

LEJLA SKELIC

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EDUCATION

Massachusetts Institute of Technology (MIT)

M.Eng. in Electrical Engineering & Computer Science February 2025

Concentrations: Computer Systems and Machine Learning / Artificial Intelligence

Thesis: CIRCUIT: A Benchmark for Circuit Interpretation and Reasoning Capabilities of LLMs

Advisor: Prof. Ruonan Han

GPA: 5.0/5.0

B.S. in Electrical Engineering & Computer Science June 2023

GPA: 5.0/5.0

Coursework Highlights:

Secure Hardware Design (C & Assembly), Operating Systems (C), Digital Systems Lab (System Verilog), Embedded Systems (C++ & Python), Computer Vision (Python), LLMs, Intro to Machine Learning (Python), Elements of Software Construction (Java), etc.

RESEARCH EXPERIENCE

MIT Microsystems Technology Laboratories (MTL),

Terahertz Integrated Electronics Group

September 2023 - Present

Graduate Research Assistant (with Prof. Ruonan Han)

Cambridge, MA

- Designed a benchmark dataset to assess large language models' reasoning in analog circuits, featuring 510 problems.
- Developed unit-test-like dataset design to functionally assess model reasoning, enabling reliable and scalable automatic evaluation, featuring evaluation metrics that highlight strengths and limitations in model reasoning and generalization.
- Experimented with state-of-the-art models.
- **First author on a paper under review at ICLR 2025.** [\[paper\]](#)

MIT Research Laboratory of Electronics (RLE), Niroui Group

September - December 2022

Undergraduate Research Assistant (with Prof. Farnaz Niroui)

Cambridge, MA

- Developed the project trajectory and baseline framework for applying Machine Learning (ML) to study the mechanics of molecular junctions in single-molecule electronics.
- Investigated limitations of conventional methods, proposed data collection and manipulation strategies tailored for ML-based classification, and suggested model architectures based on literature review.

MIT RLE, Niroui Group

February - May, 2022

Undergraduate Research Assistant (with Prof. Farnaz Niroui)

Cambridge, MA

- Studied vapor-phase and liquid-phase deposition of self-assembled monolayers (SAMs) for anti-stiction in NEMS devices and a novel nanofabrication technique.
- Designed experiments for unexplored SAM compounds through literature review, and conducted the experiments in the MIT.nano cleanroom.
- Collected and analyzed data using contact angle measurements, ellipsometry, atomic force microscopy (AFM), and x-ray photoelectron spectroscopy (XPS).

MIT Media Lab, Fluid Interfaces Group

January, 2021

Undergraduate Research Assistant (with Prof. Kevin Esvelt and Dr. Camilo Rojas)

Cambridge, MA

- Enhanced the performance of an ML model for the [Saving Face](#) project, which aimed to detect face touching using data from headphone microphones.
- Improved model accuracy and reliability with optimization methods and metrics created through model performance and exploratory data analyses.

Broad Institute of MIT and Harvard, Amit Choudhary Lab

February - March 2020

Undergraduate Research Assistant (with Prof. Eric S. Lander and Prof. Amit Choudhary)

Cambridge, MA

- Conducted literature reviews to inform the development of a process for delivering esterified anti-CRISPR proteins using newly developed diazo compounds.
- Performed wet lab experiments, including esterification of anti-CRISPR proteins, fluorescent tagging for visualization in bacterial cells, and protein delivery.
- Collected and analyzed microscopy data to evaluate the efficacy and localization of esterified proteins in bacteria.

TEACHING EXPERIENCE

MIT Department of Electrical Engineering and Computer Science (EECS)

June 2023 - Present

Graduate Teaching Assistant (with Prof. John Guttag, Prof. Stefanie Mueller, Dr. Ana Bell, and Dr. Andrew Wang)

Cambridge, MA

- Teaching Assistant and Recitation Instructor for 6.100A/B/L (Intro to CS Programming in Python, Computational Thinking, and Data Science).
- Redesigned and delivered recitation materials, incorporating different learning styles and focusing on in-depth understanding, concept applicability, and student participation and engagement.
- Developed problem sets, wrote [articles](#) diving deeper into various topics, and provided individualized support to students, including debugging assistance, conceptual clarifications, and skill-building guidance.

MIT Computer Science & Artificial Intelligence Laboratory (CSAIL), Madry Lab

June - December 2021

Course Assistant (with Prof. Alexander Madry, Dr. Ana Bell, and Dr. Silvina Hanono Wachman)

Cambridge, MA

- Developed content plans and problem sets in Python for the edX course “Teaching Machines to Make Decisions.”
- Designed problem sets to clarify key data science and machine learning concepts, leveraging interesting datasets and real-world applications to create engaging and insightful exercises. Highlighted datasets with meaningful themes fostering interdisciplinary learning and connecting technical concepts to broader societal issues.
- Focused on messaging within problem sets to reinforce learning objectives, highlighting insights gained from data analysis and the application of specific ML models.

Richmond Park International Secondary School Sarajevo & Fourth Primary School Hrasnica

Volunteer Mathematics Instructor

January 2017 - May 2019

Sarajevo, Bosnia and Herzegovina

- Taught Olympiad mathematics to high school students. Designed teaching materials, organized mock exams, and mentored the students on managing competition stress.
- Taught mathematics and mentored middle school students, focusing on foundational concepts and fostering interest in STEM fields. Organized discussions on overcoming peer pressure, building confidence, finding resources, and navigating academic challenges for students in underserved communities.

