

The Army xTech Program – xTechSBIR Autonomy Announcement

I. Background and Purpose

The U.S. Army would like to invite interested entities to participate in the xTech Small Business Innovation Research Autonomy competition, an opportunity for eligible small businesses to engage and pitch their novel technology solutions directly to the Department of Defense, earn prize money and potentially receive a Phase I SBIR award of up to \$250,000 each.

The Army recognizes that the DoD must enhance engagements with eligible small businesses, by: (1) understanding the spectrum of ‘world-class’ technologies being developed commercially that may benefit the DoD in the autonomy space; (2) integrating the sector of non-traditional innovators into the DoD Science and Technology (S&T) ecosystem; and (3) providing expertise and feedback to accelerate, mature, and transition technologies of interest to the DoD.

The xTechSBIR Autonomy competition will consist of four-rounds:

- (1) Call for concept white papers;
- (2) Final Technology Pitch event;
- (3) Request for Phase I SBIR Proposal Submission; and
- (4) Request for Phase II SBIR Demonstration

The competition will be awarding up to \$500,000 in cash prizes to select eligible entities throughout the competition. Up to 20 winners will be selected from the technology pitch event round and will be invited to submit an application for a potential Phase I SBIR Proposal worth up to \$250,000. Up to 20 companies will be selected to receive a Phase I SBIR award and then will be invited back six months after award to conduct a live demonstration to a key panel of DoD experts. Details on the prize structure and phases, are listed in this announcement below.

In addition to non-dilutive cash prizes, participants will have the opportunity to engage with U.S. DoD and winners from the Part 1: Concept White Paper round will be invited to conduct an in-person pitch at Grace’s Quarters in Maryland.

The efforts described in this notice are being pursued under the authorities of 10 U.S.C. § 4025 (formerly 2374a, Prizes for Advanced Technology Achievements) to award cash prizes as described in this announcement and potential SBIR contracts (15 U.S. Code §638) to only those eligible and selected entities as described in this announcement. In addition, 10 U.S.C. § 4003 (Prototype Projects) can be utilized to award additional follow-on contracts for additional proof-of-concept or prototype development. While the authority of this program is 10 U.S.C. § 4025, the xTechSBIR Autonomy competition may generate interest by another U.S. Army, DoD or USG organization for a funding opportunity outside of this event. The interested organization may contact the participant to provide additional information which may or may not result in partnership opportunities.

Finalists of the prize competition may be invited to submit a proposal for further development of their proposed technology innovation based on the needs of the Army. The Army may use a contract mechanism of their choice and will notify the participants accordingly. The efforts described in this Notice are being pursued under the authorities of 10 USC 2374a.

All xTechSBIR Autonomy competition submissions are treated as privileged information and contents are disclosed to Government employees or designated support contractors only for the purpose of evaluation and program support.

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Feedback from the judges panel will be provided to the participants throughout each phase of the competition. The purpose of providing this feedback is to help accelerate transition of the technology to an Army end-user by providing insight on best applications for the technology, suggestions for product improvement for Army use and recommended next steps for development. However, the Government will not respond to questions or inquiries regarding this feedback.

II. Eligibility Requirements

Small independent, U.S. businesses. Restrictions exist about (1) the type of firm, (2) its ownership structure, and (3) the firm's size in terms of the number of employees, as follows:

- (1) Type of Firm: an eligible firm must be organized as a for-profit concern and meet all the other requirements for a "business concern" in 13 C.F.R. § 3 121.105. Non-profit entities are not eligible.
- (2) Ownership and Control: A majority (more than 50%) of an eligible firms' equity (e.g., stock) must be directly owned and controlled by one of the following:
 - a. One or more individuals who are citizens or permanent resident aliens of the US.
 - b. Other for-profit small business concerns (each of which is directly owned and controlled by individuals who are citizens or permanent resident aliens of the US).
 - c. A combination of (a) and (b) above.

Note: If an Employee Stock Ownership Plan owns all or part of the concern, each stock trustee and plan member is considered an owner. If a trust owns all or part of the concern, each trustee and trust beneficiary is considered an owner.

