MATEO BUILES DUQUE

Systems and Computer Engineering Student
National University of Colombia - Medellín
matebuilesd@gmail.com | +57 312 2390597 | Medellín, Colombia
LinkedIn: linkedin.com/in/mateo-builes-73453531b | GitHub: github.com/MattBuiles

PROFESSIONAL PROFILE

Systems and Computer Engineering student specializing in AI Agents, Large Language Models, and Machine Learning. Expert in developing autonomous intelligent systems using LangGraph state machines, LangChain orchestration, and RAG architectures. Proven experience building production-ready AI agents with multi-step reasoning, self-reflection, and tool-calling capabilities. Full-stack developer with a focus on web applications integrating LLM-powered agents and ML models. Active collaborator in biological research using technology for data analysis and structural bioinformatics. Academic mentor with strong teaching skills and interdisciplinary collaboration. Passionate about technological innovation and solving complex problems through autonomous AI systems.

EDUCATION

B.S. in Systems and Computer Engineering

National University of Colombia - Medellín 2022 - Present

Specialization in Artificial Intelligence, Machine Learning, and Data Science. Active participation in research and technology development projects.

PROFESSIONAL EXPERIENCE

AI Agents Research Group Member - LLM Development

National University of Colombia - Medellín 2025 - Present

- Developed autonomous intelligent agents using LangGraph state machines and workflow orchestration
- Implemented advanced agent patterns: ReAct (Reasoning + Acting), multi-step planning, and self-reflection loops
- Built production systems with LangChain for tool-calling, RAG pipelines, and multi-agent collaboration
- Explored advanced techniques: memory persistence, conditional routing, human-in-the-loop workflows
- Collaborated on research projects applying agents in education, healthcare, accounting, and productivity

Academic Mentor - Systems Simulation

National University of Colombia - Medellín 2025 - Present

- Supported students in simulation and modeling of complex systems
- Developed interactive teaching materials and practical exercises
- Facilitated tutoring sessions and technical problem-solving

Application Developer - Biological Research

Biomolecule Prospection and Development Lab - Functional Biology Research Group 2024 - Present

- Developed and refactored applications for biological research and structural bioinformatics
- Created interactive 3D protein structure visualizer for research and teaching purposes
- Implemented technological solutions for biological data analysis and molecular visualization
- Interdisciplinary work combining biology, chemistry, and technology expertise

FEATURED PROJECTS

AI Accounting Agent - Autonomous Business Accounting System

Intelligent accounting assistant powered by LangGraph autonomous agent with state machine architecture. Implements ReAct pattern for multi-step planning, self-reflection, and automatic error correction. Features autonomous task decomposition, tool orchestration (SQL + semantic search), and persistent memory. Combines FAISS vector database for document retrieval with SQLite for structured data.

Tech: LangGraph (StateGraph), Google Gemini 2.5-Flash, FAISS, SQLite, Streamlit, RAG, ReAct Pattern

Demo: mattbuiles-ia-contable-app-ivkcyc.streamlit.app | GitHub: github.com/MattBuiles/IA_Contable

Interactive 3D Protein Visualizer with AI Assistant - Structural Bioinformatics Tool

Web-based interactive tool for visualizing and analyzing protein structures in 3D with integrated LangGraph AI agent for assistance and consultation. Features intelligent query answering about protein structures, residue analysis, and molecular properties. Combines traditional molecular visualization (PDB loading, interactive selection, customizable representations) with RAG-powered conversational interface for educational and research support. Developed for the Functional Biology Research Group.

Tech: LangGraph (Assistant Agent), JavaScript (ES6+), NGL Viewer, RAG, LangChain, HTML5/CSS3

Used by: Biomolecule Prospection Lab - UNAL Medellín

Catch the Snitch - Quidditch Betting System

Full-stack web app simulating a betting system for Quidditch matches (Harry Potter-inspired). Real-time simulation, user management, and admin panel.

Tech: React 19, TypeScript, Node.js, Express, SQLite, WebSockets, JWT

GitHub: github.com/MattBuiles/centro_apuestas_quidditch

Tuberculosis Detection with Deep Learning

AI-assisted diagnostic system classifying chest X-rays for Tuberculosis using Transfer Learning and CNNs. Focus on high sensitivity to minimize false negatives.

