Quoc H. Nguyen

Ph.D. Candidate
Department of Industrial and Management Systems Engineering
4202 E. Fowler Avenue, Tampa, FL 33620, USA
(701) 729 5142 nguyenq29@usf.edu quocnh.github.io

PROFESSIONAL POSITIONS

Graduate Research/Teaching Assistant, University of South Florida, USA — **Aug 2022 – Aug 2024**
System Research Intern, CCAST – North Dakota State University, USA — **Aug 2019 – May 2020**
Graduate Research/Teaching Assistant, North Dakota State University, USA — **Aug 2019 – Aug 2022**
AI Engineer, Vitalify Asia, Vietnam — **May 2018 – Jun 2019**
Senior Software Developer, The FlashCT, Vietnam — **Jun 2016 – May 2018**
Graduate Research Assistant, Kyung Hee University, Korea — **March 2014 – March 2016**
Software Intern/Developer, ISB, Vietnam — **Sept 2012 – Feb 2014**

EDUCATION

University of South Florida (USF) - Transfered from NDSU — **Aug 2022 – Aug 2024**
Ph.D. in Industrial Engineering. GPA: 4.0/4.0 — *Florida, USA*

- Dissertation: "A Robust Data-Driven Framework for Artificial Intelligent Systems" [PDF]

Kyung Hee University (KHU) — **March 2014 – March 2016**
M.Sc. in Computer Science and Engineering. GPA: 3.9/4.0 — *Yogin, Korea*

- Dissertation: "An Efficient Video Streaming Architecture with QoS Control for Virtual Desktop Infrastructure in Cloud Computing"

Posts and Telecommunication Institute of Technology (PTIT) — **Aug 2009 – Feb 2014**
BS in Computer Science and Engineering. GPA: 3.8/4.0 — *Ho Chi Minh, Vietnam*

HONORS & AWARDS

IISE 3F Future Faculty Fellow. The Institute for Industrial and Systems Engineers, USA — **2023 – 2024**
USENIX's Student Grant ($500). Enigma Conference, Santa Clara, USA. Sponsored by USENIX-The Advanced Computing Systems Association — **2022**
Graduate Student Council Research Grant ($500). NDSU, USA — **2021**
GPN Cyber Team SC20 Scholarship ($300). The International Conference for High Performance Computing, Networking, Storage, and Analysis. Sponsored by NSF OAC Award #1925681 — **2020**
Best Student Paper Award. "Android-based Low-cost Control System for Smart Home using Raspberry Pi", KCC Conference, Jeju, Korea — **2015**
Top 1 Students in Academic Year Award ($100). PTIT, Vietnam — **2010 – 2013**
Science Research Student Award. Research topic: "Customized Search Algorithm for Android using Google Maps APIs", PTIT, Vietnam — **2013**
Student Travel Award ($200). ACM – International Collegiate Programming Contest, Ha Noi, Vietnam. Sponsored by IBM — **2012**

RESEARCH INTERESTS

My research focuses on developing robust and trustworthy artificial intelligence systems, with a particular emphasis on applications in healthcare, cybersecurity, and industrial engineering. I am passionate about creating AI solutions that are not only effective but also reliable, secure, and ethically sound. My work spans several key areas: **(1) Federated Learning and Privacy-Preserving AI; (2) Deep Learning for Medical Imaging synthesis and Analysis; (3) IoT and Edge Computing for Healthcare Monitoring; (4) Robust and Explainable Machine Learning techniques; (5) AI for Cybersecurity, especially Network Intrusion Detection Industrial applications of AI and Computer Vision.**

PUBLICATIONS [Google Scholar]

Peer-reviewed Journals

1. **Quoc H. Nguyen***, Soumyadeep Hore, Ankit Shah, Trung Le, and Nathaniel D. Bastian, "FedNIDS – A Federated Learning Framework for Packet-based Network Intrusion Detection System", ***ACM Digital Threats: Research and Practice***, 2024, https://dl.acm.org/doi/10.1145/3696012. [PDF]

2. **Quoc H. Nguyen***, Thang Nguyen, Minh Nguyen, Trung Le, "Class Label Conditioning Diffusion Model for Robust Brain Tumor MRI Synthesis", ***IEEE Computational Intelligence Magazine***, 2023 (2nd revision). [PDF]

3. **Quoc H. Nguyen***, Chau Le, Chuan Pham, Minh Nguyen, Dung Nguyen, Arveity Setty, Trung Le, "A Hybrid Data-Centric and Model-Centric Approach Towards Robust Single-Lead ECG Obstructive Sleep Apnea Diagnosis", ***Elsevier Engineering Applications of Artificial Intelligence***, 2023 (Under review). [PDF]

