Yayun Du

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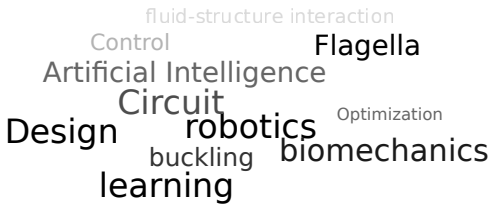

Profile Highlights

- **Research:** Interested in adaptive autonomous cyber physical systems. Prior research focused on developing and modeling biolocomotions (e.g., untethered flagellar robots in granular media and viscous fluids, starfish robots), developing a highly autonomous low-cost agricultural robot for under-canopy weed control and phenotyping, and controlling robotic arms. Expertise: Robotics, artificial intelligence, computer vision, (machine and reinforcement) learning, and modeling.
- **Publications and awards:** Published or submitted six first-authored articles and two co-authored articles within 3 years in top journals (e.g., Soft Robotics, IEEE Robotics and Automation Letters) and conference proceedings (International Conference on Intelligent Robots and Systems (IROS)) in robotics despite completely different expertise from my advisor's (solid mechanics). Five more are in preparation. Received a provisional patent on the agricultural robot. Finalists for **Best Paper Award on Agri-Robotics**, **Best Paper Award on Robot Mechanisms and Design** in IROS, 2021 (4/1261 for each category). Awarded MIT Civil and Environmental Engineering Rising Stars and four-year UCLA Graduate Division Fellowship. Awarded 2016 "Top Ten Students" at Harbin Institute of Technology, Weihai and Mazuguang scholarship.
- **Grant Writing:** Gathered preliminary data for a successful $450k federal grant from US Department of Agriculture, and a $700k National Science Foundation (NSF) grant. Prepared one third of an NSF proposal with four PIs ($1.2M) which received good reviews and was resubmitted in 2021.
- **Mentorship and Teaching:** Supervised 15 undergraduate students and two master's students, mentored two doctoral students including four female students and two community college transfer students. Co-authored peer reviewed papers with eight supervisees. Out of these supervisees, Zihang Zhao and Karunesh Schanandani later joined UCLA as PhD students, Andrew Miller joined graduate school at Stanford in Fall 2021, and Jingyi Chen joined Cornell and Jacqueline Lam joined UCLA as graduate students. Bhrugu Mallajosyula joined General Motors and Angeline Liu joined JPL. Averaged 8.0/9.0 on student evaluations in five courses across four departments, with departmental averages of $\sim$ 7.2/9.0.
- **Leadership:** Co-founder of Student Researchers United (SRU) at UCLA to waive nonresidential fees for international researchers and advocate for them. Conference planner and event coordinator of Southern California Robotics Symposium 2020, at UCLA (postponed due to COVID-19).
- **Media Coverage:** MIT Civil and Environmental Engineering Rising Stars; Finalists for two Best Paper awards in IROS 2021; Published work covered by Bioinspired Design Program at University of California, Berkeley.

Education

University of California, Los Angeles, CA — GPA:3.74/4.0
Ph.D. (Mechanical Engineering) — 12/2018 - 06/2022 (expected)
Major: Systems and Control
Minor: Structural and Solid Mechanics
M.S. (Mechanical Engineering) — 09/2016 - 02/2018

Harbin Institute of Technology, Heilongjiang, China — Ranking: 1/144 (major), 1/260 (in department)
B.S.E. (Automotive Engineering) — 09/2012 - 07/2016

Research experience

Structure-Computer Interaction Lab, UCLA, Los Angeles, CA 04/2018 - present
Graduate Research Assistant Advisor: Prof. M. Khalid Jawed
Research area: robot design, modeling and control, biolocomotion, learning, agriculture robot, SLAM

Biomechatronics Lab, UCLA, Los Angeles, CA 04/2017 - 04/2018
Assistant in Research Advisor: Prof. Veronica Santos
Research area: FEA model enabling BioTac haptic sensor, sensation of touch through supervised learning-FEA

New Energy Vehicle Research Institute, Harbin Institute of Tech, Harbin, China 07/2014 - 08/2016
Assistant in Research Advisor: Prof. Dafang Wang
Research area: distributed vehicle system control, alternative fuel vehicle

Selected Awards and Honors

Graduate

2021 Finalists for **Best Paper Award on Agri-Robotics**, **Best Paper Award on Robot Mechanisms and Design** in IROS, 2021 (4/1261 for each category)
2021 **Supervisor of Honorable Mention Best Researcher** in the National Science Foundation Summer-funded Undergraduate Researcher Program (SURP) 2021 at UCLA
2021 **MIT Civil and Environmental Engineering (CEE) Rising Stars**
2021 **Chinese-American Engineers and Scientists Association of Southern California (CESASC) Scholarship** ($1,000)
2018-2021 **Graduate Division Fellowship** from UCLA Graduate Division ($ 49,097.72/year)
2016 **Best Article Award** from UCLA Graduate Division for sharing the story "How I came to UCLA"

