CS-537 Group-7

SAM Module Report

How SAM works:

The Sample Analysis at Mars (SAM) investigation onboard the Mars Science Laboratory (MSL) Curiosity rover is designed to investigate the chemical and isotopic composition of the Martian atmosphere and volatiles extracted from powdered solid surface samples. It will conduct a sensitive search for organic compounds and measure the isotopic composition of carbonaceous material. SAM's investigations support the mission goal of quantitatively assessing the habitability of Mars, an essential step in the search for past or present life on Mars, with investigations in Gale Crater.

Compiling and Running of SAM:

1. Download / Clone this project in Eclipse.
2. Build this project.
3. Remove any libraries problem. Import the json and gson libraries in the Java Build path from the libs in SAM.
4. Use latest Java version 1.8.
5. Under src in the SAM.SamTestMain package,you can run the samTestMain.java to get the commands running.
6. SAM will start execution and two threads will be generated for the client and the server.
7. Client will send various commands to the server from the commands.txt file and the server will respond back with the appropriate response.
8. The output dataset is generated in 7.json file which is located under src/SAM/SamModule folder.

Commands for SAM:

* SAM\_ON - Turns on the SAM device.
* S-PYR - Executes the pyrolysis experiment
* S-DER - Executes the derivatization experiment
* S-CMB - Executes the combustion experiment
* A-DIR - Executes the direct atmospheric measurement experiment.
* A-ENR - Executes the atmospheric measurement experiment.
* A-MET - Executes the methane enrichment experiment.
* A-NGE - Executes the noble gas enrichment experiment.
* CAL-GAS - Executes the in situ gas calibration experiment.
* CAL-SOL - Executes the solid sample in situ calibration experiment.
* SAM\_OFF - Turns off the SAM device.
* EXIT - Shut down the server socket.

Achievements:

We have achieved the necessary functionalities keeping in mind the fundamental requirements. The module software, developed by the previous participants in the SAM module, is fundamentally incorrect. Observing the mistakes from this previous work, we found the necessity to redesign the module specific software programs and construct a whole new structure on which future enhancement can be easily performed. We have redesigned the module to perform all the experiments crucial to the SAM instrument suite and MSL. As the result of which, our module software will gather all the data from all the experiments performed in SAM, which data can further be received on earth for analyzing the atmosphere and past and present habitability of the mars.

Future Scope:

For the SAM module, the enhancement next to be performed should be more focused on developing the instrument specific software programs which can be integrated into the whole module software easily and efficiently. The enhancement should also cover the subsystems used in the SAM module other than the instrument suite(GC, QMS and TLS). It should also support the asynchrony for the emergency response of the SAM module. At last, the data should be more detailed and module should be efficient enough to include in the data the observations for the experiment environment to achieve precision for analytical purposes.