Dr. Jiztom Kavalakkatt Francis

+1 (515) 708-4467 | jiztom@iastate.edu | West Des Moines, IA | linkedin.com/in/jiztom | portfolio.jiztominnova.tech/

Professional Summary

PhD in Computer Engineering with a specialization in “Interpretable Time-Series Forecasting with Multi-Model Deep Learning and NLP-Driven XAI,” I bring over four years of hands-on experience as an AI engineer building end-to-end machine-learning solutions. My doctoral work introduced a unified pipeline that normalizes heterogeneous sensor streams into 2D heatmaps, fuses ResNet and Transformer architectures for robust pattern extraction, automates data pruning to cut computational load by over 40%, and integrates Grad-CAM and SHAP for per-sensor explainability. I demonstrated its impact with a 20% RMSE reduction on UCI energy forecasting, a 3.8% F1-score improvement on PhysioNet ECG arrhythmia detection, and a 15% boost in real-time sensor-testing efficiency on the Wanda Vision Platform. Proficient in Python, TensorFlow, PyTorch, and MATLAB, I’ve collaborated with 3M, authored multiple IEEE-published studies, and excel at delivering scalable, transparent AI systems—complete with NLP-generated narratives—for healthcare, energy, and industrial monitoring.

Education

Iowa State University **January 2021 - December 2025**
PhD, Computer Engineering *GPA: 3.82*
» Artificial Intelligence - Data Augumentaion, Quality and Pruning

Iowa State University **August 2017 - December 2019**
Master's, Computer Engineering *GPA: 3.92*
» Internet of Things - Real time data collection and optimization

Anna University **August 2013 - May 2017**
Bachelor's, Electrical Engineering *GPA: 7.6*
» Framework for ISO 15118 - European car charging standard

Professional Experience

Make Believe Studios **Nebraska, USA**
Lead Developer, DSP Applicatios *December 2025 - Present*
» Developed high-performance audio plugins compatible with major Digital Audio Workstations (DAWs), utilizing the JUCE Framework.
» Engineered optimized C++ code for real-time audio modulation and tuning, ensuring low-latency execution and stability.
» Implemented Test-Driven Development (TDD) methodologies using GoogleTest (GTest) to rigorously validate code quality and streamline debugging.

Iowa State University **Ames, IA, USA**
Digital Ag Graduate RA–Machine Vision/Machine Learning *January 2020 - May 2025*
» Increased detection accuracy by 18% in open-world agricultural image analysis by enhancing image datasets and layering data, strengthening machine learning model performance.
» Published research recognized in peer-reviewed journals by developing and validating innovative pattern-based multivariable regression and sensor data regression techniques for agricultural AI solutions.
» Reduced data processing time by 30% for large-scale sensor and image data management by building SQL Server data loaders and preprocessing pipelines for efficient machine learning workflows.
» Improved object detection precision by 22% in agricultural field segmentation by refining and optimizing machine learning algorithms for image-based predictions.
» Enhanced field insect detection rates by 25% in sound-based agricultural monitoring systems by pioneering novel machine learning techniques and integrating predictive analytics into agri-tech.

3M **St. Paul, MN, USA**
Data Science and Engineering Intern *May 2023 - August 2023*
» Enhanced airflow sensor testing efficiency by 15% by designing and implementing advanced testing methodologies in the Dewey Duct Project, utilizing data engineering techniques.

» Improved wound imagery model accuracy by contributing to a robust U-Net based data pipeline, applying deep learning techniques for medical image analysis.
» Enabled real-time visualization of sensor data by developing the Wanda Vision Platform, integrating data science and engineering concepts for actionable insights.
» Accelerated project ideation and execution by facilitating cross-functional brainstorming and collaboration, driving AI-driven solutions and rapid prototyping.

Iowa State University **Ames, IA, USA**
Engineer Designer II/ Engineer I *January 2020 - December 2020*
» Improved research efficiency and data integrity by engineering GPS tagging systems and integrating third-party APIs for digital agriculture projects, enabling precise field data collection and streamlined workflows.
» Enhanced documentation speed by 40% by developing a custom Android application for efficient field data entry and high-resolution image capture, leveraging mobile computing and computer vision principles.
» Accelerated data analysis by 50% by automating SQL-based analytics and backup protocols with advanced scripting, improving processing speed and data security for large-scale agricultural research datasets.
» Increased system flexibility and research capabilities by pioneering the design of VM products for ext4 compatibility, expanding file system options for specialized research products.
» Improved crop loss prediction accuracy by 20% by applying MATLAB for advanced satellite imagery analysis and predictive analytics in agricultural monitoring.

Iowa State University **Ames, IA, USA**
Graduate Research Assistant – Digital Ag *January 2019 - December 2019*
» Enhanced data accuracy in object detection for precision agriculture by engineering and implementing advanced vision systems across varied terrains using MATLAB and LabVIEW.
» Improved machinery data logging efficiency by 30% by pioneering Linux-based enhancements to data logger functionality for robust performance in agricultural environments.
» Optimized object sensing for complex field environments by developing and refining AI-driven algorithms tailored for diverse agricultural terrains.
» Advanced field mapping capabilities by designing and deploying vision and mapping tools in agricultural research using MATLAB and LabVIEW.

