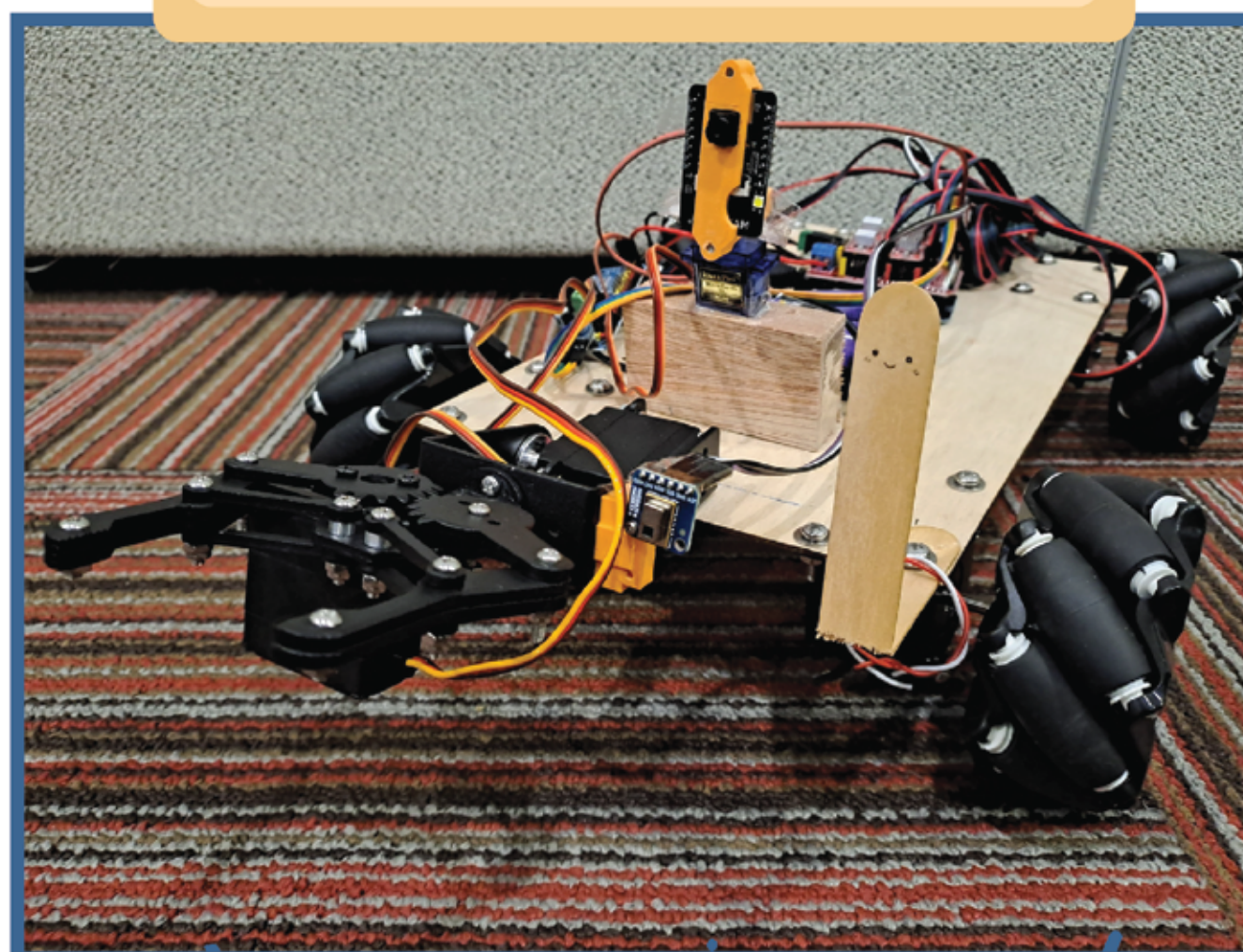


# AI IN SPACE EXPLORATION

## Members:

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## OUR ROVER



1

Space missions often operate in environments that are not suitable for humans. AI enables autonomous operation in these conditions.



2

Space telescopes and probes provide huge amounts of data. AI processes this data efficiently, identifying patterns or anomalies that humans might miss.



3

AI streamlines mission planning, resource allocation, and spacecraft maintenance, reducing the cost, complexity and possible human error of space exploration.



4

Computer Vision: Enabling machines to "see" and interpret visual information, crucial for analysing space imagery.



5

Machine Learning (ML): Systems that learn patterns from data to make predictions or decisions. Deep Learning: A subset of ML using neural networks to mimic the brain's processing of information.