4. Tien-Dung Nguyen, Pham Phuoc Hung, Tran Hoang Dai, **Quoc H. Nguyen**, Cong-Thinh Huynh, Eui-Nam Huh, "Prediction-based energy policy for mobile virtual desktop infrastructure in a cloud environment", ***Elsevier Information Sciences***, pages 132-151, ISSN 0020-0255, https://doi.org/10.1016/j.ins.2015.02.022.2016. [PDF]

5. Dinh-Mao Bui, **Quoc H. Nguyen**, YongIk Yoon, SungIk Jun, Muhammad Bilal Amin, Sungyoung Lee, "Gaussian process for predicting CPU utilization and its application to energy efficiency", ***Springer Applied Intelligent***, 874–891 (2015). https://doi.org/10.1007/s10489-015-0688-4. [PDF]

Peer-reviewed Conferences

1. Soumyadeep Hore, **Quoc H. Nguyen**, Yulun Xu, Ankit Shah, Nathaniel Bastian, Trung Le, "Empirical Evaluation of Autoencoder Models for Anomaly Detection in Packet-based NIDS", ***In Proc. of the 6th IEEE Conference on Dependable and Secure Computing (IEEE DSC)***, Tampa, USA, 2023. [PDF]

2. **Quoc H. Nguyen***, Quang Dang, Chuan Pham, Tien-Dung Nguyen, Hang Nguyen, Arveity Setty, Trung Le, "Developing an Architecture for IoT Interoperability in Healthcare-A Case Study of Real-time SpO2 Signal Monitoring and Analysis", ***In Proc. of the IEEE International Conference on Big Data (IEEE BigData)***, Atlanta, USA, 2020. [PDF]

3. **Quoc H. Nguyen***, Eui-Nam Huh, "Proposal of Novel Image Compression Algorithmusing Kmean Clustering for VDI in Cloud Computing", ***In Proc. of the 1st International Conference on Next Generation Computing (ICNGC)***, Bangkok, Thailand, 2016. [PDF]

4. **Quoc H. Nguyen***, Tien-Dung Nguyen, Phuoc-Hung Pham, Xuan-Qui Pham, Aymen Abdullah Alsa ar, Eui-Nam Huh, "An Efficient Platform for Mobile Application Development on Cloud Environments", ***In Proc. of the 3rd International Conference on Computer Applications and Infomation Processing Technology (CAIPT)***, Yangon, Myanmar, 2016. [PDF]

5. **Quoc H. Nguyen***, Ton Thi Kim Loan, Bui Dinh Mao, Eui-Nam Huh, "Low cost real-time system monitoring using Raspberry Pi", ***In Proc. of the 7th IEEE International Conference on Ubiquitous and Future Networks (IEEE ICNGC)***, Sapporo, Japan, 2015. [PDF], *(100+ citations)*

6. X.-Q. Pham, T.-D. Nguyen, C.-T.Huynh, P.-H. Pham, **Quoc H. Nguyen** and E. N. Huh, "A Novel Efficient Approach for Screen Image Classification in Remote Display Protocol", ***In Proc. of the 15th IEEE International Symposium on Cluster, Cloud and Grid Computing (IEEE SCCGC)***, Shenzhen, China, 2015. [PDF]

7. Cong-Thinh Huynh, Tien-Dung Nguyen, **Quoc H. Nguyen**, Eui-Nam Huh, "Cloud-based Real-time location tracking and messaging system- A child-care case study", ***In Proc. of the 9th International Conference on Ubiquitous Information Management and Communication (ACM IMCOM)***, New York, USA 2015. [PDF]

8. Ton Thi Kim Loan, Xuan-Qui Pham, **Quoc H. Nguyen**, Nguyen Dao Tan Tri, Ngo Quang Thai, Eui-Nam Huh, "Cost efficient real-time applications scheduling in mobile cloud computing", ***Advances in Computer Science and Ubiquitous Computing. Lecture Notes in Electrical Engineering, vol 373. Springer, Singapore***, 2015. [PDF]

Patents

1. Trung Le, **Quoc H. Nguyen**, "Smart IoT System for Longitudinal Real-time Physiological Monitoring of Cancer Patients Undergoing Treatment", *US Patent (pending)*, USF24/00352.

