Muhammad Fadhil Ginting *Last Updated on March 1, 2021*

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Education

2018 -Now **Master of Science in Robotics, System, and Control** - ETH Zürich
Gpa: 5.60/6.00 (3.73/4.00) | Advisor: Dr. Ali Agha (JPL), Dr. Juan Nieto, Prof. Roland Siegwart
Thesis: Active Information Acquisition for Resource-constrained Navigation

2013 -2017 **Bachelor of Science in Electrical Engineering** - Bandung Institute of Technology
Gpa: 3.94/4.00, Ranked 1/130 | Advisor: Prof. Bambang Riyanto Trilaksono
Thesis: Guidance System Design and Implementation for Autonomous Underwater Glider

Research and Work Experience

Sep 2019 - Now NASA Jet Propulsion Laboratory(JPL), Pasadena, CA, USA
Visiting Robotics Researcher, JPL Team CoSTAR for the DARPA Subterranean Challenge
Developing novel technologies on multi-robot autonomy, large-scale perception, and system integration for rapid underground exploration in extreme environments.
Supervisor: Dr. Ali-akbar Agha-mohammadi

Mar 2019 - Sep 2019 ETH Juniors, Zürich, Switzerland
Magic Leap Mixed Reality Developer
Led a project for one of the world's leading dental company pioneering innovative Mixed Reality solutions to assist dentist works.

Jun 2019 - Aug 2019 ETH Zürich, Zürich, Switzerland
Graduate Research Student, Autonomous System Laboratory (ASL)
Developed a learning-based method for visual place recognition using high-level landmarks.
Supervisor: Dr. Cesar Cadena

May 2017 - Aug 2018 Bandung Institute of Technology, Bandung, Indonesia
Robotics Engineer, Advanced Robotics Research Laboratory
Developed navigation and guidance system for an Autonomous Underwater Glider, and conducted sea testing.
Supervisor: Prof. Bambang Riyanto Trilaksono

Jan 2017 - Apr 2017 Labtek Indie, Bandung, Indonesia
Software Developer Intern
Developed an efficient shopping system for convenience stores with mobile apps.

Jun 2016 -Aug 2016 CERN, Geneva, Switzerland
Summer Intern, CERN Summer Student Programme 2016
Devised a controlled high voltage module for Micro Pattern Gas Detectors(MPGD) and presented the result to the Internation MPGD Collaboration meeting.
Supervisor: Dr. Leszek Ropelewski

Publications

Under Review

1. "**NeBula: Quest for Robotic Autonomy in Challenging Environments; TEAM CoSTAR at the DARPA Subterranean Challenge**," Under review for the Field Robotics Special Issue in Advancements and lessons learned during Phase I & II of the DARPA Subterranean Challenge.

Published

1. Muhammad Fadhil Ginting, Kyohei Otsu, Jeffrey A. Edlund, Jay Gao, and Ali-akbar Agha-Mohammadi, "**CHORD: Distributed Data-sharing via Hybrid ROS 1 and 2 for Multi-robot Exploration of Large-scale Complex Environments**," *IEEE Robotics and Automation Letters (RA-L)*, 2021. [Paper], [Video].
2. Muhammad Fadhil Ginting*, Amanda Bouman*, Nikhilesh Alatur*, Matteo Palieri, David D. Fan, Thomas Touma, Torkom Pailevanian, Sung-Kyun Kim, Kyohei Otsu, Joel Burdick, and Ali-akbar Agha-Mohammadi, "**Autonomous Spot: Long-range Autonomous Exploration of Extreme Environments with Legged Locomotion**," *IEEE International Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, NV, 2020. **Best Paper Award on Safety, Security, and Rescue Robotics.** [Paper], [Video].

3. Marcel Kaufmann, Tiago Stegun Vaquero, Gustavo J. Correa, Kyohei Otsu, Muhammad Fadhil Ginting, Giovanni Beltrame, and Ali-akbar Agha-Mohammadi, "**Copilot MIKE: An Autonomous Assistant for Multi-Robot Operations in Cave Exploration**," *IEEE Aerospace Conference*, Big Sky, MT, 2021.

