Curriculum Vitae

Chizhao Yang, *Ph.D. Candidate*
Morgantown, WV, United States
Website: chizhaoyang.github.io
Tel: (201)208-9981
Email: cy0003@mix.wvu.edu

Education

Ph.D. in Aerospace Engineering (Robotics) Jan. 2016 - Present
West Virginia University, Morgantown, WV
Research Advisor: Dr. Yu Gu
Dissertation: "Robust Lidar-based Motion Estimation in Dynamic Environments"

M.S. in Electrical Engineering Aug. 2014 - Dec. 2015
Stevens Institute Technology, Hoboken, NJ

B.S. in Electrical Engineering Sep. 2008 - Jun. 2012
Sichuan Normal University, Chengdu, China

Research Interests

Robotics: Perception and Localization, SLAM, Path Planning, Multi-agent Navigation;

Sensors: Sensor Fusion, LiDAR-Camera-IMU-based SLAM;

Applications: Autonomous Driving, Service Robots, Warehouse Robots.

Experience

Graduate Research Assistant Advisor: Dr. Yu Gu
Interactive Robotics Lab., West Virginia University Jan. 2016 - Present

- Designed a robust lidar-based motion estimation system in dynamic environment
- Performed visual-inertial localization using iRobot Create platform
- Designed an algorithm using EKF and particle filter to solve cooperative navigation in GNSS-denied environment
- Developed a localization system (based on LiDAR, IMU, and wheel odometry) for a pollination robot, BrambleBee, which is designed for pollinating bramble plants in a greenhouse

- Developed a 3D LiDAR based SLAM algorithm for Cataglyphis, the robot won first prize in NASA Sample Return Robot Centennial Challenge
- Implemented a local map based collision avoidance system for Cataglyphis
- Applied a navigation framework on the Freight base robot which is designed for the project focused on the human robot collaboration in smart warehouses

Graduate Research Assistant Advisor: Dr. Narayan Ganesan
HCMM Lab., Stevens Institute of Technology Apr. 2015 - Dec. 2015

- Implemented a rapid search algorithm in the Apache Accumulo Database

Summer Research Intern Supervisor: Dr. Yu-Dong Yao
ECE Department, Stevens Institute of Technology May 2015 - Jul. 2015

- Designed and built a robotic printer

Teaching Assistant Instructor: Dr. Si Long
Engineering Lab., Sichuan Normal University Sep. 2009 - Jan. 2012

Skills

Programming: C++, Matlab, Python, Latex, Script, HTML

Software: Robot Operator System (ROS), Gazebo, Docker, AutoCAD

Hardware: Velodyne LiDAR, IMU, Raspberry Pi, Particle Photon

Robot Platforms: Husky UGV, iRobot Create, Turtlebot3, Fetch Freight

Publications

Journal Publications:

- **C. Yang**, J. Strader, Y. Gu, A. Canciani, and K. Brink, "Cooperative Navigation using Pairwise Communication with Ranging and Magnetic Anomaly Measurements," AIAA *Journal of Aerospace Information Systems* (2020), 1-10.

- Y. Gu, J. Strader, N. Ohi, S. Harper, K. Lassask, **C. Yang**, L. Kogan, B. Hu, M. Gramlich, R. Kavi, and J. Gross, "Robot Foraging: Autonomous Sample Return in a Large Outdoor Environment," *IEEE Robotics & Automation Magazine*, 25(3), pp. 93-101.

Conference Publications:

- Y. Chen, **C. Yang**, B. Song, N. Gonzalez, Y. Gu, and B. Hu, "Effects of Autonomous Mobile Robots on Human Mental Workload and System Productivity in Smart Warehouses: A Preliminary Study," *Human Factors and Ergonomics Society (HFES)*, 2020, Accepted.

- **C. Yang**, R. Watson, J. Gross, and Y. Gu, "Localization Algorithm Design and Evaluation for an Autonomous Pollination Robot," *International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+)*, pp. 2702-2710, 2019.

- J. Strader, J. Nguyen, C. Tatsch, Y. Du, K. Lassak, B. Buzzo, R. Watson, H. Cerbone, N. Ohi, **C. Yang**, and Y. Gu, "Flower Interaction Subsystem for a precision Pollination Robot," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 5524-5541, 2019

- **C. Yang**, J. Strader, Y. Gu, A. Hypes, A. Canciani, and K. Brink, "Cooperative UAV Navigation using Inter-Vehicle Ranging and Magnetic Anomaly Measurements," *AIAA Guidance, Navigation, and Control Conference*, pp. 1595, 2018.

- N. Ohi, K. Lassak, R. Watson, J. Strader, Y. Du, **C. Yang**, G. Hedrick, J. Nguyen, S. Harper, D. Reynolds et al., "Design of an autonomous precision pollination robot," *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 7711-7718, 2018.

Workshops:

- R. Watson, N. Ohi, S. Harper, C. Kilic, **C. Yang**, J. Hikes, M. De, J. Strader, G. Hedrick, H. Nichols, and E. Uption, "A Rover and Drone Team for Subterranean Environments: System Design Overview," *Robotics: Science and Systems (RSS) workshop*, 2018.

Under Review:

- Y. Chen, **C. Yang**, Y. Gu, and B. Hu, " Influence of Mobile Robots on Human-Robot Collaboration and Safety Perception In Warehouse Order Picking and Fulfillment Tasks," Submitted to *IEEE Transactions on Human-Machine Systems*.

