

# MUHAMMAD MAHAD

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## EDUCATION

**Jamia Millia Islamia, New Delhi, India**

M. Tech in Computer Engineering

Jul 2023 — Aug 2025

GPA: 3.62

**Birla Institute of Applied Sciences, Bhimtal, India**

B. Tech in Computer Science Engineering

Jun 2019 — Jun 2023

GPA: 3.16

## PROJECTS

**Murmur : B2B AI-Powered Collaboration Platform** | Next.js 16, TypeScript, Neon Postgres, OpenRouter, Kinde, Arcjet, Vercel.

- Engineered a **production-ready B2B AI SaaS** platform that handles real-time synchronization for multi-tenant workspaces, resulting in a seamless, low-latency, real-time communication interface.
- Architected **real-time synchronization** using **Cloudflare Durable Objects** to manage global state and presence, reducing server overhead and latency compared to traditional WebSocket clusters.
- Optimized UI responsiveness by implementing **optimistic updates with TanStack Query**, ensuring near-instant feedback for messaging while maintaining server-state consistency in real-time environments.
- Engineered an **AI-driven workflow via OpenRouter**, automating thread summarization and AI-assisted message drafting with grammar refinement, which reduced manual user correction effort by half.
- Implemented core messaging features such as **reverse scrolling message history**, **inline message editing**, **rich-text formatting** for a seamless user experience.
- Added **subscription-based billing** and self-serve customer portals, supporting multiple pricing tiers in addition with **authentication**, **organization management**, and **member invitations** using **Kinde**, to support B2B growth.
- Hardened platform security by integrating **Arcjet** for enterprise-grade **bot detection**, **DDoS protection**, and **sensitive data shielding**, preventing automated attacks and data leaks. Deployed the platform on **Vercel**.

**Learnova : Learning Management System** | Next.js 15, TypeScript, Neon Postgres, Stripe, Better-Auth, Arcjet, Vercel.

- Architected a **high-performance LMS** utilizing **Next.js 15 Server Components**, enabling admins to create and manage courses while learners purchase, consume content, and track progress through a structured dashboard.
- Engineered a scalable media pipeline using **Tigris S3** and **Presigned URLs**, chose this over standard local storage to enable secure, direct-to-cloud uploads and globally distributed video delivery without taxing the main server.
- Implemented robust **Role-Based Access Control (RBAC)** using **Better-Auth** and **Prisma ORM**, ensuring data isolation between Admin management tools and Learner progress analytics.
- Integrated **Stripe payments** for seamless course purchases. Prioritized platform security by integrating **Arcjet** for **bot protection** and **rate limiting**. **Vercel** is used for deployment.

## RESEARCH

**The Price of Transparency: Cost Analysis of CNNs and XAI in Medical Imaging**

Jan 2025 — Aug 2025

Jamia Millia Islamia

First Author

- Benchmarked 7 CNN architectures** across **4 diverse datasets**, evaluating performance and computational costs to identify optimal models for clinical integration.
- Integrated Explainable AI (XAI) frameworks** including **Grad-CAM**, **Grad-CAM++**, **Score-CAM**, and **LIME** to generate interpretable saliency maps, increasing model transparency and clinician trust.
- Identified **ResNet50**, **VGG19** and **EfficientNetB0** as top-performing architectures, achieving a superior balance between diagnostic accuracy and real-world computational efficiency.

**Segmentation of Water Bodies in Remote Sensing Imagery Using LAR-UNet**

Jul 2024 — Dec 2024

Jamia Millia Islamia

First Author

- Engineered a novel lightweight model **Lite-Attention-Residual U-Net (LAR-UNet)** architecture combining bottleneck layers, spatial attention, and residual connections for detection and segmentation of water bodies in satellite imagery.
- Achieved 97% Overall Accuracy and 92% mIoU** on the WHDL dataset and two additional datasets, surpassing heavier SOTA models.

## SKILLS

**Programming Languages:** JavaScript, TypeScript, Python, C++, SQL

**Frameworks & Tools:** Next.js, React, Node.js, Express, Prisma, MongoDB, PostgreSQL, Git, FastAPI, AWS, S3, EC2