

NASA In-Space Inspection Technology Workshop (ISIW 2014)

Jul 15 – 16, 2014

at JSC Gilruth Center, Houston, TX

Register at ISIW 2014 Website: <http://www.nasa.gov/offices/nesc/workshops/ISIW2014.html>

Technical Sponsor: NASA Engineering and Safety Center(NESC) – NDE TDT - Bill Prosser

Chair: Mr. George Studor

JSC Facility Sponsor: NASA JSC/KA – Greg Byrne, KX Image Science and Analysis - Randy Moore

Coordination Team: Sponsors(above), JSC/Ajay Koshti, LaRC/Eric Madaras

Purpose: Promote inspection **technology development** for In-Space/**similar needs** through identifying mutual interests/potential points of co-operation in multi-agency, industry and academic groups.

2014 In-Space Inspection Workshop Sessions				
7/15	Alamo East(100)	Alamo West(50)	Discovery(40)	Coronado(40)
	Introduction, Challenges, Vision		-	-
Need	ISS Risk/Extend Life	ISS Visiting Vehicles	Future Space Vehicles	SBIR/STTR & R&D
	Lunch Speaker – R2 NASA Dextrous Robot		-	-
Need	Industry Needs	Other Gov Needs	Other Gov Needs	SBIR/STTR & R&D
Tech	3D Penetrating Imag	Snake-like(free/Fixed)	3D Surface Profiling	Misc Technologies
7/16	Alamo East(100)	Alamo West(50)	Brazos (18)	Coronado(40)
Tech	Autonomous Inspect	Robotic Insp Platform	Materials to Enhance	Free-Flying Platforms
Tech	Event-Triggered Insp	Difficult Access Areas	Hands Free in Zero-G	Liquid/Gas Leaks
	Lunch Speaker – Spacial Phase 3D Imaging		-	-
Meet	One-on-One Sessions – All Rooms – Sign-up for 15 private minutes with an End User Tour the Demonstration Tables			
Meet	Forward Planning Splinter Sessions By Session – Reports prior to Wrap-up			

Note: Rio Grande Room (Conf Rm holds 8) available to schedule small sessions – see reception desk

- Displays & Demonstration Tables in Alamo Ballroom – 16 to 18 Tables (1/2 table each)
- Food: Order Lunch(Buffet) by Jul 1 – Pay at Workshop - Will include cost of beverage/snacks
- Presenters: Will be solicited/invited to match the Needs and Key Technology areas Identified
- All Presentations will be Publicly Available and Webex/Webinar will be attempted
- Guidance: User & Technology Challenges will be sent out ahead of time
- Registration: Begins March 3rd - ends July 16th!!
- 2012 In-Space Inspection Workshop website (previous brochure, presentations, summary):

http://www.nasa.gov/offices/nesc/workshops/in_space_non_destructive.html

Contact: George Studor at george.f.studor@nasa.gov or Carol Castle at carol.j.castle@nasa.gov

Please note that all NASA civil servants and NASA contractors are required to register their conference attendance at <https://ncts.nasa.gov/index.cfm> in addition to registering here on the In-Space Inspection web site. Some centers may have their own procedure for registering on NCTS via designated center representatives. The conference code is 18920-14. Failure to register at the NCTS site can result in a denial to attend the conference.



NASA NESC ISIW Technology Needs

***Common Goals:** Low Size, Weight & Power; Minimize On-orbit crew time to address risks; Locally Derived Information to minimize data transfer; Less than 2 years to flight; Multiple NASA Aerospace program applicability – supporting recent roadmaps, Broad use case for other than Space industries and Government Agencies; take advantage of other investments to sustain maturity/long term improvements.