RESEARCH EXPERIENCE

Graduate Research Assistant **Aug 2019 – Present**
Spaches Lab, NDSU & USF *Tampa, Florida*

- **Confluence in Data-Driven AI Systems: A Comprehensive Framework for Robustness and Trustworthiness** (Ph.D. Dissertation)
  - Proposed a comprehensive AI framework for reliability and trustworthiness
  - Led a team and developed an IoT-based connected system for seamless data collection, integration and real-time monitoring
  - Developed a data synthesis solution to address limitations in available data
  - Developed a security AI system using Federated Learning to enhance privacy and safeguard model building
- **FedNIDS – A Federated Learning Framework for Packet-based Network Intrusion Detection System**
  (Funded by U.S. Military Academy W911NF-22-2-0045) | [Code]
  - Proposed a Federated Learning-based novel framework for identifying and adapting to emerging attacks
  - Developed a DNN-based local model for incident detection and empirically evaluated incident detection using autoencoder methods.
  - Analyzed packet-based data and established Non-IID silos for experiments
- **Class Label Conditioning Diffusion Model for Robust Brain Tumor MRI Synthesis** | [Code]
  - Proposed a framework for generating reliable and trustworthy brain tumor imaging using diffusion models
  - Developed a class label conditioning mechanism integrated into UNET and established a quality control system based on FID and IS metrics.
  - Conducted experiments to compare diffusion models and other generative methods such as AutoEncoder, and GANs.
- **IoT Connected System for OSA Detection and Analysis**
  (Funded by National Institutes of Health (NIH) U54GM128729) | [PDF][Code]
  - Proposed a MLOps hybrid framework for OSA detection, combining data-centric and model-centric approaches with stacked LSTM
  - Developed an IoT smart connected system, encompassing a wearable device and a cloud platform, for the collection and monitoring of heterogeneous data.
  - Implemented a seamless communication protocol using Apache Kafka and conducted data analysis using Apache Spark.
- **Luna Lander with Reinforcement Learning** | [Code]
  - Built a luna lander agent with deep Q-Learning and deep deterministic policy gradient algorithm.

System Research Intern **Aug 2019 – May 2020**
CCAST, NDSU *Fargo, North Dakota*

- **IoT Infrastructure based on OpenStack**
  - Designed a hardware architecture to build a high-performance computing system
  - Configured and developed VMs based on OpenStack in a Linux environment
  - Established a cloud environment for training with GPUs
  - Developed an IoT dashboard for data collection using Raspberry Pi

Graduate Research Assistant **March 2014 – March 2016**
ICNS Lab, KHU *Yogin, Korea*

- **An Efficient Video Streaming Architecture with QoS Control for Virtual Desktop Infrastructure in Cloud Computing** (M.Sc. Thesis)
  - Proposed a control-based architecture using multiple linear regression to optimize decisions for the QoS policy
  - Developed a novel image compression algorithm based on k-means clustering, applicable in real-world case studies
  - Analyzed QoS policies based on historical data of network conditions.
- **Real-time Mobile Cloud Service Platform**
  (Funded by National Research Foundation of Korea (NRF) NRF-2010-0020725) | [Code]
  - Proposed a mobile cloud platform based on Apache Cordova for mobile app development
  - Developed UI Platform integrated in Eclipse

PERSONAL PROJECTS

Katok | • *Role: Co-founder* • *Tech stack: Machine Learning, TensorFlow, MySQL, Flutter* | [Code] **2022**

- Developed a cutting-edge e-commerce hair salon platform, featuring web and mobile applications powered by NodeJS and Flutter. Streamlined appointment scheduling through a user-friendly interface, enhancing the customer experience and improving salon operations
- Integrated Machine Learning models such as Decision Trees and Random Forests to predict customer preferences and behaviors, optimizing product recommendations based on past purchase data

Conveyor Belt | • *Role: Team Leader* • *Tech stack: Raspberry Pi, C++* | [Code], [PDF], [Video] **2019**

- Developed an automated Conveyor Belt system using Raspberry Pi, streamlining the creation of datasets for object detection. This innovative approach significantly reduces the time and cost associated with manual data collection
- Integrated ultrasonic sensors into the conveyor system to detect objects within a specified range. When an object is detected, the conveyor halts, allowing for the automated capture of data. This not only enhances efficiency but also ensures accurate and timely dataset generation

Robot Arm | • *Role: Team Leader* • *Tech stack: CNN, Resnet-50, TensorFlow, C++* | [Code], [PDF], [Video] **2018**

- Proposed an innovative inspection system for automating the product inspection process in factories. Currently relying on manual grading, the system utilizes a Robot Arm to enhance efficiency and accuracy in defect detection
- Addresses the limitations of the current system where skilled workers manually inspect and remove defective products from a conveyor belt. The Robot Arm automates this process, significantly reducing the need for labor-intensive tasks and increasing overall throughput
- Designed to inspect products for defects using CNN, ResNet models, the Robot Arm operates seamlessly along the conveyor belt. This automated solution not only accelerates the inspection process but also ensures a more consistent and reliable assessment compared to manual inspection methods.