- (3) Size: An eligible firm, together with the affiliates, must not have more than 500 employees.

III. Topics and Problem Statements

xTechSBIR Autonomy is seeking novel capabilities and technology solutions that can support the Army's current and future needs, enable new capabilities, improve performance, faster production, and/or provide a cost savings for Army systems. The Army is particularly interested in research in autonomous ground and air vehicles, which must operate in open, urban and cluttered environments. Robotics and autonomous systems regardless of their missions require similar concepts and technologies including:

- Ability to move in very cluttered, irregular, urban and underground terrains.
- Ability to move effectively in contested environments and survive attacks.
- Technologies to enable low electronic and physical profiles.
- Techniques to allow operators to be trained quickly even for complex tasks.
- Architectures to enable reprogrammable platforms under dynamic conditions.
- Sensors to detect obscured targets and to characterize terrain obstacles.
- Autonomous ground and air structures, propulsion, and mobility components.
- Technologies to significantly reduce logistical burdens.

While the competition is open to any solutions within the Autonomy space, there are specific areas that are of interest to the Army which include:

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- Solutions or incorporated technologies to support autonomous vehicle tasks such as cross-country mobility and navigation.
- Solutions or incorporated technologies to support advanced perception and automated mobility functions to maneuver in complex, off-road, and contested environments.
- Remote operation software and/or hardware systems capable of multi-domain situational awareness (SA) without exposing the human element of additional risk.
- Solutions or incorporated autonomous vehicle technologies to increase automation and to operate remotely within limited bandwidth and signature management constraints.
- Visual and targeted technologies to support complete situational awareness that can enhance vision in one system.
- Solutions or incorporated technologies to help protect autonomous sensors from external environmental factors (e.g., dust, dirt, rain) in an off-road environment.

Additional details on these examples are listed in [Appendix A](#). **Submissions are not limited to the list of topics in the appendix but must fall within the broader Autonomy topic area.**

IV. Program Submission

The xTechSBIR Autonomy competition is voluntary and open to all entities that meet the eligibility requirements. **You may submit more than one submission, per topic area but submissions may not have any overlap.** The registration information and submission upload must be received by **5:00 PM ET on June 29, 2023**. Submissions received after the deadline will not be considered.

Register now by selecting the xTechSBIR Autonomy competition tile at:
<https://www.xtech.army.mil/>

V. xTechSBIR Autonomy Competition Structure

Part 1: Concept White Paper – Small Business Submissions Only

Applicants will submit a short three-page concept white paper outlining their technology, Army capability gaps, potential impact to the Army, technology and concept viability, and dual-use capabilities and an optional 3–5-minute video. Each concept white paper will be reviewed by a panel of DoD experts across the S&T ecosystem including Warfighter, acquisition, and research and development subject matter experts.

All concept white papers must adhere to the following requirements:

- All concept white papers must be submitted using the template found on the registration page, “xTechSBIR Autonomy_WhitePaper_Template.doc”. Any proposals submitted in a format other than that provided by the template will not be reviewed.
- Please list your company name and proposal title EXACTLY how you would like them to appear on any contest marketing materials. Use a clear and concise proposal title to give readers and potential stakeholders an understanding of how your technology would benefit the Army.

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Concept white papers will be evaluated and ranked using the following scoring criteria (further details on each scoring dimension can be found on the xTechSBIR Autonomy competition registration page):

- Abstract – 5%
- Army Capability Gap(s) – 10%
- Potential for Impact – 30%
- Technology and Concept Viability – 30%
- Dual-Use– 15%
- Proposal Quality – 10%

Upon conclusion of the concept white paper evaluation period, up to 40 applicants will be selected to receive a prize of \$5,000 each and an invitation to participate in the Part 2: Technology Pitch round. The technology pitches will be held in-person in Maryland. Additional details and requirements will be sent out to selected participants.