Technology Area	Spaceflight Need	Characteristics*
3D Surface Imagers and Profiling	- Surface Damage - Configuration	Range: 2 in – 120 ft, Insensitive to lighting, high resolution, dynamic (frame-by-frame)
3D Penetrating Imagers	- Damage+Configuration under non-conductive & conductive	Range: 2 in – 1 foot, high resolution, low SWaP, safety and reliability,
Liquid and Gas Leak Sensors	- Remote detection and location of leaks to vacuum	Range: 2 in – 120 ft, high sensitivity, reliability of detection & identification
COTS NDE, Sensors, Cameras	- Out of configuration, Damage Detection & Characterization	Cost, reliability, minimum operations and integration, improved performance
Difficult to Access Areas	- Small gaps, out of reach, EVA, blind spots, noise, rel. motion	Size, mobility, location, Safety/Hazard mitigation, min crew operations.
Robotic Inspection Platforms	- Decrease blind areas & EVAs - Increase direct access to site	Cost, min operations and planning, mobility, stability, size, safety/hazards
Snake-like Inspection Scopes	- Highly controlled, min hazard - 3D ops/sensing, mapping	Cross-section size, controllability, hazards, 3D mapping & head following, location
Free-Flying Inspection Platforms	- Flexibility of sensor location - Reduce manipulator ops	SWaP, Safety/Hazards, Re-use & throw-away, autonomy, sensor modularity
Efficiency		
Temporary Adhesion	- Hands Free Crew Operations - Velcro replacement - Secure equipment, sensors - On-Off grip for robotic ops	Easy-peel replacement of glues with temporary adhesion, quick on-off grip, no or low power, compliant to surfaces, IVA then EVA(extreme environment) capability
Materials/Mfging To Enhance Inspection	- Properties enhance damage - Properties for pass-through	Doping of embedded materials Coatings and etchings of surfaces
Event-Triggered Inspection	- Reduce scheduled inspection - Enable inspection on demand	Monitor environment, structure or system to detect threshold requiring inspection
Autonomous Inspection	- Reduce human ops (flt & grd) - Reduce data transfer needs	Command and Data handling minimized for robotic platforms and sensors Information & Answers with minimum data
SBIR/STTR Requested Technologies	- Fund sources, interests and contacts outside NASA - Technologies developed or	Solicitation wording and past contracts are relevant to InSpace Inspection Workshop TRL possibly above NASA's in some areas

	being developed by others	Future interagency cooperation potential
Miscellaneous Technologies	- Catch all – not in above list - Last minute or Inspirational	Fewer, possibly higher risk applications Ground-breaking and possibly emerging

End User/Stakeholder Presenters (As of May 26)		
Organization	Speaker	Need Area
JSC Exploration Science	Greg Byrne – Dep Director	Host – Welcome and Historical Motivation
NASA Eng & Safety (NESC)	Bill Prosser – Tech Fellow	NDE and Inspection in Space – Tech Fellow
NASA NESC NDE TDT - AMA	George Studor - Chair	InSpace Inspection Needs&Workshop Plan
JSC MMOD Program	Eric Christiansen - Lead	Micro-Meteoroid & Orbital Debris Threat
JSC ISS Vehicle	TBD	International Space Station Vehicle Risks
JSC Image Science/Analysis	Randy Moore - Lead	ISS Inspection Capability and Challenges
NASA Satellite Servicing	Ben Reed, Deputy Director	Satellite Servicing Missions
DARPA Tactical Technology	David Barnhart, Prog Mgr	Phoenix and other DARPA programs
Virgin Galactic	Jon Griffith - Operations	Virgin Galactic Inspection
JSC Image Science+Analysis	Michael Rollins, Jacobs	Orion Inspection - Lessons Learned
KSC/NDE – NEL40	Miles Skow	Crewed Vehicle Contamination Inspections
British Petroleum(BP)	Jon Rogers	Oil and Gas Inspection needs/challenges
Shell International, E&P Inc	Sergio Kapusta	Oil and Gas Inspection needs
Astrotech	David Brower	Underwater Inspection
NAVSEA	Pat Lockhart	Navy NDE and Inspection Needs
AFRL-RXL - NDE	Steve Russ	USAF Aircraft Inspection needs
NAVAIR/ORTA	Chris Root - Lead	Advanced Aircraft Technologies
DOD - TSWG	Ed Bundy	IDD Subgroup and EOD/LIC Program

