

# Isak Martin Simbolon

Taichung, Taiwan

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## EDUCATION

<b>University of Indonesia</b> <i>Bachelor of Electrical Engineering</i> <ul style="list-style-type: none"><li>● <b>GPA:</b> 3.55 / 4.00</li><li>● <b>Relevant Coursework:</b> Robotics, Control Engineering, Automation</li><li>● <b>Thesis:</b> 6 Degrees of Freedom Robot Control by Using Armband</li></ul>	<b>Depok, Indonesia</b> 2015-2019
<b>National Taiwan University of Science and Technology</b> <i>Master of Science in Electrical Engineering</i> <ul style="list-style-type: none"><li>● <b>GPA:</b> 4.00 / 4.20</li><li>● <b>Relevant Coursework:</b> Robotics, Machine Learning, Deep Learning, IoT</li><li>● <b>Thesis:</b> Integral Sliding Mode Control Optimization for Network-controlled Ball Balancing Platform</li></ul>	<b>Taipei, Taiwan</b> 2020-2021

## WORK & LEADERSHIP EXPERIENCE

<b>Robotics Engineer</b> <i>Precision Machinery Research and Development Center, Taiwan</i> <ul style="list-style-type: none"><li>● Four-wheeled Holonomic Autonomous Mobile Robot<ul style="list-style-type: none"><li>○ Localization, map making, navigation based on ROS 1 Noetic, and migrated the code base to ROS 2 Humble.</li><li>○ Wrote a bash script to automate the AMR initialization.</li><li>○ Improved localization with lidar-based odometry for holonomic robots, publish the package and build it to the public repository with GitHub Actions.</li><li>○ Wrote the motor driver program and implemented it in four-wheeled holonomic kinematics.</li><li>○ Integrated navigation and MySQL Database.</li></ul></li><li>● Computer Vision-based Assistive program for AGV positioning<ul style="list-style-type: none"><li>○ Transfer learning a neural network model to identify the object on top of the pallet.</li><li>○ Calculate the center of gravity of the pallet and object with color segmentation to improve the Forklift AGV positioning.</li><li>○ Design a camera holder on AGV with 3D Inventor.</li></ul></li><li>● Line Follower Autonomous Mobile Robot<ul style="list-style-type: none"><li>○ Improved the speed and positioning accuracy.</li><li>○ Localization and map making with SLAM on ROS.</li><li>○ Wrote the motor driver and industrial-grade line detector program with RS-485 protocol.</li><li>○ Wrote a simple PID controller for the line follower function.</li></ul></li></ul>	December 2022 - now
<b>Research Assistant</b> <i>Autonomous and Soft Robotic Lab, National Taiwan University</i> <ul style="list-style-type: none"><li>● Prosthetic Leg<ul style="list-style-type: none"><li>○ Led a team of students to collect and analyze gait movement that was later used to build a machine learning model to predict knee angle. The data were collected with 9-Axis Bluetooth IMU and trained in MATLAB.</li><li>○ Configured and debugged electromechanical parts of the prosthetic leg that consists of microcontrollers, motor driver, and DC motor.</li></ul></li></ul>	March 2022 – July 2022 (Contract)

- Anti-sway Control for Crane Prototype
  - Designed and programmed microcontroller connections to the anti-sway platform through the motor driver with C++.
  - Utilized HSV thresholding and Gaussian blur filter technique from OpenCV Python library and Kalman Filter to determine the position of the load that was later used to solve the error position with the PID control method.

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### TRAINING AND CERTIFICATIONS

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- AI-900: Azure AI Fundamentals from Microsoft
- SC-103: Shell Scripting using Bash from The Linux Foundation
- IoT Academy Certificate from Indonesian Ministry of Communication and Information Technology
- AWS Cloud Practitioner from Amazon

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### PUBLICATIONS

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**Development of Navigation System for Path Planning of Autonomous Cleaning Robot**  
*IEEE 2021 International Automatic Control Conference (CACCS)*

**Natural Tele-manipulation for Robot Movement based on Motion Pattern of Arm Posture**  
*IEEE 2020 International Conference on Smart Technology and Applications (ICoSTA)*

**The Application of Sensorless-Based Torque Estimation Technique in Industrial Collaborative Robots**  
*International Journal of iRobotics, 2023*

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### SKILLS, ACTIVITIES & INTERESTS

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<b>Languages</b>	English (TOEIC: 940) and Indonesian
<b>Technical Skills</b>	ROS2, ROS1, Python, C++, Arduino/Raspberry Pi, Bash, Tensorflow/Keras, Matlab
<b>Tools</b>	Docker, GitHub, 3D Inventor, MySQL, Visual Studio Code, Jira
<b>Research Interest</b>	Robotics, Deep Learning, Cloud-based Technology