

EDUCATION

Computational and Data Sciences, Indian Institute of Science

Bangalore, India

Ph.D. in Computational and Data Science (GPA: 9.10/10)

Aug'22 - Present

Advisor: Prof. Deepak Subramani, Thesis: *Reliable Language Model Systems for Educational Assessment and Personalized Adaptive Learning* (Submitted)

Electrical Engineering, College of Engineering Trivandrum

Kerala, India

M.Tech. in Control Systems (GPA: 9.44/10)

Aug'17 - June'19

Advisor: Prof. Lal Priya P S, Thesis: *Lateral Control of an Autonomous Vehicle*

Electrical Engineering, SCMS School of Engineering and Technology

Kerala, India

B.Tech. in Electrical and Electronics Engineering (GPA: 8.41/10)

Aug'12 - July'16

RESEARCH AREAS

Reliable LM Agents; Task Alignment; Reasoning Evaluation and Verification; LLM-as-a-Judge and Automated Verifiers; Neurosymbolic Methods for Grounding and Priors; Small and Modular LMs; NLP for Education.

TECHNICAL SKILLS

- **Programming and Scientific Computing** – Python, SQL; NumPy, Pandas, SciPy, Scikit-learn; MATLAB, R, C.
- **Agentic LLM Systems** – LangChain, LangGraph, CrewAI, MCP, A2A, ADK, Agent Skills, Tool-Use and LLM-as-a-Judge Workflows, RAG (Agentic, Graph), Context Engineering, Multi-Provider LLM Integration (OpenRouter).
- **ML and NLP** – PyTorch, HuggingFace Transformers, TRL, Unsloth, Accelerate, Fine-Tuning (SFT, PEFT, LoRA), RL (RLHF, RLVR), Embeddings and Multimodal Models, Weights & Biases.
- **Reasoning and Verification** – Z3, Prover9, First-Order Logic, Causal Graphs, Symbolic Verification.
- **Evaluation and Quality** – Evaluation Design, Benchmarking across Model Scales, Grounding against Hallucination, Red Teaming, Guardrails, Human-in-the-Loop Annotation, A/B Testing.
- **Serving and Infrastructure** – vLLM, Ollama, Quantization, FastAPI, Docker, Vector DBs (pgvector, Chroma), AWS/GCP, Tracing and Observability (LangSmith), Token/Latency/Cost Modeling.

PUBLICATIONS

1. **Scaria, N.**, Kennedy, S.J.J. and Subramani, D. Learning in Blocks: A Multi Agent Debate Assisted Personalized Adaptive Learning Framework for Language Learning. *International Conference on Artificial Intelligence in Education*, 2026 (pp. 399–413). [Oral](📄 Paper) (📄 Code)
2. **Scaria, N.**, Kennedy, S.J.J. and Subramani, D. Learning in Blocks: A Skill-Driven Framework for Assessment-Centered Agentic AI in Education. *Proceedings of the Impactful and Responsible AI Systems for Education Workshop (IRAISE)*, PMLR 339:101–106, 2026. [Oral](📄 Paper)
3. **Scaria, N.**, Kennedy, S.J.J. and Subramani, D. HeteroForge: Heterogeneous Multi-Agent Debate for Curriculum-Aligned STEM Exercise Generation. *Proceedings of the Impactful and Responsible AI Systems for Education Workshop (IRAISE)*, PMLR 339:211–216, 2026. [Poster](📄 Paper)
4. **Scaria, N.**, Kennedy, S.J.J., Latinovich, T. and Subramani, D. EvalYaks: Instruction Tuning Datasets and LoRA Fine-tuned Models for Automated Scoring of CEFR B2 Speaking Assessment Transcripts. *Computers and Education: Artificial Intelligence*, 100539, 2025. (📄 Paper)(📄 Code)
5. **Scaria, N.**, Kennedy, S.J.J., Seth, D., Thakur, A. and Subramani, D. Harnessing Structured Knowledge: A Concept Map-Based Approach for High-Quality Multiple Choice Question Generation with Effective Distractors. *The European Conference on Artificial Intelligence* 413, 4089–4096, 2025. [Oral](📄 Paper)(📄 Code)
6. **Scaria, N.**, Dharani Chenna, S. and Subramani, D. Automated Educational Question Generation at Different Bloom's Skill Levels Using Large Language Models: Strategies and Evaluation. *International Conference on Artificial Intelligence in Education*, 2024 (pp. 165–179). [Oral](📄 Paper)(📄 Code)
7. **Scaria, N.**, Chenna, S. and Subramani, D. How Good are Modern LLMs in Generating Relevant and High-Quality Questions at Different Bloom's Skill Levels for Indian High School Social Science Curriculum? *Proceedings of the 19th Workshop on Innovative Use of NLP for Building Educational Applications (BEA 2024)*, pages 1–10. Association for Computational Linguistics. [Poster](📄 Paper)(📄 Code)