Technology Presenters (As of May 22) Lunchtime Key Note Speakers

Technology Area	Org	Topic
3D Surface Imagers and Profiling	Photon-X SPEC Panoscan Capture 3D NASA/GSFC	Blair Barbour - 3D Spacial Phase Imaging Camera Brad Salle – LASR 3D Imager Tom Greaves/Dot Products – Handheld 3D - Lightfield Imaging Catherine Kim – Various 3D tools Ben Reed – VIPER for RRM and potential ISS Inspection
3D Penetrating Imagers	AS&E Physical Optics Nucsafe Turner Innovations Picometrix	Mike Snell – Hand-held 3D Backscatter Xray System Victor Grubsky – miniature 3D BXray Wayne Garber – 3D BXray Clark Turner – 3D BXray David Zimdars – Handheld Terrahertz Scanner
COTS Cameras, NDE, Liquid/Gas Leak Sensors	NASA/JSC/ES NASA/JSC/EV Sonatest GSFC	Ajay Koshti – ISS Pressure Wall Damage NDE tool Vic Studer – ISS External Camera Upgrades for High Definition Ed Cabral – user-friendly NDE tools Dino Rossetti – Ammonia Leak, Mass Spec for ISS
Difficult to Access Areas	Hydrotech Case Western U Materials & Sensors	Cory Jaskolski – Magnetic field comm/power thru metal walls Roger Quinn – Micro-robot inspector using beetle-tape feet Boro Djordjevic –Monitoring for conditioned based inspection
Robotic Inspection Platforms	NASA/ER CSA NASA-JPL SRI	Ron Diftler – R2 Dextrous Humanoid Robot for Spaceflight Yves Gonthier – Extre-Deployable Vision System(DDVS) Aaron Parness – Gecko-footed inspection robot Thomas Low – TAURUS robot
Snake-like Inspection Scopes	Olympus Uniwest/OCRobotics 4DSP RAS Lab	Frank LeFleur – Flexible videoscopes/borescopes Carlos Pairazaman - Controllable videoscopes/sensors Real-time 3D F.O. Shape, Strain and Temperature Eric Sandberg - Artificial Muscles
Free-Flying Inspection Platforms	Aerospace Corp NASA/AMES Tyvak NASA/JSC/ER Texas A&M	David Hinkley – CubeSat 4 + Inspector Andres Martinez – SPHERES IVA platform on ISS Marco Villa – 3U prox-ops, rendezvous with Inspection Darby Magruder – Underwater Inspection Platforms James Turner - Advanced Dynamic Inspection Test Facility
Efficiency		
Temporary Adhesion	Nanogripteck Felsuma Inc/UMass Illinois Inst of Tech SRI/Grabbit Justik/ElectroAdhesion	Paul Glass – Gecko-tape Rana Gupta/AI Crosby - Geckskin Matt Spenko – Electro-Adhesive Grip with Passive Gecko Victor Aguero – Electro-Adhesion R&D & Commercial product Gerhard Ferreira – Electro-adhesion technology for space
Event-Triggered Inspection	Metis Corp Invocon Ridgetop Group NASA/NESC NASA/LARC	Seth Kessler – Damage-change monitor for Triggered Insp Aaron Trott – Impact detection, location flight sys & tech Kyle Ferrio – Smart Sensor Distributed Event-Triggered SHM Lance Richards – Fiber-optic sensing for event-triggered Insp Eric Madaras – Leak Detection & Location system on ISS
Autonomous	NASA/ER	Phil Callen - Automation of Dextre-SSRMS Operations

Inspection	Astrotech DD-NN D&W Enterprises	David Brower – Undersea Inspection David Bowman - Auto Inspection for Precursor Detection Ward Rummel – Penetrant Inspection for Life-Cycle Efficiency
SBIR/STTR Requested Technologies	8 presentation to be announced	Relevant Subtopic Managers
Miscellaneous Technologies	NASA NESCC Multiversal (remote) NASA/GSFC (remote) Cybernet	Ward Rummel - Dye-penetrant for Life-Cycle Inspection S. Murali – Inertial Electrostatic Confinement(IEC) Xray source and Propulsion Kieth Gendreau – Solid State Xray, NICER Exp, Modulated Xray Kevin Tang – Optical tracking for NDE sensor scanning

ISIW 2014 Location: NASA Johnson Space Center

Gilruth Center – Outside the Gate – no NASA Badging Needed

