

# Command-and-control Subsystem for Regolith Mining Robot

## CSE Member:

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## 1. Milestone 4 progress matrix

- a. \* means assistance from other team members working on the same subsystem.

Task	Implement server-client data reception	Visual Readiness Indicator	Prevent crash on disconnect	Implement rest of robot functions
Completion %	80%	100%	100%	60%
Pablo	80%	100%	100%	60%
To do	Implement signal strength	n/a	n/a	Await finalized hardware and implement

## 2. Current milestone summary

- a. **Implement server-client data reception** - We can now measure battery voltage and send it back across the stack to the control station. The method used to achieve this can be expanded to also include signal strength and any other data we might want to see during robot control.
- b. **Visual Readiness Indicator** - Previously, once the robot is powered on the operator had to wait and try repeatedly until they

were able to connect to it via the control station. Now, a yellow LED will light up when the robot is ready for operator control and can be connected to.

- c. ***Prevent crash on disconnect*** - The server software no longer crashes on disconnect and accepts new connections after an operator disconnects. This was done by catching the exceptions thrown whenever there is a disconnection, and by altering some of the control flow logic so the program doesn't terminate after a successful control session ends.
- d. ***Implement remainder of robot functions*** - Across the software stack the skeleton for the remainder of the robot functions now exists. Functions have been declared with empty implementations and the communications protocol is prepared to handle the new functionality. On the Control Station, the buttons are now there. On the Raspberry Pi, the functions are there to send commands to the Arduino. On the Arduino the functions have been declared but are empty until finalized hardware.
- e. ***Assemble and test mock robot hardware prototype*** - The robot used from FIT's NASA RMC team last year is being used as a test bed for software and electrical functionality. We've implemented the drive motors, actuators, drum and position motors. The excavation motor hardware remains unimplemented but it uses the same hardware from the drive motors so the code is likely to be identical. Additionally, the power facilities from last year's robot appear to be in decent condition and greatly help test the software and computing components.

### 3. Milestone 5 Plan

- a. \* means assistance from other team members working on the same subsystem. (on next page)

Task	Implement software killswitch	Finalize gamepad control scheme and code	Finalize robot functions on final hardware	Create Poster
Pablo	100%*	100%	90%*	100%*

#### 4. Milestone 5 Plan Description

- a. **Implement software kill switch** - In the event that the robot is in an uncontrollable state, having the option to remotely stop it with software is ideal. The intention is to create a button on the control station that will instantly cut power to the robot. This is going to be achieved via the clever use of a relay that gets activated by the arduino upon boot , and deactivated on-demand, therefore disconnecting the battery.
- b. **Finalize gamepad control scheme and code** - The gamepad functionality has been stagnant for a little while because the software subsystem is being tested on a mock hardware prototype and the structure of it is expected to change dramatically on the final hardware. Since the final robot is expected to be built or almost built by this milestone, work can begin on finalizing control elements by then and onwards.
- c. **Finalize robot functions on final hardware** - This will include the excavation motors, limiting the actuators and drum position motors in software so as not to break anything, setting speed levels for stability and robust control, and ludicrous amounts of testing every aspect of the project.
- d. **Create Poster** - The poster for the Senior Design Showcase will be created by this milestone. It's expected that the poster will be collaborative and include all aspects of the project, so the poster creation will be a collaboration of all the subsystem teams on the project.

**Sponsor feedback on each task for the current Milestone**

Implement server -> client data reception

Visual Readiness Indicator

Prevent crash on disconnect, accept new connection sessions

Begin implementing remainder of robot functions

Sponsor Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## Sponsor Evaluation

- Sponsor: detach and return this page to Dr. Chan (HC 322)
- Score (0-10) for each member: circle a score (or circle two adjacent scores for .25 or write down a real number between 0 and 10)

Pablo	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
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Sponsor Signature: \_\_\_\_\_ Date: \_\_\_\_\_