

# Aaryaman Chandgothia

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## ABOUT ME

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I'm a mechanical engineer with a strong background in mechanical systems, mechatronics, and robotics. I have practical experience in designing advanced technologies and am eager to apply my problem-solving skills to diverse mechanical engineering projects. I'm excited to work on cutting-edge developments in mechanical engineering and system design.

## EDUCATION

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**Columbia University, New York, NY (CGPA 3.8/4.0)** Aug 2023 - Dec 2024

Master of Science in Mechanical Engineering, (*specializing in Robotics and Control*)

- Coursework: Robotic Studio, Robotics Kinematics and Dynamics, MEMS, Data Science, Computational Robotics, Digital Manufacturing, Industrial Automation, Control Theory, Mechatronics & Embedded Systems, Advanced Machine Dynamics

**NMIMS Mukesh Patel School of Technology Management and Engineering, Mumbai, India**

Jun 2019 - Mar 2023

Bachelor of Technology in Mechatronics (*Honors in Robotics and IoT*)

- Coursework: System Identification, Robotics System Design, PLC and Data Acquisition, Control Systems, Analog and Digital Signals, Engineering Mechanics, Fluid Mechanics, Microprocessors and Microcontrollers, Virtual Instrumentation (LabView)

## WORK EXPERIENCE

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**Columbia University, New York, NY**

Research Assistant

Oct 2023 - Present

- Developed algorithms for postural control in spinal cord injury and cerebral palsy patients using cable-driven robots.
- Conducted reaching and squatting experiments with motion capture, electromyography, and force plates, performing data analysis.
- Gained expertise in Unity and MATLAB for robot control, dynamics simulation, and optimizing performance in experimental tasks.
- Designed a PD controller for predicting the velocity desired for the chest and pelvis based on hand position and known endpoints for chest and pelvis movement.

**Sonoptic Systems, Boston, MA**

Hardware Engineering Intern

Oct 2023 - Apr 2024

- Tuned a laser driver via I2C to fire precise laser pulses at specific frequencies, phases, and intervals for a medical imaging device.
- Developed a timing generator to synchronize laser driver and component activations for accurate system operation.
- Optimized component timing and frequency to enhance overall device performance and imaging accuracy.

**Robotics and Mechatronics Lab MPSTME, Mumbai, India**

Robotics Intern

May 2022 - July 2022

- Authored 3-axis CNC simulator documentation, improving teaching efficiency and saving 100+ faculty hours, impacting 15 projects.
- Advanced operational functionality of simulation and machining platforms through SERCOS ID troubleshooting and PLC interfacing
- Trained 10 students in YASKAWA MOTOMAN 6-DOF robotic arm operations, sharing hands-on expertise.

## ACADEMIC PROJECTS

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**Automated Teeth Brushing, Columbia University**

Sept 2023 - Nov 2023

- Researched kinematic solutions for a 6 degrees of freedom robotic manipulator to address oral care challenges in disabled patients.
- Calculated the Jacobian matrix, optimized link offsets to avoid singularities, and designed the manipulator in SolidWorks for precision.
- Executed trajectory planning and simulation utilizing inverse kinematics and collision avoidance to optimize performance.

**Quadruped Robot, Columbia University**

Sept 2023 - Nov 2023

- Developed an autonomous quadruped robot, employing topology optimization for enhanced design and movement efficiency.
- Utilized kinematic analysis and MATLAB simulations to establish an efficient gait pattern, achieving a walking speed of 10 cm/sec.
- Demonstrated advanced skills in robotics design and programming, successfully engineering a capable and efficient quadruped robot.

**Mars Rover, Mukesh Patel School of Technology Management and Engineering**

Jul 2022 - Mar 2023

- Led a 30-member team in building a Mars rover, integrating autonomous navigation, fuzzy logic control, and terrain adaptability systems.
- Engineered a rover with a 5-Degrees of Freedom manipulator and robust mechatronic systems capable of lifting 2.5 times its weight.
- Developed control algorithms using Kalman filters, sensor fusion, and 3D mapping for soil analysis, doubling navigational efficiency.

**Arrow Throwing Robot, Mukesh Patel School of Technology Management and Engineering**

Sept 2020 - Sept 2021

- Collaborated in a 50-member cross-departmental team to design and build an arrow-throwing robot, focusing on electrical circuit design.
- Worked with mechanical and software teams to integrate components, ensuring precise functionality in arrow throwing and retrieval.
- Contributed to the successful engineering and assembly of the robot, demonstrating teamwork and technical expertise in robotics.

## PUBLICATIONS

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**IoT Patrol Robot, IEEE Xplore (<https://ieeexplore.ieee.org/document/10037325>)**

Oct 2022 - Feb 2023

- Developed a scalable, cost-effective IoT Patrol Bot for retail surveillance with CCTV integration and 98.54% ultrasonic sensor accuracy.
- Designed and integrated a robotic alarm system using advanced sensors, IoT, and PID control for enhanced security.
- Authored a research paper on the patrol robot, advancing retail night surveillance technology.

## TECHNICAL SKILLS & LEADERSHIP ROLES

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- **Skills:** Diptrace, TinkerCAD, Solidworks, EasyEDA, Fusion360, Proteus, Robot Operating System (ROS), Multisim, LABView, MATLAB, NC Code, Python, AutoCAD, Simulink, Ansys, Raspberry Pi, Arduino, C#, Linux, TensorFlow, Pandas, CNC Simulator, PLC, Unity, C++, Numpy, Simscape, C, Assembly
- Served as a Teaching Assistant for Mechatronics and Embedded Microcomputer Control, mentoring 25 students over a semester. (*Columbia University*)
- Served as a Teaching Assistant for the course Robotic Studio, mentoring 120 students over a semester. (*Columbia University*)