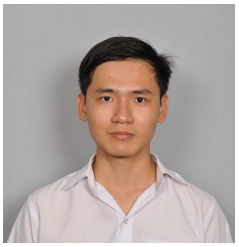

BUI THANH DAT

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EDUCATION

University of Science, Vietnam National University Ho Chi Minh City (VNU-HCM) | Ho Chi Minh City, Vietnam

Bachelor of Science in Electronics and Telecommunications Engineering | Expected Graduation: October 2025

- GPA: **8.52 / 10.0** (Equivalent to **3.65 / 4.0**)

RESEARCH INTERESTS

- Computer Systems Architecture (RISC-V, RoCC Interface)
- FPGA Design, Implementation, and Verification
- Hardware Acceleration for Machine Learning and Signal Processing
- VLSI Design and Computer-Aided Design (CAD)
- Low-Power Digital System Design
- System-on-Chip (SoC) Architecture and Integration
- Embedded Systems for AI Edge Devices
- Adversarial Machine Learning and Robustness (Time-Series Domain)

RESEARCH EXPERIENCE

Undergraduate Research Student | Computer Embedded Systems Laboratory (CESLAB), HCMUS-VNUHCM | 2022 – Present

- Advisor: Dr. Huu Thuan Huynh (hhthuan@hcmus.edu.vn)
- Contributed to the design, implementation (Verilog), and FPGA verification of hardware accelerators and SoC components.
- Designed and integrated custom peripherals, including a DMA controller with Avalon-MM interfaces, into Nios V based SoC systems using Platform Designer.
- Developed test procedures using C language and debugged systems with Ashling RiscFree IDE.
- Gained practical experience with embedded platforms (STM32, Raspberry Pi, Silicon

Labs EFR32 Gecko) and development tools (Intel Quartus Prime, ModelSim/Questa Sim, Simplicity Studio, STM32CubeIDE, Xilinx Vivado).
- Developed proficiency in digital design methodologies, simulation, hardware debugging, and system integration.

Undergraduate Research Student | Remote Collaboration | 2023 – 2024

- Advisor: Dr. Tung Kieu (Assistant Professor, Aalborg University, tungkvt@cs.aau.dk)
- Investigated unsupervised black-box adversarial attacks against Deep One-Class Classification models, specifically within the time-series domain.
- Explored the use of unsupervised meta-learning for generating effective and transferable adversarial examples.
- Developed understanding of deep learning frameworks, attack methodologies (FGSM, PGD), and model robustness techniques.

PUBLICATIONS

1. Nguyen, NH., Dang, TP., **Bui, TD.**, Hoang, TT., Pham, CK., Huynh, HT. (2024). Designing and Implementing a 2D Integer DCT Hardware Accelerator Fully Compatible with Versatile Video Coding. In: Gervasi, O., Murgante, B., Garau, C., Taniar, D., C. Rocha, A.M.A., Faginas Lago, M.N. (eds) Computational Science and Its Applications – ICCSA 2024 Workshops. ICCSA 2024. Lecture Notes in Computer Science, vol 14815. Springer, Cham. https://doi.org/10.1007/978-3-031-65154-0_7
2. Nguyen, NH., Dang, TP., Tran, TK., **Bui, TD.**, Hoang, TT. and Huynh, HT., "A Configurable 2D-Integer DCT Hardware Accelerator Compatible with H.266 Standard based on RISC-V Architecture," *2024 7th International Seminar on Research of Information Technology and Intelligent Systems (ISRITI)*, Yogyakarta, Indonesia, 2024, pp. 894-899, doi: 10.1109/ISRITI64779.2024.10963564.
3. Huynh, TMT., Tran, TK., **Bui, TD.**, Pham, CK., & Huynh, HT. (2025). An Efficient Algorithm Compatible with Low-performance Hardware for AI Edge Devices in Arrhythmia Prediction. *Presented at the 5th International Conference on Intelligent Systems & Networks (ICISN 2025), March 22, 2025*.

RELEVANT PROJECTS

Design and Integration of a Custom DMA Controller on FPGA in a Nios V/m SoC System | Internship Project & Report, CESLAB | Jan 2025 - Apr 2025

- Designed a custom Direct Memory Access (DMA) controller with Avalon-MM Master (Read/Write) and Slave (Control/Status) interfaces using Verilog.
- Integrated the DMA controller into a Nios V/m based System-on-Chip using Intel Platform Designer.
- Implemented and tested the complete system on an Intel DE10-Standard FPGA board.
- Developed C code application using Ashling RiscFree IDE to configure the DMA, initiate transfers between on-chip memory blocks, and verify data integrity.