4. Muhammad Fadhil Ginting, Thomas Touma, Jeffrey A. Edlund, and Ali-akbar Agha-mohammadi, "**Deployable Mesh Network for Enabling Reliable Communication from within Subsurface Voids to the Planetary Surface**," *American Geophysical Union (AGU)*, San Francisco, CA, 2020. [Poster]

5. Thomas Touma, Jennifer G. Blank, Muhammad Fadhil Ginting, Christopher Patterson, and Ali-akbar Agha-mohammadi, "**Mars Dogs: Biomimetic Robots for the Exploration of Mars, from its Rugged Surface to its Hidden Caves**," *American Geophysical Union (AGU)*, San Francisco, CA, 2020.

6. "**Active Information Acquisition for Resource-constrained Navigation in Unknown Environment**", M.Sc. Thesis, Department of Mechanical and Process Engineering, ETH Zürich, October 2020. [Thesis].

7. Tri W. Oktaviana Putri, Muhammad Fadhil Ginting, Bambang Riyanto Trilaksono, Egi M. Idris Hidayat, and M. Faisal Sagala, "**Hardware In the Loop Simulation Development of Guidance System for Autonomous Underwater Glider**," *IEEE International Conference on Electrical Engineering and Informatics (ICEEI)*, Langkawi, Malaysia, 2017. [Paper].

8. "**Guidance System Implementation and Hardware in the Loop Simulation for Autonomous Underwater Glider**", B.Sc. Thesis, Department of Electrical Engineering, Bandung Institute of Technology, July 2017.

Awards and Honors

2020 DARPA Subterranean Challenge Urban Circuit - 1st Place Worldwide
2020 IEEE/RSJ IROS - Best Paper Award on Safety, Security, and Rescue Robotics
2020 NASA Jet Propulsion Laboratory - Research Affiliate STAR Award
2020 California State University Northridge - Autonomy Research Fellowship
2019 NASA Jet Propulsion Laboratory - Visiting Student Research Fellowship
2018 Indonesia Ministry of Finance - Awardee of LPDP Education Scholarship (Full Scholarship)
2017 Bandung Institute of Technology - Valedictorian of Dept. of Electrical Engineering
2017 McKinsey Young Leader for Indonesia 2016 - Top 10 graduates
2016 Bandung Institute of Technology - Dept. of Electrical Engineering Outstanding Student Award
2015 ABU Robocon (Asia Pacific Broadcasting Union Robot Contest) - 2nd Runner Up

Project Experience

Mars Dogs - NASA Innovative Advanced Concepts (NIAC) Summer 2020 - Now
Robotics Aerial Mobility Group NASA JPL
- Designing a visionary mission concept to explore the Martian surface and subsurface and studying the feasibility and challenges to deploy a legged-robot team on Mars. Submitted for NIAC Phase 1 Proposal.

Autonomy Integration on Legged Robots Winter 2019
Robotics Aerial Mobility Group NASA JPL
- Integrated JPL's autonomy framework with Boston Dynamics Spot robots, developed the software interfaces and tested the integrated system on the field.

LIDAR-based Robot Calibration Winter 2019
Robotics Aerial Mobility Group NASA JPL
- Developed a LIDAR-based method to calibrate robot pose with a fiducial gate for the pose initialization in the DARPA Subterranean Challenge.

Distributed Multi-robot Data-sharing with Hybrid ROS 1 and 2 Fall 2019
Robotics Aerial Mobility Group NASA JPL
- Developed a reliable multi-robot communication system with hybrid ROS 1 and 2 and evaluated the performance in multi-robot operations in large-scale complex environments.

Robust Visual Scene Representation for Place Recognition Spring 2019
Autonomous System Lab (ASL), directed by Prof. Roland Siegwart ETH Zürich
- Designed a learning-based method to perform visual localization and mapping using text-based landmarks and to leverage high-level descriptors for place recognition.

