MAHMOOD UL ISLAM

Software Engineer | Cloud & AI Specialist

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Areas of expertise

Programming Languages: JavaScript, Python

Frontend Development

- Frameworks & Libraries: React.js, Next.js, Vue.js, React Native (Expo), Swift (iOS native)
- State Management & Utilities: Redux, Vuex, React Query, react-i18next
- Data Visualization & UI Components: Chart.js, ECharts, react-calendar, vue-cal, PDFMake

Backend Development

- Server-Side Development: Node.js, Express.js, Next.js (API & Middleware)
- Serverless & Cloud-Native Backend: AWS Lambda, AWS Amplify Backend
- API Development: RESTful APIs, GraphQL, Apollo GraphQL
- Real-Time Communication: WebSockets, Server-Sent Events (SSE), Amazon Chime SDK, WebRTC, Socket.IO

Database Management & Storage

- Relational Databases: PostgreSQL, MySQL, Amazon RDS
- NoSQL Databases: Firebase Firestore, MongoDB, Amazon DynamoDB
- ORM & Cloud Storage: Prisma, Sequelize, Amazon S3

Cloud & DevOps (AWS)

- Compute & Containers: AWS Fargate (Amazon ECS), Amazon EC2, AWS Lambda, Amazon SageMaker
- Networking & API Management: Amazon API Gateway, VPC, Application Load Balancer (ALB), Network Load Balancer (NLB), EventBridge
- Storage & Databases: Amazon S3, Amazon RDS, Amazon DynamoDB
- Messaging & Streaming Services: Amazon SNS, Amazon SQS, Amazon SES, Amazon Pinpoint, Amazon Data Firehose
- Security & Identity Management: AWS Cognito, AWS Identity and Access Management (IAM), AWS Secrets Manager
- AI & Machine Learning: Amazon SageMaker, Amazon Bedrock, Transcribe, Polly, Amazon Rekognition, HealthLake, Amazon Comprehend
- Monitoring & Automation: Amazon CloudWatch, AWS Step Functions

Authentication & Security

- Protocols & Standards: OAuth 2.0, OpenID Connect (OIDC), AWS Amplify Auth
- Libraries & Tools: Crypto.js, bcrypt.js, Auth0, AWS Cognito

Build & Deployment Tools

- Version Control & CI/CD: GitHub, Bitbucket, GitHub Action, AWS Amplify CI/CD
- Containerization & Bundling: Docker, Docker Compose, Vite, Webpack

Testing & Code Quality

- Testing & Automation: Jest, Puppeteer, Custom Node.js Scripts

CMS Integration: WordPress, Storyblok CMS

Computer Vision

Custom classifiers on SageMaker, Rekognition (pre-screen), OpenCV (preprocessing), image quality gates, confidence thresholds

AI Workflow Integration:

Designed and productionized multi-agent and computer-vision pipelines across healthcare apps. For LifeLine, built an agentic system on Amazon Bedrock (chatbot, session-summary, and risk-analytics agents) with streaming I/O, Polly TTS, and Transcribe STT; integrated Chime SDK for sessions and ambient listening (text + Rekognition facial/engagement cues) to generate real-time summaries and risk signals, with structured memory and secure backend context injection. For SkinScan, implemented a three-stage CV pipeline—Rekognition pre-screen, SageMaker classification, and serverless wound segmentation with RLE masks—plus Bedrock agents for wound staging, healing assessment, and clinical recommendations; integrated Comprehend Medical for ICD-10/RxNorm inference and real-time SSE streaming for analysis progress. Both solutions run in VPC-isolated AWS environments with Cognito auth, presigned S3 media flows, and full audit/reporting for privacy and accountability.

Experience

Virtual Health Hub

Senior Software Developer | Cloud & AI Specialist — *March 2025* **– Present**

Software Developer — ***August 2024*** *– February 2025*

Location: Saskatoon, Saskatchewan, Canada

Project: "LifeLine" (https://virtualhealthhub.ca/), (https://research-groups.usask.ca/remote-presence), (https://lifelineapp.ca/)
Virtual Mental Health Treatment Platform

Technologies: JavaScript, React.js, Vue.js, Quasar, React Native (Expo), Node.js, Express.js, REST APIs, PostgreSQL, SASS, CSS

AWS Services: Amplify, API Gateway, Bedrock, ECS (Fargate), RDS, EventBridge, Chime SDK, Lambda, Step Functions, S3, CloudWatch, Amazon Pinpoint, Cognito, Amazon Rekognition, Amazon Comprehend, Amazon Polly, Amazon Transcribe, Amazon Data Firehose.

Key Responsibilities & Contributions:

Project Leadership: Managing the Lifeline Project end-to-end, including development, cloud infrastructure, and solution architecture, ensuring scalability and compliance with healthcare standards.

