



RAC, RBU

MARCH 2025

# REPORT AXIS 2025

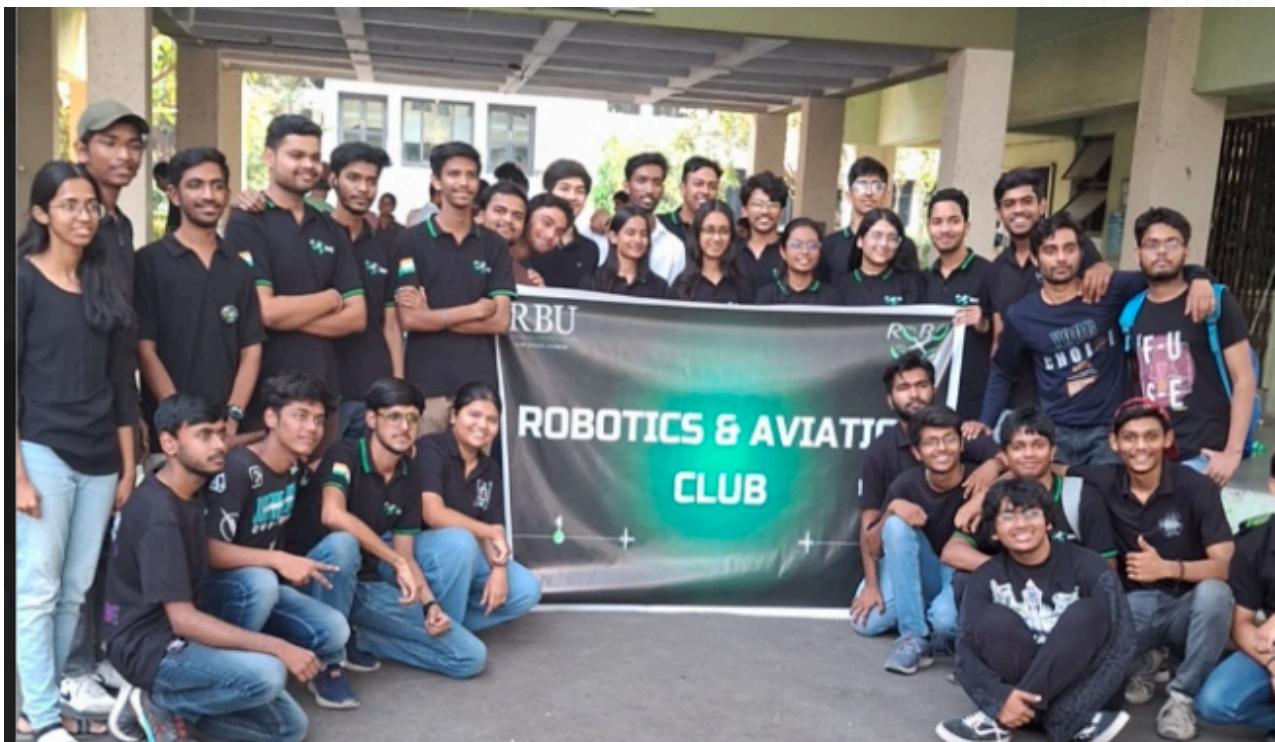
PRESENTED BY  
ROBOTICS AND AVIATION  
CLUB, RBU



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# ABSTRACT



Our team delivered an outstanding performance at AXIS VNIT 2025, showcasing exceptional technical skills, teamwork, and problem-solving abilities. The competition was fierce, with 62 registrations for Manual Robotics, 53 for Robo Soccer, 23 for Auto Bot, and 23 for Aqua Hunt, making our victories even more remarkable.

In the Auto Bot competition, we dominated the event by securing all three top positions—1st, 2nd, and 3rd place—triumphing over 22 competing teams. This achievement highlighted our excellence in designing and programming autonomous robots for line-following and maze-solving tasks.