- Documented the design, implementation, and testing process in a formal internship report.

Smart Temperature & Humidity Monitoring System with BLE & LCD | Group Project (Course: Computer Interfaces and Data Acquisition) | Sep 2024 - Dec 2024

- Developed an embedded system on a Silicon Labs EFR32 Blue Gecko board (using Simplicity Studio IDE) to monitor environmental conditions.
- Interfaced with a DHT11 sensor using GPIO to acquire temperature and humidity readings.
- Implemented custom Bluetooth Low Energy (BLE) advertising packets to broadcast sensor data wirelessly.
- Assisted in utilisation and adaptation of Silicon Labs Graphics Library (GLIB/DMD) to display real-time sensor data and system status on a Sharp Memory LCD.
- Enabled UART communication for user configuration of sensor sampling and BLE advertising intervals.
- Assisted in programming system logic, sensor interfacing, BLE communication, and display drivers in C.

Ported Adafruit Fingerprint Sensor Library from Arduino to C++ for STM32 | Microprocessor Course Final Project | Mar 2021 - Apr 2021

- Role: Lead Developer
- Successfully adapted and implemented the sensor library for an STM32 embedded board, demonstrating C++ programming skills and embedded system integration capabilities.
- Achieved high grades for both theoretical (8.7/10) and practical lab (9.5/10) components.

IoT Heart Rate & SpO2 Monitoring System | Group Project (Course: Biomedical Electronics) | Oct 2024 - Dec 2024

- Developed an IoT system to measure and monitor heart rate and SpO2 levels using STM32 and ESP32 microcontrollers.
- Established UART communication between STM32 and ESP32 for transferring processed sensor data, utilizing custom frame parsing with header detection and CRC checks for reliability.
- Programmed the ESP32 (using Arduino C++) to receive data from STM32 and transmit it to a cloud platform (ThingsBoard hosted on AWS EC2) via MQTT protocol over Wi-Fi.
- Configured an AWS EC2 instance and deployed ThingsBoard for data visualization and dashboard creation.
- Gained experience with sensor interfacing (I2C), inter-MCU communication (UART), IoT protocols (MQTT), cloud platforms (AWS EC2, ThingsBoard), and embedded C/C++ programming.

HDPharmacities - Android Pharmacy Application | Group Project (Course: Mobile Programming) | Feb 2025 - Mar 2025

- Developed a comprehensive Android application for pharmacy management and sales using Java and Android Studio.
- Assisted in designing and implementing a local SQLite database to store user, medicine, and order information, utilizing the DAO pattern for data access.
- Created distinct user interfaces and functionalities for customers (browsing, cart management, checkout, order history) and administrators (user management, product CRUD, order processing, sales statistics).
- Implemented user authentication with session management using SharedPreferences.
- Utilized RecyclerView with custom Adapters for displaying dynamic lists (products, cart items, orders, customers).
- Integrated the MPAndroidChart library to visualize sales statistics for administrators.
- Implemented per-app language support (English/Vietnamese).
- Applied MVC architecture and Singleton pattern (CartManager, UserSessionManager).

Digital Communication System Simulation | Group Project (Course: Digital Communications) | Jan 2024 - Apr 2024

- Role: Providing theoretical insights for the team, and verification for the results.
- Analyzed A-Law and μ-Law companding techniques for speech signal processing using MATLAB, evaluating signal-to-quantization noise ratio (SQNR).
- Developed MATLAB simulations for a baseband digital communication system, including signal generation, AWGN channel modeling, matched filtering, and threshold detection.
- Calculated and compared theoretical vs. simulated Bit Error Rate (BER) for the baseband system under varying noise levels (N0/2).
- Simulated a QPSK passband modulation system in MATLAB, including symbol mapping, carrier modulation, AWGN channel, coherent demodulation (matched filters), and symbol decision based on Euclidean distance.
- Calculated and compared theoretical vs. simulated BER for the QPSK system under varying Eb/N0 ratios.
- Implemented the Bit Flipping decoding algorithm for Low-Density Parity-Check (LDPC) codes in MATLAB using a given parity check matrix (H) and Tanner graph representation.

