Lucas **Steuernagel**

Runtime Engineer · Anza

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Work Experience

Anza Technology Inc. **(Solana Labs spin-off for engineering)**   *San Diego, USA (Remote)*

Runtime Engineer   *Jan. 2024 - Present*

- Implemented Solana Bytecode Format (SBF) instructions in a custom LLVM backend.
- Designed a new call convention for SBF, reducing register usage and memory operations.
- Created a fuzzer for testing Solana's virtual machine.
- Implemented multithreaded test infrastructure for the program cache.
- Currently working on peephole optimizations and designing an ALU instruction class for 32-bit operands.

Solana Labs   *San Francisco, USA (Remote)*

Compiler Engineer   *Feb. 2022 - Jan. 2024*

- Designed new syntax for a domain-specific language (Solidity) to embrace Solana's runtime model.
- Implemented control flow graph optimizations, such as redundancy and dead code elimination, to decrease binary size.
- Created passes to analyze the AST (Abstract syntax tree) and the intermediate code, collecting information about memory access mutability.
- Designed the parser, the semantic analysis, and the code generation for inline assembly.
- Created the code generation for Borsh encoding and dynamic function dispatch.

Google   *Belo Horizonte, Brazil (Remote)*

Software Engineer Intern   *Aug. 2021 - Nov. 2021*

- Created the autocomplete system for one of Google's internal programming languages.
- Devised algorithms to traverse a parse tree and generate possible completion suggestions.
- Designed type inference for variables to provide auto-complete suggestions based on type.

Uber   *São Paulo, Brazil (Remote)*

Software Engineer Intern   *Jan. 2021 - Jun. 2021*

- Integrated microservices with Uber's internal automation platform to improve communication with drivers.
- Designed the back-end architecture to supply the Uber app with information about insurance claims.
- Implemented new APIs to streamline communications between the automation engine, microservices, and Kafka topics.

Publications

1. **Steuernagel, L.**, Maximo, M.R.O.A. (2023). Trajectory Prediction for SSL Robots Using Seq2seq Neural Networks. In: Eguchi, A., Lau, N., Paetzel-Prüsmann, M., Wanichanon, T. (eds) RoboCup 2022:. RoboCup 2022. Lecture Notes in Computer Science(), vol 13561. Springer, Cham. [LINK]

2. **L. Steuernagel**, M. R. O. A. Maximo, L. A. Pereira and C. A. A. Sanches, Convolutional Neural Network with Inception-like Module for Ball and Goalpost Detection in a Small Humanoid Soccer Robot, 2020 Latin American Robotics Symposium (LARS), 2020 Brazilian Symposium on Robotics (SBR) and 2020 Workshop on Robotics in Education (WRE), 2020, pp. 1-6, doi: 10.1109/LARS/SBR/WRE51543.2020.9307038. [LINK]

Education

Aeronautics Institute of Technology (*Instituto Tecnológico de Aeronáutica*)   *São José dos Campos, Brazil*

B.S. in Computer Engineering   *Mar. 2017 - Nov. 2021*

- Average grade: 9.28/10

Activities

Linux Foundation   *Remote*

Mentor   *Jun. 2022 - Dec. 2023*

- 2023: Supervised a master's student devising and implementing a static single assignment form for the Hyperledger Solang.
- 2022: Supervised an undergraduate student implementing multiplication with overflow detection and optimizing vector push and pop operations in the Hyperledger Solang.

Open Source Contributions

Pytorch

ONE-TIME CONTRIBUTION
- Enabled the 3D convolution operation in the Apple MPS backend.

Openvino Notebooks

ONE-TIME CONTRIBUTION
- Created an interactive Jupyter notebook that uses the Openvino inference framework for machine translation.

Skills

Programming Languages   Rust, C, C++, Python
Spoken Languages   English, Portuguese, German (basic)

Projects

MLX vs PyTorch

PERSONAL PROJECT *Jun. 2024*
- This is a repository containing multiple benchmarks I created to compare the performance of PyTorch and Apple's MLX framework. [LINK].

Havina

PERSONAL PROJECT *Oct. 2023*
- This is a Python library based on the paper "Language Models are Open Knowledge Graphs." It generates a graph given an input sentence and the language model attention matrices to evaluate text understanding. [LINK].

Trajectory prediction for RoboCup Small Size League Robots

GRADUATION THESIS *Nov. 2021*
- This project introduces an encoder-decoder sequence-to-sequence neural network to forecast the trajectory of Small Size League Robots in real-time. [LINK].