

# RITTU RONALD RM

Kanniyakumari, Tamil Nadu

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## Education

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### Vellore Institute of Technology

*Bachelor of Technology in Mechatronics and Automation Engineering; CGPA: 8.74/10*

Chennai, India

2023-2027

### Christuraja Matriculation Higher Secondary School

*Grade 12, PCM Stream: 90%*

Kanniyakumari, India

Graduated 2023

## Experience

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### Department of Engineering Design – IIT Madras

*Research Intern | Certificate Link*

May 2025 – July 2025

Chennai, India

- Worked on wireless power transfer systems by modeling and simulating 3D coupler structures to analyze efficiency and energy transfer characteristics.
- Investigated magnetic shielding techniques to reduce leakage flux and improve system performance through simulation-based validation.

### RANE MADRAS LIMITED

*Project Intern | Certificate Link*

August 2024 - September 2024

Chennai, India

- Optimized the correction cycle of a rod in a rack straightener machine, gaining experience in mechanical analysis, force calculations, and industrial automation to improve manufacturing efficiency.

### ISRO Propulsion Complex – Indian Space Research Organisation

*In-Plant Trainee | Certificate Link*

June 2024

Mahendragiri, India

- Explored mechanical and electronic systems integration in propulsion technology, gaining hands-on experience with aerospace components and automated control systems.

### TEAM MOVIS (Special University Team at VIT Chennai)

*Mechatronics Engineer*

April 2024 - July 2025

Chennai, India

- Contributing to the development of space exploration technologies, including rovers and Mars drones, with a focus on robotics, automation, and planetary mobility systems.

## Projects

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### Master-Slave Robotic Manipulator | *Embedded Systems, Robotics, Web Development*

December 2025 - May 2026

- Developed a real-time leader-follower robotic system with WebSocket-based teleoperation, enabling synchronized motion control between leader and follower robotic arms.
- Implemented Forward/Inverse Kinematics, trajectory planning (MoveJ/MoveL), PID smoothing and a Three.js-based digital twin for real-time visualization and telemetry monitoring.

### Adaptive Hydraulic Suspension System | *MATLAB/Simulink, Control Systems*

July 2025 - December 2025

- Designed and simulated an active electro-hydraulic suspension system using a quarter-car model to improve ride comfort and vehicle stability under varying terrain conditions.
- Modeled hydraulic actuator dynamics and integrated them with the suspension system, validating performance in MATLAB/Simulink under multiple road profiles to achieve reduced body acceleration and improved damping response.

### Obstacle Avoidance for Industrial Robotic Arm | *Machine Vision, Path Planning*

March 2026 - May 2026

- Developed a vision-based dynamic obstacle avoidance system for an industrial robotic arm using multi-view cameras to detect humans and moving obstacles in real time for safer autonomous operation.
- Implemented obstacle position and height estimation, 3D safety block generation, and local trajectory deformation algorithms to enable adaptive path replanning without interrupting robot execution.

### PLC Automated Railway Crossing System | *Siemens PLC, Ladder Logic, Sensors*

July 2025 - December 2025

- Developed and simulated an automated railway crossing control system using Siemens PLC ladder logic and HMI for real-time monitoring, improving operational safety and reducing manual intervention.
- Implemented proximity sensor-based train detection and motor control logic to autonomously actuate railway crossing barriers, validating system response and fail-safe operation under multiple train movement scenarios.

### Construction Waste Management Robotic Arm | *Mechanical Design, Automation*

July 2025 - December 2025

- Designed and developed a robotic front-loader scooping mechanism to collect construction waste materials and autonomously transfer them into a designated disposal bin, improving waste handling efficiency.

- Integrated multiple sensors and fail-safe mechanisms into the scooping system to ensure reliable operation, enhanced safety, and effective waste collection under varying site conditions.

### **Autonomous Navigation in ROS 2** | *ROS 2, Path Planning, Simulation* **January 2025**

- Developed an autonomous mobile robot navigation system in ROS 2 by integrating localization, path planning, and obstacle avoidance algorithms within a simulated environment.
- Implemented and validated navigation workflows using ROS 2 simulation tools, enabling efficient path execution, collision avoidance, and real-time robot movement in dynamic scenarios.

### **Bio-Inspired Crashbox Design Analysis** | *ANSYS, Fusion 360, Structural Analysis* **July 2025 - December 2025**

- Designed and analyzed a bio-inspired crashbox structure aimed at improving impact energy absorption and crashworthiness for automotive safety applications.
- Developed and simulated an impact mitigation structure using ANSYS and Fusion 360, evaluating deformation behavior, stress distribution, and structural performance under collision conditions.

### **Battle Bot** | *Mechanical Design, Robotics, Technoxian 2024* **May 2024**

- Designed and fabricated a high-performance battle bot for Technoxian Robotics 2024, focusing on robust mechanical architecture, drivetrain optimization, and combat efficiency.
- Collaborated in developing combat strategies and system-level improvements, successfully advancing the robot to the semifinals through enhanced durability, maneuverability, and weapon performance.

## **Technical/Non Technical Skills**

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**Languages and Frameworks:** Python, Java, MATLAB, Ros2, Linux, Machine Learning

**Designing :** Solidworks, Fusion 360, Ansys, Altium, EasyEda

**Simulations:** ANSYS Electronic desktop, GAZEBO, Rviz, LTspice, Fiesto Fluid Sim

**Soft Skills :** Time Management, Communication, Adaptability, Problem-solving, Teamwork, Creativity, Leadership

## **Patents & Publications**

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### **Patent: A Fluid Container, and a Method for Cleaning the Same**

- Proposed an innovative fluid container design with an integrated cleaning methodology to improve maintenance efficiency and operational hygiene.

### **Publication: Machine Learning-Driven Suspension Diagnostics Using ARMA Vibration Features**

- Developed a machine learning-based predictive maintenance framework using ARMA vibration feature extraction and decision tree-based feature selection for suspension diagnostics.
- Benchmarked XGBoost, CatBoost, and LightGBM classifiers, achieving 97.5% diagnostic accuracy with XGBoost for real-time suspension fault detection.

## **Certifications**

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Complete AI & ML and Machine Learning

MATLAB Certification

SolidWorks Certification

ROS 2 Certification

## **Extracurricular/Clubs**

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### **HumanoidXVITCC**

**Mar 2025 – Present**

*Programming Lead*

*Chennai*

- Contributed to Ros2 implementation for robotics project.

### **IEEE Robotics and Automation Society, VIT Chennai Student Chapter**

**Aug 2024 – Present**

*Project Team Member*

*Chennai*

- Participated in robotics and automation projects, enhancing practical knowledge in collaborative engineering tasks.

### **ZERO BUGS CLUB**

**Apr 2024 – Jul 2025**

*Technical Team Member*

*Chennai, Tamil Nadu, India*

- Contributed to technical event organization and successfully conducted Tech Villa, supporting coordination, networking activities, and digital outreach initiatives.