

# BHAVESH BAKSHI

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## EXPERIENCE

### Mechatronics Engineer

*SS Innovations (Surgical Robotics), Gurgaon*

Oct 2022 - Present

- Architected **29-DOF bipedal humanoid** integrating whole-body control, SLAM, voice AI, and RL locomotion
- Built sim-to-real pipeline with **4,096 parallel Isaac Lab environments**; achieved **<5% real-world gap**
- Developed XR teleoperation (Quest 3) with **<50ms latency** for dexterous manipulation via IK
- Implemented voice pipeline: Whisper + Ollama LLM + RAG + TTS; **200ms response, 50ms e-stop**
- Engineered **500Hz** control loop: 14-DOF arms, 12-DOF legs, 3-DOF waist via Unitree SDK2
- Led surgical robotics integration: motion control, encoders, safety systems

### Lead Technical Consultant

*Learning Links Foundation (EdTech NGO)*

Apr - Sep 2022

- Trained **1,000+ students** in robotics, IoT, embedded systems across Kendriya Vidyalayas
- Mentored **30+ projects** from ideation to working prototypes

### Engineering Intern

*Heavy Engineering Corporation Ltd, Ranchi*

Jun - Aug 2019

- Assisted heavy machinery manufacturing; cross-functional engineering reviews

## TECHNICAL SKILLS

**Robotics:** ROS2, Unitree SDK2, MuJoCo, Isaac Lab, SLAM, IK/FK

**Languages:** Python, C++, MATLAB, Bash

**ML/RL:** PyTorch, Stable-Baselines3, PPO, ONNX, TensorBoard

**Vision:** OpenCV, RealSense, ArUco, MediaPipe

**CAD/FEA:** SolidWorks, Fusion 360, Ansys, Creo

**Embedded:** Arduino, RPi, ESP32, EtherCAT, CAN

**Infrastructure:** Docker, Git, Linux, CycloneDDS, REST

**Fabrication:** 3D Print, TIG Weld, PCB, Machining

## SELECTED PROJECTS

### Naamika: Voice-Controlled Humanoid

29-DOF bipedal with WBC, SLAM, LLM voice control, 22-action safety gate. Production-deployed.  
*ROS2, CycloneDDS, Whisper, Ollama, FAISS*

### ASAP Bipedal Motion Learning

Sim-to-real via PPO in 4,096 parallel envs. Walking, kicking, gesture policies on hardware.  
*Isaac Lab, PyTorch, ONNX, Domain Randomization*

### Universal RL Training Center

PyQt6 GUI: URDF loading, reward design, curriculum training, domain rand. 12 modules.  
*PyQt6, MuJoCo, Stable-Baselines3, ONNX*

### XR Teleoperation System

Quest 3 to robot IK. Sub-50ms, 6-DOF mapping, dexterous hands.  
*OpenXR, CycloneDDS, RealSense*

### Fixed-Wing & Multi-Rotor UAVs

### BAJA SAE ATV Chassis (3x)

5 aircraft iterations + FPV quad. Aerodynamic design,  
PID tuning, flight tested.  
*Betaflight, Arduino, PID Control*

4130 chromoly frame. 38kg, 2.1+ FOS, 25% cost  
reduction via DFM.  
*SolidWorks, Ansys, TIG Welding*

## EDUCATION

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<b>B.E. Mechanical Engineering</b>	2017 - 2021	<b>Higher Secondary (PCM + CS)</b>	2015 - 2017
Birla Institute of Technology, Mesra		Army Public School Damana, Jammu	
CGPA: 7.3/10		School Topper: C++, Physics, Chemistry (95/100)   90%	

## AWARDS

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<b>GOLD</b> World Skills India 2017 - Mobile Robotics	<b>GOLD</b> IIT Patna Robotics 2018 - Aqua Soccer
<b>GOLD</b> BIT Patna Robotics 2018	<b>GOLD</b> IIT Delhi Robotyst 2014 - Junior
<b>2ND</b> IIT Patna Robotics 2017	SAE BAJA India 2019 & 2020
Boeing RC Aircraft - IIT KGP 2018	Technoxian-18 Drone Championship

## LANGUAGES

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**English** - Professional    **Hindi** - Native    **French** - Basic