Full-Stack System Development:

• Built a highly scalable system using Next.js, Vue.js, React.js, Quasar, and React Native (Expo) for enterprise-level healthcare applications, maintaining HIPAA compliance.
• Built a fully dynamic appointment booking and medication management system for clinicians and patients, including useful analytics and notifications.
• Created an AI chatbot with voice/text to generate tailored responses according to the patient's data, create session summaries & synchronize with clinician portal; all within a secure VPC with AWS cloud infrastructure. Created a natural conversation with the AI chatbot using Amazon Polly.
• Developed a video conference ambient listening to summarize the meeting with Chime SDK, Transcribe, S3 and Bedrock.
• Built an Agentic AI system by Amazon Bedrock with the collaboration of multiple agents (AI chatbot agent, Video conference summary agent, Agent for risk analytics/alert)
• Developed and maintained REST APIs & WebSocket using Node.js and Express.js, backed by PostgreSQL, Prisma, Socket I/O, AWS API gateway, ALB/NLB, ECS-Fargate, Amazon Cognito, EventBridge, SES and many more.
• Created custom libraries and internal applications to enhance system efficiency and improve client management.
• Developed a native custom module in Expo using Swift & Kotlin to bridge Amazon Chime SDK with React Native, enabling seamless audio/video conferencing capabilities.
• Created a Vite compilation bundle to integrate Vue.js and React.js components within the same Quasar app, allowing smooth execution of Amazon Chime SDK React components alongside Vue-based UI.

Cloud Infrastructure & Security:

• Architected and managed AWS cloud infrastructure, including Cognito, ECS (Fargate), RDS, EventBridge, Pinpoint, API Gateway, and Chime SDK for secure and scalable operations.
• Implemented secure authentication mechanisms with AWS Cognito and Auth0 for seamless user management.

AI & Machine Learning Integration:

• Developing an AI Agent using AWS Bedrock and Kinesis to enhance medical data processing, automation, and real-time insights.
• Integrated Amazon Chime SDK with Amazon Transcribe, Rekognition, and Bedrock for real-time audio/video analysis, AI-driven chatbot interactions, and structured medical record processing using Amazon HealthLake.

Feature Development for Virtual Healthcare:

• Designed and developed an appointment booking system with a complete workflow for a Virtual Clinic, optimizing doctor-patient interactions.
• Developed a medication management system and an AI chatbot that integrates with the project's AI Agent, enhancing patient adherence and physician oversight.

Stakeholder & Research Collaboration:

• Collaborating with stakeholders and medical professionals to enhance system efficiency and gather requirements.
• Conducting usability tests in rural Saskatchewan, collecting patient feedback to refine AI-driven healthcare solutions.

Project: "SkinScan" (https://virtualhealthhub.ca/), (https://research-groups.usask.ca/remote-presence), (https://skinscanapp.ca/)
AI Dermatology Imaging Platform (End-to-End)

Technologies: Swift (iOS native, AR-guided capture), Next.js (doctor portal, admin portal), Node.js, Express.js, REST APIs, PostgreSQL, Prisma ORM, SSE

AWS Services: Amazon SageMaker (real-time inference, serverless segmentation), Bedrock, Rekognition (image pre-screening), Comprehend Medical, S3, API Gateway, ECS Fargate, RDS, SNS, EventBridge, CloudWatch, Cognito, IAM, Secrets Manager

Summary

Designed and delivered an end-to-end dermatology and wound care imaging platform comprising a native iOS capture app, an AWS computer-vision pipeline, and clinician/admin portals. Incoming photos are pre-screened by Amazon Rekognition for skin presence and image quality, then routed to custom vision models trained and deployed on Amazon SageMaker (fine-tuned on publicly available dermatology datasets) for classification, and serverless endpoints for wound segmentation with RLE mask generation. Integrated Amazon Bedrock agents for automated wound staging, healing assessment, and clinical recommendations. A centralized backend coordinates ingestion, real-time inference via SSE streaming, case management with visit versioning, multi-facility administration, and comprehensive auditing.

Key Responsibilities & Contributions

Project leadership & architecture: Designed the full cloud/application architecture (VPC, networking, CI/CD), aligning with healthcare privacy best practices and reusing proven patterns from LifeLine.

Computer vision & modeling:

• Fine-tuned and deployed a dermatology image classifier as a SageMaker real-time endpoint with versioning, rollback, and CloudWatch monitoring.
Implemented a three-stage pipeline: Rekognition gate for skin presence/quality, custom classifier with confidence thresholds and safe defaults, and wound segmentation via serverless SageMaker endpoints with RLE mask generation.
Integrated Amazon Bedrock agents for automated wound staging, healing trajectory assessment, and clinical recommendations generation.
Implemented AprilTag-based calibration for pixel-to-mm measurement accuracy in wound analysis.