Multi-Camera Deep Tracking and Mapping (DeepTAM) Spring 2019
Computer Vision and Geometry Group (CVG), directed by Prof. Marc Pollefeys ETH Zürich

- Developed Deep Tracking and Mapping (DeepTAM) pipeline to leverage multi-camera setup, and evaluated the approach in challenging environment.

Eye Gaze Estimation with Convolutional Neural Network Spring 2019
Machine Perception Course, taught by Prof. Otmar Hilliges ETH Zürich
- Designed Convolutional Neural Network (CNN) model to estimate eye gaze in challenging real-world settings.

Drone Formation Estimation Using UWB Measurements Spring 2019
Vision for Robotics Lab (V4RL), directed by Prof. Margarita Chli ETH Zürich
- Designed swarm drones formation estimation using the relative distance between drones in a distributed manner.

Teaching Experience

Autonomy Research Center for STEAHM, California State University Northridge
- **Robotics Senior Design Project**, *Research Mentor* (Fall 2020 - Now)

Department of Electrical Engineering, Bandung Institute of Technology
- **Electronics Laboratory**, *Lab Coordinator* (Spring 2017)
- **Control Systems**, *Teaching Assistant* (Fall 2016)
- **Microprocessor Systems Laboratory**, *Lab Assistant* (Fall 2016)
- **Electronics**, *Teaching Assistant* (Spring 2016)

Skills

Language	English (Proficient C1) , German (Independent B1), Indonesian (Native)
Programming	C/C++, Python, MATLAB, Bash(Expert), Java, VHDL, C#, SQL(Proficient)
Software	Systems (Linux, Windows, ROS/ROS 2), Tensorflow, Pytorch, CUDA, OpenCV, PCL, Git, Eigen, LabVIEW, MPI, Eagle, Altium Designer, Visual Studio, Unity, Android Studio
Hardware	NVIDIA Jetson TX2, Intel RealSense, Velodyne LIDAR, Boston Dynamic Spot, FPGA, Beaglebone, Raspberry-Pi, TS-7250 SBC, ARM STM32

Selected Research Highlighted in Media

- Article: "Meet Au-Spot, the AI robot dog that's training to explore caves on Mars" by Mindy Weisberger, Live Science, 2020.
- Article: "How JPL's Team CoSTAR Won the DARPA SubT Challenge: Urban Circuit Systems Track" by Edward Terry, IEEE Spectrum, 2020.
- Article: "Robots Autonomously Navigate Underground in DARPA Challenge" by Andrew Good, NASA JPL News, 2020.

Professional and Social Activities

Organization Experience

2020 *Strategic Communication Team Lead*, NASA JPL Team CoSTAR
2017 *Project Lead*, Assessment Center Project - McKinsey Young Leader for Indonesia
2016 *Chairman*, University Student Robotics Organization
2015 *Senior Staff of Character Development Division*, Electrical Engineering Student Association
2014 *Head of Media and Communication Division*, University Student Tennis Club
2013 *Chairman*, High School Computer Student Community

Professional Membership
- IEEE Robotics and Automation Society, IEEE Student Member.
- The American Geophysical Union (AGU), Student Member.

Volunteer Experience
- Career, graduate study, and scholarship seminars for Indonesian student communities. 2020.
- Career inspiration class for primary school students in Rusunawa Cakung, Indonesia. March 1, 2018.
- Robotics workshop for senior high school students in SMA Negeri 5 Bandung, Indonesia. January 17, 2017.
- Robotics demo for local kindergarten and primary school students. 2016.
- Field coordinator for university graduation parade. March 25, 2015.

Leadership Program
- Leadership and Graduate Study Preparation Program by LPDP Scholarship. February 25 - March 3, 2018.
- McKinsey Young Leader for Indonesia Regional Wave 4. October 2016 - May 2017.

Hobbies: Travelling, Surfing, Badminton, Photography.