

ALAN DEVKOTA

Houston, TX | 618-303-3568 | alandevkota@gmail.com | [LinkedIn](#) | [GitHub](#) | [Portfolio Website](#)

PROFILE

- Strength in Computer Architecture, Neural Networks, Transformer Neural Networks, Embedded Systems, Machine Learning Reliability, VLSI Systems Implementation with HDL, Wireless Communication, and Information Theory
- Programming experience in C, C++, Python and program solving skills using OOP principles
- Self-motivated, problem-solving, analytical and collaborative individual with excellent communication skills
- Interested in Computer Architecture, Transformer Neural Networks, High Performance Computing, Embedded Systems, FPGAs, Machine Learning Security, Multimodality Neural Networks, Cyber Security, Low Power VLSI Design, Digital Design, Electronic Design Automation, Synthesis and Verification, CUDA Programming, and Wireless Communication

EDUCATION

University of Houston, Houston, TX

Aug 2022 - Present

PhD, Electrical and Computer Engineering | Advisor: Dr. Albert M. Cheng

- **Coursework:** Advanced Machine Learning, Advanced Computer Architecture, GPU / heterogeneous programming, Operating Systems, Real-Time Systems and Embedded Programming, Advanced Hardware Design, VLSI Design

Southern Illinois University Carbondale, Carbondale, IL

Jan 2020 - Aug 2022

M.S. Electrical and Computer Engineering | Advisor: Dr. Gayan Amarasuriya Aruma Baduge

- **Coursework:** Advanced Wireless Communication, Digital Communications, Introduction to Information Theory, Signal Detection and Estimation, Probability and Stochastic Processes, Wireless Networks, Communication Systems, Digital Signal Processing, Implement VLSI Sysys w/HDL

TECHNICAL SKILLS

- **Programming:** C, C++, Python, Core Java and Web Basics
- **Scripting:** MATLAB, Python
- **HDL, Synthesis and Verification:** Verilog RTL, SystemVerilog, VHDL, Xilinx Vivado
- **Version Control:** Git
- **Libraries:** numpy, pandas, Matplotlib
- **Machine Learning:** Pytorch, Tensorflow
- **Developer Tools:** Visual Studio Code, Jupyter Notebook, Anaconda
- **Operating Systems:** Linux, Windows

WORK EXPERIENCE AND RESEARCH

Department of Electrical and Computer Engineering

University of Houston

Graduate Research Assistant

Aug 2022 - Present

- Transformer Neural Networks Attack and Defense, Multimodal Neural Networks, Convolutional Neural Network, Object Detection Transformers, Vision Transformers, Machine learning and AI, Computer Architecture, Computer vision, and Object Detection
- Adversarial Attack and Defense on Vision Transformers, Noised based Adversarial Training (Gaussian and Undervolting Noise)
- Localized Fault Recovery in FPGA BRAMs with pre-characterized fault clustering and priority-based event scheduling

Graduate Teaching Assistant

Spring 2023, Fall 2023, Spring 2024, Fall 2024

- ECE 5357 - Intro to Cybersecurity, ECE 6373 - Adv Computer Arch, ECE - 5330/6397 Intro to Robotics

Office of Information Technology

Southern Illinois University

Technical Student, Network Security (Part time)

Jan 2022 to May 2022

- Working with various customers, end-users, and vendors to troubleshoot issues pertaining to wired and wireless network access, DHCP, DNS, firewalls, VPN, subnetting, routing, and other network services

Wireless Communication and Information System Laboratory

Southern Illinois University

Graduate Research Assistant

Spring 2021 - Summer 2022

- Intelligent Reflecting Surface-Assisted Relay Networks, Simultaneously Transmitting and Reflecting Reconfigurable Intelligent Surface (STAR-RIS), and Simultaneous Wireless Information and Power transfer technology (modeling, simulation, statistical characterization, performance analysis, study of phase-shift quantization, Energy Harvesting, and achievable rate-energy trade-off).
- Modeling and simulation of Relay Assisted Cooperative Communication System, RIS-aided NOMA, and Massive MIMO systems

Department of Electrical and Computer Engineering

Southern Illinois University

Graduate Teaching Assistant

Spring 2020, Fall 2020

- *Electronics ECE-345:* Lab instructor, design and simulation of Electronics circuits, grade assignment and reports
- *Intro to Biomedical Imaging ECE-467:* Lab instructor, image processing, 3D image projection, grade assignment and reports
- *Digital Signal Processing ECE-468:* Lab instructor, signal processing and analysis, filter design, grade assignment and reports

PUBLICATIONS

- Diluka Loku Galappaththige, **Alan Devkota**, and Gayan Amarasuriya, "On the Performance of IRS-Assisted Relay System", 2021 IEEE Global Communications Conference (GLOBECOM). IEEE, 2021. ([Link](#))
- **Alan Devkota**, " Performance Analysis of RIS-Assisted Relay Systems", Southern Illinois University at Carbondale, 2022. ([Link](#))

- **Alan Devkota**, and Albert M. K. Cheng, "Localized Fault Recovery in FPGA BRAMs with Pre-Characterized Scheduling and Redundancy", IEEE Embedded Systems Letters, 2025 (**under review**)

NOTABLE COURSE PROJECTS

Advanced Machine Learning

- Implemented a DETR transformer for Multispectral Object Detection with ResNet50 backbone, concatenation of RGB and thermal tokens for early fusion, DETR encoder and decoder, and a MLP block is used to predict the object with bounding box.

