

Faculty of Engineering

ASPIRE Summer Research Program 2026-2027

Project Title: **Predictable Base-Arm Coordination for Human-Guided Mobile Manipulation**

Supervisor(s):

Department:

Email:

Website profile of project supervisor:

Objective: Develop and evaluate a mobile-manipulation control system that compares an explicit, direction-based separation of mobile-base and arm motion with a coupled whole-body controller. The project will determine whether structured base-arm coordination can make user corrections more predictable and controllable without reducing task performance.

Project Details

The student will work with a Stretch 3 mobile manipulator and an existing shared-autonomy system, called GeoSACS (<https://dl.acm.org/doi/10.1145/3757279.3785579>) that follows demonstrated task paths while allowing joystick corrections. The project has three technical components:

- Implement a recent optimisation-based whole-body controller for coordinated base and arm motion;
- Refine and validate the existing deterministic base-arm decomposition method (<https://openreview.net/pdf?id=hYXqvx9QLE>);
- Run a controlled user study mainly comparing control predictability between the two approaches.

Project Timeline

TASK	1	2	3	4	5	6	7	8	9	10
Learn robotics basics, ROS 2, inverse kinematics, and mobile manipulation concepts and review relevant literature										
Become familiar with Stretch 3 and the existing GeoSACS system										
Implement and integrate the coupled whole-body controller										
Refine and validate the existing base-arm decomposition method										
Conduct a small user study and prepare the final report										

Prerequisites

Suitable for a third- or final-year student with Electrical or Computer Science Engineering or a related degree.

- Required: Python or C++, basic linear algebra, and familiarity with feedback control or robotics.
- Desirable: ROS/ROS 2, Linux, Git, robot kinematics, optimisation, or robot hardware experience.

Student Placement Agreement

A student placement agreement must be signed by the project supervisor and the student prior to commencement of the ASPIRE program. [LV0554-72741 ASPIRE Program Co-Curricular-Student-Placement-Agreement-Short-term.docx](#)

Additional Information

Applicants may be invited to a short interview. The project includes supervised work with a physical robot and a user evaluation.