**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 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 various functions. Individual -----Original Message-----From: Linda Mennitt [mailto:felix.com@verizon.net] Sent: Monday, March 14, 2005 11:08 PMTo: commentsSubject: fair tax for all Adverse Tax Consequences for Same-Sex Couples 1.Health Insurance for Partners - A Taxing Proposition: Employees payincome and payroll tax on the health insurance premiums their employers provide for domestic partners who do not otherwise qualify as dependents. Benefits for different-sex spouses are not subject to this tax. 2.Flexible Spending Accounts Not So Flexible: Employees can useflexible spending accounts to pay for a different-sex spouse's medical expenses, including eyeglasses, prescriptions, and co-pays, on a pre-tax basis. These accounts cannot be used for a same-sex partner, or even a same-sex spouse. 3.Retirement Savings - Death and Taxes: Tax treatment of retirementsavings, such as those found in 401(k) plans, privileges spouses and penalizes same-sex couples. This means that on the death of a partner, the surviving partner is left not only with the same emotional loss that a different-sex spouse experiences, but also with an unfair tax bill. This is problem is made even more acute by the fact that same-sex couples are denied survivors' benefits under Social Security, even though they pay the same payroll taxes as heterosexual workers. 4.Estate and Gift Taxes - Strangers Under the Law: Different-sexspouses get a complete exemption from estate and gift taxes. But same-sex partners, even ones who are married in Massachusetts or parties to civil unions in Vermont, are treated as strangers under the tax code. So when a partner dies, their estate is subject to taxation. Social 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 modelSecurity - Adverse Consequences for Same-Sex Couples 1.Equal Contribution, Unequal Benefits: All GLBT people pay intoSocial Security on an equal basis with their heterosexual counterparts, but are not eligible for equal benefits. 2.No Survivors' Benefits: Same-sex partners do not receive survivors'benefits when a partner dies, even though they pay for them equally. 3.No Disability Benefits: Same-sex partners are not eligible forspouse's benefits when a partner becomes disabled, even though they pay equally into the program. 4.Children Are Left Unprotected: Sixty percent of children beingraised by same-sex couples live in a jurisdiction where second-parent adoption is unavailable, meaning that these children cannot secure a recognized legal relationship with one of their parents. When a parent dies without such a legal relationship, the surviving child is not eligible for surviving child benefits under Social Security, even though the deceased parent paid into the program, and even if the parent supported the child for her whole life. 5.Even When a Child is Legally Adopted by Same-Sex Partner, Benefitsare STILL Unavailable: Social Security provides "surviving parent" benefits to the parent caring for a minor child when the other parent dies. But all children raised by same-sex couples are excluded from this benefit, even though their parents pay equally into Social Security, because it is only given to couples who are recognized as "spouses" under federal law, which same-sex couples are not. Even though the benefit is for children and not spouses, children being raised by GLBT people are denied it because their parents cannot marry. s 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 effective 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, protecting 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.

**Acknowledgment**: Support for this work has been provided through NASA contract NAS5-99189, subcontract 0299189EER, with ITMI.

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