Rohit Hari Chintala, Ph.D.

Colorado | +1 (609) 420-7929 | rohit.chintala@gmail.com | LinkedIn | Google Scholar | GitHub

Summary

Applied Scientist and AI/ML Engineer with 7+ years of experience developing production-grade machine learning, predictive analytics, and intelligent automation solutions across renergy systems, building systems, and data-driven business applications. Technical lead for the ML surrogates behind the DOE 179D Web Calculator, a nationally deployed, IRS-supported platform; models trained on hundreds of thousands of EnergyPlus simulations across 16 U.S. climate zones achieve 1.1-3.3% average CVRMSE. Strong expertise in Python, PyTorch, TensorFlow, scikit-learn, deep learning, reinforcement learning, time-series forecasting, Generative AI, LLMs, and agentic AI systems. Experienced in building scalable ML pipelines, deploying models, implementing MLOps practices, and optimizing model performance using AWS, Azure, and modern ML frameworks. Proven ability to transform complex research and operational data into reliable, explainable AI solutions that improve prediction accuracy, automate decision-making, and deliver measurable business impact. 20+ peer-reviewed publications (401 citations, h-index 11) and one U.S. patent.

Skills

- **Programming Languages & Data Processing:** Python, SQL, C, C++, MATLAB, PySpark, Git, Power BI
- **Machine Learning & Statistical Modeling:** Supervised Learning, Regression (Ridge, Lasso), Random Forest, Gradient Boosting, XGBoost, scikit-learn, Feature Engineering, Statistical Analysis, Hypothesis Testing, Cross-Validation, A/B Testing, Hyperparameter Optimization, Transfer Learning
- **Deep Learning & Neural Networks:** PyTorch, TensorFlow, NumPy, SciPy, Deep Neural Networks, Transformer-Based Models, Sequence Modeling, Physics-Informed Machine Learning
- **Generative AI & Agentic AI:** Large Language Models (LLMs), LangGraph, Multi-Agent Workflows, Prompt Engineering, Context Design, LLM evaluation and benchmarking
- **Reinforcement Learning & Intelligent Control:** Proximal Policy Optimization (PPO), Evolution Strategies, Policy Gradient Methods, Gradient-Free Optimization, Continuous-Action Policy Search, Global-Local Policy Optimization, Model Predictive Control (MPC), Distributed Multi-Agent Optimization
- **Predictive Analytics & Time-Series Forecasting:** Energy Consumption Forecasting, Demand Forecasting, Time-Series Analysis, Probabilistic State-Space Models, Kalman Filtering, Extended Kalman Filtering, System Identification, Backtesting, Uncertainty Quantification, Sensitivity Analysis, Scenario Analysis
- **MLOps & Production Machine Learning:** MLflow, DVC, Evidently, FastAPI, Docker, Kubernetes, CI/CD, GitHub Actions, ML Pipeline Development, Experiment Tracking, Model Registry, Data and Model Versioning, Model Deployment, Model Monitoring, Data Drift Detection
- **Cloud & Distributed Computing:** AWS SageMaker, Microsoft Azure ML, Apache Spark, PySpark, Distributed Data Processing, Large-Scale Simulation Pipelines, Cloud-Based ML Workflows
- **Computer Vision & Multimodal AI:** Semantic Segmentation, Optical Character Recognition (OCR), Vision-Language Models, Structured Information Extraction, IfcOpenShell (IFC4), Shapely
- **Model Validation & Explainable AI:** SHAP, Explainable AI (XAI), Model Interpretability, RMSE, Ground-Truth Validation, Edge-Case Testing, Robustness Testing, Acceptance Criteria, Controlled Extrapolation, Load Testing (Locust)
- **Optimization & Scientific Computing:** Convex and Non-Convex Optimization, Constrained Optimization, Stochastic Optimization, Mixed-Integer Linear Programming (MILP), Numerical Modeling, Reduced-Order Modeling, Thermal Energy Storage Optimization
- **Building Energy & Intelligent Systems:** EnergyPlus, OpenStudio, ResStock, Building Management Systems (BMS), HVAC Systems, BACnet/IP, Grey-Box RC Modeling, HVAC Fault Detection, Building Energy Modeling and Control, Section

