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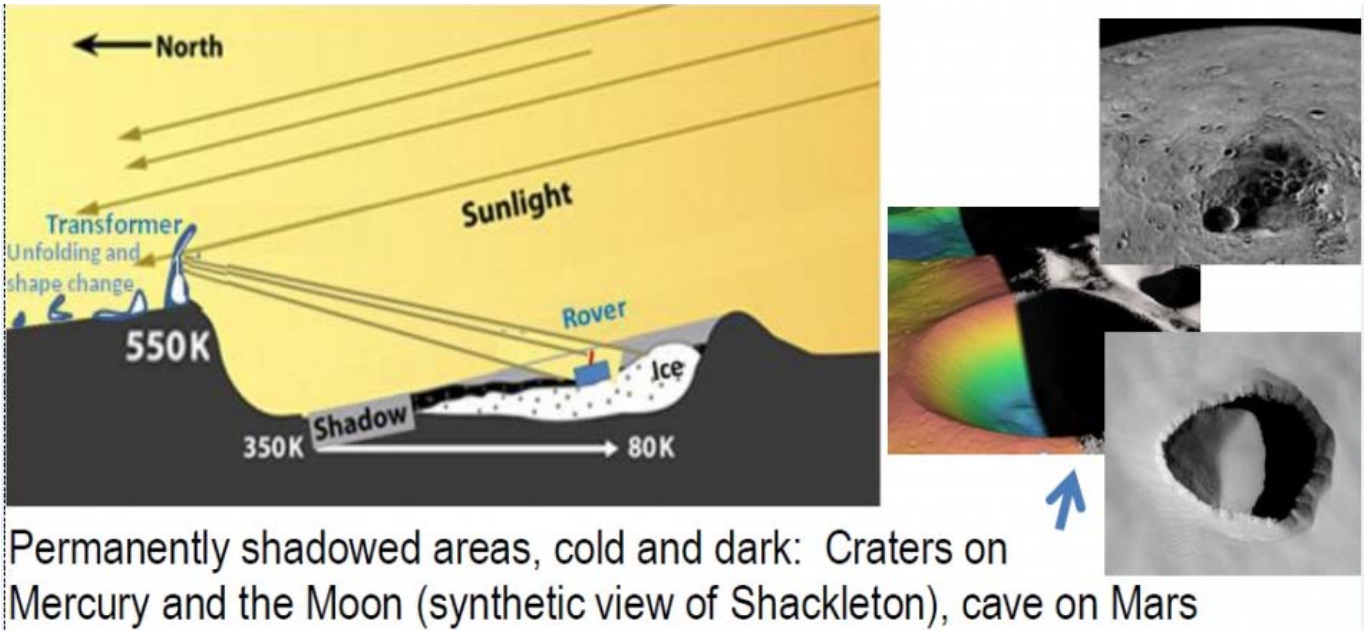
TransFormers for Extreme Environments

Speaker: Adrian Stoica, Ph.D., Senior Research Scientist, Manager, Robotic Systems Estimation, Decision and Control, NASA Jet Propulsion Laboratory
Date: Wednesday, May 7, 2014
Time: 6:30 pm pizza meet & greet; 7:00 pm Talk
Location: Rm 100, Ahmanson Science Center Aud.
CLU campus, 60 Olsen Road, T.O., CA
RSVP: Doug Askegard at dougaskegard@ieee.org

Talk Description: Imagine a revolutionary way to remotely control the environment surrounding one or more roving vehicles exploring remote and unexplored areas of the Solar System, such as the dark interiors of craters or the depths of caves on Mars, the Moon, or Mercury. We call our solution “TransFormers” - multifunctional platforms that can change their shape and function and can enable new classes of in-situ planetary missions at massively reduced cost. Unfolding to large areas, they can reflect solar energy, warming and illuminating targets, powering solar panels, tracking movement and acting as a telecommunications relay.



Permanently shadowed areas, cold and dark: Craters on Mercury and the Moon (synthetic view of Shackleton), cave on Mars

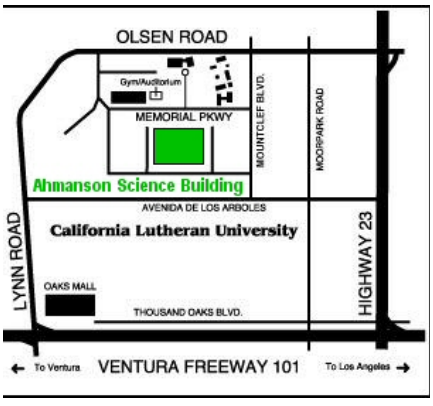
Placed on the sunny rim of a permanently-shadowed crater, or at the entrance to a cave, TransFormers can be used in conjunction with rover exploration, projecting a favorable micro-environment into cold and dark areas. These challenging sites are particularly

exciting and scientifically interesting. For example, water found in the permanently shadowed areas of craters on the Moon or Mercury can reveal clues about planetary formation and history, and could be used as a resource for astronauts. Cave exploration on Mars offers the possibility of finding extraterrestrial life; furthermore, caves are time capsules preserving geochemical traces and may safely shelter future human explorers. TransFormers present an innovative and highly adaptable way of improving survivability in such extreme environments. Our concept will enable unprecedented science and exploration of sites identified as a promising future direction for investigation in the most recent Planetary Decadal Survey.

Adrian Stoica, Ph.D. has over twenty years of R&D experience in autonomous systems, developing novel adaptive, learning and evolvable hardware techniques and embedding them into electronics and intelligent information systems, for applications ranging from measurement equipment to space avionics to robotics. He has been working at NASA JPL since 1996 leading a variety of research projects for NASA, DARPA, USAF, DTAO, BMDO, etc., and developing new technology solutions in areas ranging from evolvable hardware for survivable systems to humanoid robots for planetary surface operations. He became a Principal in 2002, a Senior Research Scientist in 2007, and Group Supervisor in 2008. Dr. Stoica contributed pioneering work in new fields (humanoid learning by imitation, evolvable hardware, survivable self-reconfigurable electronics for extreme environments), invented new concepts (polymorphic electronics, cognitive anti-tamper techniques) and took them to hardware demonstration. He has earned recognized authority in adaptive and evolvable hardware and published more than 100 papers and has been granted 5 awarded patents. Dr. Stoica has founded several conferences (including the NASA/ESA conference on Adaptive Hardware and Systems). He has played various roles in IEEE (Program Chair 2011 IEEE Systems Man and Cybernetics, etc.), plenary speaker at more than 10 international conferences.

Adrian Stoica is a visiting Professor at the University of Edinburgh since 2004 (prior academic involvements include Assistant Professor University of Iasi, Romania, 1991-1992, Adjunct Professor University of Queensland, Australia, 2003-2006). He is a member of various advisory and review boards for US government agencies, Canada, UK, Norway and European Commission. He also was part of the European Commissions ISTAG Working Group on Future and Emerging Technologies (FET), which provided strategic advice and orientations on long term foundational research in the area of Information and Communication Technology.

Adrian Stoica earned a PhD, Electrical Engineering from Victoria University of Technology, Melbourne, Australia, 1996, (Thesis in robot learning: "Motion learning by robot apprentices- a fuzzy neural approach"), a MS in Electrical Engineering from the Technical University of Iasi, Romania, 1986.



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Alternatively, CLU Public Safety has provided us with parking passes for on street parking.