Green House | • *Role: Developer* • *Tech stack: Machine Learning, Rashberry Pi, Python, PHP, MySQL* | [Code] **2017**

- Developed an autonomous platform integrated into smart houses for cultivating ginseng. The system utilizes a sophisticated algorithm to dynamically adapt and optimize the greenhouse environment based on real-time conditions, ensuring ideal growth conditions for ginseng plants
- Implemented a Raspberry Pi Kit as the brain controller, orchestrating all aspects of the greenhouse operation. This includes managing environmental parameters such as temperature, humidity, light intensity, and nutrient levels
- Leveraged Reinforcement Learning to optimize control strategies for adjusting environmental parameters over time, ensuring the best conditions for ginseng growth

Smart House | • *Role: Team Leader* • *Tech stack: Android, Machine Learning, C++* | [Code] **2016**

- Developed a Smart Home system consisting of two main components: hardware with an ARM microcontroller for house control and a software suite in C++ for the microcontroller along with an Android mobile app
- Implemented Machine Learning algorithms, including Linear Regression, to predict user behavior and determine optimal times for turning on lights. This involves capturing the linear relationship between input features (e.g., time of day, historical usage patterns) and the target variable (e.g., the likelihood of turning on lights).

GRANT WRITING EXPERIENCE

1. **"Smart IoT System for Obstructive Sleep Apnea Monitoring and Forecasting in Head and Neck Cancer Patients Undergoing Radiotherapy"**. Funding Agency: National Institutes of Health (NIH), Award Number: U54GM128729. Dates: Oct 2020-Oct 2022. Funded Amount: $111,000. Primary PIs: Trung Le, Arveity Setty. Role: Primary contributor (Literature review, research methodology development and description)

2. **"A Federated Learning System for Arrhythmia Classication with Convolutional Neural Networks"**. Funding Agency: Graduate Student Council Grant (NDSU). Dates: Oct 2022. Funded Amount: $500.

TEACHING-RELATED EXPERIENCE

IISE Future Faculty Felow Training
- Participated in teaching-related seminar training series
- Trained at Teaching WorkShop - Entrepreneurial Engineering Mindset in ISE Practice
- Discussed teaching practices with faculty teaching mentors and performed classroom observations **2024**

Teaching Assistant, ENG 4450 Introduction of Linear System at University of South Florida **2024**

Guest Lecturer, USF
- Federated Learning Tutorial for EIN6936 Graduate Seminar

Teaching Assistant, ESI 4244 Design of Experiments at University of South Florida **2023**

Teaching Assistant, IME 461 Quality Assurance and Control at North Dakota State University **2020 – 2021**
- Taught some topics as an instructor and supervised practical lab sessions
- Revised course materials and made homework solutions
- Conducted virtual assistance sessions and graded student assignments

Teaching Assistant, IME 456 Program and Project Management at North Dakota State University **2019**

LANG 701 Certificate – English Language and Classroom Skills for International GTAs **2019**

INDUSTRY EXPERIENCE

Machine Learning Engineer **May 2018 – Jun 2019**
Vitalify Asia *Ho Chi Minh, Vietnam*
- **Hair Color** | [Video]
  - Developed semantic segmentation models based on MobileNet & UNet to create real-time hair color effects for mobile apps. Utilized Apache Spark on AWS EMR with AWS Sagemaker studio.
  - Converted the trained hdf5 model to a CoreML model for the iOS app and Tensorflow Lite for Android
  - Created a labeled hair color dataset
- **GUMMY Toyota**
  - Contributed to the development of a deep learning tool for detecting defects on Toyota car buttons, involving tasks such as creating datasets and building detection models based on CNN and ResNet-50
  - Designed an HTML web interface for customers to test the model's performance. The product was ordered by a Toyota manufacturer in Japan

