SAMEERJEET SINGH CHHABRA

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EDUCATION

Arizona State University — Tempe, USA
Master of Science in Mechatronics, Robotics, and Automation Engineering; GPA: 3.94/4.0 — Graduating May 2026

Chhattisgarh Swami Vivekanand Technical University — Bhilai, IN
Bachelor of Technology in Mechanical Engineering; GPA: 3.49/4.0 — Graduated July 2022

PUBLICATIONS

Design and Inverse Kinematics Analysis of Cable-Suspended Parallel Robot 'FarmPet' for Agriculture,
International Journal for Research in Applied Science & Engineering Technology (IJRASET), Feb 2023

TECHNICAL SKILLS

Programming & Simulation: Python, C++, MATLAB/Simulink, Git/GitHub, MuJoCo, Isaac Sim, Isaac Lab, Gazebo, ROS/ROS2
Robotics & Control: Model Predictive Control (MPC), Spring Loaded Inverted Pendulum (SLIP), Zero Momentum Control, Impedance Control, Torque Control, Inverse/Forward Dynamics, LQR, PID, Kalman Filter, Spatial vector arithmetic, Rigid body dynamics, Rigid body trees
Mechanical & Hardware: Gear mechanisms (Planetary, Harmonic drives, Belt drives, Magnetic gears), Motor integration, Heat transfer systems, Arduino, Raspberry Pi, Jetson Nano, IMU, LiDAR, cameras, servos, motors
Design & Manufacturing: SolidWorks, CATIA, Inventor, Creo Parametric, AutoCAD, Ansys FEA, 3D Printing (FDM, SLA, SLS, DMLS)
Machine Learning: TensorFlow, PyTorch, Reinforcement Learning, OpenCV, Pandas, NumPy
Certifications: Deep Learning Specialization, IBM Machine Learning and Data Science Specialization

PROFESSIONAL EXPERIENCE

Physics Teaching Aide – Arizona State University — Tempe, AZ, January 2025 – Present
- Mentor and guide 72 students in physics labs, teaching advanced mechanics and electromagnetism while fostering problem-solving skills.

Data Scientist – ANYTHINGAI Cyber Pvt. Ltd. — Hyderabad, India, July 2023 – March 2024
- Data Extraction: Developed Python automation systems reducing data processing time by 98% using APIs and web scraping frameworks.
- Machine Learning Implementation: Built predictive models and deployed ML-powered systems on AWS with real-time processing capabilities.
- Algorithm Optimization: Enhanced system performance through data analysis and algorithmic improvements, achieving 30x performance gain.

CAD Design Intern – Design Center Pvt. Ltd. — Bhilai, India, June 2021 – July 2021
- Mechanical Design: Converted engineering drawings into precise 3D models for complex mechanical components and assemblies.
- Component Development: Designed and modeled 10+ gears, tires, and other parts, improving prototype accuracy and production by 15%.
- Kinematic Analysis: Performed motion analysis and surface modeling to optimize mechanical system performance and accuracy.

PROJECTS

Project Eleven — Robotic Quadruped CAD & Simulation — May 2025 – Present
- Designed a 20 cm-tall biped/quadruped robot in SolidWorks with modular legs, explicit joint axes, and simulation-ready kinematic structure.
- Modeled 3-DoF per leg (hip, knee, ankle); current biped configuration includes 2 legs (6-DoF total) with an onboard sensor site mounted on the top body.
- Exported CAD to URDF and compiled to MuJoCo XML, configuring joint limits, actuators, damping, and stiffness, and implemented MPC-style joint control in Python to validate balance and motion feasibility.

MuJoCo Robotic Arm Depth Reconstruction — Simulation & Perception — Mar 2025 – Apr 2025
- Developed a custom MuJoCo environment with a 6-DoF robotic arm on a linear slider and an end-effector stereo depth camera (90deg FoV).
- Captured and transformed depth images across 50+ camera poses into world-frame point clouds using calibrated intrinsics, extrinsics, and robot kinematics.
- Fused 100k+ 3D points and performed Poisson surface reconstruction in Open3D to recover accurate scene geometry under simulated range-dependent noise.

Foldable Grasshopper-Inspired Walking Robot — MuJoCo Simulation — Fall 2025
- Designed a bio-inspired four-bar linkage walking robot using foldable laminated cardboard mechanisms and SG90 servo actuation.
- Identified stiffness, damping, friction, and servo dynamics experimentally and incorporated parameters into a MuJoCo physics model.
- Performed parameter sweeps and simulation-based optimization to achieve stable walking gait, predicting physical performance within 5–22% sim-to-real error.

Voice Operated Mobile Manipulator — ROS2 Integration — January 2025 – May 2025
- Combined TurtleBot4 with myCobot 280 using ROS2, MoveIt2 motion planning, and YOLOv8 object detection (92% accuracy).
- Integrated SLAM navigation with Monte Carlo localization achieving ±5cm positioning accuracy.
- Embedded voice command processing using a speech-to-text API, achieving 85% recognition accuracy.

6-DOF Robotic Arm — Kinematics & Computer Vision — August 2024 – December 2024
- Engineered custom inverse kinematics solver using Newton-Raphson method achieving ±0.2mm positioning accuracy.
- Scripted URDF model and applied real-time vision pipeline with OpenCV, A* path planning, achieving 95% maze solving success rate.
- Established camera-to-robot coordinate mapping with homogeneous transformations and PID torque control.

ACHIEVEMENTS

- PU Automations Hackathon 2025 (by Los Alamos National Laboratory): Awarded 2nd place ($5,000) for developing an automated system to unpack 105mm x 23mm x 16mm MinION Flow Cells through hard shell and soft pack layers and integrate them into the sequencing device.
- GATE Exam 2022 by Indian Institute of Technology India: Qualified in Mechanical Engineering (92.22 percentile, 90,000 candidates) and Engineering Sciences (85.6 percentile, 15,000 candidates).
- GHOST Lab ASU Volunteering: Operate Fetch, YuMi, Husky, UR5 and TurtleBots for human robot interaction research.