Goddard Engineer Creates Instrument for Mars Mission

By Cynthia O'Carroll

Jesse Lewis may be young but he plays a significant role in the success of the Mars Science Lab (MSL) mission. At only 25 years of age, he has designed and built an intricate tool to process soil samples for the Sample Analysis at Mars (SAM) instrument suite that will head to Mars aboard the MSL in the fall of 2009.

Led by NASA's Jet Propulsion Laboratory in Pasadena, Calif., MSL is the next step in NASA's Mars Exploration Program, a long-term effort of robotic exploration of the red planet. The MSL rover will comb the surface of the planet looking for clues that Mars once supported microbial life and may still today.

The SAM instrument suite is being assembled at NASA's Goddard Space Flight Center in Greenbelt, Md. Paul Mahaffy is the Principal Investigator for SAM, and is also the Chief of Goddard's Atmospheric Experiment Laboratory. The science team hopes that SAM will identify carbon compounds, search for water, and detect molecules relevant to terrestrial life.

As a child, Lewis was enthralled by all things "space and NASA," and knew he wanted to contribute to the field somehow as an adult. "I was in awe of NASA and those that accomplished great, almost magical feats. I have always wanted to be a part of that magic," stated Lewis.

During the last three years, Lewis has been dedicated to completing the design and build of the Solid Sample Inlet Tube (SSIT). The SSIT is a funnel system that will deliver a freshly gathered soil sample to 1 of 74 tiny cups for testing. Once a sample is dropped into the funnel, it begins to vibrate at various frequencies to shake off different sized particles for further evaluation.

The funnel system has a heater that will come in handy for processing any soil that might contain ice, preventing it from becoming a muddy clog in the narrow tube, then delivering it as dry loose particles to the testing cups below. Once in the tiny cups, each soil sample is heated in a helium carrier gas flow to drive off gasses that are then analyzed by SAM's Quadruple Mass Spectrometer.

The design phase of the SSIT started late in SAM development, and the SSIT interfaces were already completed. Lewis was then faced with the task of crafting a funnel system that would fit in the allotted space. He met the challenge by designing a funnel system that uses a canted shape, meaning each of the funnels are flat on one side and are set at an angle. A piezoelectric actuator is in place to violently shake the SSIT to help prevent clogs in the funnel. His design is a redundant system with two funnels in case one becomes blocked or damaged during the mission.

The actual SAM SSIT flight model is 90% complete and will be delivered in May. The flight-like qualification unit has safely completed vibration testing that simulates the level of stress encountered during launch. The qualification unit is currently preparing for thermal vacuum testing and is expected to be flight qualified soon.

Lewis started working at GSFC when he was 17 years old, while a freshman at the University of Maryland, College Park. He is a skilled electro-mechanical systems engineer, providing engineering support for his employer, Stinger Graffarian Technologies (SGT). Lewis is also working on his masters degree in mechanical engineering at the University of Maryland, College Park.

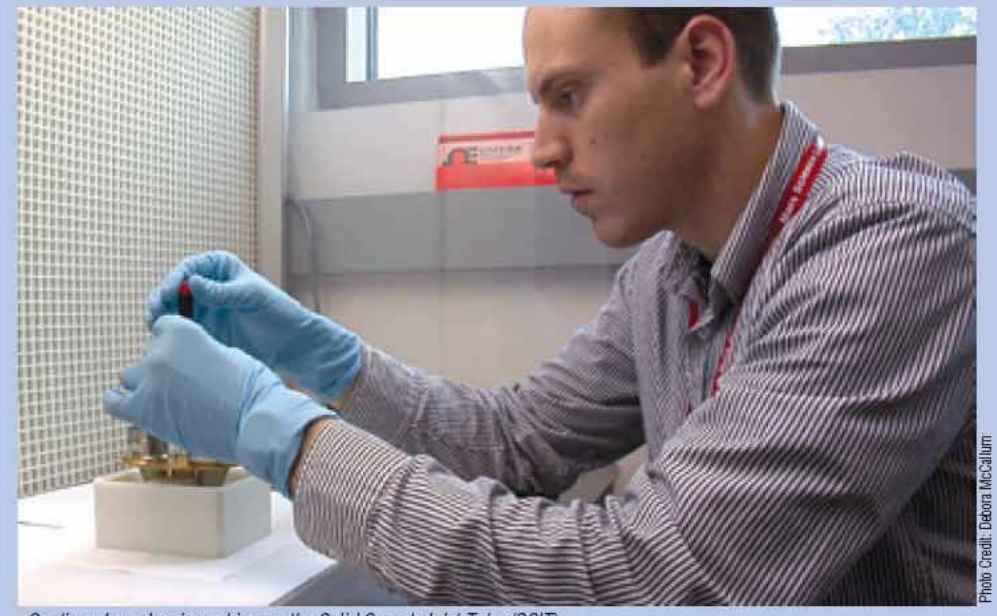

Photo Credit: Debora McCallum

Caption: Jesse Lewis working on the Solid Sample Inlet Tube (SSIT).

For more information about SAM, visit: http://ael.gsfc.nasa.gov/marsSAM.shtml. For more information about MSL, visit: http://mars.jpl.nasa.gov/msl. ■