

DHRUVA RAJESH KALE

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EDUCATION

- Vishwakarma Institute of Technology** Pune, India
Bachelor of Technology - Mechanical Engineering; GPA: 8.44 Jan 2021 - Present
Courses: Robot: Mechanics and Programming, Engineering Mathematics, System Engineering, Data Structure, Mechatronics and Robotics, Internet of Things, Machine Design, Mechanical and system engineering, Hybrid and electric vehicles, Theory of machines, Fluid engineering, Heat transfer, Material and process engineering.

SKILLS

- Softwares:** SolidWorks, MATLAB-Simulink, IPG Carmaker, Ansys.
- Languages:** Python, C, HTML.
- Others:** Leadership, Event Management, Writing, Decision-making, Time Management.
- Platforms:** Raspberry, Arduino, NodeMCU.

EXPERIENCE

- DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION** Pune, India
Research Intern (Full-time) Jul 2023 - Present
 - Supervisor:** Scientist (F). Jaising Pednekar.
 - Fabrication testing and characterization of Additive Manufacturing using RFI tow-pegs(Motive):** The strength of Continuous Fibre Composite Laminates is increased through enhancing the Matrix-Fiber ratios. This advancement enhances material performance by optimizing stress distribution across variables such as tensile strength and compression.
 - Enhancement:** Operated and revamped the 3-axis layup machine precisely to ensure the best Matrix-Fiber ratios and for less vibration and seamless transitions.
- CAD & CART** Pune, India
Research Intern (Part-time) Mar 2023 - Jun 2023
 - Supervisor:** Founder Mahesh Takey.
 - Windmill Design and Manufacturing:** Designed a drivetrain and introduced an Electronics Continuously Variable Transmission (ECVT) for a windmill that is 20% more efficient and compact, by minimizing frictional losses to maximize energy.

CO-CURRICULAR ACTIVITIES

Team Endurance Racing, SAEINDIA

- Version - Four Wheel Drive** Pune, India
Position: Mentor and Senior Design Member Apr 2022 - Present
 - Develop:** Spearheaded the design and integration of an Electronics Continuously Variable Transmission (E-CVT) into the powertrain, utilizing Power-Limited Calculations to optimize real-time data feed and achieve exceptional levels of torque and velocity.
 - Highlights:** According to ergonomics, increasing performance through a lightweight chassis (Roll cage) entails integrating a dog clutch for four-wheel drive and using an aluminum mount to reduce engine vibration.
- Version - All Wheel Drive** Pune, India
Position: Team Captain and Driver Mar 2022 - Mar 2023
 - Lead:** A 25-member cross-disciplinary team developed the Baja All-Terrain Vehicle (ATV) and competed in national intercollegiate competitions with an overall rank of 22 out of 150 teams.
 - Upgrade:** In the design of the ATV this year, the Team has successfully included an All-Wheel-Drive System. This significant upgrade enhances the vehicle's Off-Road Performance by providing better grip, stability, and control in challenging terrain.
 - Mentor:** Departments for Design, Integration, Manufacturing, and Troubleshooting for Roll-cage (Chassis), Drivetrain, Vehicle Dynamics, and Electronics.
 - Manage:** Facilities, sponsors, public relations professionals, and sponsorships totaling Rs. 6,50,000.
 - Highlights:** Boosting performance through Power-Limited Calculations entails adding an all-wheel-drive system and manufacturing the vehicle more compact compared to its prior design.
- Version - All-Wheel Drive (online)** Pune, India
Position: Junior Powertrain Member Sep 2022 - Feb 2022
 - Learning:** Used CAD modeling (SOLIDWORKS), and MATLAB(SIMULNK) for simulating the intended All-Terrain Vehicle (ATV) components made following Manufacturing Procedures for efficient power delivery to the vehicle.
 - Executing:** Implemented CAD modeling for design presentation, assembled Vehicle CAD for all subsystems, and completed the manure for IPG CarMaker.

