# Mahmad Isaq Karankot

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## Education

**Montana State University**, Ph.d. in Electrical & Computer Engineering — Expected May 2030

- **GPA:** 3.95/4.0
- **Focus:** Hyperspectral image classification, wildfire emission modeling, ML-based fuel property prediction, surrogate modeling, and multimodal AI systems for prescribed fire management.(SMART FIRES)
- **Key Projects:** NSF-funded SmartFireS($20M multi-institutional project), community sentiment modeling using AI/NLP for fire management.
- **Research Interests:** AI for environmental modeling, Generative AI, Machine Learning, Natural Language Processing/LLMs, Computer Vision, Software Engineering.

**Montana State University**, M.S. in Electrical & Computer Engineering — Aug 2023 – May 2025

- **GPA:** 3.94/4.0
- **Focus:** Machine learning for healthcare analytics and hyperspectral image classification using deep learning.
- **Thesis:** Machine Learning Predictions for ICU Length of Stay in the Presence of Missing Medical Data (Best Paper Award, IEEE i-ETC 2024).
- **Coursework:** Advance Data Mining, Parallel Processing, Advanced Human Computer Interactions, Machine learning, Algorithms, Artificial Intelligence, Mathematical Optimization, UI/UX.

## Work Experience

**Graduate Research Assistant**, Montana State University – Bozeman, MT — Aug 2023 – Present

- Contributing to the NSF-funded SMART FIRES project (Grant: OIA-2242802), a $20M statewide research initiative involving 32 researchers across 6 institutions, focused on AI/ML-driven analysis of hyperspectral imagery to study and improve prescribed fire strategies for wildfire mitigation.
- Authored and refined data collection protocols for fire science and smoke observation teams, facilitating standardization across multiple field campaigns.
- Developing machine learning models to classify fuel types and predict burn intensity from hyperspectral data, supporting real-time fire behavior assessment.
- Designed and implemented two novel feature selection algorithms, reducing model complexity by 40% and improving classification accuracy and processing speed by over 30% on benchmark datasets.
- Leading experiments on compressed vs full-image modeling, applying sparse coding techniques and surrogate modeling to estimate regional-scale emissions efficiently.
- Writing research papers, technical reports, and presenting findings at academic conferences to contribute to interdisciplinary wildfire research.
- Actively collaborating with faculty, fire scientists, AI/ML experts, and atmospheric chemists within the AI/ML thrust team of SMART FIRES.
- Using Python (PyTorch, TensorFlow, Scikit-learn) and MATLAB for model development, experimentation, and deployment on large-scale hyperspectral datasets.

**Conference Paper Reviewer, IEEE i-ETC (Intermountain Engineering, Technology & Computing Conference)** — Feb 2024 – Present

- Serving as an active reviewer for IEEE i-ETC, an annual conference receiving 300+ submissions in AI/ML, smart systems, and emerging technologies.
- Currently reviewing and evaluating technical papers based on novelty, scientific rigor, and clarity, providing structured peer feedback for program committee decisions.
- Contributing to the selection of the top 10–15% of submissions for conference presentation and IEEE Xplore publication.

**Senior Developer (SAP CX)**, Brillio Jul 2021 – Aug 2023

- Replaced Solr with Unbxd Search for FBM's site-wide search, improving search speed by 45% and result accuracy by 30%, which led to a 25% increase in product discovery.
- Implemented AI/ML-based product recommendation system, increasing monthly sales by over $400K (20% growth).
- Automated manual workflows for product uploads, stock/pricing updates, and order tracking, enhancing operational efficiency and customer satisfaction, saving 100+ hours of manual work each month..
- Developed a PrepareInterceptor for B2B unit data integration from CRM to Hybris and automated B2B login email delivery, handling over 5,000 daily CRM API calls and reducing new user setup time by 50%.
- Upgraded Hybris from version 1905 to 2105, helping the client gain 15% more customers with better performance and B2B features.

**Senior Application Development Engineer**, Accenture Oct 2019 – April 2021

- Built a scalable B2C e-commerce site for Cardinal Health, with custom checkout, secure payment gateway integration, and OAuth 2.0 login, helping onboard 50K+ users within the first 6 months.
- Improved customer service workflows by customizing Backoffice UI and integrating the Assisted Service Module (ASM), enabling agents to resolve queries 30% faster.
- Worked on the OCC (Omni Commerce Connect) layer using Swagger V2, enabling seamless integration with third-party systems. Handled 150+ RESTful endpoints with complex JSON structures, optimized API response time by 35%, and supported payloads up to 1MB with <300ms average latency for key operations.
- Followed Agile methodology with 2-week sprints, collaborating with cross-functional teams and mentoring two junior developers to ensure timely delivery and quality code.
- Contributed as a core member of a 6-person Payment Team for Samsung, integrating Samsung Pay, Klarna, Credit Card, and Cash on Delivery across Samsung sites in Dubai, Vietnam, and Thailand; handled 200+ API requests and managed over 1,000 payment parameters for regional rollout.