Undergraduate

2012-2016 **National Scholarship** from Ministry of Education of the People's Republic of China with **first** GPA ranking (**1/144**) for four years in Department of Automotive Engineering
2015 **Top Ten Students** of Harbin Institute of Technology, Weihai for combined top **1%** GPA, excellent publications and outstanding leadership. I was the only junior gaining this honor while others were seniors (**10/12000**)
2015 **Honorable Mention** from COMAP for Mathematical Contest in Modeling (MCM)
2015 **Outstanding Leader Award** from Harbin Institute of Technology for academic excellence and fantastic student club activity organization
2014 **Best-organized Volunteer Team Leader** from Harbin Institute of Technology for establishing the first volunteer team of college students to teach in Tibet and building long-term cooperation with the local government
2013 **First Prize** from Heilongjiang Provincial Education Department in Mathematics Competition for College Students (Top **8%**)
2013 **First Prize** from College Foreign Language Teaching Committee and College Foreign Language Teaching Research Association in National English Competition for College Students; (Top **0.5%**)
2013 **Most Creative Award** from Department of Automotive Engineering for the lowest cost and most efficient pressure oil pump design; **1 out of 10** teams was awarded

Media Coverage

M1. MAE Ph.D. Student Yayun Du selected as a "Rising Star" by MIT CEE, *MIT Civil and Environmental Engineering* (2021) [link1], *UCLA Mechanical and Aerospace Engineering Departmental News* [link2]

M2. Student researchers from Khalid Jawed's lab are finalists at the top robotics conference, *UCLA Mechanical and Aerospace Engineering Departmental News* [link]

M3. Paper, Simple Flagellated Soft Robot for Locomotion near Air-Fluid Interface, *Bioinspired Design Program at University of California, Berkeley* [link]

Peer-Reviewed Publications and Proceedings

[#] indicates students supervised or mentored by Yayun Du;

W1. **Du, Y.**, Zhang, G.,[#], Tsang D.[#], Jawed, M. K., "Deep-CNN based real-time robotic multi-class weed identification", *IEEE International Conference on Robotics and Automation (ICRA)*, 2021 (*Accepted*) [link, video]

W2. **Du, Y.**, Lam, J.,[#], Sachanandani K.[#], Jawed, M. K., "Modeling the locomotion of articulated soft robots in granular medium", *IEEE Robotics and Automation Letter*, 2021 (*Revised and resubmitted*) [link]

W3. **Du, Y.**, Miller, A.,[#], Jawed, M. K., "Mechanics-based analysis on flagellated robots", *Soft Robotics*, 2021 (*Revised and resubmitted*)

W4. **Du, Y.**, Mallajosyula, B.[#], Sun, D.[#], Chen, J.[#], Zhao, Z.[#], Rahman, M., Quadir, M., Jawed, M. K., "A Low-cost Robot with Autonomous Recharge and Navigation for Weed Control in Fields with Narrow Row Spacing", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Prague, Czech Republic, 2021 (Finalists for **Best Paper Award on Agri-Robotics**, **Best Paper Award on Robot Mechanisms and Design**) [video1, video2]

W5. **Du, Y.**, A., Miller[#], Jawed, M. K., "Simple Flagellated Soft Robot for Locomotion near Air-Liquid Interface", *IEEE International Conference on Soft Robotics (RoboSoft)*, Yale, CT, 2021 [link, video]

W6. **Du, Y.**, Deng, Z. [#], Fang, Z.[#], Wang, Y.[#], Nagata, T.[#], Bansal, K., Quadir, M., Jawed, M. K.,"Vision and force based autonomous coating with rollers", *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, NV, USA, pp. 9954-9960, 2020 [link, video1, video2]

W7. Qin, L., Huang W., **Du, Y.**, Zheng, L., "Genetic algorithm-based inverse design of elastic gridshells", *Structural and Multidisciplinary Optimization*, 62(5), pp.2691-2707, 2020 [link]

W8. Wang, D., Zhou, C., Zou, M., Liao, J., **Du, Y.**, "Study on Inspection of the Initial Rotor Position of BLDC Based on High-frequency Signal Injection", *IEEE Transportation Electrification Conference and Expo Asia-Pacific*, pp. 1-4, 2014 [link]

