Emanuel André Medina Araujo

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Education

Technical University of Munich Oct. 2024 – Apr. 2027
Bachelor of Science in Physics *Munich, DE*

Technical University of Munich Oct. 2020 – Apr. 2026
Bachelor of Science in Computer Science, Application Area in Physics *Munich, DE*

Herzog-Christoph-Gymnasium Sep. 2012 – Sep. 2020
Abitur, Awarded MINT-EC certificate with distinction *Beilstein, DE*

Experience

Working Student Software Engineer Nov. 2024 – Present
Vector Informatik GmbH - VSceneCreator (3D OPENDrive Editor) *Munich, DE*

- Helped ship the 0.1 alpha version of the VSceneCreator (Unity/C#) by suggesting, designing and implementing features, addressing bugs, and creating tests through close collaboration with Product Management.
- Architected a read-only "Explore Mode" with a hierarchical overview tree and dynamic tooltip system, segregating access to editing features resulting in a preview tool for licensed users and an improved UX for free users.
- Improved edit mode switching performance by restructuring the base model to enable lazy loading for non-essential and non-visible objects resulting in up to 70% faster switch times.
- Optimized file loading through batched object creation and an enhanced progress bar replacing application freezes resulting in 10% faster loading times, reduced memory usage and a better UX.
- Implemented support for single-sided lanes, enabling users to load OPENDrive files with single-sided lanes by automatically converting them to normal lanes resulting in prevention of broken files.
- Streamlined developer tools by improving Unity Rider integration resulting in 10% faster asset refresh times.

Working Student Software Developer Mar. 2021 – Oct. 2024
Vector Informatik GmbH - DYNA4 (Simulation environment for virtual driving tests) *Munich, DE*

- Developed features, fixed critical bugs, and enhanced UI using Java and Eclipse RCP, contributing to 5 major product releases (5.0 to 9.0) in direct collaboration with the Product Management.
- Engineered a custom view to assign aliases for trace signals with a new file format, a custom persistence layer and reducing expected user knowledge with errors and warnings via built-in validation and quickfixes.
- Enhanced usability by completely reworking the trace signal view, leading to a more modern and efficient UX.
- Improved user workflow and simulation project integrity by developing a utility dialog to find and remove unreferenced files and by refactoring a dialog to transparently display all unsaved artifacts.
- Reduced manual QA effort and accelerated development cycles by expanding automated test suites using SWTBot and JUnit in addition to enhancing the CI pipeline to link Jenkins results with JIRA tickets.
- Improved codebase maintainability and enabled faster subsequent development by refactorings of legacy systems.

Projects

ClarissaApp | *Privacy-first personal health mobile app* Aug. 2025 – Present

- Built a privacy-first mobile app for menstrual cycle tracking with React Native (Expo) and TypeScript.
- Implemented calendar-based cycle logging with symptom tracking and three themes (dark/light/red).
- Engineered offline-first storage with expo-sqlite, modular components/hooks, and a clear UX for fast daily logging.

Full-Stack ISP Comparison | *Check24 Scholarship Challenge* May 2025 – Jun. 2025

- Implemented a modular full-stack (React + Vite + Tailwind frontend, Node.js/Express backend).
- Integrated timeout/health handling and an ISP provider normalization layer to produce consistent comparisons.
- Developed a share results feature with via a TinyURL export persisting the results within the link.

Learning Based Inverse Kinematics | *Bachelor Thesis* Jun. 2024 – Nov. 2024

- Designed and implemented learning-based IK solvers for 2- and 3-DOF manipulators, comparing direct-angle regression with probabilistic outputs across MLP, LSTM, hybrid MLP+LSTM, and PPO.

- Built a synthetic data generation and evaluation pipeline; ran controlled experiments on a 10k-sample test set to quantify accuracy, convergence, and runtime across architectures and output parameterizations.
- Found that a simple MLP with direct-angle prediction consistently outperformed more complex models, highlighting a non-trivial complexity-performance trade-off and yielding clear guidance for practical IK model selection.

Ironman | *2.8km swim, 180km bike, 42.2km run; Overall Time : 14:21:26h* Oct. 2022 – Aug. 2024

- Completed full Ironman triathlon through disciplined training and a goal-oriented race plan, demonstrating resilience and on-the-fly problem-solving under fatigue and variable race conditions to reach the finish.

Internet lab 2 | *Advanced Practical Networking Course* Oct. 2023 – Mar. 2024

- Completed course labs on advanced networking topics in a two-person team, building strong proficiency in GNU/Linux CLI and Cisco IOS for complex network configurations.
- Co-created a full WebAuthN lab from scratch (lecture + prelab + hands-on) covering passkeys, FIDO2/WebAuthN flows, and security keys, enabling peers to configure WebAuthN end-to-end.
- Engineered the practical stack with Keycloak and a Spring Boot demo app, guiding students through server setup, WebAuthN policy configuration, and packet analysis to deepen protocol understanding.

Cyber-Physical Systems Survey | *Advanced Cyber-Physical Seminar* Apr. 2023 – Jul. 2023

- Produced an in-depth research survey of numerical inverse kinematics in cluttered environments for robots.
- Evaluated Jacobian-based, heuristic, and meta-heuristic methods, for convergence, robustness, and performance.

FreshFinder | hackaTUM - HelloFresh Challenge Nov. 2023

- Developed a React + TypeScript web app for collaborative, parallel cooking sessions with a team of 4
- Designed a recipe dependency-graph architecture for task distribution using Supabase Realtime.
- Integrated the OpenAI API to dynamically adapt recipes for individual preferences and amounts.

StreamFindA | hackaTUM - Burda Challenge Nov. 2022

- Built a React front end with a Django/Python backend for swipe-based movie/series recommendations.
- Implemented a recommendation algorithm based on pairwise choices using dwell time and negative feedback.
- Parsed and normalized the provided multi-platform catalog to a usable format to power reliable recommendations.

Computer Architecture Practical Course | *Advanced Practical Course* Apr. 2021 – Jul. 2021

- Implemented iterative space-filling Z-curve generators in assembly with SVG export and performance benchmarks.

Humanoid-controlled robot arm | *Student Engineering Academy* Sep. 2018 – Jul. 2019

- Programmed a self-built robot arm controlled via a humanoid interface.
- Developed a virtual movement visualization of the arm sleeve with flex sensors in Blender with Python.
- Programmed Arduino microcontroller in C/C++ to read movement data from the arm sleeve, transmit them wirelessly via radio using the SPI protocol to the robot arm and map them to the servo motors.

MATLAB physics visualizations | *International Summer Physics Institute, University of Notre Dame* Jul. 2018

- Completed Cosmic Ray Detection team project by building a detector plus analyzing and visualizing the data.
- Visualized and analyzed CERN CMS particle-physics data using MATLAB.

Hydrogen fuel cell prototype | *9th Trinational Student Congress, Strasbourg* Jan. 2017

- Developed a hydrogen fuel cell concept and demonstrator with a friend and presented it in the congress.

Technical Skills

Languages: C#, Java, C/C++, Python, React, MATLAB
Developer Tools: Git, Rider, VS Code, Unity, VIM Motions, Eclipse,Linux, PyCharm, Jenkins, GitHub, Jira
Relevant Course Work: Experimental Physics 1, Physics Lab Course, Innovative Entrepreneurs - Leadership of High-Tech Companies, Principles of Economics, Concepts of C++ Programming, Parallel Programming, Data Structure Engineering, Discrete Probability Theory, Functional Programming and Verification, Introduction to Theory of Computation