Additionally, in the Aqua Hunt competition, our team demonstrated remarkable precision and strategic execution, earning a well-deserved 3rd place against 22 other participants. The success in Aqua Hunt showcased our proficiency in building and maneuvering aquatic robots capable of completing complex maze challenges.

Beyond the podium finishes, the event was a tremendous learning experience for everyone involved. Each participant gained valuable insights into robotics, programming, and problem-solving, significantly improving their technical skills and collaborative abilities. The competition fostered innovation, resilience, and teamwork, making it a truly enriching experience for all.



# EVENT DETAILS

AXIS, the annual technical festival of VNIT, Nagpur spanning over 3 days, from 21st March to 23rd March, is Central India's largest tech-fest, showcasing innovation, creativity, and technical prowess. Organized by students, it attracts participants from across India to compete in events spanning robotics, coding, design, and engineering challenges.

AXIS also hosts workshops, guest lectures by industry leaders, and exhibitions that inspire learning and collaboration. The festival provides a platform for budding technocrats to explore emerging technologies, network, and showcase their talents. Known for its diverse events and vibrant atmosphere, AXIS continues to foster technical excellence and innovation, cementing its position as a premier student-driven tech event.

- 01 Robotics
- 02 Engineering Challenges
- 03 Guest Lectures
- 04 Programming
- 05 Design And Innovation



# EVENT HIGHLIGHTS

We recently attended AXIS VNIT, a premier technical fest held at VNIT Nagpur, where we participated in a series of thrilling robotics competitions. The event provided an excellent platform to showcase our technical skills, creativity, and problem-solving abilities.

In the Autobot competition, we designed and deployed a line follower and maze-solving robot. The challenge tested the bot's precision in following complex paths and efficiently navigating through intricate mazes. In Robo Soccer, we entered a fast-paced robotic soccer match, where our robot competed with others in a dynamic, action-packed game, requiring both agility and strategic control.

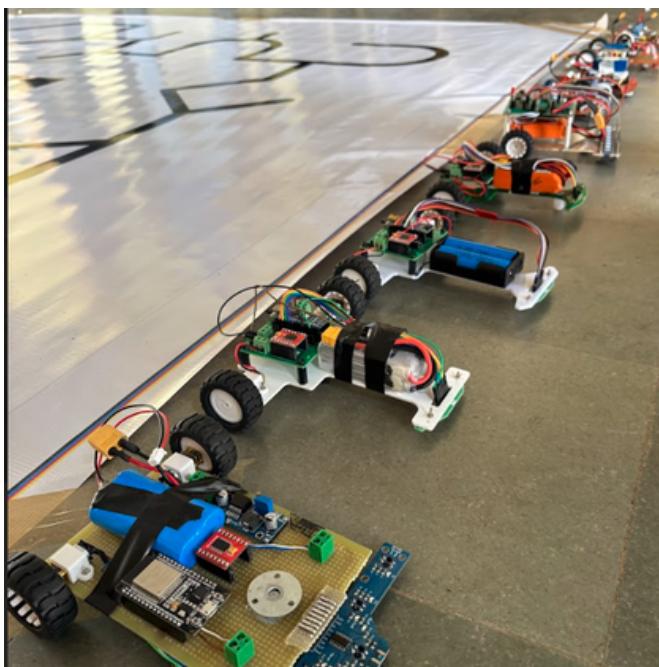
The Manual Robotics event featured a pick-and-place robot that had to traverse a challenging course while handling objects. This tested our robot's dexterity and our skills in remote navigation and precision control. Finally, in Aqua Hunt, we operated a boat equipped with a claw, aiming to pick and drop items while maneuvering through a water-based maze. This event demanded precise control and careful planning to successfully complete the task.

