Strategic Technology Partnership Initiative
GRC High-Priority Technology Areas

Related to 2019 Accelerated Lunar Exploration in 2024:

Relevance Estimates:
Early Return: 2024 Lunar Crew mission
Sustainable: sustained lunar exploration

Communications technology

Advanced RF (radio frequency) technology (sustainable)
Integrated RF and Optical Communications System (sustainable)
Cognitive Communications (sustainable)
Quantum Communications
Adaptable Communications architectures (early return) (sustainable)

Power and energy storage:

Deployable solar arrays (early return)
High energy-density batteries (early return)
High power-density solid-oxide fuel cells (sustainable)
Low-temperature PEM fuel cells (sustainable)
Regenerative fuel cells (sustainable)
Autonomous power systems (sustainable)

Space Propulsion:

High power-density electric propulsion (sustainable)
Two-phase fluid systems for reduced-gravity operations (sustainable)

Sensors and Electronics for Extreme Environments

Pressure sensors with high temperature capability
Integrated pressure and temperature sensors
Silicon-carbide based electronics and sensors (sustainable)
Miniature chemical sensors in harsh environments (early return)

Materials and Structures

Aerogels (sustainable)
Shape memory alloys and components (e.g., bearings, tires, actuators) (sustainable)
Ceramic composites (sustainable)
Thermal and environmental barrier coatings (sustainable)
Composite gears (sustainable)

Space Resource Utilization:

Carbon Dioxide capture and conversion to fuel (sustainable)
Extraction of water from minerals (early return) (sustainable)
Extraction of oxygen from minerals (sustainable)

CubeSat subsystems (relevant system scale and CubeSat Concept of Operations):

Chemical and electric propulsion
Communications
Remote-sensing instruments
Formation flying technologies

Enabling Advanced Aeronautical Science and Technology:

Electrical machines and components for hybrid and all-electric aircraft propulsion

- High power-density electrical motors
- High power-density power electronics
- High voltage cables
- Magnetic materials

Airbreathing propulsion (or gas-turbine engines)

- Low NO_x combustion technology
- Low noise technologies
- Cooled components for propulsion system hot section
- Aerodynamically efficient compressors
- Control systems for gas turbine engines