# Muhammad Fadhil Ginting *Last Updated on September 12, 2021*

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## EDUCATION

| 2018 - 2020 | **Master of Science in Robotics, System, and Control** - ETH ZÜRICH |
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| | 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 - SEP 2021 | NASA JET PROPULSION LABORATORY(JPL), Pasadena, CA, USA |
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| | *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, <u>Muhammad Fadhil Ginting</u>, 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. <u>Muhammad Fadhil Ginting</u>, 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, <u>Muhammad Fadhil Ginting</u>, 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

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| 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)** <span style="float:right">Summer - Fall 2020</span>
Robotics Aerial Mobility Group <span style="float:right">NASA JPL</span>
- 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** <span style="float:right">Winter 2019</span>
Robotics Aerial Mobility Group <span style="float:right">NASA JPL</span>
- 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** <span style="float:right">Winter 2019</span>
Robotics Aerial Mobility Group <span style="float:right">NASA JPL</span>
- 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** <span style="float:right">Fall 2019</span>
Robotics Aerial Mobility Group <span style="float:right">NASA JPL</span>
- 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** <span style="float:right">Spring 2019</span>
Autonomous System Lab (ASL), directed by Prof. Roland Siegwart <span style="float:right">ETH Zürich</span>
- 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)** <span style="float:right">Spring 2019</span>
Computer Vision and Geometry Group (CVG), directed by Prof. Marc Pollefeys <span style="float:right">ETH Zürich</span>

- 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
Machine Perception Course, taught by Prof. Otmar Hilliges

SPRING 2019
ETH Zürich
- Designed Convolutional Neural Network (CNN) model to estimate eye gaze in challenging real-world settings.

### Drone Formation Estimation Using UWB Measurements
Vision for Robotics Lab (V4RL), directed by Prof. Margarita Chli

SPRING 2019
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 - Spring 2021)

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

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| **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**

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| 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.