# DUN YANG

*Beihang University, Beijing, China*

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## EDUCATION

**M.S. in Dynamics, Systems & Controls** — **Beihang University**

- **Overall GPA: 95.6/100 (rank 1/230)** — *Beijing, China*
- Selected Awards: Top-level Fellowship, Outstanding Student (top 3%) — *Sep 2020 –Expected Jan 2023*
- Selected Courses: RL, Advanced Dynamics, Control, Dynamics.
- Thesis: Autonomous motion policy of bionic robot in unstructured environments.

**B.S. in Engineering Mechanics** — **Dalian University of Technology**

- **Overall GPA: 3.88/4 (rank 1/104)** — *Liaoning, China*
- Selected Awards: Excellent Undergraduate, National Scholarship (top 3%) — *Sep 2016 – Jun 2020*
- Selected Courses: Mechanics, FEM, Numerical Calculation, PDE
- Thesis: End-to-end neural network control based on NEAT algorithm for bio-robot gait.

## RESEARCH INTEREST

- **Robot Learning & Learning/Data-Based Planning and Control for Bio-robotics**

## PUBLICATIONS

- **Dun Yang**, Shuai Yang and Yang Yu. "Sea Urchin Robot for Autonomous Planetary Surface Exploration Based on Model-Free RL Locomotion Policy", Under review, IROS 2022.[Website]
- **Dun Yang**, Shuai Yang, Yang Yu and Wang Qi. "Design and Experiment of Complex Terrain Adaptive Robot Based on Deep Reinforcement Learning", Under review, Journal of Astronautics.
- Shuai Yang, Yang Yu, **Dun Yang** and Qishao Wang. "Twelve-legged symmetrical robot", Submitted, [Utility Model:CN202120637760.9].
- Zhenhuan Zhou, Shenbo Zhu, Yiwen Ni, Quanquan Tong, **Dun Yang**, Yang Bai. "Free vibration analysis software of functionally graded cylindrical shell based on symplectic algorithm", [Software copyright, (Patent number:2018SR587264)]

## RESEARCH EXPERIENCE

**Beihang University (Department of Dynamics, Systems & Controls)** — *Beijing, China*

**Advisor Prof. Yang Yu** — *Mar 2021 – Present*

**"Bionic Sea Urchin Robot with Self Adaptability to Complex Terrain"**

- Brief overview: Designing a kind of bionic sea-urchin (spherical twelve-legged) robot for planet unstructured unknown environment exploration tasks.
- Studying and establishing the autonomous motion policy of the robot.
- Developed sample efficient, end-to-end RL algorithms allowing robots to fast adapt to varying terrains.
- Implemented algorithms using PyTorch and evaluated performance on real-world and PyBullet simulated robots.

**Dalian University of Technology (Department of Engineering Mechanics)** — *Liaoning, China*

**Research Assistant, Advisor Prof. Haijun Peng** — *Nov 2019 – May 2020*

**"Research on autonomous adaptation algorithm of the multi-joint crawling robot to strange terrain"**

- Brief overview: Design a closed-loop robot, and use a genetic algorithm to obtain the optimal motion controller for unfamiliar and complex terrain.
- Use the Lagrangian equations to derive a dynamic model considering contact force.
- Design robot gait training framework using NEAT (Evolving Neural Networks through Augmenting Topologies)
- Implement the locomotion policy and evaluate the performance on a Pymunk simulated robot.
- **Outstanding Undergraduate Thesis**

**Zhejiang University, Dalian University of Technology** — *Zhejiang & Liaoning, China*

**Advisor Prof. Hongtao Wang, Advisor Prof. Haijun Peng** — *May 2018 – Aug 2019*

**"Robot Structural Design and Implementation"**

- Build a 6-bar tensegrity robot structure and simulate it in v-rep
- Summer Deep Dynamics Robot Practice Course: Reproduce the mechanical structure and drive mechanism of the MIT Mini-Cheetah robot. [Website]

