# Tanzim Hossain Romel

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## Experience

**Software Development Engineer 1**, IQVIA – Dhaka, Bangladesh June 2023 – Present

- Backend Engineer at KPI Library team developing microservices-based healthcare applications handling millions of patient records using .NET Core and C#
- Architected cloud-native applications on AWS (Lambda, EC2, S3, DynamoDB) and designed RESTful APIs following industry best practices for global pharmaceutical clients
- Integrated LLM capabilities into clinical data analytics dashboards, enabling natural language querying and automated report generation with 85% reduction in manual processing time
- **Performance Optimization Leadership:** Achieved 60% reduction in complex query execution times through comprehensive database optimization including query plan analysis, strategic indexing, and materialized views implementation
- Implemented advanced caching strategies with Redis and MongoDB optimization techniques, delivering 40% improvement in API response times across healthcare data pipelines
- Built interactive Angular visualization dashboards reducing data interpretation time by 30% and improving client engagement by 45%
- Implemented comprehensive testing (72% to 95% coverage), CI/CD pipelines (99.9% uptime), zero-downtime deployments, and distributed tracing with Jaeger reducing troubleshooting time by 50%
- Led proof-of-concept projects, mentored junior developers, and collaborated with cross-functional teams across multiple time zones
- Received IQVIA Impact Program – Silver award (May 2025) for outstanding performance and essential feature development
- Technologies: C#, .NET Core, PostgreSQL, MongoDB, AWS, Docker, Kubernetes, Jaeger, OpenTelemetry, GitLab CI, Angular, Redis

## Education

**Bangladesh University of Engineering and Technology** April 2018 – May 2023
B.Sc in Computer Science and Engineering

- GPA: 3.53/4.0 (3.61 in the final term) | 3.86/4.0 in sessional courses (lab practicals and group projects), demonstrating strong implementation and teamwork skills
- Notable Courses: Machine Learning, High Performance Database Systems, Fault Tolerant Systems, Data Structure and Algorithms, Operating Systems, Computer Security

## Research

**Securing Machine Learning Model Ecosystems: A Comprehensive Security Analysis** June 2025 - Present

- Research collaboration with Mohammad Latif Siddique, Ph.D. candidate at University of Notre Dame and Ph.D. intern at Meta (Summer 2025)
- Conducting systematic security analysis of 15 major ML platforms including Hugging Face Hub (752,000+ models), Kaggle (355,000+ datasets), TensorFlow Hub, and PyTorch Hub
- Investigating Remote Code Execution (RCE) vulnerabilities in ML model supply chains and developing security maturity assessment framework
- Analyzing defensive technologies including SafeTensors, MalHug framework, and proposing novel threat mitigation strategies
- Developing comprehensive vulnerability classification system and threat modeling methodology for ML ecosystems

**Making AI Reliable: Design by Contract for Large Language Models** Nov 2024 - Present

- Research collaboration with Dr. Akond Rahman, Assistant Professor at Auburn University, specializing in DevOps

and cybersecurity

- Developed comprehensive taxonomy for API contracts in LLM libraries with refined classification: Input contracts (60%), Output contracts (20%), Temporal/Sequence contracts (15%), and Extended contract types (5%)
- Conducted empirical study analyzing 412 real-world issues from Stack Overflow, GitHub, and developer forums covering LangChain, HuggingFace, and LlamaIndex
- Pioneered LLM-based approach for automated contract extraction and validation in production systems
- Currently developing Design by Contract (DbC) tools to automatically enforce API contracts, reducing LLM integration failures by proactive contract validation

**Blockchain in Healthcare 2.0: A Comprehensive Scalable and Privacy-Preserving Health Data Management System** June 2022 – May 2023

*Undergraduate Thesis*

- **Thesis Supervisor:** Professor ASM Latiful Hoque, BUET (specialist in data warehousing and big data analytics)
- **Problem Statement:** Addressed critical limitations in current blockchain healthcare systems including scalability bottlenecks, privacy concerns, and interoperability challenges
- **Technical Innovation:** Engineered novel blockchain architecture combining sharding mechanisms, Layer-2 Plasma solutions, and Directed Acyclic Graph (DAG) ledger to handle millions of healthcare records with sub-second transaction finality
- **Privacy & Compliance:** Implemented sophisticated patient-centric consent management using smart contracts, full HL7 FHIR standards compliance, and zero-knowledge proof protocols for privacy-preserving data sharing
- **Architecture Design:** Built enterprise-grade fault-tolerant microservice architecture with hybrid on-chain/off-chain storage strategy, supporting both public and private blockchain networks
- **Security Framework:** Integrated next-generation security features including post-quantum cryptography, multi-signature authentication, and automated threat detection systems
- **Performance Metrics:** Achieved 10,000+ TPS throughput, 99.9% system availability, and HIPAA/GDPR compliance while maintaining decentralization principles
- **Impact:** Proposed solution addresses real-world healthcare data interoperability challenges affecting millions of patients across fragmented health systems