Social Welfare Program, VIT

• Sociotech

Position: Team Leader

Pune, India

Sep 2022 - Feb 2022

- **Objective:** Assiduously working on an Environment Monitoring System project to improve environmental conditions in the future.
- **Built:** Prototype created to monitor the levels of oxygen, carbon dioxide, and water pH while also integrating a moisture sensor. Additionally, it is portable and small enough to operate on real-time monitoring.

PROJECTS

• Farmer Companion Bot

Feb 2023 - May 2023

Supervisor: Prof. (Smt.) Ketki Shirbavikar

- **Objective:** An automated seed sowing robot, minimizes human efforts and addresses labor-intensive challenges in agriculture. By integrating wireless control and a seed sowing mechanism, it boosts efficiency, reduces costs, and contributes to increased agricultural productivity, meeting the rising demand for food supply.
- **Technologies:** Employs Arduino for control, Bluetooth for wireless communication, and motors for movement and seed sowing, revolutionizing agriculture by automating tasks and improving overall efficiency.
- **Impact:** To revolutionize traditional seed sowing methods by introducing a wirelessly controlled robot. Combining a mobile application, Arduino technology, and a seed sowing mechanism, it seeks to significantly reduce human labor, enhance operational speed, and improve overall efficiency in large-scale agricultural settings, ensuring sustainable food production.

• Design and Modelling of Power-limited Acceleration

Mar 2022 - May 2022

Supervisor: Dr. D.B. Hulwan (HoD)

- **Objective:** To achieve the optimum acceleration results and CVT shift graph by an iterative combination of Continuously Variable Transmission (CVT) and gearbox reduction ratios.
- **Modeled & Simulation:** Utilized MATLAB Simulink with inputs based on power-limited calculations and comprehensive data from actual driving situations. The simulation considered both Resistive Forces and Dynamic Forces occurring on the ATV to obtain a more realistic conclusion.
- **Validation:** Imitated the system through a physical buggy (ATV) and integrated sensors using Raspberry Pi with Arduino UNO for data acquisition of actual parameter variation to evaluate the accuracy of modeling approaches used.

• Gesture Replication Robo-arm

Oct 2021 - Dec 2021

Supervisor: Dr. (Prof.) Laxmikant Mangate

- **Data Collection:** Transferred real-time data to an Arduino for it to make the necessary movement using Python libraries like OpenCV and hand-tracking modules.
- **Micro-controller:** Configured Arduino to take data from a Python script and utilize it to operate the motors following the instructions received, replicating finger movements.
- **Hardware:** Servo motors in the arm provide precise finger actuation, increasing dexterity and utility by mimicking the motion of a human hand. Developed a lightweight, robust robotic 3D printed arm.

• Design and calculation of Multiplate Clutch

Feb 2021 - May 2021

Supervisor: Dr. (Prof.) Shrinivas Chippa

- **Objective:** Optimized the design using the Uniform Wear Theory for the pressure and clutch plates, resulting in better durability and performance. Ensured smooth engagement and disengagement while shifting gears.
- **Implementation:** Designed, built, and simulated the operation of the system. Created 3D models using SOLIDWORKS and MATLAB.

HONORS AND AWARDS

BAJA: Overall Rank 1 in Preliminary Round and 21 out of 150 teams in presentation. Feb 2023

BAJA: Selected as finalists in the design category and overall ranking of 22 out of 150 teams. Feb 2023

ATVC: Ranked 5th position out of 30 teams and recorded the fastest lap in the Endurance Race. Apr 2023

IMO: Secured a state rank of 71, an International Rank of 175, and first in school. Jul 2018

PUBLICATION

• Gesture Replication Robo-arm

Dec 2022

Supervisor:- Dr. (Prof.) Laxmikant Mangate

- **IJRASET:** International Journal for Research in Applied Science & Engineering Technology; ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 10 Issue XII Dec 2022

• Environment Monitoring System

May 2022

Supervisor:- Dr. D. B. Hulwan (HoD)

- **IJRASET:** International Journal for Research in Applied Science & Engineering Technology; ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538 Volume 11 Issue V May 2023

• Smart Building based on IOT

Jun 2021

Supervisor:- Prof. Anita Joshi

- **NCNMT:** e-National Conference on Novel Ideas in Multidisciplinary Techno-Innovations