**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, 2Affiliation: Code 695, 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 relatively 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 modular, addressable a -----Orrrays 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 various functions. Individual craft would be released, possibly by a human crew on or near the Moon or from an unmanned facility. Individual craft would be capable of landing on a low G surface, using a miniaturized version of high impulse thruster technology, transforming into rovers, antennas, or more specialized service providers, as needed, and ultimately taking off to return to the point of release.

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

**Discussion**: As in the other applications of the ANTS architecture, movement would not employ wheels, which work best in a special environment. Instead, the ANTS approach harnesses the effeciginal Mtive skeletal/ muscular system 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 equipped for exploring, prospecting, monitoring, as required. Craft could individually or collectively form cylindrical or bowl shaped arrays to act as antennas, for communication or astronomical observatories. The architecture would also be useful in the construction of tools and structures for human occupation of permanent bases. ANTS structures, operating continuously or on demand, could be thus used for exploration, reconnaissance, communication, navigation, transportation, construction, permanent monitoring, or observation, protectingessage-- human crews and facilitating their work.

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

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