- 01 Autobot
- 02 Manual Robotics
- 03 Robo Soccer
- 04 Aqua Hunt



# EVENT HIGHLIGHTS

The line following bot we built for AXIS VNIT was designed to autonomously navigate a course by detecting and following a marked line. Equipped with infrared (IR) sensors, the bot accurately identified the path and made real-time adjustments to stay on track. The challenge included maze-solving capabilities, where the bot had to make intelligent decisions at intersections to find the optimal route. The event tested both the bot's efficiency and our programming skills, making it a rewarding technical experience.



- 01 AUTOBOT
- 02 Manual Robotics
- 03 Robo Soccer
- 04 Aqua Hunt

# EVENT HIGHLIGHTS

For the Manual Robotics event at AXIS VNIT, we built a pick-and-place robot designed to traverse a challenging course while handling objects with precision. The robot was equipped with a mechanical arm and claw controlled manually, allowing us to pick up, transport, and place objects at designated locations. The course featured obstacles and tight spaces, testing both the robot's maneuverability and our control skills. Successfully navigating the course required careful coordination, accurate handling, and strategic planning.



- 01 Autobot
- 02 Manual Robotics
- 03 Robo Soccer
- 04 Aqua Hunt

# EVENT HIGHLIGHTS

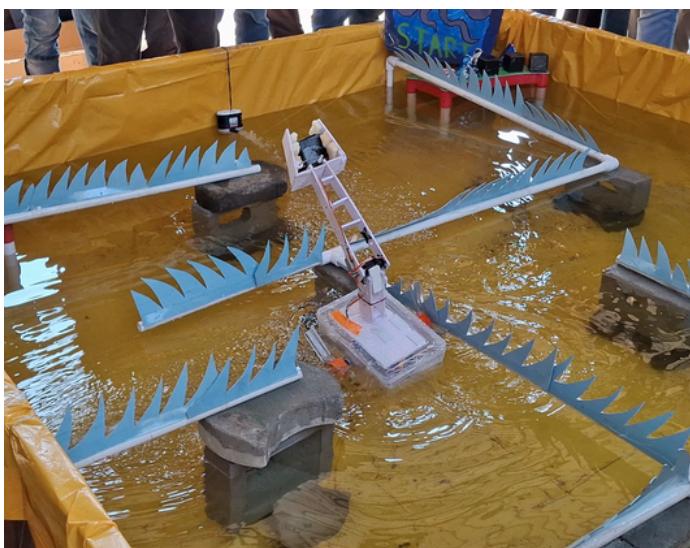
For the Robo Soccer event at AXIS VNIT, we built a remotely controlled robot designed to compete in a fast-paced soccer match. The robot was equipped with agile wheels and a kicking mechanism, allowing it to swiftly maneuver across the field and strike the ball with precision. The game required both offensive and defensive strategies, testing our robot's speed, accuracy, and responsiveness.



- 01 Autobot
- 02 Manual Robotics
- 03 Robo Soccer
- 04 Aqua Hunt

# EVENT HIGHLIGHTS

For the Aqua Hunt event at AXIS VNIT, we built a remotely operated boat equipped with a claw mechanism designed to pick up and drop items while navigating through a water-based maze. The boat was engineered for stability and precision, allowing it to move smoothly across the water and perform delicate pick-and-place tasks. The challenge involved accurately grabbing objects, maneuvering through obstacles, and strategically placing them at designated spots.