## RELEVANCE OF SPACE TECH IN SINGAPORE

- National Security: Space tech strengthens defence with satellites for communication, surveillance, and tracking space debris.
- Urban & Environmental Monitoring: Satellite data helps in urban planning, disaster management, and environmental monitoring, supporting Singapore's Smart Nation initiative.
- Research & Development: Singapore invests in space science and collaborates internationally, developing its space capabilities.
- Global Diplomacy: Participation in global space missions boosts Singapore's international presence and strategic partnerships.
- Disaster Management: Space tech improves disaster preparedness and response by providing critical data.
- Future Technologies: Space supports the development of emerging tech like quantum communication and satellite internet.
- ASEAN Leadership: Singapore is a leader in promoting space cooperation within the ASEAN region.



## CHALLENGES WE FACED

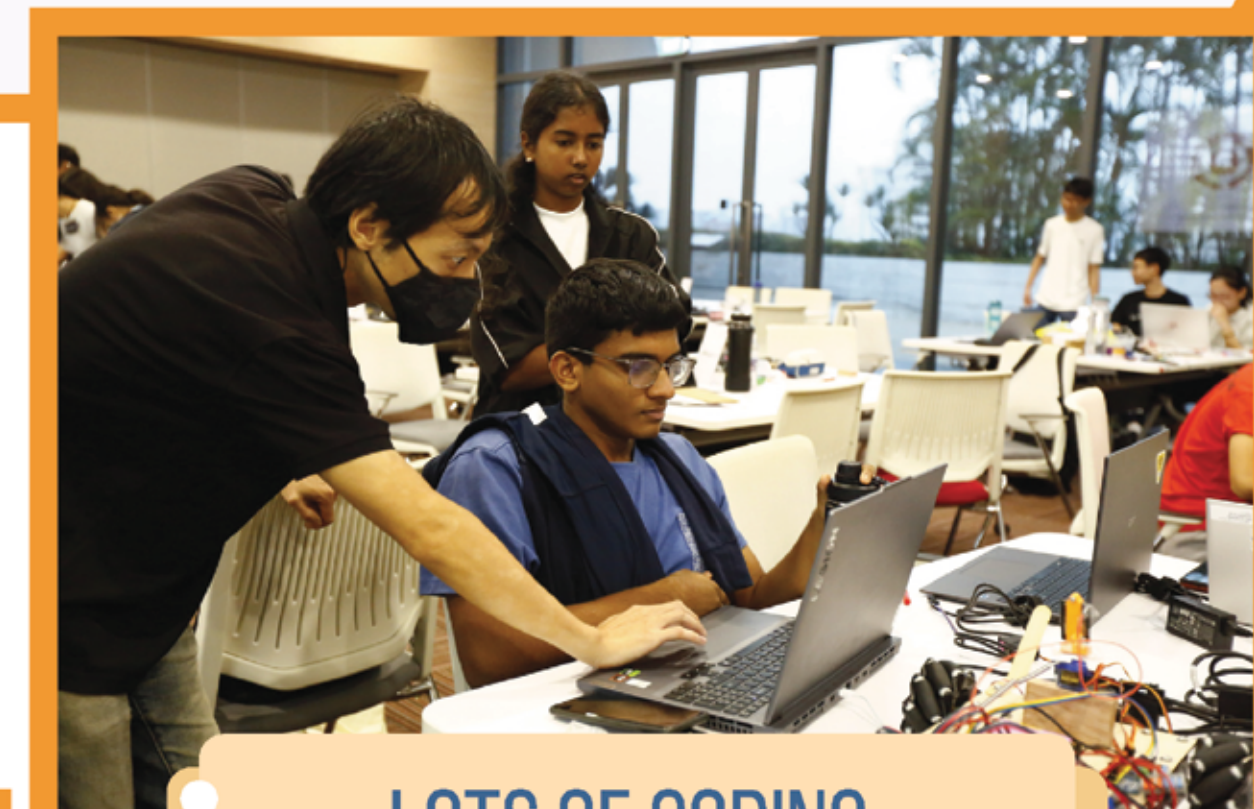
- Circuitry was quite complicated, numerous issues arose with many of the circuit components, as the inclusion of the rotating camera head added additional wiring.
- Sometimes the robot would break down and not respond to our code, causing us to spend a lot of time to solve the problem.
- The wireless control circuitry also did not factor in lag compensation, creating a disconnect from the pilots and the real time state of the robot.

## OUR EXPERIENCE

- We built a robot from scratch that was meant to resemble a Mars rover. We used the MQTT board, Arduino Uno, step motor drivers, servos, a camera and Mecanum wheels, along with the various wooden boards and paraphernalia used to construct the robot structure.
- We had to code the robot using Python-powered blocks in order to make the robot move.
- The robot featured step motor drivers to control the exact positional values of the Mecanum wheels, a rotating camera head for wider field of view, software facilitating an AI picture recognition and AI navigation modules for the robot to navigate the course without human input.



## OUR PRESENTATION ON AI IN SPACE



## LOTS OF CODING



## DRIVING THE ROVER AROUND THE OBSTACLE COURSE

