# AKBAR JURAEV

*Human-AI Interaction Researcher · Robot Learning & Embodied Systems*

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## EDUCATION

**University of Birmingham** — **Birmingham, United Kingdom**
*BSc Artificial Intelligence & Computer Science | First Class predicted* — **Sep 2025 – Jun 2028**

## PUBLICATIONS & MANUSCRIPTS

- **AgenticXR: Safe Agentic Authoring Inside Immersive Environments.** *Co-author.* Submitted to *IEEE VR 2027*, August 2026. Under review.
- **Omni-Connect: Gesture-Driven Cross-Device Interaction.** *First author.* In preparation, targeting *ACM UIST 2027*.

## RESEARCH EXPERIENCE

### Omni-Connect: Gesture-Driven Cross-Device Interaction

*Unity/C#, WebGL, Meta Project Aria 2, WebSocket-to-UDP bridge* *GitHub*

- **First author.** Led the project. It makes a laptop, a phone and a tablet behave as one workspace: the user picks up content with a hand gesture, seen by Meta Project Aria 2 glasses, and drops it onto whichever screen they look at.
- Built the real-time WebSocket-to-UDP bridge and the gesture pipeline underneath it, with the laptop acting as coordination server and the other devices joining as zero-install WebGL clients.
- Designed and ran the two controlled user studies with participants, and did the analysis.

### AgenticXR: Safe Agentic Authoring in Immersive Environments

*Unity 6, Meta Quest, Ubiq, Roslyn runtime compilation, MCP* *GitHub*

- **Co-author.** The system lets someone wearing a headset ask an AI agent to build and change the virtual world around them by speaking, with the agent's code compiled and run without ever leaving the headset.
- Own evaluation and deployment: ran the within-subjects study over five tasks and four hypotheses, measuring workload (NASA-TLX), usability (SUS), presence (IPQ) and trust in automation, and did the analysis.
- Built the study harness now merged upstream, solved Quest deployment and zero-configuration LAN discovery between headsets, and ran the first live speech-to-text validation of the system.

### When Should a Human Correct a Robot?

*Python, MuJoCo, PyTorch, behaviour cloning, HG-DAgger* *GitHub*

- Asked where in a failed robot demonstration a human should intervene, and found the intuitive answer is the worst one: correcting at the moment that *caused* the failure gave a **4.4%** task success rate, against **42.0%** for correcting where the failure first becomes *visible*.
- Explained why: repairing the cause deletes the failure from the demonstration, so the policy never sees the recovery behaviour it is supposed to learn.
- Ran the comparison over four intervention strategies at **250** episodes each on a MuJoCo harness with **bit-exact snapshot and restore**, so every episode replays identically and the four strategies are measured against the same failures.

### Vision-Based Robot Grasping

*Python, MuJoCo, PyTorch, fully convolutional networks, self-supervised labelling* *GitHub*

- Trained a fully convolutional network to score, at every pixel and **12** gripper angles, how well a robot would grip an object from a single depth image.
- Removed the human from labelling entirely: the simulator attempts grasps and records which ones held, producing **15,000** labelled attempts with no annotation.
- Reported the negative result rather than hiding it. A short hand-written depth rule beat the network on objects it had never seen, **75.3%** against **58.4%**, and the ablation traced the cause: the network learned *where* to grip but not at what *angle*.

### Error Feedback in Immersive Voice Programming (DreamCodeVR)

*Wizard-of-Oz user study | Unity/C#, Node.js, WebSocket/UDP, speech-to-text* *GitHub*

- Studies what a VR system should say when it mishears a spoken programming command, comparing three kinds of feedback against who the user blames, how they recover, and whether they keep trusting it.
- Contributed the original idea and built the **Wizard-of-Oz infrastructure**: a hidden researcher injects scripted outcomes live across four tasks and five outcome types, with condition management and per-participant event logging.
- Worked with the project's other authors in their shared repository, on branches and through review: contributed macOS support, a backend comparison contract and an executable determinism gate, revised on their feedback and merged.

