

# Muhammad Fadhil Ginting

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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     NASA JET PROPULSION LABORATORY(JPL), Pasadena, CA, USA  
- NOW     *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     ETH JUNIORS, Zürich, Switzerland  
- SEP 2019     *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     ETH ZÜRICH, Zürich, Switzerland  
- AUG 2019     *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     BANDUNG INSTITUTE OF TECHNOLOGY, Bandung, Indonesia  
- AUG 2018     *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     LABTEK INDIE, Bandung, Indonesia  
- APR 2017     *Software Developer Intern*  
Developed an efficient shopping system for convenience stores with mobile apps.
- JUN 2016     CERN, Geneva, Switzerland  
-AUG 2016     *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 International MPGD Collaboration meeting.  
**Supervisor:** Dr. Leszek Ropelewski

## PUBLICATIONS

### Under Review

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,"** Under review for the *IEEE Robotics and Automation Letters (RA-L)*, 2021. [\[Paper\]](#), [\[Video\]](#).

### Published

1. 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.** [\[Paper\]](#), [\[Video\]](#).
2. 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.

3. 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. [\[Poster\]](#)
4. 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.
5. “**Active Information Acquisition for Resource-constrained Navigation in Unknown Environment**”, M.Sc. Thesis, Department of Mechanical and Process Engineering, ETH Zürich, October 2020. [\[Thesis\]](#).
6. 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. [\[Paper\]](#).
7. “**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 - 1 <sup>st</sup> Place
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) - 2 <sup>nd</sup> Runner Up

## PROJECT EXPERIENCE

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<b>Mars Dogs - NASA Innovative Advanced Concepts (NIAC)</b>	SUMMER 2020 - NOW
Robotics Aerial Mobility Group	NASA JPL
<ul style="list-style-type: none"> <li>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.</li> </ul>	
<b>Autonomy Integration on Legged Robots</b>	WINTER 2019
Robotics Aerial Mobility Group	NASA JPL
<ul style="list-style-type: none"> <li>Integrated JPL's autonomy framework with Boston Dynamics Spot robots, developed the software interfaces and tested the integrated system on the field.</li> </ul>	
<b>LIDAR-based Robot Calibration</b>	WINTER 2019
Robotics Aerial Mobility Group	NASA JPL
<ul style="list-style-type: none"> <li>Developed a LIDAR-based method to calibrate robot pose with a fiducial gate for the pose initialization in the DARPA Subterranean Challenge.</li> </ul>	
<b>Distributed Multi-robot Data-sharing with Hybrid ROS 1 and 2</b>	FALL 2019
Robotics Aerial Mobility Group	NASA JPL
<ul style="list-style-type: none"> <li>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.</li> </ul>	
<b>Robust Visual Scene Representation for Place Recognition</b>	SPRING 2019
Autonomous System Lab (ASL), directed by Prof. Roland Siegwart	ETH Zürich
<ul style="list-style-type: none"> <li>Designed a learning-based method to perform visual localization and mapping using text-based landmarks and to leverage high-level descriptors for place recognition.</li> </ul>	
<b>Multi-Camera Deep Tracking and Mapping (DeepTAM)</b>	SPRING 2019
Computer Vision and Geometry Group (CVG), directed by Prof. Marc Pollefeys	ETH Zürich
<ul style="list-style-type: none"> <li>Developed Deep Tracking and Mapping (DeepTAM) pipeline to leverage multi-camera setup, and evaluated the approach in challenging environment.</li> </ul>	
<b>Eye Gaze Estimation with Convolutional Neural Network</b>	SPRING 2019
Machine Perception Course, taught by Prof. Otmar Hilliges	ETH Zürich
<ul style="list-style-type: none"> <li>Designed Convolutional Neural Network (CNN) model to estimate eye gaze in challenging real-world settings.</li> </ul>	

## Drone Formation Estimation Using UWB Measurements

Vision for Robotics Lab (V4RL), directed by Prof. Margarita Chli

- Designed swarm drones formation estimation using the relative distance between drones in a distributed manner.

SPRING 2019

ETH Zürich

## TEACHING EXPERIENCE

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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

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

## SELECTED RESEARCH HIGHLIGHTED IN MEDIA

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- 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

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### 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. Four times in 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. Six times in 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.