NASA Ignite 2025-II Solicitation

Proposal Details

Proposal Number: I01.01-1007
Subtopic Title: Advanced real-time monitoring and control technologies for additive manufacturing
Proposal Title: Additive Manufacturing Real-Time Density Monitor

Small Business Concern

Firm: Albireo Technologies LLC
Address: 2720 Monterey St 405, Torrance, CA, 90503

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 4 - TRL 6
Technical Abstract (Limit 2000 characters):

To address the NASA requirement for real-time additive manufacturing (AM) system control and feedback, Albireo Technologies LLC (ATC) proposes to continue the development in Phase II of an Additive Manufacturing Real-Time Density Monitor (AMRIDM). The AMRIDM will probe the condition of the metal melt pool region within AM systems using X-rays, serving as a feedback sensor for providing real-time quality control. By detecting the anomalies in the scattered X-ray flux, the AMRIDM will be able to identify irregularities in the density of the AM part as the part is being built, providing immediate feedback for corrections. The AMRIDM system will feature a compact and modular design to facilitate the integration into LPBF and DED AM systems. In Phase II, ATC plans to develop a TRL-6 system prototype, which will be integrated and tested on a commercial metal AM platform.

Duration: 18

Proposal Details

Proposal Number: I01.01-1037
Subtopic Title: Advanced real-time monitoring and control technologies for additive manufacturing
Proposal Title: Born Qualified Additive Manufacturing For Space Using In-situ Inspection

Small Business Concern

Firm: Additive Monitoring, Inc. (DBA Phase3D)
Address: 2415 w 19th st 2B-1, chicago, IL, 60608

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 5 - TRL 8
Technical Abstract (Limit 2000 characters):

Phase3D will advance Fringe Inspection™ and Fringe Qualification™ into a standards-aligned qualification data platform for metal additive manufacturing (AM). Fringe Inspection uses calibrated structured-light metrology to measure the powder and melted surface of every layer, producing quantitative 3D heightmaps and detecting geometric and process anomalies during the build. Phase II funding will be used to expand qualification datasets across multiple machines producing Invar 36, validate quantitative go/no-go thresholds, deploy Fringe Qualification across Northrop Grumman Space workflows, and develop automated exports of qualification-ready datasets and documentation aligned with NASA-STD-6030, NASA-STD-6033, and SAE AMS7032. The proposed effort builds on Phase I correlation of in-situ data with CT and dimensional inspection and is intended to transition Fringe data from an operator monitoring tool into traceable, reusable evidence for process and part qualification. Phase II will prioritize the NASA requirements most directly matched to Fringe Inspection, including in-situ process monitoring, production engineering records, quantitative surface/detail metrics, process restart evaluation, and qualification/acceptance data packages. NASA-STD-6030 specifically encourages in-situ monitoring as a source of process-control data and for guiding targeted inspection, while requiring qualification before such data are used quantitatively for part acceptance. Target markets include commercial space, aerospace, defense, energy, medical manufacturing, AM service bureaus, research organizations, and AM machine OEMs requiring scalable, auditable quality data for production AM.

Duration: 12

Proposal Details

Proposal Number: I01.01-1040
Subtopic Title: Advanced real-time monitoring and control technologies for additive manufacturing
Proposal Title: Intelligent Real-Time Additive Manufacturing (IRAM) SBIR Ignite Phase II Proposal

Small Business Concern

Firm: Rallypoint One LLC
Address: 3481 Ranger Road, Davidsonville, MD, 21035-1316

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 3 - TRL 6
Technical Abstract (Limit 2000 characters):

Metal additive manufacturing is reshaping how NASA and industry build propulsion and structural hardware. Part quality is still mostly checked after the build, when defects are expensive or impossible to fix. Rallypoint One is developing predictive thermal control: software that predicts the evolving thermal state of a build, corrects that prediction with live sensor data, and recommends or applies process adjustments before defects form. In Phase I, the team built a modular thermal model in Julia that models material deposition, heat input and heat dissipation separately, so it can be adapted to different materials, heat sources and machines. The team calibrated and tested it against published NIST AM-Bench thermal measurements. With USC McNAIR, the team set up a wire-arc additive manufacturing testbed with build telemetry, laser profilometry and an in-process thermal camera, and built a tested software interface to the robot controller. Phase I also produced a key lesson: the learned (machine-learning) components tested in Phase I did not beat a well-calibrated physics model. Phase II therefore measures every learned component against that physics baseline. Phase II connects these pieces on physical equipment. The software will analyze each completed layer during the pause between layers and adjust the next layer’s toolpath and process settings. To validate it, the team will deliberately induce defects through process settings and geometry, test whether the system detects and quantifies them, confirm the results with non-destructive and destructive inspection, and measure how much defect occurrence drops with control turned on. The deliverable is a validated, controller-independent monitoring and control capability that can be applied to other robotic additive manufacturing cells.