## Projects

**Building an Enterprise URL Shortener: Event-Sourced, Multi-Region, High-Performance Architecture** Nov 2024 - Present

- **Advanced Architecture:** Implemented Event Sourcing & CQRS with hierarchical caching strategy (Memory → Redis → Database) for optimal performance and database load reduction
- **Multi-Region Deployment:** Built active-active deployment across multiple regions with automatic failover using Kubernetes HPA scaling and circuit breaker patterns for unprecedented resilience
- **Enterprise DevOps:** Developed complete Infrastructure as Code with Terraform, automated CI/CD with GitHub Actions, zero-downtime rolling deployments, and comprehensive monitoring with OpenTelemetry
- **Real-time Analytics:** Integrated SignalR for live analytics streaming, ML-powered cache warming with intelligent predictions, and complete audit trails for regulatory compliance
- **Technologies:** .NET 8.0, Angular, AWS/Kubernetes, Terraform, PostgreSQL, Redis, Event Sourcing, Circuit Breaker patterns, JWT authentication, OWASP compliance

**Image caption generation using enhanced Show, Attend, and Tell with BERT Context Vectors** Jan 2023 – Feb 2023

- Extended the "Show, Attend, and Tell" image captioning model by adding BERT, improving both the quality and speed of image captions.
- Used BERT's language features to make captions more accurate and context-aware.
- Reduced training time by leveraging BERT's pre-trained knowledge, allowing faster model convergence without losing accuracy.
- Showed how to combine advanced language understanding with image captioning to push the limits of AI-based image analysis.

**Eventfly: An End-to-end Event Management System** May 2022 - July 2022

- Designed and developed a comprehensive microservices-based system to streamline event organization and participation.
- Led the back-end architecture and implemented key services, including newsfeed, payment, authentication, and event management.
- Tools Used: TypeScript, Express.js, Next.js, Docker, Kubernetes, NATS, and MongoDB.

## Achievements & Awards

- **IQVIA Impact Program – Silver Award** (May 2025) – Received at IQVIA for demonstrating outstanding performance by completing numerous tasks, resolving critical issues, supporting team processes, and developing essential features that significantly improved the product. [Certificate]
- **Finalist, Blockchain Olympiad Bangladesh 2021** (April 2021) – Selected as one of the 40 finalists among numerous teams from across the country with our project "Blockchain Based Ticketing Platform". Participated as part of the "Recursively Enumerable" team alongside Ataf Fazledin Ahamed and Md. Tanzim Azad Nishan from BUET.
- Secured **2nd place** out of 120 participants with an accuracy of 95.9% in the Bangla Handwritten Digits Recognition contest in CSE 472 Machine Learning Lab at BUET (November 2022). Developed custom CNN architecture implemented from scratch using only NumPy and OpenCV.
- **Dean's List Award** – Awarded for outstanding academic results in Level-2 of BUET.
- **Bangladesh Physics Olympiad (BdPhO)** National prize winner (2017)
- **Bangladesh Chemistry Olympiad** National prize winner (2017)
- **Talentpool HSC Scholarship** Received from Rajshahi Education Board in 2017 with 95.6% marks in science, placing 15th in Rajshahi Board.

## Tools & Technologies

- **Programming Languages:** C#, .NET, Python, JavaScript, Go
- **Machine Learning:** PyTorch, NumPy, Pandas, OpenAI API, LangChain
- **Blockchain:** Ethereum, Solidity, Hyperledger Fabric
- **Web & Backend Frameworks:** ASP.NET, Express.js, FastAPI
- **Databases:** PostgreSQL, MongoDB, Microsoft SQL Server
- **DevOps & Cloud:** Docker, Kubernetes, Azure, AWS, GitHub Actions
- **Monitoring & Observability:** OpenTelemetry, Jaeger
- **Other:** Redis, gRPC, Entity Framework, Azure Bicep

## Test Scores

- **TOEFL iBT**: 103/120 (Listening: 29, Reading: 29, Writing: 22, Speaking: 23)