Ekam Singh

Mohali, Punjab, India
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Aspiring robotics engineer with practical experience in mechanical design, CAD modeling, and 3D printing through Mars rover projects and industry internships. Designed and developed a 5-DOF robotic arm and collaborated in cross-functional teams for international competitions. Proficient in SolidWorks, ANSYS, and NX. Currently learning the basics of electronics and control systems to build a well-rounded foundation in robotics.

Education

Thapar Institute Of Engineering and Technology **August 2022 – Present**
Bachelor of Engineering in Mechatronics Engineering *Patiala, Punjab*

Shishu Niketan Sr Sec Model School **May 2020 – June 2022**
CBSE Board Senior Secondary Education *Chandigarh*

Saupin's School **March – April 2020**
CBSE Board Secondary Education *Chandigarh*

Experience

Rockpecker Private Limited **June 2024 – July 2024**
Quality Control Engineer - Internship *Mohali*

- Performed quality inspections on production pieces using precision instruments,including Trimos height gauge, interpreted production drawings to verify dimensional accuracy and compliance, and prepared detailed reports for final evaluation.
- Assisted in streamlining the production process by conducting in-line inspections of machined parts, identifying defects early(leading to modification in production), and collaborating with the production team to implement corrective actions, reducing overall defect rates.

Vibracoustic India Pvt. Ltd. **June 2023 – July 2023**
CAD Engineer - Internship *Mohali*

- I acquired proficiency in NX, ANSYS and Hypermesh through guidance from experienced professionals during my internship.
- Prepared reports on the above information and reported the insights

Projects

MARS Rover(Iteration 3 - Alaknanda) | *SolidWorks, ANSYS, Ultimaker Cura* **January 2024 – February 2025**

- **Robotic Arm Development:** Achieved a 27% reduction in arm weight (from 15 kg to under 11 kg) by replacing aluminium links with carbon fiber pipes and using 3D-printed bevel gears; replaced base coupler with an in-house 3D-printed worm gearbox to multiply torque and eliminate backdrivability.
- **Project Contribution and Challenges:** Contributed to executing rover tasks — IDMO, RDO, ABeX, and AutEX — by applying technical expertise and teamwork to develop a robust, high-performing system.
- **Collaboration and Mentorship:** Collaborated with a 32-member multidisciplinary team to secure runner-up at IRC 2025, gaining hands-on robotics experience and strengthening cross-functional collaboration under expert mentorship.

7 DOF Industrial Grade Robotic Arm |*Solidworks, Ender-3, Ultimaker Cura* **March 2024 – August 2024**

- Led the design and mechanical optimization of a 7-DOF robotic arm, ensuring kinematic efficiency and suitability for palletization tasks using inverse kinematics.
- Supervised and executed the 3D printing of 20+ ABS parts on an Ender 3, maintaining precision and durability through overnight production to meet industrial-grade standards.

MARS Rover(Iteration 2 - Bhagirathi)) | *SolidWorks, ANSYS, Ultimaker Cura* **March 2023 – January 2024**

- **Robotic Arm Development:** Designed and developed version II of the IRC 2024 rover with a 5-DOF linear-actuated aluminum 6062 robotic arm (7 kg payload), integrating a bevel gear differential for pitch and roll, and expanding the work envelope by 30%.
- **Rocker Bogie and AbeX Development:** Enhanced rover mobility using PU balloon wheels and differential steering (20% camber reduction), achieving a 30% lighter rocker-bogie suspension and a 40% lighter 3D-printed soil collection and sampling system.

Entity Protector Vehicle (EPV) |*Arduino IDE, Manufacturing* **March 2019 – February 2020**

- Designed and developed an innovative go-kart powered by a Bajaj Chetak engine, integrating advanced safety features including alcohol detection, flotation system, and real-time GPS tracking.
- Engineered for enhanced passenger safety and ride comfort, the project showcased a fusion of mechanical design and embedded systems for accident prevention.

Publications

7th International Conference of The Robotics Society (AIR 2025) | *Accepted* **June 2025**

Title - Design and Analysis of a Mars Rover with Rocker-Bogie Suspension carrying a 5-DOF Robotic Arm.

Contributed to research on 5-DOF Robotic Arm, Rocker-Bogie length calculations, and chassis stress calculation for a multi- subsystem Martian rover, presented at a leading robotics conference.

Leadership / Extracurricular

Team Vice Captain **June 2024 – Present**

Team MARS, Thapar University *Patiala, Punjab*

- **Led Cross-Disciplinary Team:** Coordinated efforts of mechanical, electronics, and software teams to design and build a Mars rover for competition, ensuring seamless integration of components and adherence to deadlines.
- **Supervised the Mechanical development** Led the design and development of a 5-DOF robotic manipulator, Rocker - Bogie, chassis for a Martian rover, ensuring precision and task readiness for IRC 2024.
- **Collaboration and Mentorship:** Worked with a 32-member multidisciplinary team and helped lead the rover to a runner-up position at the International Rover Challenge (IRC),

Lead - Mechanical Department **June 2024 – Present**

Mechatronics and Robotics Society, Thapar University *Patiala, Punjab*

- Supervised and guided second-year members in subsystem development and integration for the Mars rover project.
- Contributed to the design and integration of electronics systems in 5 ongoing minor projects under the MARS Society, enhancing prototyping efficiency and system reliability.

Related Course Work and Interests

Coursework: Robotics, Theory of Machines, Advanced Mechanisms, Stress Analysis, Manufacturing, Additive Manufacturing, Optimization, Materials, CAD & Analysis.
Interests: Robotics, Actuator Design, Kinematics, Dynamics, Simulation to Real, Structural Analysis, 3D Printing

Technical Skills

Fields: Mechanical Engineering, Mechanical Design, 3D Modeling, Technical Drawings
Languages: C (Basics), C++ (OOPs)
Design/Tools: SolidWorks, NX, Creo, HyperMesh, ANSYS (Static), AutoCAD, PrusaSlicer, Cura, Microsoft Excel
Simulation/Analysis: FEA (Static/Dynamic), CFD (ANSYS Fluent), Stress Analysis, Topology Optimization, Torque & Gear Ratio Calculations
Manufacturing/Prototyping: Additive Manufacturing (FDM), DFM/DFA, 3D Printing Workflow, CAM Basics, Soldering
Embedded Systems: Teensy, Arduino, STM32, Sensor Integration, Motor Control (PID, PWM)
Core Knowledge: Robotics, CAD/CAM, GD&T

Certifications

- Certificate of Participation in Robotron Workshop organized by Tech Analogy.
- Certificate of Participation in RoboAi Workshop organized by MyEquation.
- Certificate of Organization for efforts in organizing the DST-SERB sponsored One Day Space Robotics Workshop

Honors and Awards

- 2nd Overall Position in International Rover Challenge 2025 (IRC'25) held at BITS, Goa
- Winner of RoboWars, Saturnalia'24 held at Thapar University
- Finalist at International Rover Challenge 2024 (IRC'24) held at PSG iTech, Coimbatore
- Winner of RoboWars, Saturnalia'23 held at Thapar University
- Participated in National level CBSE Science Exhibition held at Suncity School, Gurugram
- Winner of State Level CBSE Science Exhibition held at GreenLand Sr. Sec. Public School, Ludhiana