

RAFAEL BELCHIOR

Researcher, Engineer

Personal webpage - click me! 

EDUCATION

Massachusetts Institute of Technology (MIT), USA  *April 2023 - August 2023*
Visiting Researcher, **under a Fulbright Scholarship**

Instituto Superior Técnico, Lisbon, Portugal  *2014 - 2024*
- **Ph.D.** (Summa Cum Laude), **M.Sc.** (Magna Cum Laude), and B.Sc. (Cum Laude) in
Information Systems and Computer Engineering

Warsaw University of Technology, Warsaw, Poland  *2018*
MSc in Information Systems and Computer Engineering (**Erasmus** scholarship)

AWARDS & ACHIEVEMENTS

- Raised 1.2M EUR from the European Commission to **expand and productize** our research on interoperability 🚀. Principal engineer and manager (team of 5 engineers).
- **Best INESC-ID Ph.D. thesis** awardee
- **Fulbright Scholarship to research blockchain interoperability at MIT**
- Ph.D. Scholarship (top 1%, national funding government agency, FCT)
- Hyperledger's Scholarship Program 2020
- Excellence in teaching awards 2019-2021

RESEARCH INTERESTS, SKILLS & TOOLS

- **Research interests:** Interoperability, Security & Privacy, Distributed Systems
- Programming Languages: Golang, Typescript, Python, Rust 🦀, **see Github** 

WORK EXPERIENCE

Blockdaemon , Remote *February 2022 – present*
Senior R&D Engineer

- Fundraising (≈\$100k USD), training and managing a team of 15 working on several open-source projects (**mentor profile**).
- Co-creator and implementer of **IETF's SATP** interoperability protocol. Clients: Central Bank of Korea, Blockchain.pt.
- Responsible for interoperability strategy and execution within the company, directly responsible for over \$50k USD revenue.
- Significantly contributed to BD's **DEFI API**. Architected and implemented key internal services, integrated Grafana and OTEL; optimized CI/CD pipelines for efficient deployment and SDK management. Enhanced documentation to improve onboarding, resolved critical bugs, optimized performance, and developed extensive test suites to ensure service reliability and stability.

- Proposed, led, researched, and implemented several projects in the context of **security, privacy**, decentralized finance, and interoperability: **Hyperledger Cacti**, security by specification techniques for **cross-chain models**, DeFi API and bridge aggregator, and **SNARK-based bridges**.

Quant Network, Remote
R&D Engineer

July 2021 – January 2022

- Created a modular Substrate Connector supporting Polkadot, Kusama, and Rococco ($\approx 39k$ LoC) in Typescript and Rust, augmenting the features of the main product of the company.
- Contributed to the cryptography and security parts of a **blockchain course with King's College London counting with 2,600+ students**.
- Research led to a paper published in a top blockchain journal on **how to choose an interoperability solution**. ACM DLT 2023 **most read paper**.

Linux Foundation, Remote
R&D Engineer

June 2020 – November 2020

- In-depth mastering of Hyperledger Fabric blockchain: smart contracts, infrastructure, full-stack dApp. **Blockchain course (distributed systems, security), and Fabric, 80+ students**.

IGFEJ, Portuguese Minister for Justice, Portugal
R&D Engineer

Sep 2018 – April 2020

- Working alongside the Portuguese government to **leverage blockchain technology for securing justice data**.

Técnico Lisboa, Portugal
Invited Assistant Professor

Sep 2018 – July 2021

- Taught 7 courses over 3 years.
- Several awards for excellence in teaching from 2019 to 2021, e.g., **2019/2020 Autonomous Agents and Multi-Agent Systems**.

SELECTED PUBLICATIONS

Harmonia: Securing cross-chain applications using zero-knowledge proofs 2024
R. Belchior, D. Dimov, Z. Karadjov, J. Pfannschmidt, A. Vasconcelos, and M. Correia

- Submitted - **extended version**

SoK: Security and Privacy of Blockchain Interoperability 2024
A. Augusto, R. Belchior, M. Correia, A. Vasconcelos, L. Zhang and T. Hardjono

- IEEE Symposium on Security and Privacy 2024 - **extended version**

A Brief History of Blockchain Interoperability 2024
R. Belchior, J. Süßenguth, Q. Feng, T. Hardjono, A. Vasconcelos, and M. Correia

- Communications of the ACM - **online version**

*updated November 2024