xTECH | HBCU STUDENT

COMPETITION ANNOUNCEMENT

U.S. ARMY
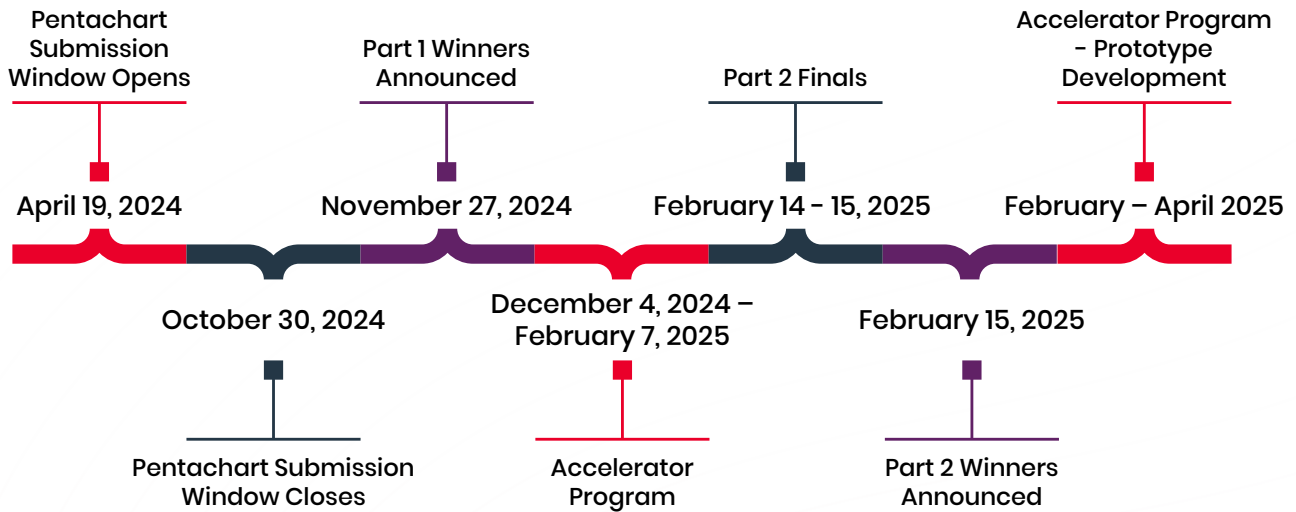
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BACKGROUND AND PURPOSE

The U.S. Army invites Historically Black Colleges and Universities (HBCU) students to participate in the xTechHBCU Student competition, a competition for eligible students to earn prize money, engage with the Department of Defense (DoD), participate in a unique accelerator program, and potentially have an opportunity to develop a prototype of their innovative idea as final winners of the competition.

The Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) recognizes the importance of enhancing engagements and highlighting opportunities for HBCUs. Diverse perspectives provide a critical source of innovative talent and novel concepts for the advancement of Army Modernization Priorities and national security.

The xTechHBCU Student competition offers:

▶ A platform for eligible undergraduate students to submit innovative ideas to the Army.

▶ Direct feedback to participants from Army and DoD stakeholders on their ideas.

▶ Access to training, mentorship and networking opportunities through the xTechHBCU Student Accelerator program.

▶ Up to $139,500 in cash prizes throughout the competition.

SCHEDULE

Pentachart Submission Window Opens
April 19, 2024

Part 1 Winners Announced
November 27, 2024

Part 2 Finals
February 14 - 15, 2025

Accelerator Program - Prototype Development
February – April 2025

Pentachart Submission Window Closes
October 30, 2024

Accelerator Program
December 4, 2024 – February 7, 2025

Part 2 Winners Announced
February 15, 2025

Visit www.xtech.army.mil to learn more about various information sessions and office hours available to HBCU students.

ELIGIBILITY REQUIREMENTS

To join the competition, student(s) must:

▶ Be enrolled as a full-time undergraduate student as of or beginning in the fall 2024 semester at a HBCU institution when registering for the competition. A list of these schools can be found at:

- https://sites.ed.gov/whhbcu/one-hundred-and-five-historically-black-colleges-and-universities/

▶ Be 18 years or older by the Part 1 submission deadline (October 30, 2024).

▶ Provide current enrollment status with their submission. Acceptable documents include:

- An academic transcript as of fall semester 2024.
- A letter or form from the HBCU's Office of the Registrar confirming student's fall 2024 enrollment.
- Enrollment verification from the National Student Clearinghouse.
- I-20 Form.

