

# AMAL SHAJI

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## Professional Summary

Senior Software Engineer & M.Tech (Data Science) Graduate with 6+ years of experience, specializing in Multi-Agent Systems, Retrieval-Augmented Generation (RAG), and scalable ML infrastructure. Expert in bridging the gap between theoretical research and production engineering. Proven track record at Amazon (AWS Bedrock) in architecting autonomous agentic workflows and automated LLM evaluation pipelines. Seeking a Research Engineer or Applied Scientist role to leverage engineering rigor in deploying state-of-the-art AI solutions.

## Education

- Master of Technology (M.Tech) in Data Science | BITS Pilani | CGPA: 8.53/10
  - Thesis: AI-Based Legal Document Summarization using LSTM & GRU architecture.
  - Key Coursework: Deep learning, Natural Language Processing (NLP), Information Retrieval.
- Bachelor of Technology (B.Tech) in Mechanical Engineering | NSS College of Engineering | CGPA: 8.19/10

## Work Experience

### SYSTEM DEVELOPMENT ENGINEER II | AMAZON WEB SERVICES (AWS) | OCT 2022 – PRESENT

- **Architected MARES (Multi-Agent Region Expansion System)**
  - Designed a novel Coordinator-Delegator-Worker multi-agent architecture using Amazon bedrock to autonomously manage AWS bedrock region expansion.
  - Integrated Knowledge bases (RAG) to retrieve historical deployment issues, enabling agents to contextually resolve infrastructure failures without human intervention.
  - Impact: Orchestrated a hybrid mesh of LLMs (Reasoning) and AWS Lambdas (Execution) to automate complex provisioning tasks, reducing region build time from 2 weeks of manual effort to 4 hours of autonomous deployment.
- **Architected VISAR (Vector Integrated Search and Retrieval)**
  - Designed a production-grade RAG system utilizing Amazon Sagemaker for embedding generation and OpenSearch serverless for k-NN vector indexing.
  - Built a serverless ingestion pipeline using AWS Batch to chunk and preprocess large document corpuses for optimal passage extraction.
  - Impact: Overcame native knowledge base constraints (limited to 5MB size/5 documents) by engineering a custom RAG solution that supports unlimited document volume and multi-format ingestion (PDF, Excel, TXT) reducing information retrieval latency from hours to seconds.

- **Engineered Data Quality & Preprocessing Pipeline**

- Architected End-to-End Transformation Pipeline: Designed a modular data preprocessing pipeline to sequence critical data cleaning and validation steps, ensuring reproducible and scalable sanitization of high-volume RLHF training datasets.
- Implemented Custom Transformers: Developed specialized custom transformers (following TransformerMixin patterns) to encapsulate complex logic – including BERT Score similarity and Detoxify filtering- allowing targeted processing of distinct text attributes.
- Automated Data cleaning Strategy: Engineered robust strategies to detect and handle outliers, missing attributes and noisy text, creating a consistent, dataset for model tuning while reducing manual review overhead by 40% and catching 95% of data quality issues.

## **SYSTEMS ENGINEER | TATA CONSULTANCY SERVICES | JULY 2019 – AUG 2022**

- Developed automated anomaly detection scripts using Elasticsearch and Kibana, reducing manual log analysis time by 40%.
- Led a team in maintaining 100% SLA compliance for critical production systems.
- Award: Recognized with “TCS Digital High Talent” tag for top-tier technical performance.

## **Academic Projects & Research**

### Legal Document Summarization (M.Tech Thesis)

- Developed an NLP model using Bi-Directional LSTM and GRU networks to generate abstractive summaries of Indian legal constitutional documents
- Implemented an attention mechanism to improve context retention in long-form legal texts.

### Content-Based Recommendation Engine

- Built a movie recommendation system utilizing Cosine Similarity and TF-IDF vectorization to map user preference to content attributes.

## **Key Accomplishments**

- Application Security Guardian, Amazon
  - Appointed as an application security guardian, actively engaging in design reviews to proactively identify and mitigate potential security vulnerabilities.
  - Collaborate with cross-functional teams to integrate secure design principles and risk mitigation strategies early in development lifecycle
- TCS Digital Associate – High talent Tag

## **Certifications**

- Certified A.I. Professional – Defense Institute of Advanced Technology (DRDO)
- Google Cloud Professional Machine Learning Engineer
- TensorFlow for AI & ML – DeepLearning.AI