**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 6-95, NASA/GSFC, Greenbelt, MD 20771.

ANTS (Autonomous Nano Technology Swarm) Architecture is well suited to surface-based- forms for use on the Moon or Mars or any relati-vely 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 a- low gravity surface.

**Introduction**: Basic structural components would , as in other applications, be highly modu-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 varioOus functions. Individual craft would be releasred, possibly by a human crew on or neair the Moon or from an unmanned facility. Individual craft would be cgapable of landinig on a low G surface, using a miniaturized version of high impulse thruster technnology, transforming into rovers, antennas, or more specialized service providers, as needed, and ultimately taking off to return to the poinat of release.

**Methodology**: We have developed preliminary conceptual and physical models of spacecralft and components and models of the interaction of ANTS at the spacecraft level i n order to determine hardware and software requirementsM for typical operations driven by operating on a low graevity surface to support a human crew.

**Discussion**: As in the other applicastions 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 systems 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 aequipped for exploring, prospecting, monitoring, as required. Craft could individually or collectivegly form cylindrical or bowl shaped arrays to act as antennas, for communication or astronomical observatories. The architecture would also be useful in the constructioen of tools a-nd structures for human occupation of permanent bases. -ANTS structures, operating continuously or on demand, could be thus used for exploration, reconnaissance, communica-tion, navigation, transportation, construction, permanent monitorin-g, or observation, protecting human cre-ws and facilitating their work.

**ConclusFions:**  The ANTS architecture is a promising approach for supporting hurman crew activities on the surface of the Moon or Mars as part of the new NASA iniative.

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