Duration: 18

Proposal Details

Proposal Number: I01.02-1008
Subtopic Title: Computational design of new materials, processes, and products leveraging the microgravity environment of space
Proposal Title: Alloy Simulation Toolkit for Robust Optimization in low Gravity (ASTRO-Grav)

Small Business Concern

Firm: QuesTek Innovations LLC
Address: 1820 Ridge Ave, Evanston, IL, 60201-3621

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 3 - TRL 4
Technical Abstract (Limit 2000 characters):

To enable NASA's goals for in-space and on-surface manufacturing of parts/ products and computational-materials-informed qualification and certification for in-space manufacturing, QuesTek (QT) is developing the Alloy Simulation Toolkit for Robust Optimization in low Gravity (ASTRO-Grav). The framework will incorporate four main technical components: (1) Multi-fidelity PSP modeling, (2) High-throughput experiments, (3) Bayesian uncertainty quantification (UQ), and (4) Robust optimization. ASTRO-Grav will enable the use of modeling and experimental data to optimize materials and processes to reduce the variability in properties of interest resulting from irreducible uncertainties in inputs, like gravity during welding in space. In-space manufacturing is critical to space missions, both in low earth orbit, and for future lunar and Martian missions – where astronauts need to be able to fix or replace parts in a reliable manner. To reliably weld parts in space, with low or no gravity and often times in variable gravity due to acceleration, docking, and astronaut movements (G-jitter) it is critical to understand the impact of gravity on processing of materials. Without gravity, hot air doesn't rise, resulting in little or no convective cooling which leads to very slow cooling and solidification and the lack of buoyancy of bubbles in the melt affects porosity. These unique solidification conditions influence the microstructure and defect evolution and in

turn mechanical properties of materials. Moreover, it is impractical to machine tensile coupons and carry out full scale mechanical testing to qualify material properties in space. Thus, ASTRO-Grav will utilize a Bayesian UQ approach to combine multi-fidelity modeling and simulation to predict the evolution of microstructure and properties in these environments with high throughput experiments to validate these predictions in a feasible manner in space.

Duration: 18

Proposal Details

Proposal Number: I02.01-1011
Subtopic Title: Multidisciplinary Space Hardware design automation leveraging AI techniques
Proposal Title: Momentum: Multidisciplinary Hardware Design Automation with Artificial Intelligence

Small Business Concern

Firm: Dan Mueller Consulting (DBA DMC Technologies)
Address: 532 Roswell AVE, Long Beach, CA, 90814-1752

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 4 - TRL 6
Technical Abstract (Limit 2000 characters):

Dan Mueller Consulting LLC (DBA DMC Technologies LLC) proposes to advance Momentum, an AI-driven, first-principles engineering automation platform that accelerates the development of complex aerospace hardware. Momentum pairs specialized AI agents with established engineering tools to turn technical requirements into manufacturable designs supported by multidisciplinary analysis, traceable verification evidence, and human engineering oversight. Building on its NASA SBIR Ignite Phase I results, Phase II funding will mature Momentum into a scalable, interoperable engineering platform. Work will focus on automated requirements interpretation, AI-assisted design generation, integrated CAD/CAE and physics-based analysis across structures, thermal, dynamics, composites, and mechanisms, manufacturability assessment, verification and validation, and

auditable engineering workflows. Demonstrations on a small-satellite payload adapter and a NASA observatory truss, independently validated by The Aerospace Corporation, will establish technical performance and readiness for commercial deployment. Momentum addresses the fragmented, labor-intensive engineering processes that raise development costs and delay hardware delivery. By automating repetitive engineering tasks while preserving engineering rigor and responsible-engineer authority, Momentum shortens design cycles, expands the design alternatives engineers can evaluate, and targets trade cycles at least five times faster. Initial target markets include NASA, commercial space companies, aerospace manufacturers, spacecraft and satellite developers, and defense contractors, with a near-term focus on U.S. aerospace companies of 100 to 1,999 employees. Additional markets include engineering service providers, research laboratories, and advanced manufacturers. DMC will commercialize Momentum through enterprise software licensing, engineering integration services, and industry partnerships.