- 01 Autobot
- 02 Manual Robotics
- 03 Robo Soccer
- 04 Aqua Hunt

# TEAM DETAILS

## Members:

1. Arnav Tijare
2. Shreya Dhanuka

## Team-Repeaters

Autobot team-1

1st Position



# TEAM DETAILS

## Members:

1. Atharva Yadav
2. Akul Kute
3. Shivanand Gupta

## Team-Fine Line

Autobot team -2  
2nd Position



# TEAM DETAILS

## Members:

1. Kartik Dharmmali
2. Vikram Jaiswal
3. Prayas Thakre
4. Aniket Kumar

## Team-Bot-1

Autobot team-3

3rd Position



# TEAM DETAILS

## Members:

1. Saddichha Nikhare
2. Vedant Dehankar
3. Amogh Mandlekar
4. Yadnyesh Thakre

## Team-Path Pirates

Autobot team-4



# TEAM DETAILS

## Members:

1. Prathesh Agrawal
2. Yash Sharma
3. Udayraj Patil
4. Vaidehi Bhoyar

## Team-Hyperspace

Autobot team-5



# TEAM DETAILS

## Members:

1. Yogiraj Chauhan
2. Aditya Singh
3. Pranav Rathi
4. Rahul Akhare
5. Utkarsh Kale

## Team-We are RAC

Robo Soccer team-1



# TEAM DETAILS

## Members:

1. Aymaan Khan
2. Yashika Rathi
3. Dimple Sachanandani
4. Monojoy Dey
5. Shreyanshu

## Team- Marine\_Lifters

Aqua Hunt Team-1



# TEAM DETAILS

## Members:

1. Akshat Jain
2. Harshit Sahu
3. Moli Agrawal
4. Prathamesh Kale
5. Manthan Tapre

## Team-Aqua Warriors

Aqua Hunt Team-2

3rd Position



# TEAM DETAILS

## Members:

## Team-ZOMATO

1. Dhairyा Wegad
2. Sanchay Dubey
3. Revanshu Pusadkar
4. Saksham Goyal

Manual Robotics team-1



# TEAM DETAILS

## Members:

## Team-COSMOPRIX

1. Anurag Deshmukh      Manual Robotics team-2
2. Aishwarya Soman
3. Aryan Salve
4. Sanchali Chandankhede



# TECHNICAL DETAILS

## Technologies Used

**FOR Manual Robotics, Aquahunt & Robosoccer:**

- Johnson Motors: These high-torque DC motors provide the necessary power for robotic arm movement and gripper control, ensuring smooth and efficient operation.
- DC Motors: A DC motor is an electromechanical device that converts direct current (DC) electrical energy into mechanical rotational motion using the principles of electromagnetism.
- L298N Motor Drivers: These dual H-bridge motor drivers control the speed and direction of the Johnson motors, enabling precise movement control.
- Arduino Uno & Arduino Nano: These microcontrollers act as the brain of the system, processing commands and controlling the motors based on input signals. The Arduino Uno manages overall system operations, while the Arduino Nano handles specific tasks, such as servo control.
- ELRS Receiver & Transmitter: The ExpressLRS (ELRS) system enables reliable long-range wireless communication between the operator and the robot, ensuring real-time control with minimal latency.

**FOR AUTOBOTS:**

- ESP32: This powerful microcontroller serves as the brain of the robot, handling real-time processing, decision-making, and communication via Wi-Fi/Bluetooth for remote monitoring or control.
- N20 Motors: Compact and high-speed N20 gear motors provide efficient and precise movement, enabling the robot to navigate smoothly through lines and mazes.
- TB66 Motor Driver: The TB66 motor driver efficiently controls the N20 motors, providing stable operation, precise speed regulation, and direction control.
- IR Sensor Array: An infrared (IR) sensor array detects the path by distinguishing between dark and light surfaces, allowing the robot to follow lines accurately and make intelligent turns for maze solving.
- Voltage Buck Converter: A buck converter regulates the power supply, ensuring a stable voltage for the ESP32 and motors, optimizing efficiency and battery performance.



