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INTERIM REPORT #1

The MSL IPE (Integrated Planning & Execution) team has the responsibility to design the operational concepts and tools for developing the uplink products of the MSL mission. The team creates procedures that include planning and sequencing in which efficiency is a crucial component. Working on the MWG (Margin Working Group) has been thus far a very rewarding learning experience. Analyzing the Margin use in the past 2000< soles, I have been able to gain insight into how the rover operates in the deeper and complex level. Continuing from former employee Chris Bennett's MWG (Margin Working Group) project, I have been rebuilding Chris's work with updated documentation and versatility in the program. As the radioisotope thermoelectric generator (RTG) on the rover slowly degrades, reducing the rover's idle time as much as possible is the end goal.

More than 30,000 EVR (Event Reports) are generated in a single sol. One of the barriers I faced was determining which EVRs are safe to disregard. Fortunately, Chris Bennet had .json files that have already nicely filtered the EVR files. However, understanding the underlying systemic iterations the rover is operating every execution is important to go further beyond in deeper levels of analyzing the margins. With the help of Jack Quade, I went through the MSLICE program and how the tactical team used it to generate master/sub-masters. MSLICE is a GUI developed by JPL for the use of ease by the engineers.

Thus far, I have augmented Chris Bennet's work with added versatility with the visual representation of the charts and graphs. To keep program sustainable as possible, I rebuilt the program in Python 3 instead of Python 2 because Python 2 is discontinuing in 2020. Furthermore, Chris used matplotlib but I decided to use Plotly due to the concern of matplotlib being outdated and the simplicity of Plotly. Future software engineers will be able to understand and edit Plotly code in an easier level than matplotlib. Additionally, the interactive aspect of the Plotly charts is a great benefit. Despite the changes, most of my time has been used tinkering with unix and getting a better understanding of the command line operations on the surface level. For example, the IPE team uses MSLRED, (a shared server among the IPE team), that has numerous built in commands. The command I needed to understand was chill_get which was essentially extracting the EVR files from the dataserver. Evan Graser, part of the software side of the IPE team, was able to guide me towards the right resources.

Conclusively, continuing with this project is to get a better understanding where this project is headed and what kind of tools I will need. As the ambitious individual I am, I want a program that will use complex statistical methods and machine learning to predict what the most efficient margin use would be. James Hazelrig once mentioned that he wants the

program to analyze the execution times in the deepest level of almost machine code. There are obviously insurmountable aspects the MWG can count for and as I learn more about the Curiosity rover everyday, I have a greater sense that I am part of the team and influencing for the greater good.