

Alexander R. Melnick

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EDUCATION

Master of Science, Electrical and Computer Engineering, LEAP Program 2023 – 2025

Boston University, College of Engineering, Boston, MA

GPA 3.96; Dean's List Recipient; Program Ambassador

Bachelor of Arts, Psychological & Brain Sciences 2018 - 2022

Washington University in St. Louis, College of Arts and Sciences, St. Louis, MO

Major GPA 3.9, Overall GPA 3.5; Dean's List Recipient

PROFESSIONAL EXPERIENCE

Scytale AI, Tel Aviv, Israel June 2024 – July 2024

Integrations Intern, Research and Development

- Configured stock Linux Ubuntu environment for all company tools. Had to find many alternatives and workarounds as all other company employees work using MacOS.
- Extensively studied company source code with the goal of understanding how back-end systems work. Required copious research into new systems, file types, and services that I was previously unfamiliar with.
- Successfully fixed faulty, in-production code integrations for numerous services, including GitLab. Investigated where in the Airflow pipeline validation was failing. Modified existing Python scripts to eliminate the issue. My improvements were put into production.
- Corrected incorrect documentation to smooth future development.
- Led daily meetings to better coordinate teams for better cooperation and synchronization.
- Successfully advocated to receive assignments on new and interesting projects.
- Project: Port legacy integration source code from TypeScript to Python.
 - Extensively researched the APIs for multiple services I worked on, including Okta, MongoDB, Snowflake, and BambooHR.
 - Analyzed multiple integrations, including legacy ones, to determine which APIs need to be implemented in the new framework.
 - Consulted with fellow colleagues on integration structures to keep workflow moving smoothly.
 - Referenced legacy code in migration to our new codebase quickly, efficiently, and effectively.
 - Debugged problems based on GitHub pipeline, Okteto, and Kubernetes log files.
 - Fixed mission-critical, in-production bug under extreme time pressure.
 - My integration was successfully put into production.
- Utilized GitHub, AWS, Kubernetes / K8s, MongoDB, Airflow, and Okta.

Eisner Advisory Group LLC, New York, NY July 2022 – January 2023

Tax Staff I, Private Wealth Advisory Group

- Expertly prepared tax returns for high-net-worth clients, including personal, corporate, and trust filings.
- Participated in extensive training over the course of multiple weeks on accounting and taxation practices.
- Reviewed years of clients' historical financial records to perform cash analyses and bank reconciliations.

National Runaway Safeline, Chicago, IL May 2021 – August 2021

Crisis Intervention Intern

- Responded to real-time inbound phone calls and internet chats from individuals in crisis to determine how to best support them to prevent further detriment.
- Assessed crisis situations in real-time by obtaining and analyzing facts. Collaborated with the youth, brainstormed possible solutions, and decided on a defined course of action.
- Trained using a five-step crisis intervention model to enable self-sufficiency with contacts, including mock crisis calls, followed listen-ins, and supervised live calls.
- Completed in depth logs and synopses of crisis communications.
- Consulted with both task supervisors and clinical supervisors for support and processing of contacts.

EisnerAmper LLP, New York, NY
Finance Summer Intern

May 2019 – July 2019

- Interviewed 15 leaders across the firm to determine the technology and processes currently utilized by their functions. Created a visualization in LucidChart of the firm's ERP System of approximately 15 systems. Findings were presented to the CTO, CFO, and CEO.
- Utilized WestLaw to review legacy vendor credentials to ensure compliance with current standards under OFAC and US Sanctions lists,
- Produced a competitive analysis report for the CFO synthesizing competition's investment in artificial intelligence.
- Directed the development of Microsoft Power BI architecture needs through Jira to replace manual processes.
- Created an acquisition review of H&R Block's acquisition of Wave, building on outsourced bookkeeping, which was sent to the Executive Committee.
- Reviewed and consolidated EisnerAmper's expenditure for ADP software. Findings were used for the renegotiation of the contract, resulting in savings of 13,000 USD/year,
- Revised 15,000+ client records using VBA and Excel. This enabled the Firm to prepare for upcoming ERP implementation.

Tannor Capital Management LLC, Rye, NY
Research Analyst Intern

May 2018 – July 2018

- Developed search techniques to identify and communicate with potential claim holders. Made cold calls on bankruptcy cases. Assisted in the purchase of several claims.
- Analyzed multiple stocks to determine companies the fund should invest in. Presented findings to the CEO
- Worked to redesign and improve websites owned by the fund using WordPress.

PROJECTS

6502 Computer from Scratch – Independent

August 2024 – Current

- Constructing a computer on breadboards using the 6502 microprocessor, 65C22 versatile interface adapter, EEPROM, 32k SRAM, and custom clock circuit, which will incorporate a compact LCD display, PS/2 keyboard, serial interface (SPI), and programmed in assembly language.
- Gaining a deeper and more tangible understanding of the interconnections between computer components and with external interfaces, exploring the intricacies of assembly programming at both the conceptual and hardware levels, and gaining hands-on experience debugging hardware issues.

