The Army xTech Program – xTech Historically Black Colleges & Universities – Student Challenge Announcement

I. Background and Purpose

The U.S. Army would like to invite eligible Historically Black College & University Students to participate in the xTechHBCU – Student competition. xTechHBCU Student is a forum for students to engage with the Department of Defense, earn prize money, participate in a unique accelerator program, and potentially have an opportunity to develop a prototype for their designed solutions as final winners of the competition. The competition finals will be held at or around the 2024 Black Engineer of the Year Awards STEM Conference from February 15 – 17, 2024.

The Assistant Secretary of the Army for Acquisition, Logistics and Technology, recognizes that the Army must enhance engagements and highlight 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 provides a structured and focused entry path for eligible undergraduates to submit novel concepts and technology solutions directly to the Army. Participants will receive detailed feedback from Army and DOD stakeholders; and will have access to training, mentorship, and networking opportunities through the xTechHBCU Student accelerator. The competition will award up to $100,000 in cash prizes to select eligible participants throughout the competition. At the finals event, the judges will select up to four winners and award the top participant the grand prize of $10,500.

The xTechHBCU Student competition will consist of two rounds:

(1) Call for pentacharts; and
(2) Final Pitch Event

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 (formerly 2374a), 10 U.S.C. §4144, 10 U.S.C. § 4022 (Prototype Projects), and 10 U.S.C. § 2192.

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.

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 continue strengthening the relationship between the Army and HBCUs and 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.

II. Eligibility Requirements

The individuals allowed to participate in this competition must be current students from institutions classified as an HBCU by the U.S. Department of Education designated HBCU institutions.

The student must:

- Be a full-time undergraduate student at a covered institution at the time of application
- Be 18 years or older by the Part 1 submission deadline
- Provide documentation of the HBCU status and current enrollment status with their submissions

Eligible applicants include community colleges or other 2-year degree granting institutions meeting the definition of a "covered educational institution."

III. Focus Areas

xTechHBCU Student is seeking novel, disruptive concepts and technology solutions from HBCU Students that can assist in tackling the Army's current needs while strengthening relationships and collaborations between HBCU Students and the Army. The xTechHBCU Student competition will focus on three main open topic areas:

- **Topic 1: Autonomy**
- **Topic 2: Chemical and Biological Sciences**
- **Topic 3: Health**

The intent of these topic areas is 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 on the competition registration page.

IV. Program Submission

The xTechHBCU Student competition is voluntary and open to all individuals that meet the eligibility requirements. There may be only one submission per eligible student. Previous xTechHBCU Student competition participants must submit a new technology solution. The registration information and submission upload must be received by **5 p.m. EDT on November 14, 2023**. Submissions received after the deadline will not be considered.

Register now by selecting the xTechHBCU Student competition tile at:

https://www.xtech.army.mil/competitions/

V. xTechHBCU Student Competition Structure

Part 1: Pentachart

All eligible students shall submit a two-slide pentachart. Slide one will outline the technology solution, 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.

Each pentachart will be reviewed by a panel of experts from across the Army Science & Technology ecosystem including Warfighter, acquisition, and research and development subject matter experts, as well as potential HBCU and venture capital experts.

All submissions must adhere to the following requirements:

- 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.**
- Please list your 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.

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 20 applicants will be selected to receive a prize of $3,500 each and an invitation to Part 2: Finals at or around the 2024 BEYA STEM Conference from February 15 – 17, 2024. Travel funding to the finals event is included in the cash prize award of $3,500.

xTechHBCU Accelerator

In addition to the prize money and invitation to the finals, Part 1 winners will have the opportunity to participate in the xTechHBCU Student accelerator, a cohort-based program designed to help develop the finalists through educational programming, diverse mentorship, venture building consulting, community building and strategic exposure. Additional details on the accelerator will be provided to the selected participants.

Part 2: Finals

Selected winners from Part 1 will be invited to conduct a final pitch, at or around the 2024 BEYA STEM Conference in February 2024. The pitches will focus on their technology concept and ability, which will be presented to a panel of Army and DOD SMEs, as well as potential HBCU and VC representatives. The exact location and dates are subject to change and will be provided to the finalists.