W9. **Du, Y.**, Bansal, K., Palan, E., Webster, D., Jawed, M. K., Quadir, M., "Robotic painting: mimicking human applicators", (*To be submitted to Journal of Coatings Technology and Research (JCTR)*)

W10. **Du, Y.**, Mo, W.,[#], Duan C.[#], Jawed, M. K., "2D LiDAR based inter-row navigation algorithm" (*submitted to Robotics and Autonomous Systems*)

W11. **Du, Y.**, Duan, C.,[#], Jawed, M. K., "Inverse design of soft flagellated robots" (*To be submitted to RAL in November 2021*)

W12. **Du, Y.**, Duan, C.,[#], Lovekin, A.,[#], Jawed, M. K., "Mobile monocular robot localization via cascaded attention mechanism and keypoint matching " (*To be submitted to Robotics: Science and Systems 2022/Conference on Computer Vision and Pattern Recognition 2022*)

W13. **Du, Y.**, Lovekin, A.,[#], Duan, C.,[#], Jawed, M. K., "Autonomous low cost customizable agricultural robot in fields " (*To be submitted to Journal of Field Robotics in January 2022*)

W14. **Du, Y.**, Dong, Z.,[#], Zhang, G.[#], Wang, T., Jawed, M. K., "Under-canopy navigation via concatenated attention wise imitation learning" (*To be submitted to IROS 2022*)

W15. **Du, Y.**, Miller, A.,[#], Lovekin, A. [#], Jawed, M. K., "Direction changing of uniflagellar soft robots in low Reynolds number fluid using buckling instability" (*Data collection and analysis in progress*)

W16. **Du, Y.**, Zhao, Z.,[#], Miller, A. [#], Jawed, M. K., "Biologically inspired soft starfish locomotion" (*Data collection and analysis in progress*)

Patents

P1. Mohammad Khalid Jawed, Yayun Du, Mukhlesur Rahman, Mohiuddin Quadir, U.S. Provisional Patent Application No. 63/239,266 entitled AUTONOMOUS WEED CONTROL ROBOT, filed on 8/31/2021

Presentations

PT1. **Du, Y.**,"Simple untethered flagellated robot in fluids and granular media.", MIT CEE Rising Star Workshop, Oct 27th-29th, 2021 (*Oral*)

PT2. **Du, Y.***, Jawed, M. K.,"A Low-cost Robot with Autonomous Recharge and Navigation for Weed Control in Fields with Narrow Row Spacing.", International Conference on Intelligent Robots and Systems (IROS), Online, Sep 28th, 2021 (*Oral*)

PT3. **Du, Y.***, Jawed, M. K.,"Simple untethered flagellated robot in fluids and granular media.", Seminar in Mechanical and Aerospace Engineering 298 at UCLA, May 28th, 2021 (*Oral*)

PT4. **Du, Y.***, Miller, A., Jawed, M. K.,"Simple flagellated soft robot near air-fluid interface", IEEE International Conference on Soft Robotics, Online, April 12-16, 2021 (*Oral*)

PT5. **Du, Y.***, Miller, A., Jawed, M. K.,"Simple untethered flagellated robot in fluids and granular media", American Physical Society March Meeting, Online, March 14-19, 2021 (*Oral*)

PT6. **Du, Y.***, Deng, Z. , Fang, Z., Wang, Y., Nagata, T., Bansal, K., Quadir, M., Jawed, M. K.,"Vision and force based autonomous coating with rollers", International Conference on Intelligent Robots and Systems (IROS), Online, Oct 25, 2020 (*Oral*)

PT7. **Du, Y.***, Lam, J., Sachanandani K., Jawed, M. K.,"Locomotion of Soft Robots with Flexible Flagella in Granular Medium", 1^{st} Southern California Mechanics Workshop, San Diego, CA, Jan 2020 (*Oral*)

PT8. **Du, Y.***, Lam, J., Sachanandani K., Jawed, M. K.,"Locomotion of Soft Robots with Flexible Flagella in Granular Medium", American Physical Society March Meeting, Boston, MA, March 4-8, 2019 (*Oral*)

PT9. Qin L.*, **Du, Y.**, Huang, W., Jawed, M. K., "Numerical Simulations for Physics-based Training of Robots for Manipulation of Flexible Rods", American Physical Society March Meeting, Boston, MA, March 4-8, 2019 (*Oral*)

PT10. **Du, Y.***, Jawed, M. K.,"Locomotion of Soft Robots with Flexible Flagella in Granular Medium", Southern California Robotics Symposium, Caltech, CA, April 2019 (*Poster*)

