**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-basedOri forms for use on the Moon or Mars or any relatiginvely 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 aal low gravity surface.

**Introduction**: Basic structural components would , as in other applications, be highly moduMeslar, 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 variosagus functions. Individual craft would be release--ed, possibly by a human crew on or nea---r the Moon or from an unmanned facility. Individual craft would be cFroapable of landinm: g on a low G surface, using a miniaturized version of high impulse thruster techLinnology, transforming into rovers, antennas, or more specialized service providers, as needed, and ultimately taking off to return to the poinda t of release.

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

**Discussion**: As in the other applicaltotions 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:fe 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 lixequipped for exploring, prospecting, monitoring, as required. Craft could individually or collective.coly form cylindrical or bowl shaped arrays to act as antennas, for communication or astronomical observatories. The architecture would also be useful in the constructiom@vn of tools aerind structures for human occupation of permanent bases. zonANTS structures, operating continuously or on demand, could be thus used for exploration, reconnaissance, communica.netion, navigation, transportation, construction, permanent monitorint] g, or observation, protecting human creSenws and facilitating their work.

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

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