Part 2: Technology Pitches

Finalists from Part 1, will be asked to conduct an in-person pitch on their technology concept and team ability to a panel of Army and DoD experts, tentatively scheduled from September 25-29, 2023 at Grace's Quarters in Maryland (dates and location will be finalized with participants) and are subject to change. Each team will have **20-minutes to pitch**, followed by **10-minutes** for questions and answers with judging panel.

Detailed instructions and evaluation criteria will be provided to the teams selected for Part 2 of the competition. Up to 20 teams will be selected as finalists and will receive a prize of \$15,000 and an invitation to submit a Phase I SBIR proposal.

Part 3: Request for Phase I SBIR Proposal

A separate SBIR announcement will be issued with detailed instructions on how to submit the SBIR proposal materials. The xTechSBIR Autonomy competition serve as the competitive down select to receive a Phase I SBIR award. The final small business winners from Part 2 will be the only entities given the opportunity to participate and submit a Phase I SBIR proposal. All other submissions will be rejected.

Additional instructions and details will be provided to the eligible firms.

Part 4: Phase II SBIR Proposal Request and Demonstrations

A separate SBIR announcement will be issued with detailed instructions the submission requirements for the Phase II. The only eligible firms to submit for a Phase II SBIR award are the selected firms from Part 3. Demonstrations are currently planned to be held in person at Grace's Quarters in Maryland between April/May 2024.

Additional instructions and logistical details will be provided to the eligible firms.

VI. Prizes and Incentives

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Prizes will be offered under 10 U.S.C. §4025 (Prize competitions). The total prize pool is \$500,000. The SBIR contract awards will be offered under 15 U.S.C. 638; each Direct to Phase II SBIR proposal shall be up to \$1.9M.

Phase	Winners	Prize	Phase I SBIR	Phase II SBIR
Part 1: Concept White Paper	Up to 40	\$5,000 each		
Part 2: Final Technology Pitches	Up to 20	\$15,000 each		
Part 3: Request for Phase I SBIR Proposal	Up to 20		Up to \$250,000 each	
Part 4: Phase II SBIR Proposal Demos	Up to 4			Up to \$1.9M each
	Total	\$500,000	\$5M	\$7.6M

VII. Proposed Schedule

The proposed schedule is outlined below and subject to change without notice.

Date	Activity
May 25 – June 29, 2023	Application Part 1: Concept white paper submission period
August 15, 2023	Part 1 Winners/ Finalists Announced
September 25-29, 2023	Part 2: Final Technology Pitches
October 10, 2023	Part 2 Winners Announced
October 17, 2023	Part 3: Phase I SBIR Submissions Due
October 31, 2023	Part 3 Winners Announced
April/May 2024	Part 4 Phase II SBIR Proposal Request and Demonstration

VIII. Disclaimers

Registered participants shall be required to assume any and all risks and waive claims against the Federal Government and its related entities, except in the case of willful misconduct, for any injury, death, damage, or loss of property, revenue, or profits, whether direct, indirect, or consequential, arising from their participation in this prize competition, whether the injury, death, damage, or loss arises through negligence or otherwise.

IX. Intellectual Property

The Army is a strong proponent of deliberate intellectual property (IP) rights and management by the private sector and the DoD.

For the xTechSBIR Autonomy competition:

- The Federal Government may not gain an interest in IP developed by a participant without the written consent of the participant;
- Nothing in this xTechSBIR Autonomy prize competition shall diminish the Government's rights in patents, technical data, technical information, computer software, computer databases, and computer software documentation that the Government had prior to this xTechSBIR Autonomy prize competition, or is entitled to, under any other Government agreement or contract, or is otherwise entitled to under law; and
- The Federal Government may negotiate a license for the use of IP developed by a registered participant in the prize competition.

