

Ce Hao

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Education

School of Astronautics, Beihang University (Beijing)

09/2018 - Present

Master Degree of Guidance Navigation and Control

Research Topic: Time Series Fault-Tolerance based on RNN and LSTM

School of Astronautics, Beihang University (Beijing)

09/2014 - 06/2018

Bachelor Degree of Guidance Navigation and Control

Overall GPA: 3.8/4.0; Ranking: Top 1 in the Dept

Publication

JIA Song, CE Hao, et al, Double-Loop Sliding Mode Control of Reentry Hypersonic Vehicle with RCS, *International Conference on Control and Automation*, 2019 (Submitted)

Research Experience

Digital Navigation Center of Beihang University

Research Assistant; Supervisor: Prof. Long Zhao

Feb.2016-Aug. 2018

Design of GPS/INS Combined Navigation System and Inertial Navigation Path Calculation

Embedded inertial navigation system (INS) has become an important attitude navigation component. However, commercial inertial navigation accuracy is not high, so combined filtering algorithm is needed to improve the calculation accuracy and resist interference.

- Designed the inertial navigation platform (inertial measurement unit, IMU) based on MPU9250 and STM32F103 development.
- Proposed GPS/INS integrated navigation filtering algorithm and used Kalman filtering to reduce white noise interference.
- Used the double IMU armband worn on the forearm for gesture reduction.
- Optimized the Least Mean Square (LMS) algorithm to obtain the pseudo inverse solution with the minimum error to track arm movement, depending on the arm posture corresponding to the initial point (strapdown matrix).

Key Laboratory of Spacecraft Design Optimization and Dynamic Simulation Technologies,
Ministry of Education, China

Nov 2017 - Jun 2018

Graduation Design

Tutor: Prof. Jia Song

Design of RCS Aircraft Control System based on Nonlinear Sliding Mode Control

When aircraft flies across the atmosphere, the thin air cannot provide sufficient aerodynamic force. Therefore, thrusters are necessary and reaction control system (RCS) must be taken into consideration.

- Established general reentry aircraft Winged-Cone model and its 6-DOF twelve state equations.
- Designed the fractional sliding mode control(SMC) equation based on lyapunov stability criterion

- Verified the reentry attitude stabilization and had stronger robustness against external environmental disturbances.

Department of Guidance Control and Navigation, Beihang University.

Sep 2018 - Present

Master Research Topic

Tutor: **Prof. Jia Song**

LSTM and Variational Mode Decomposition (VMD) timing signal detection

Early weak and coupled fault information of aircraft is hidden in complex sensor data, therefore I built up a time serial network to extract and diagnose.

- Proposed variational modal decomposition to analyze the sensor signal of the aircraft, and introduced permutation entropy to extract the effective characteristics.
- Adopted LSTM network to train fault model (based on tensorflow), and designed multi-label classification to detect and prevent faults.

Internship

No Barriers Entrepreneurial Firm

Hardware Engineer

Apr 2017 - Jun 2018

Sign Language Electromyographic (EMG) signal acquisition based on CNN

Sign language as the common way to communicate with mute people is usually recognized by images, which require constant camera monitor and less portable.

- Designed STM32L476 single chip micropyco PCB and EMG sensor. Used the 50Hz digital wave trap to remove the alternating current interference.
- Built a seven-layer convolutional neural network (CNN) framework and extract signal features to achieve action recognition.

Honor & Award

- Beihang Golden Medal Award (Beihang highest prize for undergraduate , only top 10 students receive the Golden Medal every year) 2018
- Beihang Undergraduate Graduation ceremony Outstanding Graduates Speak on Behalf of the 2014 Undergraduate Students (only 1 representative from 4,000 students) 2018
- Outstanding Member of Communist Party (only 2 undergraduates are selected from 15,000 party member every two years including students and teachers) 2018
- Golden Medal in China College Students' Entrepreneurship Competition (top 21 projects from 50,000 competitors all around the country) 2018
- Excellent Communist Youth league Member of Beijing (top 30 in 4000) 2017
- First Prize of Beihang *Feng Ru* Cup Science and Technology Competition (top 3% from 4000 competitors) 2017
- National Scholarship (top 5%) , Excellent Student of the University (top 5%) 2016

Other Information

Computer Skills: Matlab/Simulink, C/C++ (Visio Studio), Python/Tensorflow, Verilog HDL (Keil), Altium Designer (PCB Schematic Diagram and Layout), Solidworks/AutoCAD