INDUSTRY EXPERIENCE

Analog Devices, Analog Garage - Advanced Algorithms Group

June - August, 2023

Advanced Algorithms Researcher

Boston, MA

- Implemented and optimized a neural network on a new audio processing chip.
- Conducted a bare-metal implementation of the network in C, using assembly to engage accelerators for real-time inference optimization. Gained in-depth knowledge of the chip’s architecture and memory limitations and adapted the implementation to leverage these insights for improved performance.
- Collaborated in data collection and the testing process, learning how to adapt the system to real-world complexities and limitations, such as constraints in hardware components of the audio system.

Analog Devices, Advanced Process Development Group

May - August, 2022

Device Design and Process Engineer

Wilmington, MA

- Assembled and characterized high-power transistors, evaluating their performance across different operating conditions.
- Analyzed experimental data to identify design trade-offs for various applications, supporting the development of advanced devices tailored to operational requirements.

- Studied fabrication processes through foundry visits and discussions, gaining a deeper understanding of manufacturing constraints.

Expert Experiments

Software Engineer

July - September 2020

Cambridge, MA

- Designed software for sensor data acquisition and real-time data processing on the ESP8266 microcontroller.
- Implemented a real-time data display system, providing intuitive visualization for collected sensor data.

PROJECTS

Advancing Diabetic Retinopathy Detection with Hybrid CNN-Transformer Architectures and Novel Loss Techniques

[\[paper\]](#)

May - June 2024

Cambridge, MA

- Implemented hybrid CNN-transformer architectures for diabetic retinopathy detection using the APTOS 2019 Blindness Detection dataset.
- Developed a CAM-based hybrid loss technique, combining GradCAM-derived penalties with standard cross-entropy loss to address model bias.
- Designed a soft loss reweighing method to balance class weights by applying a square root transformation, reducing the impact of extreme weight values and addressing model bias.

SkyLocator – Star Observation VR System on FPGA

[\[paper\]](#)

November - December 2022

Cambridge, MA

- Designed and implemented a star observation virtual reality (VR) simulator system using a Nexys 4 DDR FPGA, ESP32, and an LCD display.
- The system features UART communication between the FPGA and ESP32, integration of an IMU (on the ESP32) for movement tracking, an SD card memory for storing star data, an LCD display for visual output, and a server for calculating vernal equinox coordinates from user input time and location.
- Designed user input interface components. Implemented data processing on the ESP32, integrating user, server, and sensor data. Developed efficient communication channels between the ESP32, server, and FPGA. Designed a compact star data representation for SD card storage and optimized local memory for efficient graphics rendering. Created a dynamic graphics pipeline to render stars in real-time based on celestial coordinates and user perspective.

Characterizing Temperature-Dependent Behavior of IGZO Thin-Film Transistors

[\[paper\]](#)

April - May 2022

Cambridge, MA

- Designed, fabricated, and tested IGZO transistors and resistors with varying channel lengths to investigate their current-voltage characteristics across different temperature conditions.
- Conducted detailed analysis to extract key electrical parameters, including transistor and resistor properties, and evaluated the temperature-dependent resistivity of the IGZO material.

Fabricating Light-Trapping Microstructures for Enhanced Performance in Organic Solar Cells

[\[poster\]](#)

October - December 2021

Cambridge, MA

- Fabricated an organic thin-film solar cell and optimized the Langmuir-Blodgett assembly of polystyrene nanospheres, which were etched, used as a mask for silicon dioxide evaporation, and removed via sonication in toluene.
- Evaluated the light-trapping properties of the fabricated structures by measuring IV characteristics under a solar simulator and analyzing light reflectance using an integrating sphere to investigate efficiency enhancements.
- Presented findings at the **Microsystems Annual Research Conference 2022 (MARC2022)**. [\[poster\]](#)

Scribble-Or-Study System on ESP32

[\[website pdf\]](#)

April - May 2021

Cambridge, MA

- Designed and implemented an interactive system featuring a group study progress tracker and an online scribble game, integrating hardware and web components to enhance real-time communication and collaboration.

- Programmed the ESP32 to handle multi-directional communication, collecting inputs from buttons and an IMU, sending data to the server, and updating LED lights and LCD screens based on user input and server responses.
- Developed server backend to track session states, manage user interactions, and synchronize data between the ESP32 and the web interface. Engineered an FSM-based interface on the ESP32 and designed user-friendly web features.

PUBLICATIONS AND MANUSCRIPTS

- Skelic, L., et al. [CIRCUIT: A Benchmark for Circuit Interpretation and Reasoning Capabilities of LLMs](#). Under review at ICLR 2025.
- Skelic, L., et al. [Fabrication of Light-Trapping Nanostructures on Organic Solar Cells via Colloidal Lithography](#). Presented at MARC 2022, Microsystems Annual Research Conference.

TECHNICAL STRENGTHS

Computer Languages	Python, C/C++, Assembly, System Verilog, Java, Julia
Tools	Git, Nano, VS Code, Jupyter, LaTeX
OSs	Windows, Linux

AWARDS

Silver Medal at European Girls’ Mathematics Olympiad (EGMO)	2019	International
Silver Medal at Bosnia and Herzegovina Mathematics Olympiad	2019	National
Gold Medal at Mediterranean Mathematics Competition (MMC)	2018	International
Honorable Mention at European Girls’ Mathematics Olympiad (EGMO)	2018	International
Honorable Mention at European Girls’ Mathematics Olympiad (EGMO)	2017	International
Bronze Medal at Bosnia and Herzegovina Mathematics Olympiad	2017	National
Bronze Medal at Mediterranean Mathematics Competition (MMC)	2017	International