Each participant will conduct a pitch presentation followed by a question-and-answer session with the judging panel. Detailed instructions and evaluation criteria will be provided to the participants selected for Part 2. Up to four winners will be selected and will receive a first-place prize of $10,500, a second-place prize of $8,500, a third-place prize of $6,500, or a fourth-place prize of $4,500.

Prototype Development

Selected 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,

mentorship, and assistance in the development of their ideas to create a product that could potentially be integrated into the Army.

VI. Prizes and Incentives

Prizes will be offered under 10 U.S.C. §4025 (Prize competitions). The total prize pool is $100,000. Other non-monetary incentives are provided through the xTechHBCU Student competition to help participants engage with the Army.

Phase	***Number of Winners***	***Prize***
Part 1: Pentachart	Up to 20	$3,500 each
Part 2: Finals	Up to 4	1st Place - $10,500 2nd Place - $8,500 3rd Place - $6,500 4th Place - $4,500
	Total	**$100,000**

VII. Proposed Schedule

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

Date	**Activity**
September 20 – November 14, 2023	Part 1 Submissions Open
December 8, 2023	Finalists Announced
January 8 – March 1, 2024	xTechHBCU Student Accelerator
February 15 – 17, 2024	Part 2: Finals
February 17, 2024	Winners Announced

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 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.

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https://www.xtech.army.mil/competitions/

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/

APPENDIX A – xTechHBCU Student Competition Topic Definitions

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 towards 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 & 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, autonomous logistics and supply chain management, advanced artificial intelligence systems for decision support, as well as 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 everchanging environment.

Example Ideas for Innovation

- Autonomous UAS and UGVs 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 logistics (e.g., Logistics Information Systems (LIS) for supply chain optimization, asset visibility, and risk management) to improve the efficiency and safety of supply chain 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).

Supplemental Materials

You are not required to solely utilize these resources. These documents are intended to provide a starting point for your research on how to achieve the Army's strategic climate goals.

- 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/

Topic 2: Chemical and Biological Sciences

Rapid development and convergence of disparate branches of science and technology are both expanding the landscape of chemical and biological threats to the Joint Force and demanding new approaches for developing products and capabilities to understand, protect against, and mitigate the effects of rapidly emerging threats. To better prepare the Joint Force against future and unknown threats, including naturally occurring emerging pathogens, the Chemical and Biological Defense Program (CBDP) has released guidance that pivots away from viewing the threat landscape as a defined list of known biological and chemical agents, instead placing emphasis on removing or reducing the impact of agents' effects.

Background & Problem Definition

The Army Research Laboratory (ARL) has also identified a critical need to pursue synthetic biology solutions to yield new capabilities in protection, situational awareness, and lethality for warfighters. Research has already demonstrated the potential for this field to have major effects on commodity and specialty materials, sensing, human performance, medical, and biological and chemical weapons threats/defense, all of which are of substantial importance to the U.S. Department of Defense (DoD).

Historically, with some exceptions, the defensive approach against chem/bio threats focused on countering a defined list of known biological and chemical agents. However, the rapid evolution of technology continues to drive the expansion of that threat list and, as the COVID-19 pandemic demonstrated, the threat landscape now also includes the emergence of novel infectious disease pathogens. It may become increasingly difficult to determine the nature and origin of threat agents yet impacts to the operational mission will be similar regardless of whether the threat agent is naturally occurring, accidentally released, or deliberately made. This requires the Army to shift its strategy to focus on both non-specific products and specific countermeasures that can be scaled to quickly prepare for and respond to unknown threats.

The rapid evolution of chem/bio technology has also coincided with advancements in synthetic biology capabilities. Research has already demonstrated the potential for this field to have major effects on materials, sensing, human performance, medical, and biological and chemical weapons threats/defense - all of which are of substantial importance to the U.S. Department of Defense.

Example Ideas for Innovation

The U.S. Army is interested in innovative approaches to keep its service members safe from harmful Chemical and Biological agents and/or leverage synthetic biology innovations to enhance Soldier protection, situational awareness, and lethality. Some examples of ideas might include:

- Early detection/identification of emerging threats
- Preventative measures against known and unknown threats (e.g., prophylactics)
- Scalable countermeasures and test products
- Materials that improve stealth / camouflage to avoid detection
- Biological methods for computing, data storage, and/or cryptography
- Uniforms that have intrinsic insect-repellant properties without the use of DEET