# AUTOBOT BUDGET

PER BOT(x5)

COMPONENTS	UNIT PRICE	QUANTITY	TOTAL
Esp32 (38pins)	400	1	400
TB6612FNG Motor	200	1	200
N20 Motors (300RPM)	200	2	400
Buck (XL4015)	40	2	80
QTR 8A IR-Array	1500	1	1500
3s Lipo Battery	900	1	900
Perf Board	40	1	40
N20 Wheels	35	2	70
Push Buttons	10	2	20
LED	2	2	4
Female Headers	-	60	40
Switch	10	1	10
Wires(1 M)	10	1	10
			TOTAL : 3674



# MANUAL ROBOTICS BUDGET

PER BOT(x2)

COMPONENTS	UNIT PRICE	QUANTITY	TOTAL
Arduino Uno	300	1	300
Jhonson Motor(300 rpm)	405	4	1620
Gear Motor(10 rpm)	180	2	360
Radio master Pocket	5000	1	-
Motor Clamps	80	4	320
Wheels	50	4	200
L298n Motor Driver	130	3	390
Battery 12V	2600	1	2600
Wires (Jumper set of 40)	80	1	80
Fly- Sky FS-i6 controller	4200	1	-
Receiver			
			TOTAL : 5870



# AQUAHUNT BUDGET

PER BOT(x2)

COMPONENTS	UNIT PRICE	QUANTITY	TOTAL
Arduino Nano	250	2	500
Nano Connector	-	1	-
DC Motor 500RPM	150	2	300
XT60 Connector	30	1	30
MG90s Metal Gear Servo	250	1	250
MG995 Metal Gear Servo	300	1	300
LM2596 Buck Converter	100	1	100
L298N Motor Driver	150	1	150
ELRS Receiver	-	-	-
Radiomaster Transmitter	-	-	-
Switch	20	1	20

**TOTAL : 1650**



# ROBO-SOCCER BUDGET

PER BOT(x1)

COMPONENTS	UNIT PRICE	QUANTITY	TOTAL
Arduino Uno	300	1	300
I298n	150	2	300
DC motors	150	4	600
Radio Receiver Transmitter	4000	1	-
MDF board	50	1	50
Wires	-	-	-
Wheels	-	4	-
Clamps	-	4	-
TOTAL :			1250



# GENERAL BUDGET

FOR COMOPNENTS BOUGHT BEFORE AXIS'25

COMPONENTS	UNIT PRICE	QUANTITY	TOTAL
<b>REUSABLE ITEMS</b>			
Autobot			
ESP32 Dev Board	340	2	680
Castor Wheels (N20)	43	2	86
N20 12V 600RPM	244	2	490
Mounting Brackets	40	2	80
QTR 16s Sensor array	1550	1	1550
QTR 8s Sensor array	110	1	800
L298N Motor Driver	150	2	300
TB66 Motor Driver	170	2	340
Manual Robotics			
Lipo 4S	1900	1	1900
MG90s	110	2	220
General Components			
LiPo Tester	110	1	110
Club Flex	300	1	300
Maze Track Flex	200	1	200
Nose Pliers, Pliers, Tweezers	-	-	-
<b>CONSUMABLE ITEMS</b>			
Glue Sticks	200	1	200
Zipties	100	1	100
Zero PCBs (4-5)	250	1	250
PLA Filament (2 Colors)	750	2	1500
Soldering Wires	180	2	360

REUSABLE ITEMS TOTAL : 7056  
 CONSUMABLE ITEMS TOTAL : 2410  
 TOTAL : 9466



# GENERAL BUDGET

FOR COMOPNENTS BOUGHT BEFORE AXIS'25

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TB66 Motor Driver	170	2	340
Manual Robotics			
Lipo 4S	1900	1	1900
MG90s	110	2	220
General Components			
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Club Flex	300	1	300
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# TOTAL BUDGET

AXIS 2025

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EXPENSES	TOTAL
COMPONENTS	9466
SERVICES	0
PARTICIPATION FEE	0
TRAVEL	0
TOTAL : 9466	



# RESULTS

Our team delivered an outstanding performance at AXIS VNIT 2025, showcasing exceptional technical skills, teamwork, and problem-solving abilities. The competition was fierce, with 62 registrations for Manual Robotics, 53 for Robo Soccer, 23 for Auto Bot, and 23 for Aqua Hunt, making our victories even more remarkable.

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