PROGRESS UPDATE

September 1, 2018

While slow at first, consistent progress is being made toward developing a large-scale 3D-printer capable of producing structures using only in situ and mission-recycled materials. Currently, a significant effort is behind prototyping and testing of the full-size printing apparatus, consisting of an extrusion mechanism and material hopper. The design the team is working with is of course functional on Earth; but, it is being geared toward the material collection scheme the team envisions rovers would use on Mars.

The multi-axis robot to be used for movement of the material deposition apparatus is on order and will be delivered shortly. The cleanroom (further details at left) and all necessary infrastructure upgrades for installation are in progress.

In tandem with equipment design and robot installation, work is progressing on a comprehensive mechanical evaluation of the sulfur-based Martian concrete (Marscrete) material. While initial studies have been performed by internal and external institutions; no comprehensive studies exist, and there are few using the exact materials Northwestern is currently using. Additionally, the team is exploring deterioration mechanisms that may exist on Mars, as well as Earth (for traditional sulfur concrete).

While gearing up for the November qualifying deadline, the Virtual Construction team is on hold. They have been reassigned to various areas of the physical 3D-printing competition. As time progresses and fabrication duties dwindle, work on the Virtual Construction Competition will resume.

Our Robot Cleanroom.
The Northwestern Team is progressing forward with the physical 3D-printing habitat competition. In order to contain and properly ventilate the fumes created from the sulfur-based Martian concrete (Marscrete) used, a cleanroom-type structure is being erected in the Northwestern Center for Sustainable Engineering of Infrastructure Materials Laboratory. The structure will create an internal negative pressure to securely and safely ventilate gases. The structure under consideration is modular in construction and will allow for transportation off-site to later external competitions and demonstrations.

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