GE Appliances **Lafayette, GA, USA**
Fall 2018 AME Co-Op *August 2018 - December 2018*
» Increased inventory tracking accuracy by 20% by designing and implementing a robust embedded inventory control label leveraging automation principles.
» Improved product quality assurance by fine-tuning and optimizing test sequences for new product builds, applying data-driven decision-making and root cause analysis.
» Enhanced quality control in manufacturing by analyzing and improving camera testing systems using statistical analysis and automated testing tools.
» Reduced testing errors by 15% by developing and executing meticulous test protocols to ensure high reliability and consistency in product output.

Heilbronn University **Heilbronn, BW, Germany**
Senior Design Project Intern *February 2017 - March 2017*
» Developed an ISO15118-compliant display driver for a 4th Gen Car Charging Station project by engineering software solutions with Python, EBGuide, and C++ to enable reliable communication and interoperability.
» Led a team of 3 in backend driver development for a cross-functional design project, coordinating creation efforts and fostering collaboration to deliver robust software components for smart charging stations.
» Enhanced project outcomes and team skills by facilitating cultural and language exchange during a university program, strengthening cross-functional communication and collaboration in an international setting.

Research

Deep Learning and Pattern-based Methodology for Multivariable Sensor Data Regression **Nassau, NW, The Bahamas**
IEEE - ICMLA 2023 *December 2023 - December 2023*
» Achieved high predictive accuracy with MAE of 4.394, RMSE of 5.945, and R2 of 0.861 in regression modeling of agricultural crop yield by developing a deep learning methodology leveraging sensor-to-image data conversion and state-of-the-art computer vision architectures.
» Enabled fast and robust learning on multivariable sensor data for agricultural yield prediction by engineering a pattern recognition-based data preparation technique to optimize deep neural network training for regression tasks.

» Enhanced model benchmarking and performance assessment by comparing the proposed deep learning approach to leading models from MLCAS2021, validating improvements in accuracy and robustness.
» Leveraged computer vision techniques for sensor data analysis by applying advanced architectures to sensor-derived image data, expanding deep learning capabilities for continuous regression outputs in agricultural applications.

Multivariate Temporal Regression at Scale: A Three-Pillar Framework Combining ML, XAI and NLP **Paris, France**
IEEE - ICECET 2025 *July 2025 - July 2025*

» Accelerated actionable insight discovery by 40–60% in high-dimensional temporal data by integrating machine learning-driven pruning, explainable AI for feature validation, and NLP for contextual validation, streamlining data workflows and enhancing data quality.
» Improved model performance metrics (MSE, R^2, MAE) and computational efficiency by developing a scalable, hardware-agnostic multivariate temporal regression framework evaluated on real-world agricultural and synthetic datasets.
» Enabled faster iteration cycles for domain experts in dynamic domains like agriculture and energy by designing a three-pillar AI methodology supporting rapid prototyping and validation in data-centric environments.
» Mitigated noisy, redundant, and biased datasets by implementing ML-driven pruning and XAI-based interpretability to identify and validate critical feature interactions, overcoming traditional temporal data analysis limitations.

IEEE Access - Interpretable AI for Time-Series: Multi-Model Heatmap Fusion with Global Attention and NLP-Generated Explanations **Remote**
January 2025 - June 2025

» Achieved 94.1% classification accuracy and F1 score of 0.93 on PhysioNet dataset by engineering a multi-model heatmap fusion technique with global attention and NLP-generated explanations, advancing interpretability in time-series AI applications.
» Reduced regression error to RMSE = 0.28 kWh and R^2 = 0.95 on UCI Energy Appliance dataset by implementing a unified visualization merging ResNet and transformer outputs, surpassing standalone baselines by up to 12.4%.
» Enhanced transparency and actionable insights in AI models for healthcare and industrial monitoring by integrating globally weighted input saliency and causal fidelity metrics to address spatial-temporal misalignment in interpretability methods.
» Validated NLP-generated explanations with BLEU-4 (0.586) and ROUGE-L (0.650) scores by developing an NLP module that translates fused heatmaps into domain-specific narratives, increasing stakeholder trust in AI-driven decision-making.
» Offered a scalable and transparent AI solution for time-aware decision-making by formalizing interpretability as causal fidelity and spatial-temporal alignment, bridging technical outputs with stakeholder understanding.

Interpretable time-series forecasting with multi-model deep learning and NLP driven XAI
PhD Thesis

» Reduced RMSE by 20% and increased F1-score by 3.8% on benchmark datasets by developing a unified deep learning framework with CNN–Transformer fusion, automated data pruning, and NLP-driven explainable AI using Grad-CAM and SHAP.
» Decreased model training time by over 40% for time-series forecasting and clinical diagnostics by implementing efficient data processing and model optimization strategies in a multi-model deep learning architecture.
» Enabled human-readable AI decision narratives for energy management and clinical diagnostics by integrating NLP pipelines with XAI outputs to generate clear, domain-specific explanations for model predictions.
» Improved model transparency and stakeholder trust in high-stakes AI applications by unifying interpretable deep learning methods with visual (Grad-CAM) and feature-based (SHAP) explanations.

Skills

Skills: MATLAB, Adobe After Effects, Java, Android Development, AutoCAD, SolidWorks, Linux/Unix, Microsoft Azure, HTML/CSS, Git, Altium, Tensorflow, Pytorch, python, Computer Vision, RedHat, Data Analysis, C/C++, C#, Qt, Blender, Tableau, Minitab, AWS, Excel/Numbers/Sheets, Natural Language Processing (NLP), Python
Languages: French, German, Hindi, Tamil, Malayalam