Duration: 20

Proposal Details

Proposal Number: I02.01-1035
Subtopic Title: Multidisciplinary Space Hardware design automation leveraging AI techniques
Proposal Title: Closed-Loop Generative Design Platform Experimentally Validated on Rocket Propulsion Hardware

Small Business Concern

Firm: PhiNyx Technologies, Inc.
Address: 221 Fritz Way, Cibolo, TX, 78108-4364

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 4 - TRL 6
Technical Abstract (Limit 2000 characters):

PhiNyx Technologies is developing a next-generation engineering platform that autonomously creates complex flight hardware from mission requirements. In Phase I, the platform generated an actively cooled rocket thrust chamber in 59.4 seconds,

including geometry generation, thermal-fluid analysis, and additive manufacturing checks. Phase II pushes the software capability into hardware. PhiNyx will generate regeneratively cooled LOX/LCH4 thrust chambers, manufacture/characterize them, predict their performance before test, and hot-fire them across representative operating conditions. The resulting test data will be used to improve the engineering models and generate subsequent hardware for repeat testing. The objective is to radically compress the design-build-test cycle for high-performance hardware. Phase II funding will support software maturation, hardware development, manufacturing, and hot-fire testing. Target markets include NASA, commercial space, and adjacent domains such as fusion energy, commercial aviation, automotive, and advanced electronics cooling.

Duration: 16

Proposal Details

Proposal Number: I02.01-1049
Subtopic Title: Multidisciplinary Space Hardware design automation leveraging AI techniques
Proposal Title: Mixed Initiative Collaborative Agents for Robot Design

Small Business Concern

Firm: TRACLabs
Address: 100 NE Loop 410 520, San Antonio, TX, 78216-4727

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 3 - TRL 6
Technical Abstract (Limit 2000 characters):

Robots will play an increasingly important role in future space missions. Robots will be servicing space telescopes, assembling structures on the lunar surface, exploring distant planets, and assisting crew members in their tasks on Moon Base. Designing a space robot is a complex task with multiple trade-offs in shape, size, strength, and flexibility. Current space robots are one-of-a-kind, custom-designed for their particular set of tasks. Design factors and requirements unique to space robot systems include the need to fit within launch vehicle fairings, minimizing

weight to reduce launch cost, while still guaranteeing payload capacity and task capabilities. Designing a space robot that is optimized over these many objectives can take years. Emerging artificial intelligence tools such as Large Language Models (LLMs), Reinforcement Learning (RL), and Genetic Algorithms (GA) can assist engineers in both the iterative design of and the simulated testing of space robots. These tools can also be used by manufacturing companies installing robotic work cells. In Phase I, TRACLabs and its partner Texas A&M University developed a proof-of-concept MICARD system, that can assist NASA robotics engineers in designing robots for space mission tasks. This work provides a solid foundation for implementing a prototype system in Phase II.

Duration: 18

Proposal Details

Proposal Number: I02.01-1050
Subtopic Title: Multidisciplinary Space Hardware design automation leveraging AI techniques
Proposal Title: AI-Coupled Design Agents for Real-Time Adaptive Spacecraft Architecture

Small Business Concern

Firm: UHV3D Inc dba. CAMINNO
Address: 333 Montezuma Ave. Suite 10, Santa Fe, NM, 87501

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 5 - TRL 7
Technical Abstract (Limit 2000 characters):

Atmospheric entry-vehicle design couples three disciplines that NASA and industry run as separate groups: the trajectory sets the aerothermal environment, the environment sets the thermal protection system (TPS), and the TPS mass changes the trajectory. Each turn of the loop takes weeks of hand-offs, and each hand-off adds margin the vehicle carries as mass. CAMINNO is building an AI-based design automation tool that closes this loop. A language-model agent runs the study but computes no physical quantity. Every number comes from a physics solver or a

physics-constrained surrogate and is returned with its uncertainty and validity through open, documented APIs (REST and Model Context Protocol); outside the validated range, the engineer decides. In Phase I, on TPS sizing for the Apollo 4 capsule, surrogates trained on 185 NASA reference solutions reached median errors of 0.06–0.16% with answers in milliseconds, geometry is meshed automatically from STEP files, and an in-house hypersonic solver generates reference data where none exist. Phase II funds 22 months of development to extend the tool from one validation case to any entry vehicle. It adds radiative and turbulent heating, ablative material response, shape and center-of-gravity design with stability and manufacturability checks, requirements from MBSE and SysML models, NASA's DPLR, LAURA, FIAT and CHAR as a high-fidelity tier, and a verification report per requirement. The tool will be tested against the current sequential process, with a target of at least five times faster. Target markets are NASA entry-system design and Text-to-Spaceship, commercial return-capsule and reusable-vehicle developers, defense hypersonic programs and national laboratories that require air-gapped deployment, and advanced-energy developers facing the same coupled design loop.

