

Brian H. Wang

PH.D. CANDIDATE IN AEROSPACE ENGINEERING · CORNELL UNIVERSITY AUTONOMOUS SYSTEMS LAB

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Education

Cornell University

Ithaca, NY

PH.D. IN AEROSPACE ENGINEERING

August 2016 - Present

Expected graduation in Fall 2021

Advisor: Professor Mark Campbell

Thesis Committee: Profs. Mark Campbell, Kilian Q. Weinberger, and Silvia Ferrari

GPA: 4.09

Selected Coursework: Autonomous Mobile Robots, Human-Robot Interaction, Intelligent Sensor Planning and Control, Intermediate Dynamics and Vibrations, Machine Learning for Intelligent Systems

Cornell University

Ithaca, NY

M.ENG. IN AEROSPACE ENGINEERING

August 2015 - May 2016

Advisor: Professor Mason Peck

Thesis Title: Optical Attitude Determination for Autonomous Spacecraft

GPA: 3.45

Selected Coursework: Feedback Control Systems, Multivariable Control Theory, Robotic Manipulation

Cornell University

Ithaca, NY

B.A. IN COMPUTER SCIENCE

August 2011 - May 2015

GPA: 3.60

Selected Coursework: Object-Oriented Programming and Data Structures, Systems Programming, Dynamics

Research Experience

Autonomous Systems Lab

Ithaca, NY

PH.D. RESEARCHER

September 2016 - Present

- Research projects include vision- and lidar-based robotic perception, probabilistic tracking and estimation, and navigation in unstructured and uncertain environments.
- Conduct laboratory experiments using Clearpath Jackal mobile robots, Robot Operating System (ROS) software, and a Vicon motion capture system.

Draper Laboratory

Cambridge, MA

PH.D. STUDENT INTERN

July 2019 - October 2019

- Supervisor: Dr. Gian Luca Mariottini
- Graduate student intern in the Perception & Autonomy group.
- Designed and implemented system architecture for autonomous vision-based navigation on resource-constrained quadrotor drones.
- Performed flight tests on a Parrot Bebop 2 drone.

NASA Langley Research Center

Hampton, VA

ENGINEERING INTERN

June 2015 - August 2015

- Supervisor: Dr. James Warner
- Worked alongside NASA Langley scientists in developing ScIFEN (SCalable Implementation of Finite Elements at NASA), a free-to-use finite element analysis program optimized for massively multicore supercomputers.
- Designed and implemented the graphical user interface for ScIFEN in the Python programming language, improving the usability of the program and facilitating its adoption by NASA researchers.

Cornell University Cislunar Explorer CubeSat

Ithaca, NY

ATTITUDE DETERMINATION AND CONTROL SUBSYSTEM TEAM

June 2014 - May 2016

- Assisted with implementation of a computer-vision based attitude determination system on a Raspberry Pi computer board, enabling deep-space operations for a miniaturized, low cost lunar satellite which is scheduled to launch on the NASA Orion spacecraft.

Publications

JOURNAL PAPERS

- **Wang, B. H.**, Chao, W., Wang, Y., Hariharan, B., Weinberger, K. Q., and Campbell, M. “LDLS: 3-D Object Segmentation Through Label Diffusion From 2-D Images.” *IEEE Robotics and Automation Letters*, vol. 4, no. 3, pp. 2902-2909, July 2019. *Presented at the 2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) in Macau, China.*

CONFERENCE PAPERS

- **Wang, B. H.**, Diaz-Ruiz, C., Banfi, J., and Campbell, M. “Detecting and Mapping Trees in Unstructured Environments with a Stereo Camera and Pseudo-Lidar.” *International Conference on Robotics and Automation (ICRA)*, 2021.
- Wang, Y., Lai, Z., Huang, G., **Wang, B. H.**, van der Maaten, L., Campbell, M., and Weinberger, K. Q. “Anytime Stereo Image Depth Estimation on Mobile Devices”. *International Conference on Robotics and Automation (ICRA)*, 2019.
- **Wang, B. H.**, Wang, Y., Weinberger, K. Q., and Campbell, M. “Deep Person Re-identification for Probabilistic Data Association in Multiple Pedestrian Tracking”. *Arxiv preprint*.
- Gemerek, J. R., Ferrari, S., **Wang, B. H.**, and Campbell, M. “Video-guided Camera Control for Target Tracking and Following”. *IFAC Conference on Cyber-Physical and Human Systems*, 2018.

