



# MAHARANI A. P. IRAWAN

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## RESEARCH INTERESTS

Machine learning for systems, systems for machine learning, operating systems, storage systems, distributed systems.

## EDUCATION

**Computer Science, Bandung Institute of Technology (ITB)**

*Aug 2020 – Expected Jul 2024*

#1 Science and Engineering University in Indonesia

GPA: **3.75/4.00** / MGPA: **3.77/4.00**

**Mathematics and Natural Science, St. Louis 1 Surabaya Senior High School**

*2017-2020*

#2 Senior High School in Indonesia

Final rank: **#3/550**

## PUBLICATION

**FlashNet: Cutting Storage Tail Latency with Machine Learning Engineered on Extensible Data-Science Framework.** *Manuscript is available upon request. In preparation, 2023.*

## RESEARCH EXPERIENCES

**International Undergraduate Research Collaboration on ML for Storage Systems**

*September 2022-current*

- Collaborating with **Prof. Haryadi S. Gunawi of the University of Chicago** and **Achmad Imam Kistijantoro of Bandung Institute of Technology**.
- Utilize **machine learning** to **reduce tail latency** by balancing I/O requests on SSDs since they suffer from **unpredictable performance** due to internal management processes.
- Designed **15 machine learning models**, an **I/O trace labeler**, and a **continuous training pipeline** utilizing **11 drift detection algorithms** for storage performance prediction both in coarse and fine granularity.
- Published a **Chameleon Trovi** notebook containing a fine granularity experiment of a data science platform for storage system studies as part of **FAST'23 experiment artifacts**.
- Successfully **cut tail latency at p99** with **less than 20%** of total I/O failovered into another disk, scoring **80-93% ROC-AUC** towards labelers built using domain knowledge. Enhance **inference time up to 47x faster** than the previous optimization.
- Supported by the MoECRT Garuda Open Research Program.

**Summer of Reproducibility - Open Source Research Experience**

*May – August 2023*

- An NSF-funded summer fellowship contributing to reproducibility research held by the UC Santa Cruz OSPO.
- Collaborated as a part of FlashNet research project under the mentorship of **Prof. Haryadi S. Gunawi of the University of Chicago** and **Daniar H. Kurniawan**.
- Built and analyzed **4 drift detection algorithms** for existing machine learning pipelines for storage systems.
- Reproduced **research findings from prior publications**.

**International Undergraduate Research Collaboration on Systems for ML**

*April – August 2022*

- Collaborated with **Prof. Haryadi S. Gunawi of the University of Chicago**.
- Research on applying a **3-layer cache** on **recommender system** for escalating performance of deep learning **model inference**, which harnesses all-or-nothing property, requiring all embedding vector tables to be present.
- Analyzed the Deep Recommendation System (DRS) **embedding distance/similarity**.
- Reduced **23%** and **27% latency** at average and p90, **quadrupling throughput** while **losing 0.2% accuracy**.

## PROJECTS

**Event Information Website**

*2022*

Developed a static, fully responsive event information website for a student organization called StudentsxCEOs' 11<sup>th</sup> Grand Summit using Next.js. [\[Link\]](#)

**3D Virtual Exhibition Website**

*2022*

Developed a 3-Dimensional website for a Virtual Exhibition Event called Environmental Social Project and Notable Career Expo (Esperance) held by the Society of Petroleum Engineers Trisakti Student Chapter using Next.js and Three.js. [\[Link\]](#)

## HONORS AND AWARDS

### **1<sup>st</sup> winner of Gemastik XVI Data Mining Competition**

2023

- Innovated machine learning model for detecting network intrusion using few-shot learning autoencoder for the preliminary stage. [\[Link\]](#)
- Employed deep Exploratory Data Analysis (EDA), engineered domain knowledge-based features, and exploited ensemble tree models by voting for generating predictions in multiclass classification of network intrusion log data in 5 hours, resulting in 96% accuracy for finals competition.
- Won **1<sup>st</sup> prize out of 192 teams from Indonesia's top 70 participating universities**. On submission for Ganesha Karya award, a university-level award for outstanding, innovative papers.

### **2<sup>nd</sup> winner of ABU Robocon Indonesia 2022**

2022

- Participated in a selection for international ABU Robocon country representative. Built 2 robots for playing India's traditional game. The 1<sup>st</sup> robot has to shoot down a pile of cylinders. The 2<sup>nd</sup> has to pile up shot cylinders.
- Developed master code for both robots to control movements using Mbed OS and Arduino IDE in C++, also integrated computer vision model for automatic operation using 2 distros of Robot Operating System (ROS 1).
- Won **2<sup>nd</sup> prize out of 54 teams from 54 universities in Indonesia participated**.

### **National Finalists of Schneider Go Green (Asia) 2022**

2022

- One of **five national finalists**, representing Bandung Institute of Technology in a sustainable energy competition held by Schneider.
- Presented experiment results and product ideas regarding transforming food waste into battery utilizing yeast fungus to Schneider Indonesia executives and international representatives. [\[Link\]](#)

### **The ABB Jürgen Dormann Foundation Scholarship Awardee**

2021-2024

One of four students awarded a full-ride 4-year scholarship granted by ABB Ltd. for outstanding students in 2021.

## ORGANIZATIONS

### **Robotics Club**

2022

Single-handedly wrote codes for controlling robots' movement in Python and C++ using Robot Operating System (ROS1). Improved previous robots' code written in C++ for MbedOS. Combined pure pursuit controller and Stanley controller for automatic trajectory follower robot. Leveraged Intel NUC, Jetson Nano, Arduino, ESP, and STM32 ARM-based development board.

### **KMB Dhammanaño ITB**

2020-2023

As part of the committee guidance team, organized 15 teamwork and leadership training sessions and guided 7 committee teams throughout 2 years.

## COMPUTER SCIENCE SKILLS

<b>Programming Language</b>	C, C++, C#, CSS, HTML, Java, JavaScript, Python, Shell script, SQL, TypeScript
<b>Systems</b>	ActiveMQ, CentOS, CephFS, Linux, RabbitMQ
<b>Machine Learning</b>	Jupyter Notebook, Keras, PyTorch, Tensorflow
<b>Database</b>	MySQL, PostgreSQL, SQLite
<b>Cloud Computing</b>	Azure, Chameleon Cloud Testbed, Chameleon Trovi
<b>Robotics &amp; IoT</b>	Arduino, ESP, Intel NUC, MbedOS, NVIDIA Jetson, ROS, STM32
<b>Web Development</b>	Express.js, React.js, Next.js, Node.js, Three.js, Vite.js
<b>DevOps</b>	Vercel, Github CI/CD
<b>Other</b>	LaTeX

## REFERENCES

### **Haryadi S. Gunawi**

Associate Professor  
University of Chicago  
haryadi@cs.uchicago.edu

### **Achmad Imam Kistijantoro**

Senior Lecturer, Researcher  
Bandung Institute of Technology  
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### **Saiful Akbar**

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