Student(s) must register their self or team to join. Professors may not submit submissions on behalf of students.

STUDENT TEAMING

▶ Students can join the competition as a single-entry participant or in teams of up to three (3) eligible students. If joining as a team, the following criteria must be met:

▶ All students must be undergraduates, currently enrolled at HBCUs.

▶ Teams can consist of students from various accredited HBCUs.

▶ Teams must create a name.

▶ Each team must have one main point of contact.

▶ All team members must participate in all aspects of the competition.

Students may only submit one submission in a team OR single-entry participant. Students cannot participate as a single-entry participant and in a team.

REGISTRATION

There may be only one submission per eligible student and/or team. Previous xTechHBCU Student competition participants are invited to participate but must submit a new technology idea. The registration information and submission upload must be received by 5 p.m. ET, October 30, 2024. Submissions received after the deadline will not be considered.

Register now by selecting the xTechHBCU Student competition image at https://www.xtech.army.mil/competitions/

COMPETITION STRUCTURE AND SUBMISSION INSTRUCTIONS

xTechHBCU Student is seeking innovative ideas from HBCU students that can assist in tackling the Army's current challenges while strengthening relationships and collaborations between HBCU students and the Army. The xTechHBCU Student competition will focus on two main open topic areas:

▶ Topic 1: Autonomy
▶ Topic 2: Power and Energy

These topic areas are to provide the Army with new ideas while enabling students to build upon their concepts for future Army use. Additional details on each topic area can be found in Appendix A of this document or and on the competition registration page on the xTech website.

The xTechHBCU Student competition will consist of two rounds:

(1) Part 1: Pentachart; and

(2) Final Pitch Event

PART 1: PENTACHART

All eligible students will submit a two-slide pentachart. Slide one will outline the innovative technology idea, how it relates to the problem statement, potential markets for the idea and a student profile. The second slide will provide space for any diagrams, elements or visuals that can help the reviewer understand what the student is proposing. The second slide is optional.

Pentacharts will be reviewed by a panel of subject matter experts across the Army and DoD.
Pentachart submissions must follow this format:

▶ All pentacharts must be submitted using the template found on the registration page, "xTechHBCU_Pentachart_Template.pdf." Any proposals submitted in a format other than that provided by the template will not be reviewed.
▶ Use Calibri font, size 11.
▶ List your name(s) and proposal title EXACTLY how you would like them to appear on any competition marketing materials. Please use a clear and concise proposal title to give readers an understanding of how your innovative technology idea would benefit the Army.

Pentacharts will be evaluated and ranked using the following scoring criteria (further details on each scoring dimension can be found on the xTechHBCU Student competition registration page):

▶ Problem – 20%

▶ Solution – 20%

▶ Impact – 20%

▶ Why Me? – 20%

▶ Market Knowledge – 10%

▶ Idea Visuals – 10%

Upon conclusion of the pentachart evaluation period, up to 15 applicants will be selected to receive a prize of $4,500 total per single-entry participant selected or team (teams will split $4,500 prize award among winning team members) and an invitation to Part 2: Finals at or around the 2025 BEYA STEM Conference from February 13-15, 2025. Travel funding to the finals event is included in the cash prize award of $4,500.

In addition to prize money and invitation to finals, Part 1 winners will have the opportunity to participate in the xTechHBCU Student Accelerator, a cohort-based program designed to help finalists prepare for competition finals through educational programming and diverse mentorship. Additional details on the accelerator will be provided to the selected finalists.

PART 2: FINALS

Selected winners from Part 1 will be invited to present at or around the 2025 BEYA STEM Conference in February 2025. Their pitch presentation will focus on their innovative technology idea, which will be presented to a panel of Army and DoD SMEs. The exact location and dates are subject to change and will be provided to the finalists.

Each individual participant or team will present their innovative idea, followed by a question-and-answer session with the evaluation panel. Detailed instructions will be provided to the students selected for Part 2. Up to five winners will be selected and will receive a first-place prize of $18,000, a second-place prize of $15,000, a third-place prize of $12,000, fourth-place prize of $9,000, and fifth-place prize of $6,000. All others, six through fifteen will receive a cash prize of $1,200. Cash prizes are per submission, so prize amounts would be split among members of winning teams.

Accelerator Prototype Development

Competition winners from Part 2 will potentially have the opportunity to develop a prototype for their innovative technology solution based on its viability. Through this process, the winners continue to progress through unique programming via an accelerator, receiving education and mentorship.