Grant Writing

G1. Collected preliminary data for Grant # 2021-67022-34200, "Autonomous Robotic Systems for Precision Weed Control in Flax", National Institute of Food and Agriculture, **United States Department of Agriculture**, $453,190, 2021 - 2025. PIs: Mukhlesur Rahman and Mohi Quadir (North Dakota State University), M. Khalid Jawed (UCLA)

G2. Developed the preliminary soft robots and collected preliminary data for **National Science Foundation CAREER** Award # 2047663, "MaLPhySiCS - Machine Learning-assisted Physics-based Simulation and Control of Soft robots", $700,000, 2021 - 2026. PI: M. Khalid Jawed (UCLA)

G3. Wrote $\sim$ 33% of the project narrative for a proposal titled "Smart and Connected Robotic Infrastructure for Data-driven Sustainable Agriculture", **National Science Foundation**, $1.2M, 2021. PIs: Rajit Gadh (UCLA), M. Khalid Jawed (UCLA), Wei Wang (UCLA), and Mukhlesur Rahman (North Dakota State University). Received ratings of (1) Very Good, (2) Very Good, (3) Very Good/Good, and (4) Fair, but eventually declined because of lacking effective and efficient localization algorithm. Resubmitted the proposal 2021 based on my research update

Service to professional community

Reviewer

- ☐ IEEE Robotics and Automation Letters (RA-L)
- ☐ IEEE International Conference on Robotics and Automation (ICRA)
- ☐ IEEE International Conference on Intelligent Robots and Systems (IROS)

- IEEE International Conference on Advanced Robotics and Mechatronics (ICARM)

Leadership

- **Co-founder of Student Researchers United (SRU), UCLA**, Los Angeles, CA 02/2021 - present
  Fight for waiving nonresidential fee in UC system for incoming Ph.D. students
  Advocate for and provide legal resources and peer support to international researchers
- **Organizer of Southern California Robotics Symposium 2020, UCLA**(postponed), Los Angeles, CA
  Settle on the agenda, venues, and budget, arrange and book the right venues for various sessions on-site; this includes the presentation, posters, lunch and dinner bars
  Cooperate with another Ph.D. peer to design and UCLA IT support team to launch the conference website
  Finalize and invite speakers and sponsors
- **Co-founder of Yuan Meng Tibet**, Tibet, China 06/2013 - 09/2013
  Create and lead the first volunteer team at Harbin Institute of Technology to teach in rural areas in Tibet
  Establish long-term collaboration with local Tibetan government since 2013 Summer

Prefessional membership

- American Physical Society
- Institute of Electrical and Electronics Engineers

Student Supervision

Undergraduate Student Research Program (SRP)

- 2020-2021 Wenjie Mo, Chenda Duan, Yu Zhou, Guofeng Zhang, Darren Tsang
  "Low-cost autonomous agricultural robot for weed control"
- 2019-2021 Andrew Miller, Arthur Lovekin
  "Bacteria-inspired flagellated robot turn by buckling soft tails"
- 2019 Keerthi Pradaa Balajee
  "Bacteria-inspired soft robot capable of traveling through granular media"
- 2019 Taiki Nagata
  "Collaborative robotic drawing simulation in Vrep with constant force"
- 2019 Karunesh Schanandani, Jacqueline Lam
  "2D movement control of soft robots in low Reynolds number of fluid"
- 2019 Zihang Zhao, Visiting Summer Undergraduate Student
  "Build a compact agriculture robot for weed control"

Teaching Experience

Department of Electrical and Computer Engineering, UCLA, Los Angeles, CA 09/2017 - 09/2020
Teaching Associate for online *ECE 205A Matrix Analysis for Scientists and Engineers* (Graduate)
Student evaluation: **8.0/9.0** (Department average: 7.2/9.0)

Department of Mechanical and Aerospace Engineering, UCLA, Los Angeles, CA 09/2018 - 12/2021
Teaching Fellow for *M20 Introduction to Computer Programming with MATLAB* (Undergraduate)
Student evaluation: **8.0/9.0** (Department average: 7.0/9.0)

Department of Physics & Astronomy, UCLA, Los Angeles, CA 03/2018 - 06/2018
Teaching Assistant for *Physics 5C Physics for Life Sciences Majors: Electricity, Magnetism, and Modern Physics*
Physics 1C Physics for Scientists and Engineers: Electrodynamics, Optics, and Special Relativity (Undergraduate)
Student evaluation: **8.0/9.0** (Department average: 7.4/9.0)

Department of Psychology, UCLA, Los Angeles, CA 09/2017 - 12/2017
Teaching Assistant for *Psychology 120B Sensation & Perception* (Undergraduate)
Student evaluation: **8.0/9.0** (Department average: 7.2/9.0)

References

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