework.
- Extension of nominal NMPC to learning-based NMPC. Enhanced the performance of the controlled process with structure uncertainty and disturbance.
- Comparison between NMPC methods and a flatness-based method regarding control performance, feasible region, design complexity and computing costs in scenarios of a floating system, PVTOL aircraft and planar manipulator.
- Reconstruction of a floating object system with a STM32 Nucleo board. Boosted control performance notwithstanding one third sampling frequency versus the previously implemented PID-controller - 6% according to $L1$ norm criterion and 79% less convergence time.

Institute of Control Theory, TU Dresden — Dresden, Germany
Advanced Seminar — Oct 2018 - Jan 2019

- Investigation and implementation of two flatness-based approaches to control nonlinear and non-flat systems: 1. added a compensator to construct a flat system with flat inputs 2. used fictitious inputs.
- Comparative studies of two methods. Researched the application requirement, scope, pros and cons of two methods - the second method is less computationally intensive and does not require observability or discretization to avoid singularity in compensator.

Fraunhofer IPMS — Dresden, Germany
Research Assistant — Apr 2018 - Oct 2018

- FPGA-based testbed for the IPMS-constructed Time-Sensitive-Networking(TSN) IP-Core. Developed a testbed that accomplishes communication of three different types of data streams between FPGAs and demonstrates the effect of traffic shaping algorithm through observing the communication quality of the low-priority data streams.
- Realtime-guaranteed communication control application in FreeRTOS. Designed and implemented an application that provides services for package management, traffic shaping, and algorithm configuration through UDP-package - jitter of data stream with the lowest priority under a heavy network load is under several micro-seconds.

Fraunhofer IPMS Dresden, Germany
Research Assistant Oct 2017 - Mar 2018

- Development of a network-device-driver-based hardware driver for CAN-FD-IP-Core. Developed a configurable driver that supports multiple protocols and provides services for message filtering, data transfer, remote data request, and recovery management.
- Control application for multiple bus-nodes. Developed an application-layer software that manages communication among multiple CAN-FD transceivers on the same CAN-FD bus.
- Validation of CAN-FD driver and device. Conducted a reliability test to measure the transmission performance of CAN-FD packages with various bit rates and packet, and validates the applicability of CAN-FD-IP-Core in the automotive and industrial scenarios.

PROJECT EXPERIENCE

Electronic travel aids TU Dresden

- Object classification for the blind-assistant facility using surface features collected with sonar.

3D VR object modeling TU Dresden

- Processing facility modeling in VR for interaction and process data visualization.

Trajectory planning and robot control Fraunhofer IWS

- Robot trajectory design and machining operation control for laser robot.

Intelligent Parking Assist System TU Dresden

- Design and implementation of an automatic parking assistant through space detection, motor control and prediction control algorithm.

PATENT

Racing car design for Formula Student China; Patent number: CN205044823U

SKILLS

Programming:
Advanced - C, Matlab
Intermediate - Python, Verilog, C++, Assembly
Machine and structural: Stress analysis with the help of ANSYS Workbench, detail drawing and layouts using AutoCAD and SOLIDWORKS