SCHEDULE AND PRIZES

The xTechHBCU Student competition will provide non-dilutive seed prizes to select undergraduate students. The efforts described in this notice are being pursued under the authorities of 10 U.S.C. §4025, 10 U.S.C. §4144, 10 U.S.C. § 4022 (Prototype Projects), and 10 U.S.C. § 2192.

PHASE	NUMBER OF WINNERS	CASH PRIZE
Part 1: Pentachart	Up to 15 Finalists	$4,500 each
Part 2: Finals	Up to 5 Winners	1st place: $18,000 2nd place: $15,000 3rd place: $12,000 4th place: $9,000 5th place: $6,000 6th – 15th place: $1,200
	TOTAL	**$139,500**

PRIVACY

All xTechHBCU Student 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.

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.

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 xTechHBCU Student 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 xTechHBCU Student 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 xTechHBCU Student 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.

CONTACT US

If you have any questions, please email the Army xTech Program Team at: usarmy.pentagon.hqda-asa-alt.mbx. xtechsearch@army.mil.

TOPIC 1: AUTONOMY

The rapid advancement and integration of autonomous technologies across various domains are transforming the landscape of military operations and therefore demands a fresh approach to enhance the capabilities and safety of the Joint Force. To better prepare the Joint Force for an evolving and unpredictable future, the DoD has shifted its approach away from traditional notions of warfare and toward embracing autonomy as a critical tool. This approach acknowledges that autonomy extends beyond specific platforms or technologies, emphasizing the need to harness autonomous systems to optimize decision-making, operational efficiency and mission success.

BACKGROUND AND PROBLEM DEFINITION

The U.S. Army, recognizing the significance of autonomy in modern warfare, is actively seeking innovative approaches to leverage autonomous technologies for the benefit of its service members. This includes a wide array of applications, including unmanned ground and aerial vehicles, protection of autonomous platforms against cyber vulnerabilities, advanced artificial intelligence systems for decision support and autonomous weaponry. These innovations aim to enhance Soldier protection, augment situational awareness and improve the lethality of our forces while adapting to the complexities of contemporary conflict.

Historically, military strategies often focused on traditional warfare scenarios, but the rapid evolution of autonomous technologies presents new challenges and opportunities. The Army's commitment to embracing autonomy underscores the need to stay ahead of technological advancements, ensuring that our forces are prepared to face both known and unforeseen threats in an ever-changing environment. Some examples of ideas might include:

EXAMPLE IDEAS FOR INNOVATION

▶ Autonomous UAS (unmanned aircraft systems) and UGVs (unmanned ground vehicles) to enhance operational capabilities, reduce risks to Soldiers by enabling remote and safer missions, and maintain a technological edge to adapt to modern warfare (e.g., unmanned systems and semi-autonomous convoys and enabling technology).

▶ Autonomous systems for cyber defense (e.g., enabling local automated intrusion detection) to improve the efficiency and safety of autonomous operations (e.g. autonomous convoys equipped with advanced sensors, GPS and communication systems to navigate pre-determined routes).

- Robotic systems capable of conducting tasks in high-risk environments to reduce the exposure of Soldiers to danger while contributing to force multiplication (e.g., robotic systems to assist with equipment transportation through rugged terrain or a remotely operated robotic device equipped with a weapon).

- AI systems capable of analyzing vast amounts of data, like imagery or video data from drones and other sources, to aid in decision-making and/or the identification and tracking of objects of interest (e.g., predictive analysis and threat assessment).

- Immersive systems capable of analyzing data and providing a walkthrough to the user for maintenance issues on aviation and ground vehicles.

- Immersive systems capable of simulating a live environment for training purposes.

- Software enabling data management, processing, and fusion across sensors and AI algorithms for autonomous systems.

SUPPLEMENTAL MATERIALS

https://breakingdefense.com/2022/06/army-robotics-officer-more-autonomy-could-ease-battlefield-bandwidth-worries/

https://defensescoop.com/2022/11/17/army-acquisition-chief-sees-autonomy-system-hardening-as-key-to-overcoming-comms-challenges-in-future-drone-wars/

https://www.defense.gov/News/News-Stories/Article/Article/2928194/artificial-intelligence-autonomy-will-play-crucial-role-in-warfare-general-says/

https://www.defenseone.com/technology/2022/02/near-future-military-autonomy-isnt-robotanks-microservices/361873/

https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/November-December-2019/Turner-UGVs/

https://www.defense.gov/News/News-Stories/Article/Article/3278065/dod-updates-autonomy-in-weapons-system-directive/

https://www.csis.org/analysis/dod-updating-its-decade-old-autonomous-weapons-policy-confusion-remains-widespread

https://defense.info/re-shaping-defense-security/2021/04/sustaining-machines-logistics-and-autonomous-systems/

https://fedtechmagazine.com/article/2021/01/army-uses-ar-make-training-more-dynamic