Awards & Honors

Competition Round Qualification Award ($15,000 Prize) Jan. 2021
- NASA Space Robotics Challenge Phase 2 Centennial Challenge
- Mentor (Localization and Mapping)

WVU Outstanding Merit Fellowship for Continuing Doctoral Students 2017 - 2018

Final Challenge ($750,000 Prize) Winner Sep. 2016
- NASA Centennial Challenge (Sample Return Robot Challenge)
- Key Team Member (Collision Avoidance, SLAM)

Excellent Undergraduate Student Award in Sichuan Province 2008 - 2012
- Four Consecutive Academic Year from 2008 to 2012

- Top 1% of students in Province

Invited Presentation

West Virginia University, Morgantown, WV — Aug. 2020
"Cooperative Navigation using Pairwise Communication"

West Virginia University, Morgantown, WV — Aug. 2020
"A robust Lidar-based Motion Estimation Algorithm Design"

Sichuan Normal University, Chengdu, China — Mar. 2019
"*Robotic Localization"*

Robert H. Mollohan Research Center, Fairmont, WV — Oct. 2017
"Cataglyphis: An Autonomous Sample Return Robot"

Professional Activities

Student Member of IEEE | Student Member of AIAA

Reviewer for the Following Technical Conferences and Publications:
- 2019 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)
- 2019 IEEE International Conference on Advanced Robotics (ICAR)
- 2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)
- 2020 IEEE International Conference on Automation Science and Engineering (CASE)
- 2020 IEEE International Conference on Robotics and Automation (ICRA)
- IEEE Robotics and Automation Letters (RA-L)
- IEEE Transactions on Mechatronics (TMECH)

University Services

Visitors Services Volunteer
Watts Museum, WVU — Aug. 2017 - Apr.2018
Special Advisor
WVU Chinese Students and Scholars Association — Dec. 2016 - Mar. 2018
Volunteer
SIT Chinese Students and Scholars Association — Aug. 2014 - May. 2015
President
Student Union in College of Engineering, SNU — Sep. 2010 - Jun. 2011
Outreach Activities:
Help students with Lego Robot Competition

Robot display during MAE Pumpkin Drop event
Presentations at Day in the Park event in Fairmont (NASA IV&V)
Robot demonstration at WVU Nursery School
Robot and UAV demonstrations to Cub Scout Pack 60
Robot demonstration during Black Bears baseball game
Annual WVU IRL Open House

Media Coverage

Television and Online Videos:

- "NASA competition winners develop AI for future rovers," NASA 360, Nov 2019.
- "NASA Challenge winners develop robots for earth and rovers for space," NASA 360, Aug 2019.
- "As bees die NASA-inspired robot could fill the pollination void," NASA 360, Aug 2019.
- Daily Planet, Discovery Channel Canada, April 2017.
- "What Happened This Year @ NASA," NASA, Dec 2016.
- "This Week @ NASA," NASA, Sept. 9, 2016.

Article:

- "Shooting for the moon: WVU qualifies for final round of NASA Centennial Challenge," WVUToday, Jan 2021
- "22 Teams Crack Code, Qualify for Final Stage of NASA Space Robotics," NASA, Jan 2021
- "The BrambleBee robot promises to help honeybees pollinate flowers," DigitalTrends, Sep 2018
- "This robotic pollinator is like a huge bee with wheels and an arm," Wired, May 2018
- "This robot could help pollinate crops if we kill all the bees," Fast Company, May 2018
- "Could robots replace honeybees as pollinators?" Vegetable Growers News, June 2017
- "Video Friday," IEEE Spectrum Robotics Blog, April 2017.
- "From a Massachusetts Field to the Plains of Mars," Air & Space Smithsonian Magazine, Nov 2016.
- WVU Magazine, Spring 2017.
- "US Team Wins USD 750k NASA Award for Sample-Retrieving Robot," Business Standard, Oct 2016.
- "NASA's Mars Rover Prototype Challenge Ends; $750K Awarded for Autonomous Technology," Top Examiner, Oct 2016.
- "NASA Awards $750K in Sample Return Robot Challenge for Autonomous Technology," NASA, Sep 2016.

- "West Virginia University Students Win Robotics Competition," The Associated Press, ABC News, The Washington Post, The New York Times, Yahoo Tech, USA Today, ASEE, CNS News, News Times, The Hour, the News & Observer, Midland Daily News, Las Vegas Sun, Seattle Pi, SFGATE, WTOP, The State Journal, Neuron, among others, Sep 2016.
- "West Virginia University's Cataglyphis Robot Wins NASA Robotics Mission," Nature World News, Sep 2016.
- "Determined WVU Students are First, and Now Only, Winners of NASA Robot Competition," WVU Today, Video, Sep 2016.
- "After 5 Years, NASA has a Centennial Challenge Winner," WPI News, Sep 2016.
- "WVU Team Wins NASA Robot Challenge," Herald Standard, The Dominion Post, Sep 2016.
- "Robots Take Over WPI; One Leaves with $750,000 and Technology that Could Get to Mars," MassLive, Sep 2016.
- "NASA Awards $750K at WPI to Winner of Robot Competition," Telegram, Sep 2016.
- "NASA Ran a Treasure Hunt for Robots to Develop Space Exploration Tech," Motherboard, Sep 2016.
- "WVU Team Preps for Upcoming Sample Return Robot Challenge," WVU Today, Aug 2016.

Personal Interests

Computer Builder; Photography; Cooking; Economics; Travel; Basketball.