Experience

Researcher, Residential Buildings Group — **Jun 2020 – April 2026**

Postdoctoral Researcher, Residential Buildings Group, National Laboratory of the Rockies-NREL | Golden, CO — **Jan 2019 – May 2020**

- Led the end-to-end development of production-grade machine learning systems for the DOE Section 179D Web Calculator, a nationally deployed DOE- and IRS-supported decision-support platform. Owned data engineering, model development, validation, deployment and production performance monitoring to deliver reliable energy-efficiency estimates for financially consequential building decisions.
- Trained machine learning surrogate models using regularized regression and deep neural networks on thousands of EnergyPlus simulations to estimate building energy-cost savings across 2 commercial building types, 6 HVAC system types and 16 U.S. climate zones. Translated computationally intensive simulation outputs into scalable predictions for building-energy analysis and tax-incentive stakeholders.
- Orchestrated a Generative AI and agentic AI workflow using Python, LangGraph and LLM-based reasoning to automate grey-box building model identification. Integrated building-construction documents and historical building-model information to propose 2–3 candidate resistance-capacitance (RC) structures and initialize Extended Kalman Filter parameters for engineering analysis.
- Designed an automated LLM evaluation framework to validate agent-generated building models against held-out simulation ground truth rather than relying solely on model-generated explanations. Implemented deterministic acceptance criteria including RMSE of 0.5°C or lower, parameter coefficient of variation of 0.15 or lower and a winning-candidate margin above 0.1°C, improving the reliability of AI-assisted engineering workflows.
- Engineered repeatable machine learning training and evaluation pipelines covering feature engineering, hyperparameter optimization, cross-validation, simulation-based backtesting and edge-case validation. Incorporated controlled extrapolation strategies for atypical building configurations and boundary-condition inputs, enabling reproducible model updates and dependable predictions for production decision-support applications.
- Operationalized production MLOps and model observability using MLflow, DVC, Evidently, Prometheus, Grafana and GitHub Actions. Integrated experiment tracking, model and data versioning, drift detection, automated monitoring and cloud ML tooling including AWS SageMaker and Azure ML to improve model traceability and support reliable deployment and troubleshooting.
- Prototyped transformer-based sequence models trained on model predictive control outputs to learn building-control policies and predict 24-hour HVAC setpoint schedules. Conditioned the models on building characteristics and weather information to investigate faster inference and scalable control decisions for residential and commercial building applications.
- Explained machine learning predictions through SHAP-based summary and interaction analysis, evaluating whether learned relationships aligned with established engineering principles. Communicated model behavior, validation findings, technical trade-offs and known limitations to DOE sponsors and interdisciplinary research collaborators to strengthen confidence in AI-driven decision-support systems.
- Co-developed a two-stage deep reinforcement learning framework for grid-interactive multi-zone building control using PyTorch and continuous-action policy optimization. Combined gradient-free evolution strategies for global policy exploration with Proximal Policy Optimization (PPO) for local refinement, outperforming either approach individually and benchmarking performance against model predictive control baselines.
- Created an automated fault-detection methodology for residential HVAC systems using thermostat drive-cycle time-series data and grey-box thermal models. Applied Extended Kalman Filter-based parameter identification to recognize abnormal operating behavior and support building-system diagnostics, with the research methodology published in Energy and Buildings (2021).

- Established sensitivity-analysis methods to evaluate automated HVAC fault-detection robustness across changing operating conditions. Examined how measurement noise, data-quality problems and confounding operating factors influenced detection performance, supporting more dependable identification of actual equipment changes; related findings were subsequently published in Applied Thermal Engineering (2024).
- Developed probabilistic state-space and hybrid physics-informed machine learning models for dynamic building-system identification. Applied extended Kalman filtering for latent-state estimation and parameter estimation from noisy operational measurements, supporting improved building-model calibration and reliable engineering analysis.
- Generated large-scale residential building simulation datasets spanning thousands of building configurations using ResStock and EnergyPlus. Automated reduced-order model generation through system identification to support comparative energy-performance analysis across varying building characteristics, equipment configurations and climate conditions.
- Forecasted 24-hour building energy consumption and demand to support model predictive control frameworks balancing energy costs, peak demand and occupant comfort. Incorporated time-of-use electricity pricing and demand charges into individual-building and distributed multi-building optimization workflows for energy-management stakeholders.
- Formulated large-scale non-convex optimization models for thermal energy storage sizing and configuration. Evaluated solution performance and operational robustness across different climate zones, load profiles and operating conditions to support building-energy system planning and optimization decisions.