ZF & MMSE Equalizer Simulation for Wireless Channels | Group Project (Course: Wireless Communications) | Sep 2024 - Nov 2024

- Role: Analyze, research and give insights on the reasons of performance of different equalization methods.
- Contributed to the simulation of a QPSK communication system over a frequency-selective AWGN channel using MATLAB by analyzing channel effects.
- Analyzed the modeled channel using a multi-tap impulse response and its calculated frequency response (FFT).
- Researched and analyzed the performance of frequency-domain Zero-Forcing (ZF) and Minimum Mean Square Error (MMSE) equalizers used to mitigate Inter-Symbol Interference (ISI).

- Calculated and compared the Signal-to-Noise Ratio (SNR) before and after applying ZF and MMSE equalization.
- Analyzed the performance of the equalizers by visualizing the received and equalized signals using constellation diagrams and eye diagrams.

Enterprise Network Design & Simulation | Group Project (Course: Networking Technology) | May 2024 - Aug 2024

- Designed and simulated a multi-segment enterprise network using GNS3, incorporating routers, switches, and Windows Server VMs on VMWare.
- Configured VLANs, Spanning Tree Protocol (STP), and DHCP servers for network segmentation and management within the 172.16.0.0/16 address space.
- Implemented OSPF routing protocol for dynamic route discovery and default routes for external connectivity within the 192.168.0.0/16 address space.
- Configured Network Address Translation (NAT - dynamic, static, PAT) and firewall rules using Access Control Lists (ACLs) on routers to manage traffic flow between internal networks, a DMZ, and a simulated ISP.
- Deployed and managed Windows Server Active Directory Domain Services (AD DS), including creating users, groups, and Organizational Units (OUs).
- Configured DNS servers (Primary, Secondary, Root Hints) for name resolution across different domains.
- Implemented Group Policies to enforce security settings and user restrictions (e.g., password policies, application restrictions, remote shutdown rights).
- Configured Client-to-Gateway and Site-to-Site VPNs for secure remote access and inter-site connectivity.
- Set up file sharing services with specific access permissions based on AD groups.

TECHNICAL SKILLS

- **Hardware Description Languages:** Verilog HDL
- **FPGA Tools:** Intel Quartus Prime, Platform Designer (Qsys), ModelSim/Questa Sim, Intel FPGAcademy Platform (DE10-Standard), AMD (Xilinx) Vivado
- **Hardware Concepts:** Digital Logic Design, Computer Architecture, SoC Design & Integration, Hardware Acceleration, RISC-V (Nios V), DMA Controllers, Avalon Bus Interfaces, DCT, Low-Power Design, FPGA (Intel Cyclone V, Xilinx Virtex)
- **Programming Languages:** C/C++, Python, MATLAB
- **Software/Tools:** Simulink, Linux (Bash Shell), Git, Ashling RiscFree™ IDE, Linux Device Drivers (Basic), Android Studio, GNS3, Simplicity Studio
- **Mobile Development:** Android SDK, Activities, Fragments, SQLite, SharedPreferences, RecyclerView, Adapters, ViewPager2, TabLayout, MVC Pattern, DAO Pattern, Singleton Pattern, MPAndroidChart
- **Embedded Systems:** Silicon Labs Gecko, STM32, Raspberry Pi
- **Communication Protocols:** BLE (Custom Advertising), UART, SPI, I2C, MQTT, OSPF, DHCP
- **Networking:** Network Design & Simulation (GNS3), Cisco IOS Configuration (Routers, Switches), VLANs, STP, ACLs, NAT/PAT, VPN (Client-to-Site, Site-to-Site), TCP/IP

- **Server Administration:** Windows Server, Active Directory Domain Services (AD DS), DNS, Group Policy Management, File Sharing & Permissions
- **Digital & Wireless Communications:** SNR Analysis, Constellation Diagrams, Eye Diagrams
- **Cloud & IoT Platforms:** AWS EC2, ThingsBoard
- **Machine Learning:** Deep Learning Concepts, Adversarial Attacks (FGSM, PGD), Meta-Learning, Data Structures & Algorithms

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HONORS AND AWARDS

Long An High School for the Gifted | Specialize in Informatics & English | 2018 - 2021

- National Round Participant, Vietnam Olympiad in Informatics (for two consecutive years: 2020 - 2021)
    - Qualified via Provincial Round Third Prize in 2019 for VOI 2020, and Second Prize in 2020 for VOI 2021.
- Gold Medal, Southern Summer Camp Olympiad in Informatics VI (2019)
- ICPC National Round Qualifier (Vietnam Southern Regional), 2020

LANGUAGES

- **Vietnamese:** Native
- **English:** Proficient (IELTS Academic: 7.0, 2021)