## SELECTED PROJECTS

**Multibody System Simulation - BUAA** *Jun 2021*

**"Ellipse Disk Pure Rolling Simulation Based on First Kind Lagrangian Equations"**

- Use Lagrangian equations to build a kinetic model. Establish constraint conditions of pure rolling of an elliptic disk by two methods, and prove their equivalence. Simplify Differential-Algebraic Equations (DAE) using the Baumgarte Constraint Violation and perform numerical calculations in MATLAB.
- **Get the highest score for the course (Top 1 of class)**

**Nonlinear Dynamic Systems - BUAA** *May 2021*

**"Overview: Proof and Reversal of Aizeman Stability (An Absolute Stability in nonlinear systems)"**

- Introducing the research history of Aizeman Stability. Reorganizing Aizeman Stability Criterion and its proof. Clarifying and supplying the process of overturning the Aizeman Stability Criterion based on Leonov Method
- **Get the highest score for the course (Top 1 of class)**

**Parallel Programming - DUT** *Nov 2018 – Nov 2019*

**"Parallel Algorithm Design Based on MPI Method"**

- Using C++/C to realize parallel programming based on MPI to Solve Sequence Problems and Plane Truss Stress.
- **Get the highest score for the course (Tied for first place in 130)**

## SELECTED AWARDS AND HONORS

- 2021 Robot competition of University in Beijing — First Prize (5%)
- 2021 Academic Forum of College — First Prize (15%)
- 2021 Outstanding Graduate — Top 3%
- 2021 CATIC Scholarship — 5 of 15000
- 2020 Admission Scholarships — Top 5%
- 2020 Outstanding Undergraduate Graduate of Liaoning Province — Top 1%
- 2019 National Scholarship — Top 1%
- 2019 Interdisciplinary Contest in Modeling (ICM) — First Prize (6%)
- 2019 Mathematical modeling competition in northeastern provinces — First Prize (10%)
- 2016 Qianlingxi Mechanics Scholarships — Top 5%

## WORK EXPERIENCE

**Beihang University: *Planetary Rob-lab*** *Beijing, China*

**Leader of graduates in Robot Project** *Sep 2021 – Expected Jan 2023*

- Laboratory construction and planning, in overall charge of sea urchin research and product development.

**Beihang University: *Theoretical Mechanics-A*** *Beijing, China*

**Teaching Assistant** *Sep 2020 – Expected Jan 2023*

- Responsible for undergraduates: homework Q & A, credit consultation and final exam scoring

**Beihang University: *Student Union Presidium*** *Beijing, China*

**Member of the Graduate Committee** *Sep 2020 – Expected Sep 2022*

- Plan and organize outdoor practical activities, academic lectures, intercollegiate fellowship for more than 2000 graduate students in universities in Beijing, such as Peking University, Tsinghua University.

**Ethnic-Primary School of Yibin** *Sichuan, China*

**Short-term Volunteer Teacher (outstanding volunteers)** *Jun 2018 – Aug 2018*

- Responsible for junior high school physics curriculum, lesson preparation, teaching and homework correction

**Taikuo community in Nansha street, Dalian** *Liaoning, China*

**Community Workers, part-time job** *Feb 2017 – Mar 2018*

- Organize activities and meetings, popularize basic knowledge for low-income groups and the elderly.

**Chuang Yifang- Campus startup studio** *Liaoning, China*

**Startup Co-founder** *Jun 2017 – Jul 2018*

- Campus cultural creative products design, sales, product channel contact, and team management.

## ADDITIONAL INFORMATION

**Programming Languages:** Python, C/C++, MATLAB

**Tools:** PyTorch, Catia, Linux, Tensorflow, Abaqus, Ansys, PyBullet, V-rep, Mujoco, Pr, Latex

**Skills:** Team Management, CAD, CAE, Machine Learning

**Interests:** Fitness, Philosophy, Music