**Software Engineer**, Born Group Jul 2019 – Oct 2019

- Designed and developed key features like Account Settings and Share Cart for Makino USA's B2B platform, increasing repeat purchases by 18%.
- Customized Google reCAPTCHA for enhanced security and built Hot-folder data feed processors (converters, translators, decorators) to streamline content updates and reduce manual overhead by 40%.
- Provided production support for live environments, resolving critical issues with an average turnaround time of <4 hours per incident.

**Developer**, Usha Martin Technologies Oct 2018 – Jul 2019

- Designed robust data models (items.xml) and workflows for order confirmation and password recovery on GlaxoSmithKline's B2B SAP Commerce site, improving customer self-service success rate by 30%.
- Built an in-house CI/CD pipeline using Jenkins and Git, eliminating third-party dependencies and reducing operational costs by 15%.
- Customized Product Listing Pages (PLP) and Product Detail Pages (PDP); optimized flexible queries in the DAO layer and automated production data fixes using Groovy scripts, reducing manual effort by 50%.
- Operated in a scrum-based Agile environment with Jira, delivering features and hotfixes in bi-weekly sprints and supporting continuous delivery.

**Trainee Software Engineer**, Bob-eProcure (Effigo Global) Jan 2017 – March 2018

- Developed a fraud detection module for Exim Bank of India's e-tender platform, increasing transparency in contractor selection and improving audit compliance by 40%
- Contributed to UI development using JSTL, data bindings, and AJAX-based controller calls for improved responsiveness.
- Participated in unit testing and code reviews, helping improve overall code quality and reduce defect leakage by 30%.

## Publications

**Addressing the Challenge of Missing Medical Data in Healthcare Analytics: A Focus on Machine Learning Predictions for ICU Length of Stay** June 2024

***Mahmad Isaq Karankot***, Dr. Bradley Whitaker

Link, Code

**Attention And Edge-Aware Band Selection For Efficient Hyperspectral Classification Of Burned Vegetation** July 2025

***Mahmad Isaq Karankot***, Dr. Bradley Whitaker

IEEE International Workshop on Machine Learning for Signal Processing (MLSP) 2025
Link, Code

**Hyperspectral Band Selection via Self-supervised and Reinforcement Learning for Prescribed Burn Impact Analysis** Nov 2025

***Mahmad Isaq Karankot***, Dr. Bradley Whitaker

SPIE Future Sensing Technologies 2025
Link, Code

**Virtual band construction for dimensionality reduction in hyperspectral image classification** Nov 2025

Ethan M. Glenn, ***Mahmad Isaq Karankot***, Dr. Bradley Whitaker

SPIE Future Sensing Technologies 2025
Link

## Projects

**SMART FIRES: Sensors, Machine Learning, and Artificial Intelligence in Real Time Fire Science** Aug 2023 - Present

- Developed ML models to classify fuel types & predict burn intensity from hyperspectral imagery.
- Designed and implemented feature selection algorithms to reduce model complexity & computational overhead.
- Contributed to data collection protocol development in collaboration with fire science & smoke observation teams.
- Worked on surrogate modeling to estimate emissions at regional scale.

**Healthcare Analytics: ICU Length of Stay Prediction with Missing Data**

- Collaborated with SelectHealth to predict ICU stay duration using incomplete EHR data.
- Evaluated ML models under different imputation techniques (KNN, SVD, Mean), achieving high accuracy.

## Awards

- **Best Computing Paper Award i-ETC (2024):** i-ETC Conference Student Awards for Computing Track.

## Technologies & Skills

**Programming:** Java, Python (Pandas, PyTorch, NumPy, TensorFlow), MATLAB, Julia, Groovy, JavaScript.

**Machine Learning & Data Science:** Scikit-learn, PyTorch, TensorFlow, OpenCV, Matplotlib, SciPy.

**Backend Development:** SAP Commerce (Hybris), Spring Framework, Microservices, RESTful APIs, JSP, JSTL.

**Database Management:** MySQL, MSSQL, PostgreSQL, HSQL.

**Cloud Platforms:** AWS, Azure, SAP Commerce Cloud(CCV2).

**DevOps & Testing:**GitHub, CI/CD pipelines, JUnit, Functional Testing.