[Melnick.ai](https://melnick.ai) *Online Engineering Portfolio – Independent*

August 2024 – Current

- Currently developing an online engineering portfolio (melnick.ai) to showcase my projects, technical achievements, and professional experience. The portfolio is designed to be a comprehensive resource for potential employers and anyone interested in my work.
- Building the website using WordPress, focusing on creating a clean, professional, and user-friendly interface that effectively highlights my skills and accomplishments.
- Learning and applying principles of web design to create an aesthetically pleasing and functional layout that aligns with my professional brand. Enhancing my understanding of GUI design to improve the user experience, ensuring that the website is intuitive and easy to navigate. Gaining practical experience in front-end development, including customizing WordPress themes and utilizing plugins to extend the website's functionality.
- Aiming to create a dynamic and engaging online presence that not only showcases my technical expertise but also serves as a platform for future updates and new projects as my career evolves.

Jovial Assembler – Independent

June 2024 – August 2024

- Developed custom assembly language and assembler for the 1982 HP-16C programmable Computer Scientist's calculator and emulators in Python.
- Implemented comprehensive support for all HP-16C operations, automatic inclusion of modifier keys, changing settings on the fly, comments, and argument error checking.
- Added advanced features for error handling, including memory overflow and out-of-range address detection (crucial when working with the HP-16C's measly 203 Bytes of combined program and data memory).
- Supported advanced functionalities such as floating-point numbers, initial mode settings, and pseudo-instructions.

- Enabled output in multiple formats, including direct importing for 2 different simulators and a printable PDF.
- Created extensive documentation and user guides to facilitate ease of use and understanding.
- Utilized logging for debugging and error tracking, ensuring robust and maintainable code.
- Contributed to the open-source community by extending the usefulness and accessibility of existing open-source software.
- Wrote and supplied numerous Jovial Assembly programs to provide an extensive software library for additional functionality when using the HP-16C.

NFC-Enabled Secure Locking Mechanism – Course Project

March 2024 – May 2024

- Developed an innovative NFC-based door lock requiring majority custody of NFC tokens (2 out of 3) for secure access control.
- Implemented a locking mechanism using a linear solenoid controlled via GPIO on a BeagleBone Black, interfaced with MFRC522 and PN532 NFC antennas using I2C and SPI protocols.
- Designed and developed custom Linux kernel modules to interface with NFC tokens and solenoid, overcoming challenges related to SPI driver support and BeagleBone kernel compatibility.
- Encountered significant difficulties with SPI communication due to the lack of necessary SPI drivers in the BeagleBone Black's Linux kernel. Attempted recompilation of the kernel, which resulted in a basic but non-functional system, leading to the exploration of using a standard Debian distribution that introduced further complications with file transfer and module compilation. Faced hardware limitations when trying to switch from SPI to I2C with the MFRC522 NFC controller, ultimately leading to the adoption of the PN532 NFC board, which presented its own set of challenges due to complex memory mapping and unreliable I2C communication. Conducted extensive debugging with Linux I2C tools (`i2cget`, `i2cset`, `i2cdetect`), ultimately discovering hardware-level issues with the PN532 board.
- Gained hands-on experience with SPI and I2C communication protocols, in-depth analysis of hardware datasheets, and practical skills in Linux kernel development. Enhanced understanding of solenoid circuit design, including flyback diode implementation and GPIO control.
- Although the final implementation was incomplete, the project significantly deepened my knowledge of embedded systems, particularly in hardware-software integration, troubleshooting kernel-level communication issues, and selecting appropriate components for embedded security applications.

Web Crawler for Language Correction Software

March 2024 – April 2024

- Developed a high-performance web crawler as part of a language correction software, designed to analyze and compile language usage patterns across the internet for the purpose of identifying and correcting inconsistent or incorrect language usage in written content.
- Architected the crawler to efficiently manage URLs using HashSets for $O(1)$ operations on adding, removing, and checking URLs. This ensured that each URL was crawled only once, avoiding redundancy and improving processing speed.
- Implemented URL management by loading seed URLs from command-line arguments or files, and dynamically handling domain permissions through the retrieval and parsing of robots.txt files to ensure compliance with each website's crawl policies.
- Optimized the crawling process by implementing a delay management system, adhering to website-specific rate limits, and efficiently handling data extraction with a file writing mechanism that capped data per site, preventing overloads and maintaining crawl integrity.
- Navigated complexities in handling large volumes of URLs, ensuring efficient storage and retrieval without duplication. Addressed challenges in parsing and respecting the robots.txt constraints across diverse websites, which required careful handling of domain-specific rules and rate limits. Managed the balance between thorough data collection and adherence to page limits, ensuring the crawler remained within the ethical and operational bounds of web scraping.
- Gained extensive experience in web crawling techniques, including URL management, compliance with robots.txt, and efficient data extraction. Developed a deeper understanding of handling large-scale data and optimizing processes for speed and compliance.
- Successfully created a foundational component of the language correction software, significantly contributing to the overall functionality by enabling large-scale language pattern analysis across diverse online sources.