Senior Analytics Specialist, Opera Solutions | San Diego, CA Jun 2018 – Dec 2018

- Directed a data analytics team developing statistical and machine learning models to forecast used-vehicle floor prices at auction. Leveraged historical pricing patterns and available auction data to generate predictive pricing estimates that supported bidding strategies and commercial decision-making.
- Devised model validation and performance-reporting workflows to evaluate forecasting behavior and assess the reliability of statistical and machine learning predictions. Structured analytical outputs and forecast-performance reports to help business stakeholders understand price movements and evaluate model suitability before production deployment.
- Translated predictive modeling results and forecast movements into actionable pricing and bidding recommendations for business stakeholders. Presented analytical findings in a business-oriented manner to support production model adoption and improve the use of data-driven insights in used-vehicle auction decisions.

Education

Ph.D., Mechanical Engineering, Texas A&M University **2018**

M.S.Mechanical Engineering, Texas A&M University **2011**

Projects

LLM Agent for Automated Grey-Box Building Model Identification

- Developed a LangGraph-based LLM agent to automate grey-box resistance-capacitance (RC) building model identification, using EnergyPlus IDF construction data and historical building information to propose 2–3 candidate structures and initialize Extended Kalman Filter states, covariance matrices and parameter bounds.
- Engineered an automated evaluation framework that scores candidate models through open-loop simulations on held-out data and applies deterministic acceptance criteria, including RMSE ≤ 0.5°C, parameter CV ≤ 0.15 and a winning-candidate margin above 0.1°C, routing results through six evaluation outcomes.
- Implemented LLM-assisted active experiment design to generate occupancy- and comfort-constrained setpoint schedules, then benchmarked candidate initializations against default approaches using known-parameter simulations and measured data, validating convergence, model selection accuracy and uncertainty estimates against empirical parameter variation.

Architectural Drawing to IFC to Energy Model Pipeline

- Developed an automated pipeline to transform architectural PDF drawings into IFC building models and OpenStudio/EnergyPlus energy models, extending the workflow from document ingestion through Bayesian calibration against metered building data.
- Fine-tuned CubiCasa5K semantic segmentation models on annotated architectural drawings and implemented IFC4 generation using IfcOpenShell with Shapely-based geometry validation; integrated vision-language models and OCR to extract room codes, door tags and ceiling heights into structured JSON with cross-validation against architectural schedules.

DOE 179D Web Calculator: Production ML Decision-Support Platform (Published)

- Developed production-grade surrogate models using ridge regression and deep neural networks trained on EnergyPlus simulation data for a nationally deployed DOE- and IRS-supported Section 179D energy-efficiency tax incentive platform, prioritizing prediction accuracy, stability and controlled extrapolation.
- Applied regularization, cross-validation and systematic edge-case testing to improve model generalization, using SHAP summary and interaction analysis to explain predictions and validate learned relationships against engineering expectations for financially consequential decisions.

Deep Reinforcement Learning for Grid-Interactive Building Control (Published)

- Developed a continuous-action reinforcement learning framework for building control, balancing occupant comfort, energy efficiency and grid demand-response objectives; combined gradient-free evolution-strategy optimization for global policy search with Proximal Policy Optimization (PPO) for local refinement and evaluated performance against model predictive control (MPC) baselines.

Consumption Forecasting and Predictive Control at Scale

- Generated simulation datasets across thousands of residential building configurations using ResStock and EnergyPlus, automated reduced-order model development through system identification and designed MPC frameworks for 24-hour energy consumption forecasting and HVAC setpoint optimization under occupant comfort constraints and time-of-use electricity pricing; explored transformer-based models for faster policy inference at population scale.

Automated Anomaly Detection for Residential HVAC (Published)

- Developed an HVAC fault-detection methodology using thermostat drive-cycle time-series data, grey-box thermal models and Extended Kalman Filter-based parameter identification, validating detection performance against EnergyPlus simulations and publishing sensitivity analysis to distinguish actual system changes from noise, data-quality issues and confounding operating conditions.