ZHUONAN HAO

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PROFICIENT IN CONTROL THEORY, MATERIAL, ROBOTICS AND MACHINE LEARNING

PUBILCATION

- X.J. Zhu, D.H. Ning, **Z.N. Hao**, et al. Modelling and experimental evaluation of a variable stiffness MR suspension with self-powering capability [J]. *Journal of Intelligent Material Systems and Structures*. 2021. *31(2). Accepted.*
- L.L. Ren, **Z.N. Hao**. A Simple Fix for Convolutional Neural Network via Coordinate Embedding[J]. *arXiv preprint*. 2020
- W. Zhou, **Z.N. Hao**, N. Gravish, et al. Collisions drive gait compatibility in collective undulatory locomotion. 2020. *In prep.*
- **Z.N. Hao**, N. Gravish. Collective locomotion of autonomous swarm robotics system. 2021. *In prep.*

EDUCATION

University of California, San Diego

Jacobs school of Engineering

September 2019 – Present | San Diego, California, U.S.A.

- M.Sc. in Mechanical and Aerospace Engineering
- Term GPA: 3.97

Beijing Institute of Technology & University of Wollongong

School of Mechanical Engineering

September 2015– July 2019 | Beijing, China & Wollongong, Australia

- B.Sc. in Vehicle Engineering
- Thesis: A novel semi-active vehicle suspension with a stiffness variable self powered MR damper
- Advisor: Weihua Li

LATEST PROJECT

Gravish Lab (PI: Prof. Nicholas Gravish)

Collisions drive gait compatibility in collective undulatory locomotion

May 2020 – Present | San Diego, California, U.S.A.

- Explore how groups of simple bio-inspired robots that move through lateral body undulation can locomote in close proximity under time-dependent and autonomous joint control modes

Perturbation Resilient Central Pattern Generator (PR-CPG) on a Hybrid Bipedal-Wheeled Robot

January – March 2020 | San Diego, California, U.S.A.

- Developed PR-CPG algorithm on hybrid legged-wheeled robot to realize adaptive locomotion under various external disturbance

Tensorflow API & Data Science and Machine Learning Platform

Coordinate-embedded CNN applied on traffic sign detection problem

January – March 2020 | San Diego, California, U.S.A.

- Description – Proposed a simple approach to incorporate the coordinate information to the CNN model which reachan overall 2.47% mAP performance boost on object detection problem

Dynamics and Vibration Control Lab (PI: Prof. Weihua Li)

Development of a variable stiffness magnetorheological damper with self-powered generation capability

October 2018 – July 2019 | Wollongong, NSW, Australia

- Description – Designed and manufactured a damping and stiffness controllable damper, then evaluated on Quarter-car suspension model

SOFT SKILLS

Flexibility | Effective communication | Team Work | Resourcefulness

PROFESSIONAL SKILLS

Matlab/Simulink	●●●●●
Python	●●●●○
AutoCAD	●●●○○
ANSYS & COMSOL	●●○○○

STRENGTHS

- Control System design

Lyapunov stability | PID control | LQG | Autonomous system | Optimal Control

- Robotics

Bionics | Kinodynamic planning | CPGs | Adaptive Gait | Neuronal-oscillator

- Machine Learning on robotics

ConvNet | A* & Dijkstra's algorithm | MDPs | Q-learning | SLAM

EXPERIENCE

University of California, San Diego

Graduate Research Assistant

Mar. 2020 – Present | San Diego, U.S.A.

Topic: Synchronization behavior in swarm robotics system and micro-robot design

University of Wollongong

Undergraduate Research Assistant

Jan. – Mar. 2019 | Wollongong, Australia

Topic: Application of magneto-rheological material on semi-active vehicle suspension

Beijing Institute of Technology

Teaching Assistant

Feb. – Jun. 2018 | Beijing, China

Undergraduate linear & nonlinear system