Duration: 22

Proposal Details

Proposal Number: I03.01-1018
Subtopic Title: Low-cost mm-wave and cm-wave radar for planetary exploration vehicles
Proposal Title: Versatile Imaging System for Terrain & Anomaly Detection (VISTA)

Small Business Concern

Firm: Vulcan Ventura LLC
Address: 2412 Wimbledon St, Concord, NC, 28025

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 3 - TRL 5
Technical Abstract (Limit 2000 characters):

Vulcan Ventura LLC proposes to advance the Versatile Imaging System for Terrain

& Anomaly Detection (VISTA), a low-cost, low-size, weight, and power radar perception system designed to enable autonomous planetary surface vehicles to navigate safely in darkness, low-light conditions, and dust-obscured environments. VISTA combines millimeter-wave and lower-frequency radar sensing with advanced signal processing and artificial intelligence to provide high-resolution 3D terrain mapping, hazard detection, object tracking, and localization in GPS-denied environments. The system is designed primarily for NASA's Lunar Terrain Vehicle and other robotic planetary exploration platforms. Phase I established technical feasibility through numerical modeling, simulation, and initial hardware development. The proposed 22-month Phase II effort will advance VISTA from TRL 3 to TRL 5 by developing and integrating radar hardware, antenna systems, calibration technology, and AI-enabled perception software. The project will culminate in an integrated prototype demonstration on a terrestrial test vehicle under lunar-analog environmental conditions. Beyond NASA applications, VISTA targets commercial mining and heavy-equipment automation, defense ground vehicles, and other autonomous mobility markets where reliable environmental perception is essential. Its modular architecture and use of commercially available radar components are intended to support cost-effective deployment and commercialization across government and commercial markets.

Duration: 22

Proposal Details

Proposal Number: I04.01-1021
Subtopic Title: Modular, scalable robotic subcomponents to unlock scalable robotic manufacturing & assembly in remote, challenging environments
Proposal Title: Mass-Optimized Rotary Actuators for Scalable Space Robotics: A COTS-Based Approach

Small Business Concern

Firm: Interlune Corporation
Address: 5601 6th Ave S STE 270, Seattle, WA, 98108

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 4 - TRL 6

Technical Abstract (Limit 2000 characters):

Interlune proposes to continue the development of a standardized, commercial-off-the-shelf (COTS) family of lunar-rated rotary actuators. The architecture integrates catalog brushless DC motors, strain-wave gears, and precision bearings enclosed in parametric housings with multi-layered dust sealing, including non-contact labyrinths and Nomex felt lip seals, along with non-proprietary interfaces. Phase II funding will advance this product line to Technology Readiness Level (TRL) 6 through environmental qualification at Interlune's Houston facility and NASA Kennedy Space Center's Swamp Works. Key efforts include establishing Design for Manufacturability (DFM) for high-volume production capacity, testing PFAS-free ionic-liquid greases for extended gear life in thermal vacuum conditions, and investigating the effectiveness of an in-line Electrostatic Pulse Device (EPD) to actively repel regolith. Five flight-like actuator units will be built and qualified to SMC-S-016 standards. The target market includes commercial lunar surface system integrators developing Lunar Terrain Vehicles (LTVs), CLPS landers, robotic arms, hopper drones, and In-Situ Resource Utilization (ISRU) processing infrastructure. By maintaining stocked COTS component lots, Interlune intends to eliminate massive custom engineering costs, bandwidth and reduce procurement lead times.

Duration: 20

Proposal Details

Proposal Number: I04.01-1027
Subtopic Title: Modular, scalable robotic subcomponents to unlock scalable robotic manufacturing & assembly in remote, challenging environments
Proposal Title: Hierarchically Structured Dry Adhesive Materials to Enable Dexterous Robotic Grasping

Small Business Concern

Firm: Nanoscale Labs
Address: 1006 BRENTWOOD ST, Austin, TX, 78757-3035

Summary Details

Estimated Technology Readiness Level(TRL Begin - TRL End): TRL 4 - TRL 6

Technical Abstract (Limit 2000 characters):

Nanoscale Labs is developing hierarchically structured, gecko-inspired dry adhesive materials that allow robotic grippers to grasp objects with a light touch and release them on command, without suction, power-hungry clamping, or surface residue. This effort aims to develop these dry adhesive materials via a low cost and highly scalable self-assembly based process, removing the fabrication cost that has kept high-performance dry adhesives out of commercial use. Phase 2 funding will advance the technology from TRL 3 toward TRL 5 over 18 months. The work will additionally develop novel passive and active lunar dust removal technologies which interface directly with the fabricated dry adhesives. For NASA, the technology supports dexterous manipulation for in-space servicing, assembly, and capture of uncooperative objects, as well as operations in lunar dust. Commercially, we are targeting robotic automation in warehouse, logistics, and manufacturing, where unreliable grasping of irregular objects remains a leading cause of failure.

Duration: 18