Machine Learning for Image Classification – Course Project

November 2023 – December 2023

- Developed a binary classification model to distinguish between dog and cat images using MATLAB.
- Employed machine learning techniques, including Principal Component Analysis (PCA) and discriminant analysis (LDA and QDA), to reduce overfitting in high-dimensional data.
- Analyzed model performance, understanding trade-offs between complexity and accuracy.
- Showcased proficiency in data preprocessing, feature extraction, and AI performance evaluation.

FPGA-Based Stopwatch and Alarm – Course Project

November 2023 – December 2023

- Developed digital stopwatch alarm on Nexys A7 board with XILINX Artix-7 FPGA using Verilog and Vivado.
- Included advanced timing functions for both ascending and descending time tracking capabilities.
- Implemented scoreboard system which stores the three longest and shortest times in memory for later recall.
- Incorporated multiple 7-segment displays, switches, debounced buttons, and audio for a comprehensive UI.

Treasure Chess App Development

November 2023 – December 2023

- Led the technical development of "Treasure Chess," an Android-based chess game designed to facilitate in-person play without the need for physical chess pieces, providing a clean and accessible user experience for all ages.
- Served as the Technical Lead, overseeing the integration of various software components and ensuring compatibility between the front-end user interface and the back-end gameplay logic.
- Implemented core gameplay logic, including the movement of chess pieces, validation of moves, and tracking of game states (e.g., check, checkmate). Developed a class structure that defined individual chess pieces and their specific movement rules. Created algorithms to handle game states, ensuring that moves were valid, and the game could accurately detect checkmate and check conditions. Designed and implemented the board initialization process, ensuring pieces were correctly positioned and could interact as expected during gameplay.
- Contributed to the overall architecture by designing the software structure, including the separation of concerns between UI components and gameplay logic, enabling a clear and maintainable codebase.
- Managed task distribution within the team, ensuring timely progress and alignment on project goals. Maintained clear communication across team members to integrate different components smoothly.
- Addressed challenges in ensuring the accuracy of piece movement rules and the validation of complex game states like checkmate, requiring detailed implementation of chess rules within the app's logic. Optimized the interaction between front-end and back-end components to provide a seamless user experience, particularly in managing user inputs and reflecting them on the game board in real-time. Debugged and refined the board setup logic to prevent errors in piece positioning and interaction, ensuring a consistent and reliable gameplay experience.
- Developed advanced skills in Android development, particularly in handling complex logic for game development. Enhanced my ability to lead a technical team, manage software architecture, and ensure the successful integration of multiple software components.
- Successfully delivered a functional chess app that provided a digital alternative to traditional chess, emphasizing ease of use and in-person play, with a strong, maintainable codebase for future enhancements.

RELEVANT COURSEWORK

- Cyber Physical Systems
- Learning from Data
- Introduction to Embedded Systems
- Computer Organization
- Advanced Data Structures
- Electric Circuits
- Introduction to Logic Design
- Introduction to Software Engineering; Programming for Engineers; Computer Science
- Product Design
- Mechanics I (Statics)
- Energy and Thermodynamics

- Physics I & II
- Computer-Aided Design
- Calculus I, II, & III; Differential Equations; Linear Algebra
- Statistics, Probability, and Data Science; Statistics; Introduction to Psychology Statistics
- Solar System Astronomy; Stars, Galaxies, and Cosmology
- Experimental Psychology; Cognitive Neuroscience; Sensation and Perception; Abnormal Psychology; Human Learning and Memory
- Microeconomics; Principles of Financial Accounting

AWARDS & HONORS

- Inductee, Psi Chi International Psychology Honor Society
- Inductee, Mu Alpha Theta Math Honor Society
- Recipient, Dean's List
- National Merit Semifinalist
- AP Scholar

STUDENT LEADERSHIP

- President, Robotics and Engineering Club
- Health and Wellness Chairman, Delta Chi Fraternity
- LEAP Ambassador, Boston University College of Engineering

MEMBERSHIPS & AFFILIATIONS

- American Psychological Association – Undergraduate Student Affiliate Member
- American Psychological Association of Graduate Students
- Delta Chi Fraternity

CERTIFICATIONS

- LinkedIn Learning – Learning VBA in Excel
- LinkedIn Learning – Finance Foundations: Income Taxes
- LinkedIn Learning – Being an Effective Team Member

SKILLS

- C/C++; Java; Verilog; Jovial/HP-16C assembly; MIPS assembly; Python; MATLAB; Microsoft VBA; Computer programming; High level languages; Low level languages; Back-end development; Full-stack development
- HTML; CSS; WordPress; Web Design
- Android Studio; Android App Development; Mobile Development; Front-End Development
- Algorithms, Data Structures, Machine Learning
- Web Crawlers, Natural Language Processing
- Logic design, Digital logic design, Digital circuit design, FPGA & ASIC, Computer organization, computer Architecture
- Embedded systems, Kernal modules, Kernal module programming, Low level programming, Linux, Linux kernel programming
- Computer Aided Design (CAD); SOLIDWORKS; Soldering
- Calculus, Differential Equations, Linear Algebra, Probability and Statistics
- GitHub, AWS, Kubernetes / K8s, MongoDB, Airflow, Okta
- Microsoft Office; Microsoft Excel (including advanced concepts e.g., macros, pivot tables, VLOOKUP, etc.)