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X. Point of Contact

The xTech Program Office

Office of the Deputy Assistant Secretary of the Army, Research and Technology

Email: usarmy.pentagon.hqda-asa-alt.mbx.xtechsearch@army.mil

Website: <https://www.xtech.army.mil/>

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APPENDIX A – xTechSBIR Autonomy Challenge Areas of Interest

Autonomy - The Army is particularly interested in research in autonomous ground and air vehicles, which must operate in open, urban and cluttered environments. Robotics and autonomous systems regardless of their missions require similar concepts and technologies including:

- Ability to move in very cluttered, irregular, urban and underground terrains.
- Ability to move effectively in contested environments and survive attacks.
- Technologies to enable low electronic and physical profiles.
- Techniques to allow operators to be trained quickly even for complex tasks.
- Architectures to enable reprogrammable platforms under dynamic conditions.
- Sensors to detect obscured targets and to characterize terrain obstacles.
- Autonomous ground and air structures, propulsion, and mobility components
- Technologies to significantly reduce logistical burdens.

Specific Autonomy Topic Areas

Topic 1: Develop solutions or incorporated technologies to support autonomous vehicle tasks such as cross-country mobility and navigation. Some examples of needed technologies: Perception Sensor Advancement (environment, distance, speed, processing power, etc.), Path planning software, Vegetation Detection, and Negative Obstacle Detection.

Resources: <https://ieeexplore.ieee.org/document/4209141>;
<https://www.nrec.ri.cmu.edu/solutions/defense/other-projects/negative-obstacle-detection-system.html>

Topic 2: Develop solutions or incorporated technologies to support advanced perception and automated mobility functions to maneuver in complex, off-road, and contested environments. Some examples of needed technologies: Vegetation Detection, Negative Obstacle Detection, Semantic Segmentation (identify types of obstacles), Terrain sensing.

Resources: <http://dspace.mit.edu/handle/1721.1/42419>;
[Army research advances autonomous systems | Article | The United States Army](#)

Topic 3: Develop remote operation software and/or hardware systems capable of multi-domain situational awareness (SA) without exposing the human element of additional risk. Some examples of needed technologies: Automated camera search (various AiTDR systems), Automated TeUAS for unmanned ground vehicles (Various TeUAS systems), Automated sensor warning systems.

Resource: [Soldiers test new IVAS technology, capabilities with hand-on exercises | Article | The United States Army](#)

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Topic 4: Develop solutions or incorporated autonomous vehicle technologies to increase automation and to operate remotely within limited bandwidth and signature management constraints. Some examples of needed technologies: GD Mission Systems; Automated PACE planning.

Resources: [PACE \(communication methodology\) - Wikipedia](#),
[Microsoft Word - spie2005-rankin-5804-41-final.doc \(nasa.gov\)](#);
['Wingman' program developing armed robotic vehicles to be controlled by Soldiers | Article | The United States Army](#)

360SA Topic Area

Topic 5: Develop visual and targeted technologies to support complete situational awareness that can enhance vision in one system. Technologies may have the ability to: reduce workload while improving capability, enhance visibility of the rear exterior areas of vehicles, or increase target detection and identification. Some examples of needed technologies: Visible, Near Infrared, Shortwave Infrared, Midwave Infrared, and Longwave Infrared Imaging technologies; At the sensor processing, also known as edge processing; Size, weight, and power optimized processing hardware; Helmet mounted displays; Panoramic image processing; Degraded vision environment enhancement processing; Driver assistance algorithms; Obstacle identification and tracking Threat detection algorithms.

Resource: <https://sam.gov/opp/beab2183cc1d44b0a7f734f9fa3e5396/view>

Additional Topics of Interest

Topic 6: Develop solutions or incorporated technologies to help protect autonomous sensors from external environmental factors (e.g., dust, dirt, rain) in an off-road environment. Some examples of needed technologies: Automated Sensor Cleaning; Algorithms for accounting for degraded environments, Lens protectors for cameras – NASCAR “Clearview” removes grit / grim from lens, part of RaceCam.

Resources: [Automatic Sensor cleaner for cars | Automotive technology | Valeo](#);
[Advances in sensor cleaning pave the way for autonomous driving | Automotive World](#);
<https://www.continental-automotive.com/en-gl/Passenger-Cars/Safety-and-Motion/Products/Washer-Systems/Camera-Cleaning-Systems>;
<https://en.wikipedia.org/wiki/RaceCam>