Leadership and Service

Reviewer

REVIEWED CONFERENCE PAPER SUBMISSIONS FOR:

- IEEE International Conference on Robotics and Automation (ICRA), 2021
- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2019

Debates on the Future of Robotics Research

Online Event

ORGANIZING COMMITTEE (2019-2021), TECHNICAL CHAIR (2021)

September 2019 - June 2021

- Organized series of debates on the impacts and direction of robotics research, held as online workshops at ICRA 2020 and 2021.

Cornell AI Driving Olympics Team

Ithaca, NY

CO-FOUNDER, PROJECT SUPERVISOR

September 2018 - May 2020

- Co-founded the AI Driving Olympics team within the Autonomous Systems Lab. The team consisted of undergraduate and Master’s students, who implemented autonomous driving algorithms such as navigation and lane-following on small mobile camera-equipped robots driving around a miniature model city.

Sport Taekwondo at Cornell

Ithaca, NY

PRESIDENT (2014-2015), TREASURER (2013-2014)

August 2011 - May 2017

- Attained second-degree black belt; trained and competed in Olympic-style taekwondo in over 30 intercollegiate tournaments.
- As president, led practices and oversaw administration of one of Cornell’s most popular club sport teams, with over 50 members.

Teaching and Mentorship

Autonomous Systems Lab

Ithaca, NY

STUDENT MENTOR

August 2017 - May 2021

- Mentor for undergraduate and master’s student projects in the Autonomous Systems Lab, including:
 - 3-D object detection-based SLAM.
 - Aerial robot simulation in Unreal Engine.
 - Object detection, particle filter localization, and lane following for autonomous driving on miniature robotic cars.
 - Embedded system design for a stereo camera data collection sensor package.

eCornell: Autonomous Mobile Robots

Ithaca, NY

COURSE CONTENT DEVELOPER

June 2020 - March 2021

- Developed slides, animations, and coursework on robotics algorithms, for an online version of Cornell’s Autonomous Mobile Robots course to be offered through the eCornell certificate program.

MAE 5180: Autonomous Mobile Robots

Ithaca, NY

TEACHING ASSISTANT

January 2020 - May 2020

- Graduate-level course on algorithms for autonomous robots.
- Taught students fundamental robotics algorithms for localization, mapping, SLAM, and path planning.
- Led lab sessions, recitations, and office hours, and assisted with designing course materials.

- Core computer science class on computer architecture and the hardware-software interface.
- Led weekly recitations and office hours, and graded exams and programming projects.

Skills

TECHNICAL SKILLS: SOFTWARE

- **Programming languages:** Experienced with Python, MATLAB. Proficient with C++.
- **Software tools:** Robot Operating System (ROS), NumPy, Numba, OpenCV, StereoLabs ZED SDK, Git, Linux.

TECHNICAL SKILLS: HARDWARE

- **Robot platforms:** Clearpath Robotics Jackal, Rethink Robotics Baxter, iRobot Create, Parrot Bebop 2.
- **Embedded systems:** Raspberry Pi, Arduino, Nvidia Jetson TX2 and Nano.
- **Sensors:** Stereolabs ZED camera, Velodyne VLP-16 lidar, Intel RealSense RGBD camera.

LANGUAGES

- **English** (native speaker)
- **Korean** (conversant)
- **Mandarin Chinese** (basic knowledge)