

**# AJAY SORATHIYA**

**# Bachelor of Engineering in Mechatronics**

## **Projects Done**

### **Project No. 1**

<b>Name of Competition</b>	:	ROBOFEST - GUJARAT 3.0
<b>Name of Project</b>	:	Rover
<b>Title of Project</b>	:	Kissan Rover
<b>Mentor</b>	:	Dr. Vinod Patel
<b>Achievements</b>	:	Grant Received of Rs. 2.5 Lakhs From GUJCOST.
<b>Status</b>	:	Ongoing, Working for Final Stage.
<b>Role</b>	:	Team Leader & Head of Design and Manufacturing
<b>Description</b>	:	The Kisaan Rover is an innovative eight-wheeled robot characterized by its utilization of a rocker bogie mechanism, enabling exceptional adaptability across various types of terrain. The rover demonstrates proficiency in a range of agricultural tasks, including automated weeding, seeding, and soil monitoring. Notably, it harnesses the power of deep learning to accurately identify and address different weed varieties. The incorporation of a 3-axis mechanism, employing linear guideways and stepper motors, further enhances its capabilities in both weeding and seed sowing operations. The rover's distinctive design ensures efficient and precise operation, underscoring its value in compact and accurate agricultural practices.
<b>Activities</b>	:	<ul style="list-style-type: none"><li>• Designed Complete rover, 3-axis mechanism, Rocker bogie mechanism, steering mechanism and wheel designed.</li><li>• Manufacturing responsibility of assemblies and sub-assemblies.</li><li>• Finite element analysis and Analytical problem solving</li><li>• Work as a Team Leader, successfully drive and achieve goals in diverse and dynamic environments to make the rover functional by performing assigned tasks.</li><li>• Process planning and time management of a complete project.</li></ul>
<b>Skill Acquired</b>	:	<ul style="list-style-type: none"><li>• Finite Element Analysis (Ansys Workbench)</li><li>• 3D Designing (Fusion 360 &amp; Solidworks)</li><li>• 2D Drafting (Autocad)</li><li>• Manufacturing Operations</li><li>• Leadership and Management</li></ul>

<b>Learnings</b>	:	<ul style="list-style-type: none"> <li>• Reduce assembly hurdle by doing multiple design iteration.</li> <li>• Budget management and documentation along with presentation.</li> <li>• Understand and built leadership qualities</li> <li>• Process Planning, Team management and Time management.</li> </ul>
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## Project No. 2

<b>Name of Project</b>	:	Minor Degree Project - IoT
<b>Title of Project</b>	:	IoT-Based Ripe or Unripe Fruits/Vegetables Detection and Mechanical Sorting.
<b>Status</b>	:	Completed
<b>Mentor</b>	:	Dr. Geetali Saha
<b>Role</b>	:	Team Leader
<b>Description</b>	:	The setup comprises a fusion of an industrial sorting machine designed to identify fruits/vegetables utilizing IR Sensors for detecting its presence. Additionally, a Color sensor system is employed to assess the ripeness of these items by contrasting their RGB values with predetermined thresholds. The mechanical arrangement operates through a pulley-conveyor belt system, facilitating the movement of fruits and vegetables for sorting purposes. Particularly, the system efficiently segregates unripe produce based on these evaluations, presenting a comprehensive solution for automated sorting in an industrial context.
<b>Activities</b>	:	<ul style="list-style-type: none"> <li>• Hardware designed using CAD Software for a physical model (Conveyor Belt &amp; Design)</li> <li>• Arduino Programming and sensor calibration.</li> <li>• Team Work and Team Management.</li> </ul>
<b>Skill Acquired</b>	:	<ul style="list-style-type: none"> <li>• 3D Designing (Fusion 360)</li> <li>• Arduino Programming</li> <li>• Sensor Calibration</li> <li>• Team management</li> </ul>
<b>Learnings</b>	:	<ul style="list-style-type: none"> <li>• Enhance programming knowledge.</li> <li>• Team management</li> <li>• Explored 3D Printing Technology</li> </ul>