Senior Software Developer **Jun 2016 – May 2018**
The FlashCT *Ho Chi Minh, Vietnam*
- **E-commerce CT Platform**
  - Led a team of 4 developers in creating an E-commerce app for web and mobile platforms using Wordpress, PHP, MongoDB, and Android
  - Integrated a CRM system using open-source Zoho and optimized Google SEO within the E-commerce system. This initiative improved customer contact management, tracked interactions, and enhanced account management, resulting in a 50% increase in revenue
  - Implemented project management using Redmine and Openproject, incorporating Agile/Scrum methods to enhance task and human resource management for the company

Software Intern/Developer **Sept 2012 – Feb 2014**
ISB *Ho Chi Minh, Vietnam*
- **Back-end and Fron-end Mobile App**
  - Learned in both frontend (Android, NodeJS, PHP, HTML) and backend (PHP server, Node.js, SQL, NoSQL) tools to construct a scalable system
  - Developed Fall Detection app for the elderly utilizing Android and Accelerometer sensors
  - Investigated new data parsing techniques for more efficient data handling

MENTORING EXPERIENCE

NDSU Research Experience for Undergraduates (REU) Summer Program
- *Taranatee Khan*, "Federated Learning for Internet of Medical Things", Jun-Aug 2022
- *Adeoye Olomodosi*, "IoT system for OSA Monitoring in Cancer Patient", Jun-Aug 2021

ECE Undergraduate Capstone Project, NDSU
- *Quang Dang*, "Point-of-care Obstructive Sleep Apnea (OSA) Monitoring and Forecasting Platform for Cancer Patients", 2019-2020.
- *Hoskins, Thomas; Stein, Karl; Cummings, Charles; Utke, James*, "Developing Smart Internet of Things (IoT) Device for Healthcare Edge Computing System", Spring 2021.

PRESENTATIONS

Federated Learning Framework for NIDS based Packed Data (next coming)
- The 4th Workshop on Artificial Intelligence-Enabled Cybersecurity Analytics, August 25, 2024, Barcelona, Spain

FedNIDS: Federated Learning Framework for Network Intrusion Detection
- 2024 INFORMS Conference on Security, 28 July, Arlington, VA

Smart IoT System for OSA
- IISE Annual Conference, Canada, May 2024

Class Label Conditioning Diffusion Model for Robust Brain Tumor MRI Synthesis
- INFORMS Annual Meeting, Phoenix, USA, Oct 2023

IoT Interoperability Architecture: Realtime SpO2 Signal Monitoring and Analysis Case Study
- IEEE International Conference on Big Data, Dec 2020 (Virtual)

Cloud computing with OpenStack
- Center for Computationally Assisted Science and Technology, NDSU, May 2020

Proposal of Novel Image Compression Algorithm using Kmean Clustering for VDI in Cloud Computing
- 1st Internal Conference on Next Generation Computing, Bangkok, Thailand, 2016

Low cost real-time system monitoring using Raspberry Pi
- 7th IEEE International Conference on Ubiquitous and Future Networks, Sapporo, 2015

Android-based Low-Cost Control System for Smart Home using Raspberry Pi
- KCC Conference, Jeju, South Korea, 2015

SERVICE

Session Chairs
- 2023 INFORMS Annual Meeting, Phoenix, USA
- 2022 INFORMS Annual Meeting, Indianapolis, USA

Journal & Conference Reviewer
- IEEE Transactions on Automation Science and Engineering
- Sensors
- Multimedia Tools and Applications
- 2023 International Conference On Advanced Technologies For Communications
- 2015 IEEE Conference on Computer Communications

Web developer. Developed a website to raise funds for the non-profit
Dakota Sleep Society Organization in North Dakota, USA **2020 – Present**
Field Assistant. Assisted referees and reset boards for the First LEGO League
hosted by STEM Robotics - The College of Engineering, NDSU, USA **2021**
President of Badminton Club.
Trained new members and raised funds for the group, NDSU **2021 – 2022**
Vice President of Vietnamese Group.
Created traditional activities and raised funds for the group, NDSU **2021 – 2022**

AFFILIATION

Member of Institute of Industrial and Systems Engineers (IISE) **2021 – Present**
Member of Institute of Electrical and Electronics Engineers (IEEE) **2019 – Present**
Member of INFORMS **2019 – Present**

REFERENCES

Ankit Shah, Assistant Professor

- Industrial and Management Systems Engineering Department, University of South Florida, USA

Tapas K. Das, Professor

- Dean of Industrial and Management Systems Engineering Department, University of South Florida, USA

Huong M. Manh, Professor

- Department of Physics University of South Florida, University of South Florida, USA