Senapati S. Diwangkara

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Education

- **Johns Hopkins University** — Aug 21 - May 27 (expected)
  *Ph.D., Computer Science, advised by **Prof. Yinzhi Cao*** — *Baltimore, MD, USA*
  - **Research Area**: Program Analysis, Code Intelligence, Web Security and Privacy, Distributed Systems Reliability, Networked Systems Reliability
- **Bandung Institute of Technology** — Aug 16 - Jul 20
  B.S., Computer Science — *Bandung, Indonesia*

Publications and Manuscripts

C=Conference, J=Journal, S=In Submission

[S.1] **TranSPArent: Taint-style Vulnerability Detection of Generic SPAs through Automated Framework Abstraction**
Senapati Diwangkara, Yinzhi Cao — *In submission to NDSS 26, manuscript available upon request*

[C.2] **Deriving Semantic Checkers from Tests to Detect Silent Failures in Production Distributed Systems** — OSDI 25
Chang Lou, Dimas Shidqi Parikesit, Yujin Huang, Zhewen Yang, Senapati Diwangkara, Yuzhuo Jing, Achmad Imam Kistijantoro, Ding Yuan, Suman Nath, Peng Huang.

[J.1] **Tempus: Probabilistic Network Latency Verification** — IEEE Access 24
Sepehr Abdous, Senapati Diwangkara* (*equal contribution), Soudeh Ghorbani*

[C.1] **Study of Data Imbalance and Asynchronous Aggregation Algorithm on Federated Learning System** — ICITSI 20
Senapati Diwangkara, Achmad Imam Kistijantoro

Research Experience

- **Automated Vulnerability Detection in Single Page Applications (SPA)** [S.1]
  *Advised by **Prof. Yinzhi Cao** (Johns Hopkins University)*
  - Developed and implemented TranSPArent, a taint-style vulnerability detection tool for SPA, which pre-analyzes its runtime to reveal SPA-specific sinks
  - Designed static and dynamic analysis methods to comprehensively solve incomplete JavaScript data flow edges within the SPA runtime
  - Improved false negative rate to 19.6% compared to 62.5% achieved by the state-of-the-art tool, CodeQL, revealing 11 zero-day vulnerabilities
- **Automated Detection of Silent Semantic Failures in Distributed Systems** [C.2]
  *Advised by **Prof. Chang Lou** (University of Virginia) and **Prof. Peng Huang** (University of Michigan)*
  - Developed a dynamic analysis approach to check silent semantic failures generated from the unit test suite of popular distributed systems
  - Conducted evaluation experiments on ZooKeeper, Cassandra, HDFS, and HBase open-source test suites as a baseline benchmark
  - Processed 672 test cases across 4 systems, detecting 15 silent failures out of 20 that were manually detected
- **Verification of Network Latency Service Level Agreement (SLA) in Faulty Datacenter Networks** [J.1]
  *Advised by **Prof. Soudeh Ghorbani** (Johns Hopkins University, Meta)*
  - Developed a probabilistic network latency verifier to test a network's latency SLA between various node pairs under various link-failure conditions
  - Improved analysis time of an 8-ary fat-tree network to 8 minutes compared to 1 month time taken by the benchmark latency analysis tool, Parsimon
  - Maintained tail-latency accuracy irrespective of network load, from 10% to 70%

Professional Experience

- **Shopee - Backend Engineer Intern** — Nov 20 - Feb 21
  NYSE:SE - The largest e-commerce platform in Southeast Asia — *Jakarta, Indonesia*
  - Refactored the in-app minigame system to a more uniform output that integrates better with the existing Grafana dashboard
  - Created 2 new Grafana dashboards about user retention and resource utilization, and presented them to the Engineering Manager (EM)
  - **Tech stack**: Go, JavaScript, Node.js, Grafana, Git, GitLab
- **GoTo - Data Scientist Intern** — Dec 19 - Feb 20
  IDX:GOTO - The largest ride-hailing company in Indonesia, operating across Southeast Asia — *Jakarta, Indonesia*
  - Initiated Simulacrum, a Python-based ride-hailing market simulation for testing different driver incentive schemes based on historical data
  - Implemented Simulacrum prototype, which has high throughput (1000+ orders/second) while maintaining accuracy to historical data
  - **Tech stack**: Python, scikit-learn, pandas, Anaconda, Jupyter, Git
- **Kata.ai - Research Engineer Intern** — Jun 19 - Sep 19
  An Indonesian NLP-based chatbot startup — *Jakarta, Indonesia*
  - Worked on the company's Named Entity Recognition (NER) engine on its flagship chatbot product, improving its F1 score from 86% to 92%
  - Handled the experiment of a semi-supervised model, Cross-View Training (Clark et al., 2018), to leverage the company's unlabeled data
  - **Tech stack**: Python, TensorFlow, PyTorch, Jupyter, Anaconda, Git

Teaching Experience

- **Head Teaching Assistant**, Object Oriented Software Engineering (40 students) — Fall 2023, 2024 | Johns Hopkins University
- **Head Teaching Assistant**, Software Testing and Debugging (40 students) — Spring 2023, 2024 | Johns Hopkins University
- **Head Teaching Assistant**, Introduction to Algorithms (133 students) — Fall 2022 | Johns Hopkins University

Honors and Activities

- **CS Research Mentorship Program (CSRMP)**, Google — 2022
- **Cum Laude**, Bandung Institute of Technology — 2020

Skills

- **Program Analysis**: CodeQL, Semgrep, Esprima, Java Management Extensions (JMX), abstract interpretation, model checking, fuzzing
- **Web and Cloud Runtime**: JavaScript (Node.js, React, Vue, Angular), Java, Cassandra, Spark, HDFS, HBase, Docker, Go, C/C++, Rust
- **Data Analysis and Machine Learning**: Python (Pandas, NumPy, scikit-learn, Jupyter), Matplotlib, PyTorch, TensorFlow