NASA Kennedy Space Center’s Laboratories Capabilities

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4th International Workshop on Lunar Science Applications

Angela Balles / NASA KSC
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- Shape memory alloy self healing metals
- Self healing wire
- Low Temperature Shape Memory Alloys (SMAs) for adaptive, autonomous systems
Electrical

- Full life cycle support including concept development, prototyping, design, troubleshooting, testing, etc. for power, command, monitoring, and control systems:
  - Critical sensors & transducers (cryo/hydrogen)
  - Hazardous gas detection
  - High speed data acquisition
  - PLC based control systems
  - Range technology (tracking, telemetry, & comm)
  - Software - system applications & embedded
  - Health management systems
  - Electromagnetic interference monitoring & mitigation
  - Environmental and qualification testing
Rapid Prototyping

Design Engineering Services
- Mechanical/electrical engineering design
- Mechanisms and kinematics
- ProE CAD/CAM
- "Design for Manufacturability" consultation
- Structural and finite element analysis

Mechanical Integration Services
- Pneumatics and hydraulics fabrication
- Rapid prototyping / additive manufacturing
- Mechanical & structural fabrication and testing
- Computer Numeric Control (CNC) machining
- Sheet metal fabrication
- Welding & soldering
- Composite materials fabrication
- COTR of 8 Mechanical IDIQ contracts

Electrical Integration Services
- Power and electrical systems
- Electrical fabrication
- Data acquisition
- LabVIEW software programming
Life Sciences and Environmental

- Applied, fundamental, and translational research in genetics, microbiology, molecular biology, and plant science
- Biological imaging, cell/molecular biology, DNA sequencing/gene expression, and microbial enumeration/identification
- Design, fabricate, and test biological reactors and environmental control systems for bioregenerative water recovery and waste treatment
- Closed-loop environmental control and life support systems
In-situ Surface Resource Utilization (ISRU) and Surface Systems

- Remote habitation, volatiles extraction, and environmental protection on surfaces beyond earth, including, oxygen, water, and fuel production, excavation/handling, & tele-robotics.
  - Oxygen, water, and fuel production and waste processing
  - Methane regeneration
  - Solar energy for oxygen extraction
  - Lunar regolith particle separation for further processing
  - Regolith excavation and handling
  - Habitation and Radiation Shielding
  - Dust Mitigation
  - Rocket Plume Blast Effects
  - Robotics and Tele-Robotics
Environmental Mitigation, Biomedical Research, and Green Technologies

- Field deployment of remediation materials & technologies
- Particle separation methods
- Design, fabrication, and testing of personal protective equipment and breathing apparatus prototypes
- Design and fabrication of emergency medical equipment and communications devices
- Design and implementation of physiological protocols for human testing, both lab based and remotely
- State-of-the-art biological and molecular imaging facilities
- Green Technologies – Alternative Energy Prototypes
  - Hydrogen Power
  - Solar Energy
  - Superconducting Magnetic Energy
Lifecycle Modeling and Simulation and IT Services

- Full lifecycle simulation development including command-and-control operations, supply chain management, process flows, discrete events and human factors impacts
- Human Centered Engineering of Safety Critical Systems
- Analyze and Evaluate Life Critical System Failure Modes & Effects
- Extend “human factors” into the workings and processes of the human mind
- Human Centered Automation in the context of Safety Critical Systems
- Collaborative Systems Engineering
- Apply advanced interactive system and methods to Safety Critical System controls
- Multi-modal Interfaces, Ubiquitous Computing, Distributed Cognition
- Human Centered Information Flows for Socio-Cognitive
Launch Equipment Test Facility

- Full-scale umbilical and ground support equipment (GSE) testing with vehicle motion and lift-off simulation
- LN2 and LH2 flow to subject test articles to cryogenic temperatures and pressures that simulate launch processing conditions
- Component testing using LN2, LH2, GN2, GHe, Water, or hydraulic fluid
- Data acquisition up to 352 channels with recording speeds up to 60 million samples per second
- Programmable logic controller (PLC) / Controls development
- Structural testing/proof load testing of lifting hardware, slings, etc, up to 600 tons
- Instrumentation services (fixed & portable)
- Pyrotechnics testing
- Test Engineering

Vehicle Motion Simulator
Smart command, control, and monitoring of ground and flight systems including health management capability and tele-robotics.

- Range Technologies – Tracking, Surveillance, Communications, and Telemetry
- Autonomous Flight Safety Systems
- Critical Sensors & Transducers (Cryogenic & Hydrogen)
- Hazardous Gas Detection
- Operational Health Management Systems
- Weather Technologies
- Tele-robotics
Questions?
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