Tech: PyTorch, TensorFlow, MLflow, ResNet18, Vision Transformers

GitHub: github.com/MattBuiles/Deteccion_de_Tuberculosis_con_DeepLearning

Medical AI Dashboard - XGBoost Literature Classification (2nd Place National Contest)

Dashboard for automatic classification of medical literature into 4 categories using XGBoost. Real-time API, interactive visualizations, 3,565 real samples.

Tech: XGBoost, Flask, Next.js, Python, TypeScript, Vercel

Demo: clasificacion-biomedica.vercel.app | GitHub: github.com/MattBuiles/ai-data-challenge

Quotation Management System

Web platform for managing quotes, clients, and documents. Supports creation, versioning, and visualization of project/service quotes.

Tech: Flask, Python, HTML/CSS, SQLite, SQLAlchemy

Demo: cotizacionsoftware.onrender.com | GitHub: github.com/MattBuiles/CotizacionSoftware

TECHNICAL SKILLS

AI Agents & LLMs **Machine Learning & Deep Learning** **Programming & Development**

- LangGraph (StateGraph, Workflows)
- LangChain (Orchestration, Tools)
- RAG (Retrieval-Augmented Generation)
- OpenAI API, Google Gemini
- Multi-Agent Systems & ReAct Pattern
- Tool Calling, Self-Reflection, Memory
- Scikit-learn, XGBoost
- TensorFlow, PyTorch
- Hugging Face Transformers
- FAISS (Vector Search)
- Computer Vision (CNNs, ViT)
- Python (Expert)
- JavaScript / TypeScript
- SQL, R
- FastAPI, Flask, Streamlit
- React, Node.js, Next.js

MLOps & DevOps

- Docker, DVC
- MLflow, Weights & Biases
- CI/CD (GitHub Actions)
- Git, Linux, AWS

Data Engineering

- SQLite, PostgreSQL, MongoDB
- ETL/ELT Pipelines
- Vector Databases (FAISS, Pinecone)
- Document Processing (PDF, Excel)

Web & Cloud

- Streamlit, Gradio
- WebSockets, JWT
- Vercel, Render
- AWS, Google Cloud

PROFESSIONAL CERTIFICATIONS

CI/CD for Machine Learning
DataCamp
November 2025

Monitoring Machine Learning in Python
DataCamp
November 2025

Introduction to Data Versioning with DVC
DataCamp
October 2025

Introduction to Docker
DataCamp
October 2025

Intermediate AI Bootcamp
MinTIC Colombia - IU Training
August 2025 (159 hours)

Supervised Learning with scikit-learn
DataCamp
April 2025

MLOps Deployment and Life Cycling
DataCamp
May 2025

ETL and ELT in Python
DataCamp
June 2025

Introduction to MLflow
DataCamp
June 2025

Generative AI: Prompt Engineering
IBM - Coursera
December 2024

AI Essentials
IBM - Coursera
December 2024

Data Science in Python
University of Michigan - Coursera
September 2023

Mathematics for ML: Linear Algebra
Imperial College London - Coursera
May 2023

Problem Solving & Decision Making
UC Irvine - Coursera
January 2025

RESEARCH INTERESTS

AI Agents & Autonomous Systems: LangGraph state machines, multi-agent architectures, ReAct pattern, tool-calling, self-reflection, conditional routing, human-in-the-loop workflows

Large Language Models: RAG systems, prompt engineering, LLM integration, embeddings, fine-tuning, chain-of-thought reasoning

Machine Learning: Supervised, unsupervised, and ensemble methods, predictive modeling, transfer learning

Computer Vision: Image processing, pattern recognition, transfer learning with CNNs and Vision Transformers

NLP: Text analysis, semantic search, document understanding, information extraction

MLOps: Model deployment, monitoring, lifecycle management, experiment tracking

Bioinformatics: Structural bioinformatics, molecular visualization, AI applications in biology and healthcare, medical diagnostics

Data Engineering: ETL/ELT pipelines, vector databases, document processing, DVC, Docker, CI/CD for ML

LANGUAGES

Spanish: Native
English: Intermediate–Advanced (Technical and academic proficiency)