Amirreza Sokhankhosh

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Highlight of Relevant Skills

- **Back-End Development:** Expertise in building and maintaining **RESTful APIs** using **Django, Nest.js, Express.js, Flask,** and **FastAPI**.
- **Front-End & Full-Stack Integration:** Hands-on experience aligning **React + Tailwind** interfaces with backend services for seamless user experiences.
- **Databases & Data Modeling:** Proficient with SQL and NoSQL systems **(PostgreSQL, MySQL, MongoDB)**, including schema design, stored procedures, and efficient querying.
- **Blockchain Integration:** Proficient with EVM-based blockchains and Hyperledger Fabric, with hands-on experience designing consensus mechanisms, integrating DLTs into FL frameworks, and ensuring decentralized coordination.
- **Machine Learning Engineering:** Skilled in developing, training, and scaling ML models with **PyTorch, TensorFlow, Hugging Face Transformers**, applying best practices in distributed AI, model evaluation, and **MLOps** (Docker, Kubernetes, CI/CD) for production-grade pipelines.
- **Generative AI & LLMs:** Designed and deployed applications powered by LLMs using **LangChain, OpenAI API, vector databases (FAISS), and Ollama**, with expertise in **retrieval-augmented generation (RAG)**, fine-tuning (LoRA), and advanced prompting strategies (CoT, ReAct, Zero/Few-Shot).
- **Programming Languages:** Strong foundation in **Python, TypeScript, JavaScript, and Java**, with additional experience in C++.
- **Cloud & DevOps:** Familiar with containerization **(Docker, Kubernetes)**, **CI/CD pipelines**, **GitHub Actions**, and cloud platforms such as **AWS** for scalable deployments.
- **AI & Data Integration:** Applied **LLMs, federated learning, time-series forecasting**, and predictive modeling to enhance application functionality and intelligence.
- **Collaboration & Agile Practices:** Experienced in **Scrum/Agile** environments, sprint planning, code reviews, and cross-functional teamwork.

Experience

University of Manitoba Sep 2023 – Jul 2025
Graduate Research Assistant *Winnipeg, Canada*

- Designed and developed four novel distributed AI architectures to address critical challenges in the field, including:
  PoCL | Link: A blockchain consensus mechanism repurposing energy-intensive mining for secure, incentive-aligned, and resource-efficient federated learning.
  SSFL | Link: An architecture enhancing scalability and efficiency for SplitFed Learning.
  BSFL | Link: The first decentralized SplitFed Learning framework leveraging smart contracts for model integrity and decentralized coordination.
  BPFL | Link: A framework improving fairness and model ownership through contribution-based personalization and tokenized access.
- Implemented and optimized these architectures using a robust tech stack, including TensorFlow, PyTorch for AI model development, Hyperledger Fabric for blockchain integration, and Express.js/Flask for modular API development.
- Achieved significant system optimizations across the architectures, demonstrating substantial improvements:
  1. Reduced Communication Overhead by 85.2% (in SSFL/BSFL) **2.** Increased Fault Tolerance by 62.7% (in BSFL)
  3. Enhanced Energy Efficiency through PoCL by replacing energy-intensive mining with productive AI tasks.
- Authored and contributed to multiple research publications submitted to/published in top-tier IEEE venues

Bobo App Ltd. Jun 2024 – Aug 2024
Full Stack Developer Intern *Winnipeg, Canada*

- Accelerated product development by designing and implementing RESTful APIs using Supabase and PostgreSQL, enhancing backend functionality and data management.

- Automated data integration by developing a Python script to convert CSV data into executable SQL, significantly streamlining database population.
- Ensured seamless full-stack integration through close collaboration with the front-end team to align API specifications with user interface requirements.
- Contributed to agile workflow efficiency by utilizing the Atlassian suite (Jira, Confluence) for task management, documentation, and team coordination.

Nadin Soft (Sadr Group Company) Jul 2020 – Dec 2020
Full-stack Developer Intern

- Drove the successful completion of a critical internal project, addressing key deficiencies in API security, authentication, and data modeling for production deployment.
- Developed robust RESTful APIs with AdonisJS and Express.js, implementing JWT authentication to secure user access and enable core application functionalities.
- Designed and implemented highly accurate MySQL database schemas for precise tracking and management of employee working and non-working hours, foundational for the project's business logic.
- Deployed fully functional features to the live production server and created thorough Swagger API documentation, facilitating seamless internal integration and knowledge transfer.
- Contributed to an Agile Scrum development team by actively tracking and managing personal tasks within ClickUp, ensuring efficient progress and clear communication within sprints and CI/CD pipelines.

Projects

MarkMate | *React, Django, PostgreSQL, OpenAI API, LangChain* | Link

- Built a full-stack web app for automated assignment grading using **React, Django, and PostgreSQL**.
- Integrated OCR and RAG-based **LLM agents** with custom test-case pipelines to generate consistent feedback.
- Reduced grading time and instructor effort by **≈80%**, improving reliability and scalability.

Digital Twin – FL | *TensorFlow, PyTorch Forecasting, Flask, Express.js* | Link

- Developed a smart-building **Digital Twin** predicting CO_2, humidity, and temperature across 76 IoT rooms.
- Implemented **Temporal Fusion Transformers (TFT)** for multivariate time series forecasting.
- Integrated into a **federated learning framework**, ensuring scalability and privacy-preserving analytics.

Paper Summarizer | *Hugging Face Transformers, Ollama, OCR, LLMs* | Link

- Engineered an LLM-powered summarization tool for academic papers with **OCR + NLP pipelines**.
- Applied **LLaVA and LLaMA models** for segmentation, entity extraction, and multimodal summarization.
- Generated holistic one-page summaries, improving research efficiency for academic users.

Education

University of Manitoba Sep 2023 – Aug 2025
Master of Science in Computer Science (GPA: 4.4 / 4.5) *Winnipeg, Canada*

- **Relevant Coursework:** Security & Privacy, Deep Generative Modeling, Blockchain & Distributed Systems: A+

K.N. Toosi University of Technology Sep 2018 – Feb 2023
Bachelor of Science in Computer Engineering

Technical Skills

AI / Machine Learning: TensorFlow, PyTorch, Flower, Numpy, Pandas, OpenCV, Transformers, LangChain, LangGraph, Scikit-learn, Keras, Matplotlib, TensorBoard, CUDA.
Languages: Python, C++, Java, C#, JavaScript, TypeScript, Node JS, Solidity.
Cloud & DevOps: Docker, Kubernetes, Hyperledger Fabric, Git, GitHub, Linux, CI/CD, AWS.
Databases: PostgreSQL, MongoDB, MySQL, Redis, Db2, Supabase.
Web Frameworks: *Back-end*: ASP.NET, Django, Express.JS, Flask, Adonis.JS. *Front-end*: React, Tailwind
Tools & Methodologies: Jira, Confluence, Swagger, ClickUp, Agile, Scrum.