Advanced Computer Architecture

- Investigated the performance impact of several basic cache configuration parameters, such as the L1, L2, and TLB cache size, associativity, and block size using the SimpleScalar "sim-outorder" model and the SPEC 2000 benchmark suite.

GPU/Heterogeneous Programming

- Simulated gravitational interactions among n bodies using a Python serial implementation and a C++/CUDA parallel approach, leveraging GPGPU architecture for efficiency.
- Developed a C++ ray-tracing algorithm for direct sphere illumination, leveraging std::thread for parallelism to reduce latency.

Operating Systems

- Developed and integrated the Banker deadlock avoidance algorithm into the Process Manager to prevent deadlocks in a Unix/Linux system. Implemented EDF and LLF scheduling with tiebreakers, using semaphores and pipes for inter-process communication.
- Simulated the Chor and Coan Randomized Byzantine Agreement Algorithm using real Unix/Linux processes. Used shared memory and semaphores to model communication links between processor pairs.

VLSI Design

- Implemented a D flip-flop (D-FF) circuit cascading two MUXs in Cadence and LTspice using 180nm technology for Mosfets.

Advanced Hardware Design

- Designed a Vehicular Robotic Arm using ESP32 microcontroller and developed an Android app for control using Android Studio.

Implementation of VLSI Systems with HDL

- Design of adder, multiplexer, register, flip-flops, counter circuits, and memory using Synopsys VCS and Xilinx Vivado and implementation in Bays3 FPGA board.

Introduction to Information Theory

- Realized entropy in terms of the asymptotic behavior of independent and identically distributed sequence and verified the weak asymptotic equipartition property through simulation in MATLAB.

Signal Detection and Estimation

- Generated random variates, derived statistical properties, and determined the asymptotic properties of the MLE estimator and the CRLB estimator via MATLAB.

Digital Communications

- Designed and analyzed digital receivers, error control coding using MATLAB, realized communication over a bandlimited channel.

CONFERENCE PRESENTATIONS AND POSTERS

- **Conference Presentation:** "On the Performance of IRS-Assisted Relay System" at 2021 IEEE Global Communications Conference: Wireless Communications Conference (GLOBECOM), held in Madrid, Spain [Presented Online]
- **Poster Presentation:** "Harnessing Heterogeneous Healthcare Data: An Attention Neural Network Approach" at 2023 AI in Health Conference (AIHC), Hosted by the Ken Kennedy Institute at Rice University

AWARDS

- Graduate Research Assistant (Fall 2022 - Present), Graduate Teaching Assistant (Spring 2023, Fall 2023, Spring 2024), UH
- Graduate Research Assistant (Spring 2021 - Summer 2022), Graduate Teaching Assistant (Spring 2020, Fall 2020), SIUC
- High Achiever Scholarship (Undergraduate), Kathmandu Engineering College, Tribhuvan University

OTHER PROGRAMMING PROJECTS

Single and Multi-Modality Object Detection Transformer leveraging cross-attention across modalities

- Developed a transformer model that integrates the information from different modalities together to enhance the prediction as well as address the challenges posed by missing modalities via cross-attention encoders.
- Developed a RT-DETR, an extension to Detection Transformers (DETR), as a means to conduct real-time Object Detection from saved video as well as webcam video.

Harnessing Heterogeneous Healthcare Data: An Attention Neural Network Approach

- I will be developing an attention neural network-based model to fuse heterogeneous healthcare data, focusing on cross-modality attention transformer blocks for modality integration. Moreover, prompt learning will be utilized to effectively address the challenge of missing modalities in the dataset.

Performance Analysis of IRS-Assisted Relay Systems

- Investigated the performance of intelligence reflective surface (IRS)-assisted relay systems via modeling, simulation, and statistical characterization in MATLAB.

Energy Harvesting in RIS-Assisted Relay Networks

- Investigated the performance of intelligence reflective surface (IRS)-assisted relay systems for Simultaneous Wireless Information and Power transfer (SWIPT) technology, Energy Harvesting, effects of phase-shift quantization and achievable rate-energy trade-off in SWIPT technology via modeling, simulation, statistical characterization in MATLAB.