### Project No. 3

<b>Name of Competition</b>	:	IEEE Robomania
<b>Name of Project</b>	:	Scrub Nurse
<b>Title of Project</b>	:	Simulation of Scrub Nurse by performing Preoperative, Intraoperative, Postoperative tasks.
<b>Achievements</b>	:	1 <sup>st</sup> Runner Up at State Level.
<b>Status</b>	:	Completed
<b>Role</b>	:	3D CAD Designing and Operations
<b>Description</b>	:	The "Scrub Nurse" concept introduces a versatile robotic assistant designed to enhance hospital operations by undertaking various tasks across different surgical stages: preoperative, intraoperative, and postoperative. This robotic system efficiently gathers and readies surgical instruments and equipment, all while upholding the crucial aspect of sterility. It actively participates in transferring instruments between the surgical table and the operating area, streamlining the surgical process. Moreover, the robot performs post-operative responsibilities, such as conducting instrument counts and preparing packaging for sterilization. The integration of this robotic assistant promises to significantly contribute to the efficiency and precision of surgical procedures, marking a notable advancement in hospital and healthcare practices.
<b>Activities</b>	:	<ul style="list-style-type: none"> <li>• 3D CAD Designing and of scrub nurse.</li> <li>• Explored ROS Environment.</li> <li>• Operation analysis of scrub nurse.</li> <li>• Simulation in Gazebo</li> </ul>
<b>Skill Acquired</b>	:	<ul style="list-style-type: none"> <li>• 3D Designing (Fusion 360)</li> <li>• Gazebo Software</li> <li>• ROS Environment</li> </ul>
<b>Learnings</b>	:	<ul style="list-style-type: none"> <li>• Enhance Presentation and Documentation skill.</li> <li>• Team Work, and work distribution.</li> </ul>

## Project No. 4

<b>Name of Competition</b>	:	ABU Robocon - 2022
<b>Name of Project</b>	:	Lagori Game Playing Robot
<b>Mentor</b>	:	Prof. Bhavik Ardeshana
<b>Achievements</b>	:	Scored 78 out of 100 in the First Round (Design Stage)
<b>Status</b>	:	Completed
<b>Role</b>	:	Manufacturing and Hardware Assembly Operations
<b>Description</b>	:	The ABU Robocon stands as a longstanding international competition, spanning over 23 years, distinguished by its annual thematic variations. In the year 2022, the chosen theme was "Lagori," a traditional Indian game. Within this framework, participating teams engage in a robotic interpretation of the game, employing two robots per team. One of these robots assumes the role of "Pick and Place Lagori Pile," tasked with manipulating the Lagori piles, while the other undertakes "Ball Shooting," focused on accurately launching balls. This unique convergence of robotics and traditional sport encapsulates the innovative spirit of ABU Robocon, facilitating cross-cultural engagement and technological advancement within a spirited competition.
<b>Activities</b>	:	<ul style="list-style-type: none"><li>• Manufactured, Ball Shooting Mechanism via Rotating Friction of Wooden Wheels.</li><li>• Designed, Swivel Plate Mechanism and Manufactured using Thrust Bearing for Ball Shooting at Various Angles by Controlling Speed of Motor.</li><li>• Assembly and Sub-assembly Manufacturing.</li></ul>
<b>Skill Acquired</b>	:	<ul style="list-style-type: none"><li>• Manufacturing Operations and Material selection.</li><li>• Vibration Analysis.</li><li>• Documentation (Microsoft Excel)</li></ul>
<b>Learnings</b>	:	<ul style="list-style-type: none"><li>• Assembly Process and Tools selection.</li><li>• Procurement of materials and its documentation.</li><li>• Designing Thinking.</li><li>• Time management.</li></ul>

