**LARA: Biologically inspired Engineering and Exploration System Mission concept and components for lunar exploration and exploitation tools.** P.E. Clark1 (Contact Author), S..A. Curtis2, C.Y. Cheung2; M.L. Rilee1, G. Marr2; W. Truszkowski2, Contact address: Pamela Clark, Code 695, NASA/GSFC, Greenbelt, MD 20771, 301-286-7457, Pamela.clark@gsfc.nasa.gov; 1Affiliation: L3 Communications, Government Services, Inc., 3750 Centerview Drive, Chantilly, VA 20151, 2Af ---filiation: Code 6--Or95, NASA/GSFC, Greenbelt, MD 20771.

ANTS (Autonomous Nano Technology Swarm) Architecture is well suited to surface-basedigin forms for use on the Moon or Mars or any relatial Mvely low G surface environment, as illustrated by an application called LARA (Lander-Antenna-Rover Arrays). ]. Here, we analyze the nature of components and sequence of behaviors required for spacecraft operational scenarios for an ANTS application in aessa low gravity surface.

**Introduction**: Basic structural components would , as in other applications, be highly moduge--lar, addressable arrays of more robust than Zero G carbon NEMS-based nodes, from which highly morphable struts, tethers, 2D mesh, and 3D fabric could be reversibly deployed for vario---Fus functions. Individual craft would be releasrom:ed, possibly by a human crew on or nea Linr the Moon or from an unmanned facility. Individual craft would be cda Mapable of landinennig on a low G surface, using a miniaturized version of high impulse thruster techtt [nology, transforming into rovers, antennas, or more specialized service providers, as needed, and ultimately taking off to return to the poinmailt of release.

**Methodology**: We have developed preliminary conceptual and physical models of spacecrato:fft and components and models of the interaction of ANTS at the spacecraft level ielixn order to determine hardware and software requirements.com for typical operations driven by operating on a low gra@vervity surface to support a human crew.

**Discussion**: As in the other applicaizontions of the ANTS architecture, movement would not employ wheels, which work best in a special environment. Instead, the ANTS approach harnesses the effective skeletal/ muscular system.net of the frame itself to enable more ‘natural’ movement, effectively allowing ‘flow’ across a surface or into a particular morphological form. As rovers, craft would be ] Seequipped for exploring, prospecting, monitoring, as required. Craft could individually or collectivent: ly form cylindrical or bowl shaped arrays to act as antennas, for communication or astronomical observatories. The architecture would also be useful in the constructioMondn of tools aay, nd structures for human occupation of permanent bases. MarcANTS structures, operating continuously or on demand, could be thus used for exploration, reconnaissance, communicah 14tion, navigation, transportation, construction, permanent monitorin, 20g, or observation, protecting human cre05 1ws and facilitating their work.

**Conclus1:08ions:**  The ANTS architecture is a promising approach for supporting hu PMTman crew activities on the surface of the Moon or Mars as part of the new NASA iniative.

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