

Jingwen Shi

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EDUCATION

Focus: Wireless Network, Security, Distributed Systems

- Ph.D., Computer Science and Engineering, Michigan State University *Aug. 2019 - May 2024*
- M.S., Applied Computer Technology, University of Chinese Academy of Sciences *Sept. 2016 - May 2019*
- B.S., Information Security, Hunan University, Graduated with Honor (Summa eq.) *Sept. 2012 - May 2016*

INTERNSHIP

Research Intern, Los Alamos National Lab

June 2021 - Aug. 2021

- Developed a learning approach to re-construct a black-box cyber-physical system model from scratch by observing operating data samples. The cyber-physical system consists of physical equations and control rules.
- Applied (1) **ordinary least squares** regression to infer the variables and corresponding coefficients of physical equations; (2) **support vector machine** to infer the decision hyperplane of control rules. Reduced redundant parameters by **singular value decomposition**. Attained an accuracy of **97%**.

Research Intern, Alibaba

Jan. 2019 - June 2019

Project1. Traffic Prediction and Uncertainty Estimation for Resource Allocation in Cloud

- Queries per Second (QPS) prediction is critical for resource allocation in the cloud. Developed **Bayesian Neural Networks** to dynamically predict the upper bounds of QPS, where the upper bounds are more crucial than the mean predictions.
- Fetched data from the distributed monitoring system **EagleEye** and trained the **deep learning** model on **Hadoop**. One paper accepted to [JST'19].

Project2. Anomaly Detection for Virtual Machines Failure in Cloud

- Developed an efficient **anomaly detection** framework reducing the false alarm rate in detecting virtual machine failure due to the inherent jitters in low-level system metrics(e.g., I/O, CPU usage).
- Fetched low-level system metrics logs from large-scale clusters in parallel and persisted the data to the local machines using **Shell** and **SQL**. Integrated Machine learning and statistic models in a hierarchical pipeline from multi-views using **isolation forest**, **three-sigma**, and **kernel density estimation (KDE)**. Reduced **95%** of false alarms without sacrificing the true alarm rate.

PROJECTS

Uncovering Insecure Designs of Cellular 911 Services in 4G/5G

Sept. 2021 - Dec. 2021

- Built a testbed consisting of the core **IMS network** (**OpenIMSCore**, **MySQL**, and **Linux**) and Radio Access Network (**srsRAN**, **USRP**). Successfully defended **DoS attacks** on 911 services using **TLS** encryption. One paper accepted to [Mobicom'22].

Uncovering Insecure Designs of Voice Services in 4G/5G

Jan. 2020 - May 2021

- Discovered loopholes in the PDCP layer of the **4G/5G radio protocol stack** and QoS from **3GPP** standards.
- Developed (1) an **overshadow attack** that can mute voices during the call by modifying **srsRAN** (mainly on the **PHY** and **MAC** layers); (2) an **identity linkage attack** that can discover users' radio network identities; (3) a **free-charging attack** that can bypass the charging policy rules of operators.

A Big Data System for Geographical Data

Feb. 2017 - April 2018

- Implemented a data pipeline to store raw data in **HDFS** and connect HDFS with **PostgreSQL** of a cloud system for storing, querying, and analyzing large-scale satellite images and traffic data.
- Designed a spatial index approach that can reduce I/O traffic by up to **70%**.
- Built **Hbase** and **MongoDB** for performance evaluation. One paper accepted to [IPCCC'18].

PUBLICATIONS

- **Network Security**: [TMC'22, [Paper](#)], [Mobicom'22, [Paper](#)](Best Community Paper), [Mobisys'23 Peer Reviewing]
- **Federated Learning and Privacy**: [AAAI'23 Peer Reviewing, [Paper](#)]
- **Distributed System**: [IPCCC'18, [Paper](#)], [JST'19, [Paper](#)]

SKILLS

- **Frameworks**: SDR, OpenIMSCore, Android; MongoDB, Hbase, PostgreSQL, Spark, Hadoop; Django, D3.js, Scrapy
- **Languages**: Python, Java, C, Matlab, Julia, PHP, JavaScript, Shell, SQL
- **Developer Tools**: Linux, Git, Github