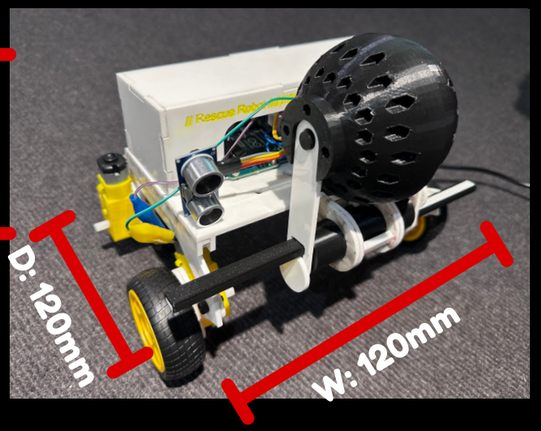
R2R TEAM 4

VINDEX
OPTIMUS AMICUS

Vindex (Latin for '**rescuer**') is a prototypical rescue robot designed for navigating a maze, identifying and collecting a "patient" (simulated by a tennis ball), and safely transporting this patient ball back to the origin outside the maze. The design utilises a **Double Scoop** system, an **Ultrasonic Sensor** to measure distance and combination **Gyroscope/Accelerometer** to map surroundings, and a **Colour Sensor** to identify the patient.

SIZE CONSTRAINT



WEIGHT CONSTRAINT

BUDGET

TOTAL ($)	118.29

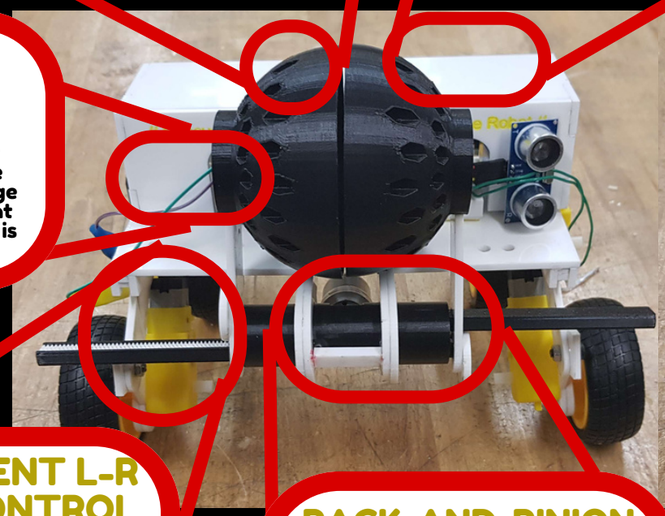
HARDWARE INNOVATION

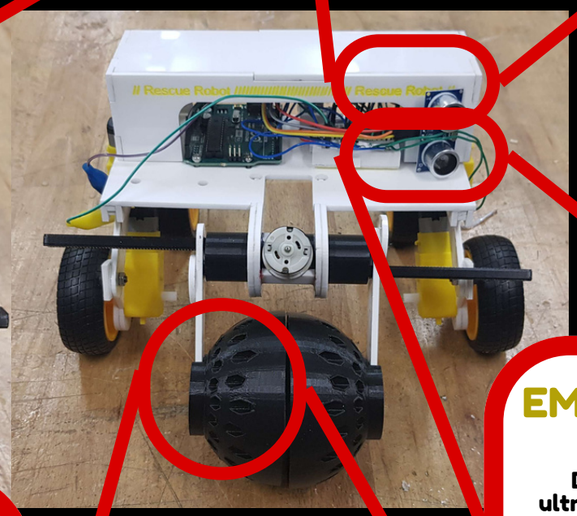
COLOUR SENSOR
To facilitate automation, a colour sensor has been implemented such that the robot can identify the tennis ball 'obstacle' to prepare its collection process.

ACRYLIC CASING
Using **laser-cut acrylic** for the suspension and chassis for both aesthetic (electronics covered) and safety purposes; further, its waterproof and chemically resistant nature (ISM, 2015) also makes it suitable for wet disaster environments.

TEXT DECALS
In thematic yellow; both the robot name and its purpose for easy identification

TORQUE-MAXIMISED CIRCUIT
The H-bridges are rated for highest current rating of the motor, maximising both voltage through H-bridges and current supplied to motors (as torque is proportional to current)





INDEPENDENT L-R MOTOR CONTROL

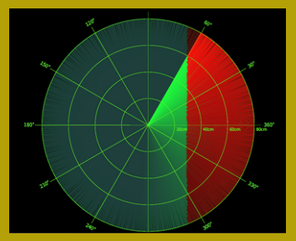
To manage motors with minimal uno pins available using **H-bridges**; both left motors have been assigned to same control, and both right, while each of the arm's motors is independently controlled.

RACK-AND-PINION LINEAR ACTUATOR
This system allows the scoops to open and close. **3D printed** rails with racks contained within move with a pinion at the center, powered by a motor. The rails slide through another 3D printed part, providing movement to the arms.

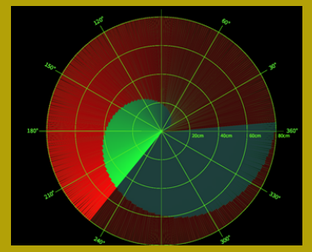
3D-PRINTED DOUBLE SCOOPS
With an inner diameter of 75mm, **enclose patient entirely** for safe transport. **Gear systems** and **rack-and-pinion** mechanism allows these arms to rotate up-down (pictured), and to 'clench' in-out.

EMERGENCY STOP
By utilising an ultrasonic sensor to measure the distance between the robot and an object, we can ensure that the robot stops moving before colliding with a wall.

SOFTWARE INNOVATION



Using our ultrasonic sensor and gyroscope, we can visually represent the immediate surroundings on a **radar-style output**.



AUTOMATION
The robot also uses a **closed-loop automation** system capable of detecting objects and changing direction without user inputs, **mapping out the course** in its process.

This includes navigating the maze, identifying the victim, collecting the victim, and returning the victim all **without the need for user interference.**