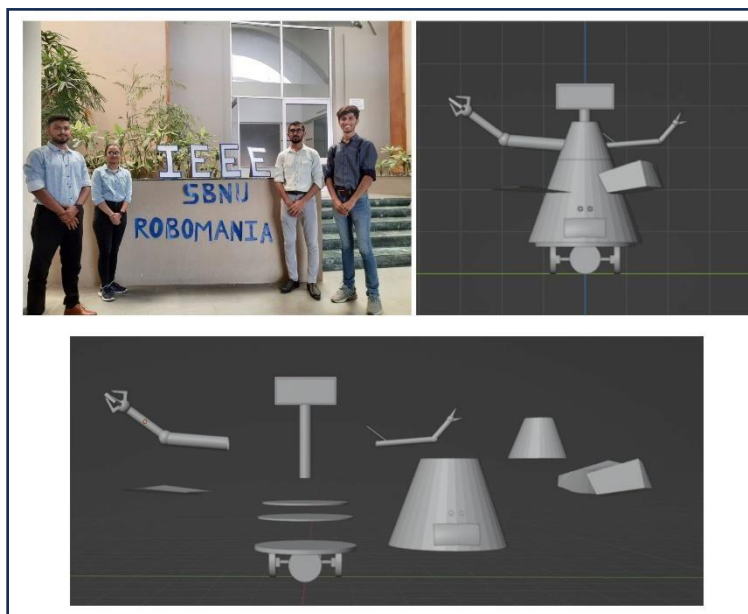
## *Glimpse of Projects done*



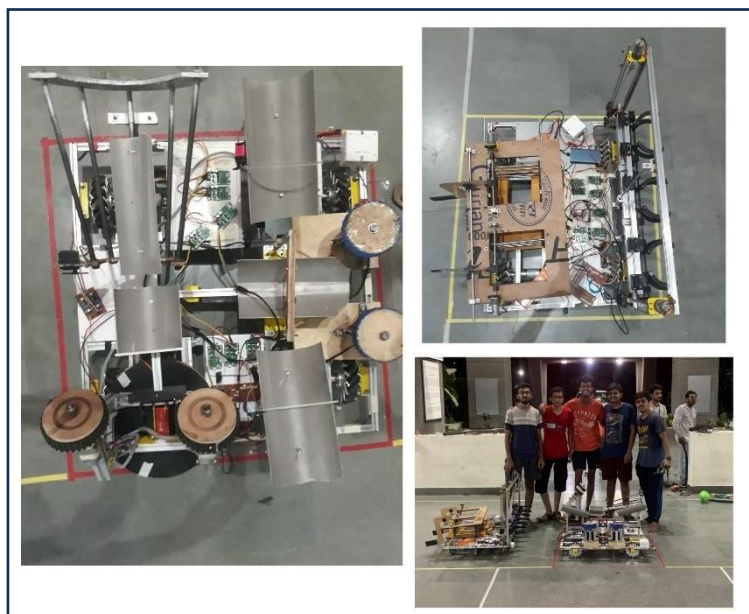
**Project No. 1**



**Project No. 2**



**Project No. 3**



**Project No. 4**

## ***Skills & Area of Interest***

1. **CAD Designing:** I possess a strong command over both 2D and 3D CAD designing. I have a strong grasp of software tools such as AutoCAD, SolidWorks, Ansys Workbench, and other CAD platforms. Additionally, I am continually expanding my knowledge by incorporating Finite Element Analysis (FEA) into my skill set. Willing dive deeper into CAD Designing.
2. **Analytical Problem Solving:** I excel into analytical approach for complex challenges, particularly in the domain of mechanism design and optimization. My ability to dissect intricate problems and derive effective solutions is a distinguishing aspect of my skill set. Would like to Expand my boundaries by working with complex challenges.
3. **Manufacturing Process and Operations:** I command a comprehensive understanding of various manufacturing processes and operations. From conventional techniques to modern methodologies. I am well-versed in the intricacies of production and CNC Programming. Additionally, I have honed my skills in the realm of 3D printing technology, staying up-to-date with the latest advancements. Looking forward for opportunities in the field of Manufacturing and Production.
4. **Programming:** I have solved multiple problems using softwares like MathWorks MATLAB and C – Programming. Exploring and solving more problems with programming.
5. **IDE & Tools:** Raspbian OS, Arduino IDE, MS Excel, MS Words, MS PowerPoint, Ardupilot are some software and environment which I used apart from technical tools and MS Softwares plays vital role in my every project. Exploring work with my skill in IDE & Tools to successfully develop projects.

## ***Certification Course***

COURSE NAME	SOURCE
Understanding Research Methods	Coursera
Business Writing	Coursera
MATLAB Onramp & MATLAB Fundamentals	MATLAB academy
Fusion 360 Fundamentals, 3D Modelling, Manufacturing	Autodesk academy
Solar Energy Systems Overview	Coursera
Build Your Professional ePortfolio in English	Coursera
The Arduino Platform and C Programming	Coursera
Fundamentals of Fluid Power	Coursera
Digital Manufacturing & Design	Coursera
Managing Major Engineering Projects	Coursera
Research Design: Inquiry and Discovery	Coursera