

Murtaza Rangwala

murtaza.rangw@gmail.com | (540) 425-6966 | github.com/multiagentrl/casRL | [Google Scholar](https://scholar.google.com/citations?user=UW3t38QAAAAJ)

SUMMARY

Ph.D. candidate in Electrical Engineering at Virginia Tech (December 2026) and RL/MARL researcher and framework builder. Sole creator and principal architect of **Coordination for Scale RL (casRL)**, an open-source research framework whose compiler and runtime convert typed experiments into validated, prebound execution plans. casRL unifies more than 100 algorithms and variants across online, offline, hybrid, single-agent, and multi-agent learning and sustains 2–4 million environment steps per second during end-to-end single-node training on one CPU and one GPU.

EDUCATION

Virginia Tech

Ph.D. Candidate in Electrical Engineering

Blacksburg, VA

Expected Dec. 16, 2026

Virginia Tech

M.S. in Electrical Engineering

Blacksburg, VA

Dec. 2020

PES Institute of Technology (now PES University)

B.E. in Electrical and Electronics Engineering

Bengaluru, India

2008 – 2012

RESEARCH EXPERIENCE

Laboratory for Coordination at Scale, Virginia Tech

Blacksburg, VA

Ph.D. Researcher, 2020–Present; M.S. Researcher, 2017–2020

- **casRL — Sole Creator and Principal Architect, 2020–Present.** Designed and built an open-source research framework whose compiler and runtime convert typed RL and MARL experiment compositions into validated, prebound execution plans.
- Designed a composable experiment lifecycle in which users define the order, timing, repetition, and synchronization of rollout, inference, training, evaluation, teacher and target updates, and user-defined operations across synchronous and asynchronous multi-trainer schedules.
- Implemented more than **100 RL and MARL algorithms and variants** from reusable operators. The same composition model supports on- and off-policy, online, offline, hybrid, supervised, imitation, teacher–student, model-based, safety-constrained, auxiliary, and federated learning.
- Made safety constraints, planning, world models, auxiliary tasks, and coordination independently composable across heterogeneous agents, policies, environments, and datasets; supported message passing and attention within policies and policy-external k-NN, graph, and hypergraph construction.
- Sustained **2–4 million environment steps per second** during end-to-end training on a single node with one CPU and one GPU through compiled execution and device-resident data processing.
- Created SARNet and its multiprocessing TensorFlow trainer; the observed data-movement and runtime limits motivated casRL’s device-resident, zero-copy PyTorch architecture. Published at NeurIPS 2020.
- Developed DeepPaSTL for long-horizon pasture prediction and co-developed a data-synthesis, prediction, and intermittent multi-robot deployment pipeline; published in *Agronomy* and IEEE T-ASE.
- Developed field-topology feedback using Morton Z-codes to coordinate heterogeneous swarms over spatially structured fields; ICRA 2027 manuscript in preparation.
- Serve as sole administrator for CASLab’s research and computing infrastructure, maintaining laboratory equipment and servers, repairing hardware, managing the laboratory website, and performing system upgrades and software installations.

INDUSTRY & STARTUP EXPERIENCE

Co-Founder

Jan. 2016 – Apr. 2017

LightSpeed Mobility

Ahmedabad, India

- Defined product strategy and led engineering for two electric two-wheelers; launched one at a lower price than comparable products in India.
- Raised more than \$200K through private investment and crowdfunding.

EE System Leader

Dec. 2013 – Sep. 2015

Volvo Trucks

Bengaluru, India

- Led a cross-functional pre-study involving more than 40 people on Ethernet-based ECU software delivery and directed technical execution of a large-scale cost-optimization program.
- Led engineering, product planning, and purchasing for a new suspension-control product.

EE System Design Engineer

Jul. 2012 – Dec. 2013

Volvo Trucks

Bengaluru, India

- Architected electrical and ECU systems for medium-duty trucks in Southeast Asia and redesigned the electrical system to reduce cost by 2%.
- Pioneered a physical-layer vehicle-network simulation as an advanced-engineering project, replacing hardware prototypes for existing-product verification.
- Served as the primary technical owner for body-builder applications.

PUBLICATIONS

- **M. Rangwala** and R. K. Williams. “Learning Multi-Agent Communication through Structured Attentive Reasoning.” *Advances in Neural Information Processing Systems (NeurIPS)*, 33:10088–10098, 2020.
- J. Liu, **M. Rangwala**, K. S. Ahluwalia, et al. “Intermittent Deployment for Large-Scale Multi-Robot Forage Perception: Data Synthesis, Prediction, and Planning.” *IEEE Transactions on Automation Science and Engineering*, 21(1):27–47, 2024.
- **M. Rangwala**, J. Liu, K. S. Ahluwalia, et al. “DeepPaSTL: Spatio-Temporal Deep Learning Methods for Predicting Long-Term Pasture Terrains Using Synthetic Datasets.” *Agronomy*, 11(11):2245, 2021.

PATENT

- **M. Rangwala**. “Method and System for Driver Assistance for a Vehicle.” U.S. Patent 9,889,847, granted Feb. 13, 2018; corresponding filings in Europe, India, Japan, and China.

MANUSCRIPTS IN PREPARATION

- **M. Rangwala** and R. K. Williams. “casRL: A Compiler and Runtime for Composable Reinforcement Learning Systems.” Manuscript in preparation; targeting MLSys 2027.
- **M. Rangwala** and R. K. Williams. “casRL: Composable Systems for Unified Single- and Multi-Agent Reinforcement Learning.” Manuscript in preparation; targeting JMLR.
- **M. Rangwala** and R. K. Williams. “Field-Topology Feedback via Morton Z-Codes for Heterogeneous Swarm Coordination.” Manuscript in preparation; targeting ICRA 2027.

ENGINEERING LEADERSHIP

Team Haya | Formula SAE Suspension and Brakes

Team Lead, PESIT

- Led a three-person suspension and brakes team through design, integration, and skidpad validation; won the Skid Pad event at SUPRA SAE India 2011 against 44 teams.

PISat | 5.25 kg Remote-Sensing Nanosatellite

Team Captain and Electrical Power Systems Lead, PESIT

- Captained PISat and led its electrical power-system design with former ISRO scientists; the satellite launched aboard PSLV-C35 and operated successfully in orbit for one year, supported by radiation-aware and fault-tolerant design.

TEACHING EXPERIENCE

- **Graduate Teaching Assistant, Virginia Tech** (2018–Present): Led undergraduate power-engineering laboratories and assessed coursework for classes of up to 113 students.
- **Guest Lecturer, PESIT** (Aug.–Dec. 2013): Delivered course material to 50+ undergraduate students.
- **Private Mathematics and Physics Tutor** (2016–2017): Provided 15 hours of individualized instruction weekly.

REVIEWING

- **Reviewer:** NeurIPS, ICLR, ICML, and IEEE Robotics and Automation Letters (RA-L).

TECHNICAL SKILLS & INTERESTS

Programming & ML Systems: Python, C/C++, MATLAB; PyTorch, torch.compile, CUDA, TensorFlow, NumPy, PufferLib

Learning & Robotics: RL, MARL, offline RL, imitation learning, GNNs, MPNNs, attention, world models, planning, ROS, Gazebo

Systems & Engineering: Linux, Docker, Git, SolidWorks, CATIA, CANoe, Simulink

Interests: Self-hosted infrastructure and network administration; local LLM deployment and inference; workstation assembly; automotive diagnostics and repair; e-commerce price monitoring and discount research