Mars Rover

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This essay is the summary of some professional articles about Mars Rover and it will talk about one of the Mars Rovers of NASA which is Curiosity and its functionality, usability and contribution.

Curiosity was launched from Cape Canaveral on November 27, 2011 at 15:02 UTC aboard the MSL spacecraft. After launching, the rocket drew a beautiful arc in the sky. On August 6, 2012, 05:17 UTC, Curiosity landed on Aeolis Palus in Gale Crater on Mars. The landing was perfect, the MSL spacecraft landed gently on ground by using a big parachute. Then, Curiosity got out from the MSL successfully and on its own way to discover this unbeknown planet - Mars.

First of all, let’s talk about the functionality and usability of Mars Rover. Curiosity as a splendid Mars Rover, it definitely has the best cameras, which includes Mast Camera, Mars Hand Lens Imager, Mars Descent Imager, Chemistry and Camera and so on. These cameras help Curiosity to discover Mars easily and clearly, for example, capture high resolution colour pictures, record video of the rover’s descent to the Martian surface, get up-close looks at Martian rocks and soil and so on. Most importantly, it has an awesome Alpha Particle X-Ray Spectrometer which sits at the end of Curiosity’s arm, measures the abundances of various chemical elements in Martian rocks and dirt.

In addition, the heart of Curiosity is Sample Analysis at Mars (SAM) and it makes up about half of the rover’s science payload. SAM is formed by three separate instruments – a mass spectrometer, a gas chromatograph and a laser spectrometer. These instruments search for carbon-containing compounds, the building blocks of life as we know it and other elements associated with life on Earth, such as hydrogen, oxygen and nitrogen. Scientists are excited about the drill because they can see the inside of Mars.

Moreover, Curiosity also has the job to discover the minerals on Mars and quantify their abundance. Therefore, it equips the Chemistry and Mineralogy (CheMin) which identify different types of minerals on Red Planet, quantify their abundance and helps scientists better understand past environment conditions on Mars by shining a fine X-ray beam through the sample, identifying minerals’ crystalline structures based on how the X-rays diffract and sending the data back to Earth.

Furthermore, Curiosity could also measure weather, temperatures and pressures on Mars by Rover Environmental Monitoring Station (REMS). REMS is a Martian weather station and it measures atmospheric pressure, humidity, wind speed and direction, air temperature, ground temperature and ultraviolet radiation. All of this information records daily and sends seasonal reports to scientists which will make a huge contribution to Red Planet immigration in the coming future.

Secondly, let’s talk about the progress that Curiosity has made on Mars for almost 5 years. After landing, the primary mission for Curiosity is to determine if Mars is or was, suitable for life. It carries several instruments on board that can bring back information about the surrounding environment. Drilling is a perfect way to discover the history of Mars. The first drill was very successful because scientists almost got what they want from the powder samples which included sulfur, nitrogen, hydrogen, oxygen, phosphorus and carbon. These fundamental elements could definitely support life. However, after a few months of analyzations, NASA state that “While the team can’t conclude that there was life at Gale crater, the discovery shows that the ancient environment offered a supply of reduced organic molecules for use as building blocks for life and an energy source for life.” Therefore, it is hard to say that there was life on Mars and humans can live on Mars without any difficulty which means scientists and Mars rover still have to do a lot of explorations, analyzations and researches on this. It is clearly that Curiosity’s first mission didn’t have a comprehensive conclusion, but it just need a lot of time to finish this mission.

The second mission for Curiosity is to check out the environment. Some of instruments on board that are designed to learn more about the environment surrounding it. The goal of this mission is to have a continuous record of weather and radiation observations to determine how suitable the site would be for an eventual human mission. Curiosity measured the radiation on the ground and in the atmosphere. After a couple months of explorations, scientists found out that a mission with 180 days flying to Mars, 500 days on the surface and 180 days heading back to Earth would create a dose of 1.01 Sieverts which is harmless for any human being.

In addition, Curiosity also measured the wind’s speed and chart its direction, as well as determining temperature and humidity in the surrounding air. After a couple years of analyzations, scientists were able to see long-term trends in atmospheric pressure and air humidity. These are some very valuable results that discovered by Mars rover and NASA. Therefore, the second mission was finished successfully because scientists found out the details about the environment on Mars and Curiosity did an excellent job.

Thirdly, let’s look at some difficulties that Curiosity has encountered on Mars. In February 2013, the first major problem happened. A computer glitch punted the roving laboratory into safe mode for a few days and it caused an interruption of normal science activities, but fortunately did not impact the rover’s long-term health. Clearly, this computer is a hard real-time system which means deadlines are critical. Once misses the deadline, it would cause some very serious problems.

Moreover, the real long-term issue is that the state of the rover’s wheels is getting worse and worse. Some holes have appeared on the wheels and Curiosity cannot drive to anywhere if any wheel is broken. It is also impossible to change some wheels for it because there isn’t a robot can help and it will cost too much money to send a robot to Mars and change wheels for Curiosity. Therefore, some Scientists from NASA are worried about that and they said the rover should do less driving and more searching for habitable destinations. Therefore, the new mission for Curiosity is to see how the climate of Mars changed from a wet past to the drier, acidic conditions of today. This is a very interesting mission because lots of people and scientists are curious about this and they want to know the answer of this question more than Curiosity does.

There are some recent articles about the latest state of Curiosity, so let’s talk about it. After a recent check, one of six wheels has break in its zigzag trends. This issue was caused by rough terrain on Mars, but it won’t keep Curiosity from completing its mission. In addition, this issue will give NASA valuable clues about how to hone the design of an upcoming rover. The new rover will launch in 2020 and it will have thicker wheels with curved rather than zigzag grousers which means new wheels will be much stronger and durable for working and driving on Mars.

Furthermore, there are some good news, Curiosity’s primary mission was fulfilled within the rover’s first year on Mars, when it found out that Mars once had liquid water and chemical ingredients for life, which means Mars was suitable for life before. Then, this question comes, “how an environment that was very wet became more harsh and dry?” which is the new mission talked above. Undeniably, Curiosity still has more work to do to figure out this complex question and complete the mission.

Overall, Curiosity doesn’t seem particularly bothered by the damage to its wheel and it has made a lot of progress on Mars. It is showing its age and that’s not all that bad. Curiosity as a Mars rover, it is doing its job nicely and carefully. It has already won the hearts of people back here on Earth. More than 3.6 Million people follow Curiosity on Twitter and 5 million people watched its landing on TV or online stream in 2012.

Have a nice day, Curiosity!

References

**Belani, A. (2017, March 30). NASA's Curiosity Mars Rover Is Showing Its Age, but That's Not All Bad. Retrieved May 27, 2017, from** <http://www.nbcnews.com/mach/space/nasa-s-curiosity-mars-rover-showing-its-age-s-not-n740541>

**Wall, M. (2011, November 20). 11 Amazing Things NASA's Huge Mars Rover Can Do. Retrieved May 27, 2017, from** <http://www.space.com/13689-nasa-amazing-mars-rover-curiosity-science.html>

**Howell, E. (2016, May 13). Mars Curiosity: Facts and Information. Retrieved May 27, 2017, from** <http://www.space.com/17963-mars-curiosity.html>

**Curiosity (rover). (n.d.). In Wikipedia. Retrieved May 27, 2017, from** <https://en.wikipedia.org/wiki/Curiosity_(rover)>

**Wall, M. (2017, May 15). A Glitch Nearly Killed NASA's Curiosity Rover After 6 Months on Mars. Retrieved May 27, 2017, from** <http://www.space.com/36841-mars-rover-curiosity-computer-glitch-60-minutes.html>