### Semantic 3D Mapping: Which Perception Errors Actually Matter

*Python, Docker, continuous integration, benchmark design* *GitHub*

- Held every other variable fixed to isolate one: whether a perception model's mistakes are correlated matters more than how often it is right. A **70%**-accurate labeller whose errors scatter built a better map (**0.560** mIoU) than an **85%**-accurate one whose errors repeat (**0.502**).
- Packaged the whole benchmark in Docker with **seven** CI checks that recompute every published number on each commit, so any reader can reproduce the table from a clean checkout.

### Teleoperation Demonstration Pipeline

*Python, data pipelines, quality scoring, reproducible training* *GitHub*

- Takes a raw human-teleoperated robot session through to a trained policy in **seven** stages, with **nine** signal-level checks grading each session gold, silver or reject from the numbers alone, so a sloppy demonstration is caught before it reaches training.
- Session-aware splitting stops near-duplicate trajectories straddling the train/test boundary, and every trained model is pinned to a data revision and a commit.

## TECHNICAL SKILLS

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|---|---|
| **PROGRAMMING** | Python, C++, C#, Java, TypeScript, JavaScript, SQL, Bash, data structures and algorithms |
| **FRAMEWORKS** | PyTorch, NumPy, Pandas, OpenCV, Node.js, React / Next.js, Unity 6 / URP |
| **ROBOTICS & ML** | MuJoCo, NVIDIA Isaac Lab, ROS 2, Gazebo, Franka Panda, MJCF and URDF, inverse kinematics, RGB-D perception, sim-to-real, imitation learning, HG-DAgger, ablation design, closed-loop evaluation |
| **BACKEND & INFRA** | REST APIs, WebSocket and UDP networking, Docker, CI/CD (GitHub Actions), Git, Linux, edge inference, canary rollout |

## EXPERIENCE

### Research Assistant

**Birmingham, United Kingdom**

University of Birmingham, School of Computer Science | *Python, Unity, C#*

**May 2026 – Present**

- Design and run studies on how people notice, diagnose and correct an AI system's mistakes in VR, owning the design, the study software, the sessions with participants, and the analysis.
- Co-author on a paper under review at **IEEE VR 2027**, and **first author** on one in preparation for **ACM UIST 2027**.

### Robotics & Software Engineer

Drone EduTrain, venture-backed, UzCombinator S2 | *Python, PyTorch, LiteRT, ONNX Runtime*

**Jun 2026 – Present**

- Shipped the drone inspection app the company demos to investors: detection runs on the MK15 handheld itself, with no network, as an installable Android build and an offline browser version.
- Chose the detector on what it reaches at the cadence that handheld can hold, not at a matched one: a candidate leading **70%** to **66%** at a shared 250 ms cycle takes **1.93x** the time per look, so at its real 500 ms cycle it reaches **52%**.
- Real-time tracking carries an identity across frames, so a person is counted once rather than once per frame, and detection is decoupled from drawing so the interface stays responsive. Each flight leaves a video, a per-detection CSV and stills.
- Fly the aircraft on production test flights and work the hardware directly: see how it behaves outdoors, trace what I find back with the team, and decide from that whether a build ships. Split the system with the other engineers and own my part end to end.

### Information Technology Intern

**Tashkent, Uzbekistan**

IT PARK Uzbekistan

**Aug 2025**

- Placement at Uzbekistan's national technology hub, **2,800+** member companies and **$392M** in annual service exports, across its engineering, HR and management functions.

## TEACHING

### English and Mathematics Tutor

**Tashkent, Uzbekistan**

SATashkent College Prep Company

**Sep 2024 – Jan 2025**

- Taught English and mathematics to exam candidates and mentored them through their university applications, adapting each explanation to the student in front of me.
- Co-designed test questions and practice materials used by the English department.

## SELECTED AWARDS

- **Informatics Olympiad of Uzbekistan** (competitive programming): **1st** place at school stage in two consecutive years, in the national rounds that lead to the International Olympiad in Informatics.
- **English Olympiad of Uzbekistan: 3rd** place in the Bukhara region, qualifying to represent the region at the national stage.