Usama Siddiquie

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Summary

MSc Computer Science student at the University of Bonn (graduating March 2027) working in robot learning, with a focus on safety in robotics, generative policies and world models. Co-authored papers on safe reinforcement learning and on imitation learning for long-horizon manipulation, and deployed learned policies on real robot arms through ROS2. Previously two years as a software engineer on production mobile, backend and video systems.

Education

University of Bonn Apr 2024 – Mar 2027 (expected)
MSc Computer Science (current grade 1.9, German scale) *Bonn, Germany*

- Thesis: adding provable safety to mobile manipulation using generator policies, while maintaining task success.

National University of Sciences and Technology (NUST) 2022
BSc Computer Science (CGPA 3.56 / 4.0) *Pakistan*

Research Experience

Student Research Assistant, Humanoid Robots Lab Mar 2025 – Present
University of Bonn *Bonn, Germany*

- **Safe RL.** A regulator scales a policy's actions to avoid constraint violations. I managed the benchmarking against five state-of-the-art methods on five Safety Gymnasium tasks, producing the metrics and visualisations of the performance differences (up to 126× fewer violations, higher returns). I also managed our GPU resources so every method, parameter setting and environment got multiple seeds for statistically reliable results.
- **Long-horizon manipulation from sub-task demos.** One flow-matching policy is trained on demonstrations of separate sub-tasks, and a critic selects among the sampled behaviours, so they are coordinated without explicit sequencing. My focus was the sim-to-real gap on a UR3e: I built the ROS2 inference controllers and verified that input processing and the generated actions were correct on the robot (19/20 trials vs 10/20 without the critic).
- Built the real-robot data-collection system (varied manipulation skills for diverse demonstrations) and the processing pipeline that turned the raw data into training sets.
- Ran the Habitat 2.0 simulation experiments and built a VLM-based hierarchical controller as a baseline.

Student Research Assistant Oct 2024 – Present
University Hospital Bonn (UKB) *Bonn, Germany*

- Started and lead development of MARVEL, a Python/FastAPI web platform for human-in-the-loop annotation of multimodal behaviour data (multi-camera video, IMU) with model suggestions and in-browser retraining. In a 10-participant user study it cut annotation time by 33% and edit actions by 72% (paper in preparation).

Industry Experience

Software Engineer Sep 2022 – Mar 2024
Cognitive Healthcare International *Islamabad, Pakistan*

- Built the group-calling backend of a video-calling system (NestJS, WebRTC, Kurento, PostgreSQL, AWS); owned DevOps.
- Led an iOS SDK integrating 10+ Bluetooth LE sensors (reverse-engineered protocols) with a team of 1–2 engineers.

Mobile Developer Feb 2022 – Sep 2022
TruID *Islamabad, Pakistan*

- Built Android and iOS KYC SDKs (liveness, OCR, face matching, ID verification) with ML Kit and OpenCV.

Projects

- **A2WorldFinetuning** (Python, Isaac Sim, cuRobo): collected manipulation datasets for a UR5e setup in Isaac Sim with cuRobo and fine-tuned A2World on them, for use in future HRL research.
- **F1Tenth RL** (Python): PPO policy deployed on a real F1Tenth racing car. GitHub
- **Cueroom** (Go, React): live web app for managing and sharing music-production projects. cueroom.app

Publications

- M. Dawood, **U. A. Siddiquie**, S. Khorshidi, M. Bennewitz. *Constraint-Aware Reinforcement Learning via Adaptive Action Scaling.* L4DC, PMLR, 2026. arXiv:2510.11491
- A. Shokry, **U. A. Siddiquie**, S. Pan, M. Bennewitz. *Implicit Behavior Coordination from Sub-Task Demonstrations by Exploiting Overlap-Induced Multimodality.* arXiv preprint arXiv:2607.09234, 2026.

Skills

Robotics: ROS2, MoveIt, cuRobo, MuJoCo, Isaac Sim / Isaac Lab, Habitat, UR3e / UR5e
ML: PyTorch, reinforcement learning (SAC, TD3, PPO), imitation learning, flow matching, VLM-based control
Programming / tools: Python, C++, JavaScript/TypeScript, Go, Kotlin, Swift, Docker, AWS, React, Git
Languages: English (C1, IELTS 8.0), German (A2, working towards B1), Urdu (native)