Hansen Idden

Computer Science

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Education

Virginia Tech, United States – vt.edu Aug. 2024 - Expected Aug. 2029

- Doctor of Philosophy, Computer Science
- GPA : **3.92/4.00**

Sepuluh Nopember Institute Of Technology (ITS), Indonesia – its.ac.id Sept. 2020 - Apr. 2024

- Bachelor of Science, Computer Science
- Overall GPA : **3.77/4.00**, Major GPA : **3.74/4.00**

Research Experience

Graduate Research Assistant, Virginia Tech Aug. 2024 - Present

- Advisor: Prof. Huaicheng Li
- **Criticality-Driven Memory Tiering for AI & Data-Intensive Systems (Under Submission)**
  - Designed a **novel page-level metric** to quantify per-page performance criticality using CPU performance counters and lightweight analytical modeling
  - Built an **online memory tiering system** that dynamically promotes/demotes pages based on true performance impact rather than access frequency
  - Evaluated across diverse workloads (graph analytics, Redis, and AI inference with GPT-2), achieving up to **40% performance improvement** with significantly **fewer migrations**
  - Advanced efficiency of AI and database systems by **reducing latency** and **resource overhead** through intelligent memory management
- **Programming Models & Runtime Systems for Computational Storage (Under Submission)**
  - Co-designed the **first unified programming model, compiler, runtime, and hardware stack** for in-storage computing
  - Developed a Python DSL with stateful, asynchronous semantics to **offload AI workloads directly to computational storage devices**
  - Built a **storage-aware compiler and runtime** that map tasks across ARM, NPUs, and near-flash SIMD accelerators, enabling **cross-boundary optimizations**
  - Demonstrated acceleration of **AI workloads** including DLRM embedding lookups, video analytics, extreme classification, and multi-query attention for LLM inference, achieving up to 14× speedup
- **Project Cylon: Fast & Accurate Full-Stack CXL-SSD Emulator**
  - Co-designed hybrid memory access path for CXL-SSD emulation
  - Creating accurate flash and DRAM buffer emulation for CXL-SSD through hypervisor optimization
- **Computational Storage for Distributed DLRM**
  - Implementing embedding lookup offloading to the storage side to reduce host memory bandwidth and improve recommendation model performance
  - Optimizing data placement and access patterns for distributed deep learning recommendation models

International Research Collaboration on Storage and Memory Systems Oct. 2022 - Nov. 2023

- Collaborating with **Prof. Huaicheng Li of Virginia Tech** and Prof. Ary Mazharuddin Shiddiqi of Sepuluh Nopember Institute of Technology, Supported by the MoECRT ACE Open Research program
- Make **DRAM-backed SSD Emulator (FEMU) accurately emulate the zoned interface latency** of an actual Zone Namespace (ZNS) device by adding **delay emulation mapping logic** on **FEMU ZNS SSD architecture**,
- Improving tail latency by optimizing **FEMU context switch interrupt** through **virtual timer interrupt** on **KVM** and QEMU tuning. Achieving **80% reduction** in context switches and **70% improvement** in tail latency under high workloads

Research Assistant, Sepuluh Nopember Institute Of Technology Feb. 2022 - Oct. 2022

- Advisor: Prof. Dr. Diana Purwitasari, S.Kom., M.Sc.
- Create **Topic Modelling** for **social media posting** with GSDMM, LDA, and IndoBERT + K-Means

- Labelling social media posting data for **Named Entity Recognition**
- Analyze **social media user's behaviour** in postings

Patents

IProctor: AI-based Assessment Monitoring Application 2021

- Advisor: Dini Adni Navastara, S.Kom, M.Sc.
- Responsible in creating the **face recognition** to **verify the person** and **predict the confidence level** of a person cheating

Talks & Presentation

Project Cylon: Fast and Accurate Full-Stack CXL-SSD Emulation
19th USENIX Symposium on Operating Systems Design and Implementation (OSDI) (Jul. 2025)

- Presented full-stack CXL-SSD emulation system, reducing VM-exit penalties and enabling realistic system evaluation

Research in NLP and Text Pre-processing
BISA.AI (Nov. 2021)

- Talks about the developing **AI research** especially in **NLP field**
- Give insight of NLP research papers and uprising topic for NLP
- Demonstrate ways to tackle **text pre-processing** to make a clean dataset
- Discussing the strategy to ensure data entrigity and the importance of clean dataset.

Work Experience

Data Scientist Intern
Bukit Vista Property Management Bali, Indonesia (Nov. 2021 - Feb. 2022)

- Create a **guest review-based property classification model** to **boost sales engagement** Increased booking rates by $> 10\%$
- Create a **topic modelling model** based on review used by 3 teams to **promote properties** with the right selling value

Bangkit Academy by Google 2020
Machine Learning Path Jogja Cohort (Jan. 2020 - Jun. 2020)

- **Top 3 out of 51 participants** Bangkit Final Project Jogja Cohort
- Creating breast cancer detection website
- **Youngest** Graduates

Awards

Garuda Hacks 2.0 Hackathon Nov. 2021

- **Best Sustainability Hacks**: The best projects out of 500 participants for the environment
- Ecoxyztem Award: Award from **Ecoxyztem company** for the best **Climate Tech** project
- Developed **Recycle-Me app** that **gamifying recycling proccesses**
- Create and deploy a **garbage classification** model for Recycle-Me app

Quadrathlon 2021 Nov. 2021

1^{st} out of 45 participants in Data Mining division

GEMASTIK XIV Oct. 2021

$4^{th} - 10^{th}$ Finalist of Data Mining Divisions, out of $>$ **2000 participants nationally**

Quadrathlon 2020 Nov. 2020

1^{st} out of 36 participants in Competitive Programming division
2^{nd} out of 60 participants in Data Mining division
3^{rd} out of 33 participants in Capture The Flag division

National Sebelas Maret Mathematics Competition Dec. 2019

1^{st} out of $>$ 200 participants

Technical Skills

System Hacking Experience Linux Kernel (KVM), FEMU
PL C, C++, Python, Java, JavaScript, SQL, Laravel, Bash, Go, Latex
AI Tensorflow, Pytorch, Keras
DB PostgreSQL, MySQL, SQLite
Tools & UNIX commands GNUPlot, QEMU, Make, awk

Organization and Volunteering

Data Mining Community, HMTC ITS
Committee (Jan. 2021 - Dec. 2021)

- A community for Computer Science students to learn and improve in Data Science
- Hosting data science seminars with prominent Indonesian Data Scientists as a speaker to share their insightful experiences and industry expertise

Intelligence and Vision Computational Laboratory, Informatics ITS
Coordinator (Jan. 2022 - Dec. 2023)

- Managing the laboratory and some events held by the department
- Helping ITS Informatics lecturers that are part of our lab as a **Research Assistant**