TOPIC 2: POWER AND ENERGY

By 2040, military operations will have evolved significantly with an increased emphasis on energy efficiency and sustainability. Reliance of fossil fuels presents many logistical burdens due to the complexity of the supply chains and risks associated with transporting fuels. The future battlefield will require a logistical framework that can support solar, wind, biofuels, and other energy sources that are more sustainable and can be produced during military operations.

The shift to energy efficiency and sustainability during military operations will require development of robust logistical strategies that can adapt to the dispersed nature of future combat operations and align with the DoD Operational Energy Strategy to reduce energy demands and adopt clean technologies. The Army is interested in new and innovative technologies and techniques to ensure uninterrupted, clean energy supplies when faced with future contested environments.

BACKGROUND AND PROBLEM DEFINITION

Successful military capabilities rely on assured access to sufficient and secure supplies of energy. Contested logistics environments and a heavy reliance on commercial technology and infrastructure are two challenges seen in power and energy generation that the DoD is looking to alleviate. The DoD must ensure mission readiness is supported with resilient, reliable, clean, and efficient installation and operational energy capabilities.

The DoD has established the Operational Energy Strategy to outline its goals in providing resilient energy to the Joint warfighter and reducing energy demand while enhancing capabilities of weapon systems and forces. Operational Energy is defined as the "energy required for training, moving, and sustaining military forces and weapons platforms for military operations and includes energy used by ships, aircraft, combat vehicles, and tactical power generators." In alignment with the National Defense Strategy, the DoD is prioritizing energy demand reduction and seeking to adopt more efficient and clean energy technologies that reduce logistics requirements in contested environments.

Climate change discussions and rapid developments in clean energy technologies are key drivers in the global energy markets. This shift in the industry will have a major impact on the DoD's current operations. The U.S. Army heavily relies on energy-dense, liquid fuels for mobile applications. While reliant on fossil fuels to support operations in the near- to mid-term, the DoD is looking to leverage this energy transition to increase operational capability and reduce risk.

These efforts include hybridizing ground vehicles and developing microgrids to decrease the Army's dependence on fuel convoys. Hybrid technologies leverage auxiliary battery power to lower fuel usage and emissions when tactical vehicles are idle. Microgrids are able to provide stability of operations in installations, even when infrastructure is under attack.

EXAMPLE IDEAS FOR INNOVATION

▶ Energy storage (e.g., man-portable, ground vehicle and support equipment applications, and airborne vehicle solutions).

▶ Clean energy generation (e.g., primary but not exclusive range of 1kW-200kW and 20-1,000 energy consumption endpoints).

▶ Micro-grid components compatible with the DoD's Tactical Microgrid Standard.

▶ Electric and hybrid electric transportation components (e.g., ground vehicles, ground support equipment, UAV, helicopter and small-fixed wing aircraft solutions).

▶ Thermoelectric generators can be on military installations to convert waste heat into additional electrical power and in automobiles as automotive thermoelectric generators (ATGs) to increase fuel efficiency.

▶ Photovoltaic systems that can harvest energy in darkness, reducing the need for batteries that store electricity generated during the day.

▶ Charging of electrified transportation in austere environments.

SUPPLEMENTAL MATERIALS

https://www.ausa.org/articles/climate-change-hits-home-assessment-tool-helps-gauge-way-forward

https://www.thedefensepost.com/2023/06/28/us-tactical-energy-storage-prototype/

https://www.defense.gov/News/News-Stories/Article/Article/3365277/official-describes-steps-dod-taking-for-energy-environmental-resilience/

https://s3.us-gov-west-1.amazonaws.com/oe-storage.core.public.0006/UserGuides/DoD%20Energy%20Strategic%20Plan%20Signed%2020201224.pdf

https://www.acq.osd.mil/eie/Downloads/IE/FY22%20AEPRR%20Report.pdf

https://nstxl.org/energy-solutions-for-the-u-s-military/

https://www.freethink.com/hard-tech/solar-panels-nighttime-electricity?amp=1