1. **Scaria, N.**, Kennedy, S.J.J. and Subramani, D. Position: From Chatbot Tutors to Bounded PedAgents for Personalized Adaptive Learning.
2. **Scaria, N.**, Kennedy, S.J.J. and Subramani, D. Sensitivity of Small Language Models to Fine-tuning Data Contamination. *arXiv:2511.06763*, 2025. ([Paper](#))([Code](#))
3. **Scaria, N.**, Kennedy, S.J.J., Agarwal, K., Seth, D. and Subramani, D. Dissecting Physics Reasoning in Small Language Models: A Multi-Dimensional Analysis from an Educational Perspective. *arXiv:2505.20707*, 2025. ([Paper](#))

ONGOING RESEARCH PROJECTS

1. **Precondition-based Memory for Continual Learning in Agentic Systems:** This work addresses the limits of similarity-based memory in language model agents, where past experience is retrieved because it resembles the current situation rather than because it applies to it. Each entry carries an explicit condition for when it holds, so the agent can retrieve nothing when nothing applies, drop entries that no longer hold, and merge overlapping ones. The approach is studied on coding and robotics tasks.
2. **Causal Scaffolding for Logical Reasoning: A Three-Stage Pipeline for Improved Formal Problem Solving:** This work addresses the formalization challenges in Large Language Models by introducing explicit causal structure representations as intermediates between natural language problems and formal logic, enabling more accurate translation to First-Order Logic and symbolic solver integration for multi-hop reasoning tasks.
3. **Improving Physics Reasoning in Small Language Models through Step-by-Step Symbolic Verification:** This work addresses the reasoning deficiencies in Small Language Models by implementing symbolic systems and step-by-step verifiers to validate and improve the quality of generated reasoning chains in physics problem-solving.

PROFESSIONAL EXPERIENCE

- Research Scientist (Consulting)** | *Talking Yak English Learning Pvt. Ltd., Bangalore, IN* August 2024–Present
- Co-led the development and launch of a low latency conversational AI product for interview preparation and language learning, balancing model capability, response speed, and user experience.
 - Built a capability-based query router that directs conversations to LLMs according to the reasoning effort required.
 - Developing an agent-based spaced repetition system with structured long term memory represented as event sub-graphs, enabling context-aware retrieval and adaptive review.
- GenAI Research Intern** | *Fujitsu Research of India Private Limited, Bangalore, IN* May 2025–July 2025
- Built neurosymbolic pipelines for grounded reasoning and verification in legal and coding domains.
- Lead Research Intern** | *Talking Yak English Learning Pvt. Ltd., Bangalore, IN* August 2023–July 2024
- Built the conversational agent later integrated into the product, and developed automated scoring for learner speaking performance using LoRA fine-tuned models validated against expert raters.
- Project Scientist** | *Indian Institute of Science, Bangalore, IN* May 2021–July 2022
- Built interactive simulations and educational technology for teaching artificial intelligence.
- Fellow** | *Teach For India, Chennai, IN* June 2019–April 2021
- Completed a two year classroom teaching fellowship, developing data-driven interventions and applying learning engineering to improve student outcomes.
- Research Intern** | *Tata Elxsi, Trivandrum, IN* May 2018–June 2019
- Developed adaptive model predictive control and time series modeling methods; contributed to the autonomous driving stack later demonstrated as Tata Elxsi's **RoboTaxi** at CES 2020.

TEACHING & MENTORING

- **Mentoring:** 6 students (4 B.Tech, 2 M.Tech); 4 co-authored publications Aug'22 - Present
- **Deep Learning**, DA 225o, IISc May'26 - July'26
- **Applied Data Science and Artificial Intelligence**, UMC 301, IISc Aug'25 - Dec'25
- **Deep Learning**, DA 225o, IISc May'25 - July'25
- **Applied Data Science and Artificial Intelligence**, UMC 301, IISc Aug'24 - Dec'24
- **Introduction to Natural Language Processing**, DS 207, IISc Jan'24 - Apr'24
- **Data Science in Practice**, DA 204o, IISc Aug'23 - Dec'23
- **Introduction to Data Science**, DA 202o, IISc Aug'22 - Dec'22

RECOGNITIONS AND GRANTS

- **AIED Scholarship:** *International Conference on AI in Education*, 2024, 2026 [Competitive award for outstanding research contribution]
- **ACM-W Grad Cohort:** 2026 [Selected participant; travel supported by ACM-W]
- **Bharat Bodhan AI Conclave:** 2026 [Selected participant; supported by the Centre of Excellence for AI in Education, IIT Madras Bodhan AI Foundation]
- **Travel Grants:** Microsoft Research (AIED 2024); GARP & FSID, Indian Institute of Science (ECAI 2025); Eedi Labs ([IRAISE 2026](#), [Festival of Learning](#))
- **Valedictorian:** *M.Tech. Control Systems, CET*, 2019 [Highest academic achievement]

PROFESSIONAL SERVICES

- **Program Committee:** *Workshop on Innovative Use of NLP for Building Educational Applications* (BEA), ACL 2026, ACL 2025, NAACL 2024; *International Conference on AI in Education*, 2026
- **Student Volunteer:** *Festival of Learning*, 2026; *International Conference on AI in Education*, 2024
- **Reviewer:** *Workshop on Generative AI for Education* (GAIED), NeurIPS, 2023

REFERENCES

Will be provided on request