Native iOS app (Swift):

• Built AR-guided photo capture and library import with on-device checks; integrated Rekognition pre-screen calls to block low-quality/irrelevant shots before upload.
Secure media handling (presigned S3 uploads, retries, background transfers) and UX tuned for diagnostically useful images.
Integrated iOS push notifications via SNS/APNs for real-time case update alerts.

Doctor portal (Next.js):

• Developed a clinician portal for patients, cases, waitlist, and triage.
Case view with image viewer, model prediction + confidence, status transitions, and notes/audit history.
Built waiting list management with case acceptance/rejection workflow and treatment plan updates.
Implemented real-time notifications for new case assignments.

Backend (centralized, Node/Express):

• Built a centralized service that orchestrates ingestion, pre-screening, model inference, and persistence, fronted by Amazon API Gateway and an internal Load Balancer for ECS services; secured with Amazon Cognito authorization, rate limiting, and structured logging; productionized with CI/CD; and integrated with Prisma for PostgreSQL.
• Implemented real-time SSE streaming for long-running AI analysis with progress updates.
• Built visit versioning system tracking full case history across initial, follow-up, and discharge visits.
• Integrated AWS Comprehend Medical for ICD-10-CM inference, RxNorm medication extraction, and PHI detection.

Saaska Software Inc.

Software Engineer and Technical Support Assistant **April 2023 – June 2024**
Location: Saskatoon, Saskatchewan, Canada

Project: "esiKidz" (https://esikidz.com/) childcare management software.

Project's usage:
JavaScript, React.js, React Native, Node.js, REST APIs, MySQL, SASS, CSS, Git, Bitbucket, Trello, Jira.
• SAAS development by React.js & React Native at the enterprise level.
• Specialize in developing and managing secure web and mobile apps.
• Learning data science by creating apps for web crawling, data extraction, and manipulation.
• Creating & practicing various libraries for data extraction, filtration, and React UI styling.
• Experiencing AWS Lambda, Amazon-S3, and other related technologies.
• Developing multiple internal applications & custom libraries to support the software system in efficiently managing clients.

Project's specific works:
• Working collaboratively in a team to maintain the overall architecture and develop a highly scalable system integrated with ReactJS & React-Native APPs, communicating via Node JS API services.
• Performing optimization of the developer toolchain to support instant provisioning of new services and infrastructure, fully automating the deployment, and minimizing development friction.
• Designing and implementing to improve software's reliability, scalability, performance, and security.
• Supporting Business Development and Marketing by creating internal software to enhance tasks.
• Performing software testing, improving existing systems, and adding new features.
• Creating and maintaining documentation on test and development operations.
• Demonstrating the system to new customers and providing technical support to existing customers.

SELISE Digital Platforms

Software Engineer **June 2022 – Aug 2022**

Project: "Sunrise-club" (https://www.sunrise.ch/en/moments), an Event booking site for the Telco (Sunrise) users of Switzerland

Project's usage:
JavaScript, TypeScript, React.js, Next.js, MongoDB, REST APIs, Storyblok CMS, Material UI, Ant Design UI, React-bootstrap, SASS, bootstrap, CSS, GitHub, Jira.
• Learned Next.js at the enterprise level, the pros, and cons of using Next.js to maintain URL redirection
• Created a website with high security and maintained a web firewall
• Learned to implement OAuth 2 + OIDC and learned to implement Adobe Analytics
• Experienced using Material UI + React-Bootstrap and SASS
• Proficient in using logger in the project, Building API in Next.js, implementing Storyblok CMS, and MongoDB database
• Practiced using SWR with Axios, Crypto.js, and Lodash.
Project's specific works:
• Maintained URL redirect with WAF (Web Application Firewall) in the production site. Creating an API & middleware through Next.js
• Maintained 3 test environments and helped my peer with fixing up the commit history on the main branch in our project
• Created documentation with code standards of the codebase of our project, implementing CSS modules into our main project
• Constructed a complete language translation system

Quantic Dynamics Ltd.

Web Developer **Feb 2019 – May 2022**

Project's usage:
JavaScript, React.js, Next.js, MongoDB, Firebase, Material UI, Ant Design UI, React-bootstrap, SASS, Bootstrap, CSS, GitHub, GitLab, Trello.
• Learned to use SWR with Axios, Crypto.js, and Lodash, as well as learned to use cookies and query parameters.
• Implement search and sort functions and manipulate data from the user using Node.js.
• Experienced using Material UI + Ant Design and SASS altogether.
• Customized fully responsive websites with mobile, tablet and desktop views.
• Architected frontend & backend solutions, implementing asynchronous client-server communication via REST API and setting up the server with databases.

Education

• Applied Certificate in Website Design and Development: Saskatchewan Polytechnic
• Bachelor of Science in Textile Engineering: Ahsanullah University of Science & Technology (WES Canadian equivalency 4-year bachelor, Ref# 4848976)