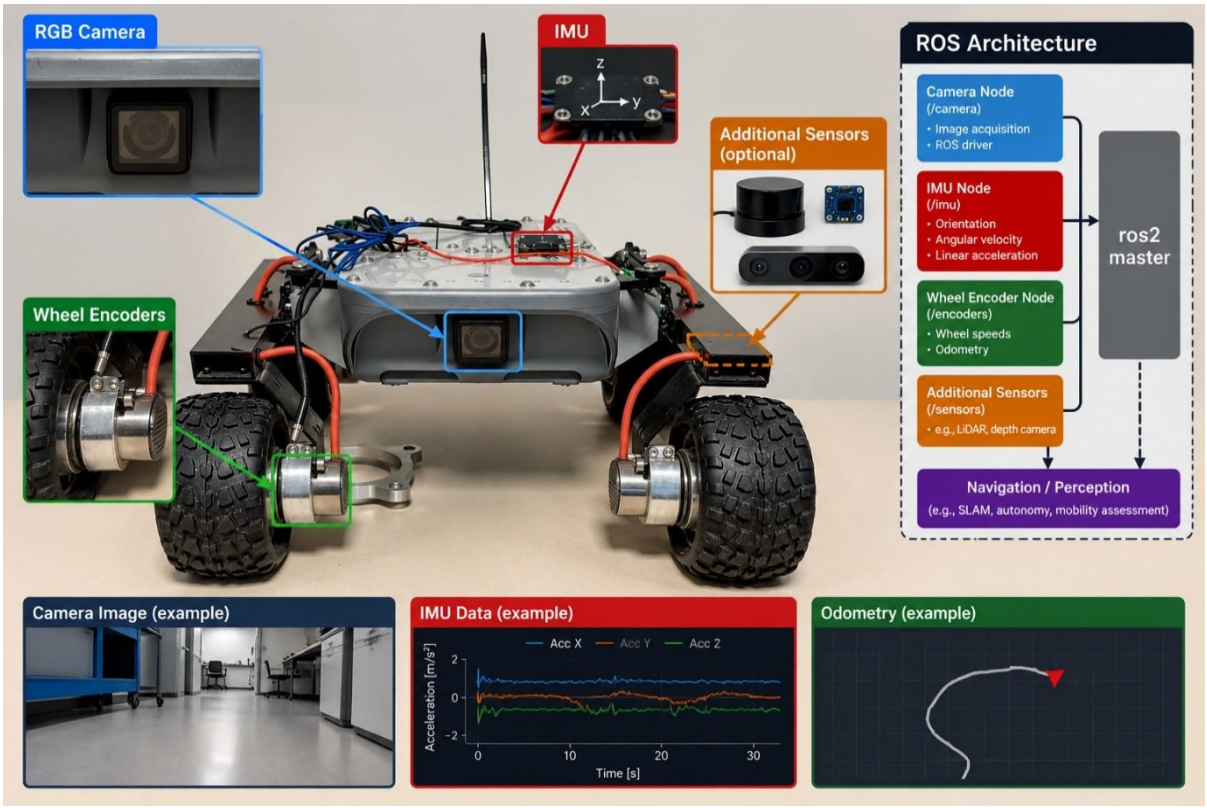
Student project: ROS-Based Sensor and Camera Integration for a Mobile Rover



This project focuses on developing a modular sensing and communication architecture for an existing mobile rover using ROS/ROS 2. The current optical camera will serve as the first imaging payload and will be integrated with the rover's IMU and wheel encoders. The system should provide synchronized acquisition of image and rover-state data, onboard processing capabilities, and wireless communication with a ground station.

As a first demonstrator, image data will be used to estimate the rover's ground-relative velocity and compared with velocity information obtained from the wheel encoders and IMU. The architecture should be designed so that the optical camera can later be complemented or replaced by advanced imaging payloads

Main tasks:

- Sensor integration: Integrate the optical camera, IMU, and wheel encoders into ROS/ROS 2.
- Data acquisition and synchronization: Develop synchronized acquisition and handling of image, IMU, and encoder data.
- Velocity estimation: Implement ground-relative velocity estimation using the optical camera and compare it with encoder- and IMU-based estimates.
- Sensor fusion: Investigate the combination of the different measurements for robust rover velocity estimation.

- Wireless communication: Implement communication between the rover and a ground station for telemetry, sensor data, and processed information.