Vaisakh Shaj Kumar

vaisakh-shaj.github.io
vaisakhs.shaj@gmail.com | +44 7376609392 | github.com/vaisakh-shaj

FOCUS

Neural Networks
State Space Models / Filtering
Sequential & World Models
Bayesian & Probabilistic ML
Model-Based RL & Planning
Uncertainty / Calibration
Safety / Robust Decision-Making
LLMs & Uncertainty-Aware Agents

SKILLS

PROGRAMMING
Python, MATLAB.

ML STACK
PyTorch, TensorFlow, Triton
scikit-learn, OpenAI Gym

TOOLS
Git/GitHub, LaTeX

EDUCATION

KIT
PH.D., ML & ROBOTICS
(MAGNA CUM LAUDE)
2019--2024 | Germany
Advisor: Prof. Gerhard Neumann
Thesis: World Models with Hierarchical Abstractions
CGPA: 1.0 (Highest Possible Grade)

IIST
M.TECH, ML & COMPUTING
2014--2016 | India
CGPA: 8.4/10

UNIVERSITY OF KERALA
B.TECH, ELECTRICAL ENG.
2009--2013 | India
CGPA: 8.1/10

LINKS

Web:// vaisakh-shaj.github.io
GitHub:// vaisakh-shaj

SERVICE

Reviewer: NeurIPS, ICLR (incl. workshops), CoRL, IROS, ICRA, IEEE RAL, ACML

PROFILE

Research scientist at the intersection of **deep learning**, **probabilistic modelling**, and **decision-making/control**. Current focus: **efficient, controllable, and safe LLMs** and **uncertainty-aware agents**. Track record in top venues (e.g., **NeurIPS Spotlight**) and experience delivering ML systems in production security settings.

EXPERIENCE

UNIVERSITY OF EDINBURGH | POSTDOCTORAL RESEARCHER
(BAYESIAN AND NEURAL SYSTEMS LAB UNDER PROF AMOS STORKEY)
2024--Present | Edinburgh, UK

- Developing **Bayesian primitives for safe/controllable language modelling**, combining probabilistic modelling, and control-theoretic structure to improve steerability, robustness, and reliable uncertainty.
- Developing highly parallel hardware aware probabilistic (sequential) inference in Triton etc.

KARLSRUHE INSTITUTE OF TECHNOLOGY (KIT) | PH.D. RESEARCHER, MACHINE LEARNING & ROBOTICS
2019--2024 | Karlsruhe, Germany

- Built **probabilistic sequential/world models** for dynamics learning and decision-making under uncertainty (control as inference/model predictive control/RL).
- Applications in robotics and heavy machinery.
- Teaching & mentoring: created assignments/tutorials for *Reinforcement Learning* (M.Sc.) and *Fundamentals of AI* (B.Sc.); co-supervised 15+ B.Sc./M.Sc. theses.

INDIAN INSTITUTE OF SCIENCE (IISC) | RESEARCH ASSISTANT
Sep 2018--Jan 2019 | Bangalore, India

- Computer vision research on **knowledge distillation** and **adversarial robustness**; resulted in ICML 2019 and CVPR 2019 Workshop publications.

MCAFEE | DATA SCIENTIST
2017--2018 | Bangalore, India

- Adversarial ML and anomaly detection for security; robustness analysis of deep models in adversarial environments.
- **Top 5 / 2500** finalist for CEO's Innovator of the Year Award.

INTEL | RESEARCHER (2016--17), GRADUATE INTERN (2015--16)
2015--2017 | Bangalore, India

- Developed a deep neural net based **dynamic malware classification engine** for Advanced Threat Defense; **deployed in production**.
- Developed sparse ML algorithms for audio understanding (denoising, source separation, classification).

AWARDS

McAfee CEO's Innovator List (2018)
Magna Cum Laude with Highest Grade 1.0 (KIT Doctral Committee 2024)
GATE: 98th percentile (2013)
Dept. of Space Fellowship (2017)

PATENT

US Patent Filed:
Methods, Systems, And Media For Detecting Anomalous Network Activity
(1303010.216-US1)

MOOCS

Generative AI with LLMs (2024) Certificate
Probabilistic Graphical Models (CMU / Eric Xing)
Bayesian Methods in ML (2019) Certificate | Code
Deep RL (UC Berkley 2017) Code
Deep Learning (Larochelle) Course

LANGUAGES

Malayalam (Native)
English (Fluent)
Hindi (Intermediate)
German (Basic)

PUBLICATIONS (SELECTED)

- **ICML 2026 (Submitted)**: *Kalman Attention: Parallel Bayesian Filtering for Scalable Language Modeling and State Tracking*. Vaisakh Shaj Kumar, Cameron Barker, Aidan Scannell, Elliot Crowley, Amos Storkey.
- **NeurIPS 2023 (Spotlight, 3%)**: *Multi Time Scale World Models*. Vaisakh Shaj Kumar, Saleh Gholam Zadeh, Ozan Demir, Luiz Douat, Gerhard Neumann.
- **ICLR 2022**: *Hidden Parameter Recurrent State Space Models for Changing Dynamics Scenarios*. Vaisakh Shaj Kumar, Dominik Buchler, Rishabh Sonker, Philipp Becker, Gerhard Neumann.
- **CoRL 2020**: *Action Conditional Recurrent Kalman Networks for Robot Dynamics Learning*. Vaisakh Shaj Kumar, Philipp Becker, Dominik Buchler, Harshil Pandya, Marc Hanheide, Gerhard Neumann.
- **ICML 2019**: *Zero-Shot Knowledge Distillation in Deep Networks*. Vaisakh Shaj Kumar* et al. (*equal contribution)

TEACHING

KIT | Teaching Contributor / TA
2021--2023 | Karlsruhe, Germany

- **Reinforcement Learning (M.Sc., 2021–2022):** developed coding assignments for model-based RL modules; delivered tutorials; supported exams/grading.
- **Fundamentals of AI (B.Sc., 2022–2023):** created assignments on Bayesian Networks, MDPs, and RL; ran tutorials; supported grading.

SUPERVISION (SELECTED)

- Co-supervised B.Sc./M.Sc. theses on transformer/world models, hierarchy in learning world models, model-based RL under non-stationarity, time series forecasting, and robotics control (2021–2024).