

JOAO VITOR BARROS DA SILVA

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Professional Summary

Computer Science Senior at Penn State specializing in Entrepreneurship and Innovation, with hands-on experience in machine learning, blockchain, and full-stack development. Lead researcher at Penn State's Blockchain Data Intelligence Lab developing QLink, a quantum-safe interoperability protocol integrating QKD and PQC. Passionate about creating scalable, high-impact technologies that blend AI/ML, blockchain to solve real-world challenges.

Education

The Pennsylvania State University, University Park

May 2026

B.S. in Computer Science, Minor in Entrepreneurship and Innovation

Technical Skills

Programming & Development: Python (Flask, FastAPI), JavaScript, C, Ruby on Rails, Solidity, SQL (PostgreSQL, SQLite), React.js, Next.js, Node.js, APIs, HTML/CSS

ML & AI: TensorFlow, PyTorch, LangChain, Scikit-learn, Pandas, NumPy, Large Language Models (LLMs)

Cloud & Tools: AWS, Docker, Jira, Figma, Git/GitHub

Experience

Software Development Intern | *Ruby on Rails, AWS, Docker, REST APIs*

Oct 2025 – Present

Penn State University Libraries

- Develop and maintain **enterprise full stack Ruby on Rails applications** supporting **40,000+ users**, handling **production, bug fixes** and **database updates** across **multiple repositories** (psu-libraries) within a **Scrum workflow**
- Member of development team for a large scale **PDF remediation platform** with **AWS** and **Adobe**, supporting over **3 million uploads** and improving accessibility via automated parsing and secure storage using **Adobe APIs** and **S3**.
- Built a **cross system integration API** to **POST JSON** between websites, implemented **JSON to XML** importers and **Swagger documentation**, reducing manual departmental processing by **60%** through cross team collaboration.
- Developed a **Python Pandas data pipeline** integrated into the Rails platform, cleaning and standardizing faculty data from **17.7K to 9.8K valid entries** and reducing manual data processing time by over **90%**.

Lead Researcher | *QKD, PQC, Blockchain Protocol Design*

Feb 2025 – Present

Blockchain Data Intelligence Lab

- Developed **QLink**, a quantum-safe Layer-3 interoperability protocol integrating **Quantum Key Distribution** and **Post-Quantum Cryptography (PQC) Crystals-Dilithium** and **Falcon** to secure cross-chain blockchain bridges.
- Simulated a **7-validator QLink network** over **50 km QKD fiber links**, achieving up to **707× surplus key throughput** and **under 1s latency**, outperforming classical blockchain bridges by **over 400×** in cross-chain key refresh rate.
- **Publication:** "QLink A Quantum Safe Layer 3 Interoperability Protocol for Blockchain Networks," arXiv preprint arXiv:2512.18488, 2025.

Innovation and Operations Intern | *AI Automation, Data Integration*

May 2023 – Jul 2024

Happy Valley LaunchBox Startup Accelerator

- Spearheaded the integration of **HubSpot CRM** with a new internal UI, centralizing engagement data for **40+ active startups** and improving reporting visibility by **45%**.
- Automated **email replies, data entry, and data fetching** workflows using **AI in Power Automate**, streamlining communications and data management, and increasing team efficiency by **30%**.

Projects

NFL 4th Down Conversion Predictor | *Python, Pandas, XGBoost, Seaborn, Matplotlib*

Oct 2025 – Present

- Built a machine learning model predicting **4th down conversion probabilities** using **11 years of NFL play-by-play data** (480K plays).
- Achieved **62% accuracy, 0.66 ROC-AUC, and 0.23 Brier Score**, ensuring well-calibrated probability predictions.

ZorAi – Full Stack Decentralized App | *React, Node.js, Solidity, OpenAI, LLMs*

Mar 2025 – Present

- Developed a platform to **register and verify AI-generated images on the blockchain** to combat misinformation.
- Deployed **BNB testnet dApp** integrating **OpenAI API** for content analysis and **Pinata (IPFS)** for decentralized storage, verifying **5K+ AI-generated images** with **99% detection accuracy** and less than **2s verification latency**.

Certifications

AI Agents with RAG & LangChain, IBM, Jun 2025

Deep Learning & Neural Networks, IBM, Jun 2025

AI & Blockchain Certificate, Google, May 2025

Machine Learning with Python, IBM, Jun 2025