**Command-and-control Subsystem for Regolith Mining Robot**

**CSE Member:**

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**Other members:**

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1. **Milestone 6 progress matrix**
   a. * means assistance from other team members working on the same subsystem.

| **Task** | **Senior Showcase Demo Asmbly** | **Packet Queue Implemen-tation** | **Final Robot Electrical Assembly** | **User Manual** | **Demo Video** |
|---|---|---|---|---|---|
| Progress % | 90%* | 100% | 80%* | 100% | 100% |
| Pablo | 90%* | 100% | 80%* | 100% | 100% |
| To do | n/a - finished | n/a | Receive final hardware and place system inside | n/a | n/a |

2. **Milestone 6 Progress Task Description**
   a. ***Senior Showcase Demo Assembly*** - Due to the fact that the final robot hardware isn't fully complete yet, and wasn't at senior showcase, we created a board showing the electromechanical components of the robot. This board had a "drivetrain" style view of how the components interact with the software and showed their functions in the final design. I was involved in the assembly of all of

the electrical facilities on this display. It was functional at showcase but turning it on was not allowed.

b. ***Packet Queue Implementation*** - A long-standing issue in the project was that sometimes the socket from which commands are parsed on the on-board robot's computer got jumbled up leading to single errors. The system would quickly recover but it still resulted in a degraded user experience as some commands would be lost. Network communications to the robot's on-board computer have been redone with a packet queue implementation. The system will continuously receive commands and add them to the end of a queue, and another thread will read from the front of the queue any commands that might be available in a FIFO order. This has resulted in dramatically smoother network communication between the Control Station Laptop and the on-board Raspberry Pi computer.

c. ***Final Robot Electrical Assembly***- On the display board used for senior design showcase, a close to finalized version of the electronics assembly is being used. This is currently where electrical systems are being worked on because the final robot hardware isn't ready yet. We've taken steps to minimize the amount of wiring used to minimize points of failure. This is done by using direct connections from one point to another rather than adapters and connector expansion. Additionally, the most difficult wiring to work with (motor control wires) have all been labeled to assist in assembly on the final robot hardware. The electrical system is operational and we're waiting on the final robot hardware to perform final assembly and testing.

d. ***User Manual***- A very detailed guide for how to start up and use the system has been created and can be found on the project website at http://pa.blocanse.co/nasarmc at the bottom of the page.

e. ***Demo Video*** - Video footage has been recorded and edited. It depicts the software subsystem in action, as well as the startup procedure and some notes/considerations regarding use of the

system. It's also available at http://pa.blocanse.co/nasarmc at the bottom of the page.

3. **Competition Plan**
    a. * means assistance from other team members working on the same subsystem. (on next page)

| **Task** | **Create System Startup Checklist** | **Final Robot Assembly** | **Test robot Apr 22 ~ May 15** | **Attend NASA RMC** | **Incidental Tasks that may come up.** |
|---|---|---|---|---|---|
| Pablo | 100% | 50%* | 95%* | 100%* | - |

4. **Competition Plan Description**
    a. ***Create System Startup Checklist*** - Last year, the team wasn't very organized in the sense that there were no formal procedures for working with and interacting with the robot. This year, we plan to bring to the competition a system startup checklist to ensure we're able to get up and running as quickly as possible.
    b. ***Final Robot Assembly*** - The carbon fiber parts are currently being manufactured. We anticipate having the final robot hardware no later than April 18th. Following this, the electrical assembly will take place in the following days and we'll have an initial functional prototype by April 22nd. Failure to meet this deadline will result in not being able to attend the competition.
    c. ***Test Robot 4/22 ~ 5/15*** - After creation of the initial functional prototype, gratuitous testing of the system will take place. Benchmarks of how much material is excavated will be taken, as well as software tweaks to optimize the system's stable operation vs. speed of function execution. This is the time to be used for ironing out any final imperfections in the entire system.

d. ***Attend NASA RMC*** - The 2016 NASA Robotic Mining Competition will take place the week of May 16th. The plan is to attend the competition and operate the robot during the team's scheduled competition runs.
e. ***Incidental tasks that may come up*** - If a task comes up that I have the ability to help the team with, I will aid them to the best of my ability to help assure good performance in the competition.

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

Senior Showcase Demo Assembly

Packet Queue / System Networking Reimplementation

Final Robot Electrical Assembly

User Manual

Demo Video

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 |

Sponsor Signature: _____ Date: _____