USE OF ROVERS IN SPACE EXPLORATION

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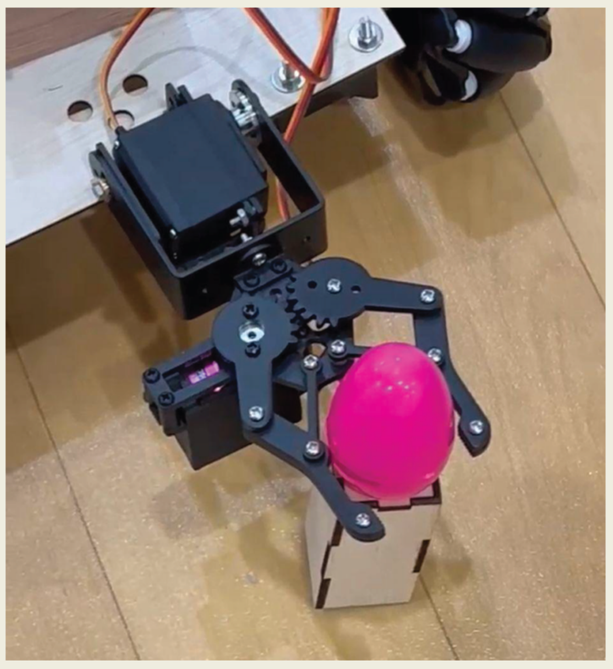
About the Camp

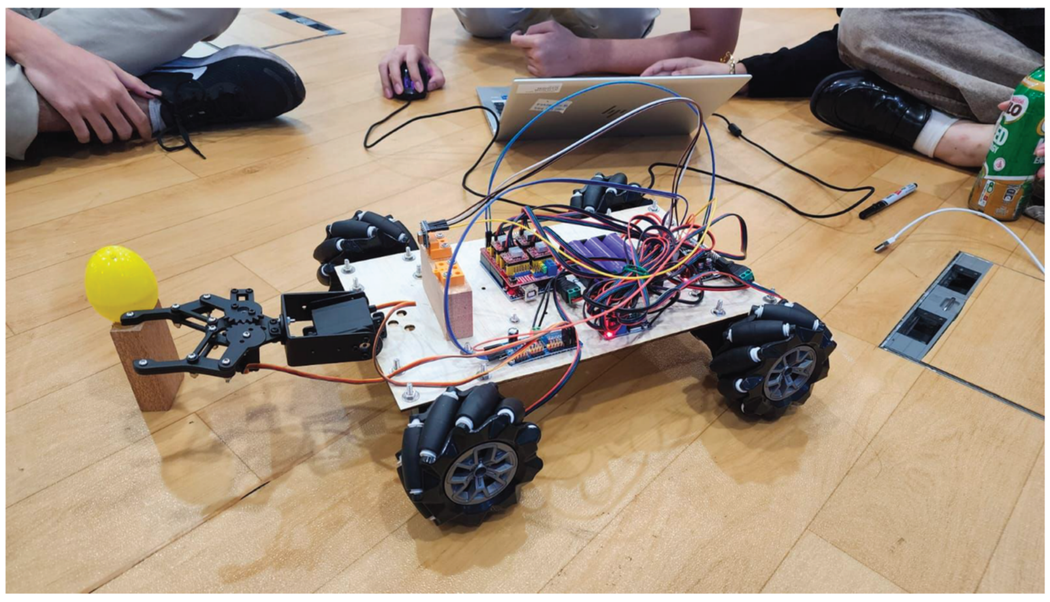
We programmed a rover with guidance from instructors to complete **three tasks:**

1) Retrieving fragile 'samples'
2) Using a claw attached to our rover to build a tower of wooden blocks
3) Using machine learning to allow our robot to recognise and return to our Martian base without manual control.

Precautions / Aims:

1) Retrieve as many egg samples as possible within a specified time frame, ensuring that none of the eggs were dropped during the process. However, there was an important restriction to keep in mind: we were not allowed to come into contact with any eggs that had been contaminated with radioactive material which were warmer than normal eggs. While we were equipped with a thermal camera, this definitely added layer of difficulty as it required us to carefully navigate the task, ensuring both efficiency and safety.
2) Stacking wooden blocks on top of one another using the claw of our rover.





Applications of Rovers

The competition was designed to simulate the operation of actual Mars Rovers, which travel along Mars' surface to **collect data and relay back to earth**. They mainly perform tasks like collecting rock or soil samples and taking images of the environment on Mars, which are very much like the tasks in this camp. Rovers are built to be very durable or self-repairing so that they can run for as long as possible without needing to be retrieved for repair.

Our strategy

Focusing on the first task, our competition strategy was to focus on efficiency by **minimising travel time**. By dragging the box closer to the samples, we reduced the distance between retrieval and deposit, allowing us to focus on handling the samples with precision and care to ensure that they remained intact. Furthermore, our user interface is designed to be intuitive, requiring minimal effort to control, ensuring **seamless integration** between user and machine, which is a cornerstone for any product's success.

Challenges

1) Rover's bumpy movements made our claw's grip on the eggs **unstable**.
2) **Too tight a grip** on the eggs would also cause them to break.
3) **Delay** between our control inputs and the robot's movements, which made micro-adjustments difficult.

Solutions

1) We lined the jaws of the claw with a soft, spongy material to create a **cushioning effect** and increase friction between the claw and the egg.
2) We designed three joystick controls for different speeds, so as to **maximise our precision control.**