Supplemental Materials

- Approach for Research, Development, and Acquisition of Medical Countermeasure and Test Products
    - https://media.defense.gov/2023/Jan/10/2003142624/-1/-1/0/APPROACH-RDA-MCM-TEST-PRODUCTS.PDF
- 2023 Biodefense Posture Review
    - https://media.defense.gov/2023/Aug/17/2003282337/-1/-1/1/2023_BIODEFENSE_POSTURE_REVIEW.PDF
- Chemical, Biological, Radiological, and Nuclear Platoons
    - https://armypubs.army.mil/epubs/DR_pubs/DR_a/ARN32065-ATP_3-11.74-000-WEB-1.pdf
- Approach for Research, Development, and Acquisition of Medical Countermeasure and Test Products

  - https://media.defense.gov/2023/Jan/10/2003142624/-1/-1/0/APPROACH-RDA-MCM-TEST-PRODUCTS.PDF
- https://www.armytimes.com/home/2022/10/12/as-the-army-pivots-to-battle-peers-chemical-biological-threats-loom/
- https://www.armytimes.com/news/your-army/2018/08/29/to-prepare-for-urban-warfare-soldiers-train-for-chemical-attack-mass-disaster-response-in-detroit/
- https://www.defense.gov/News/News-Stories/Article/Article/649239/dod-chemical-biological-program-has-a-global-mission/

Topic 3: Health

Mental health and physical health are top priorities for the next generation of innovators. The US Army also recognizes that strong mental and physical health is the foundation for a healthy, resilient soldier. The U.S. Army is interested in technologies that provide better mental and physical health solutions to the broader society and to the soldier. We hope to find cutting edge ideas that have the potential to grow into profitable health technology companies that can change the lives of the U.S. Soldier and society.

Background & Problem Definition

Digital Transformation is a key initiative in the Army's modernization strategy for the future force of 2035. The Army's focus from 2022 through 2027 will be for preventative care when thinking about digital wellness such as mental health, physical health, and the prevention of harmful behaviors like suicide. The Army is also aware of the effects that the digital world has on young people's health. The Army is interested in technologies that help provide better mental and physical health solutions to the broader society and to the Soldier.

Emerging technologies like cloud, AI, extended reality, and wearables continue to shape battlefield domains in ways that allow the Soldier to stay more connected than ever before. Remote and hybrid work environments have also shaped society towards a trend of 24/7 digital connectivity. While digitization has many benefits, research shows increased technology usage can also have negative effects to physical and mental health if not properly protected. Statistics also show these effects are exacerbated in marginalized communities with fewer paths and resources leading towards recovery and health.

Digital Wellness is an emerging field created to promote healthy technology usage habits. It also incorporates preventative care practices into technology design to optimize performance while protecting physical and mental health. Research has shown that technology use can become harmful to health when it interferes with healthy nutrition, sleep, and exercise. Excessive screentime is associated with increased risk of depression, cardiovascular disease, and other chronic conditions. Over 27% of Army personnel reported 5+ hours of screentime per day. Only 40% of soldiers reported eating 2 or more servings of vegetables per day. Less than 40% of the Army met sufficient sleep targets set by the CDC and the National Sleep Foundation in 2020 during active duty. Increased suicide rates among active-duty military have also been reported.

While health is a broad topic, areas of critical importance in the context of preventative care and digital wellness include: Mental Health, Sleep Health, and Nutritional Science.

"There is no stigma associated with taking care of yourself and your family. We should strive to connect our Soldiers with the necessary resources for their wellbeing. The Army is its people, and a strong, healthy, resilient, trained force is the most important indicator of our readiness." - The Secretary of the Army

Example Ideas for Innovation

Your idea can be anything in these three focus areas. Some examples to help you dream of a better world include: a gamified online platform designed to teach self-reflection and emotional literacy, or using nutritional science to power unique, individualized meal plans to Soldiers for combat zones.

Supplemental Materials

- 2022 U.S. Army Health of the Force Report
  - https://phc.amedd.army.mil/Periodical%20Library/2022-hof-report-web.pdf
- U.S. Army Public Health Update
  - https://phc.amedd.army.mil/Pages/default.aspx
- 2018 Health Related Behaviors Survey: Deployment Experiences and Health Among the Reserve Component
  - https://apps.dtic.mil/sti/pdfs/AD1129969.pdf
- https://www.defense.gov/Spotlights/Military-Health/
- https://www.army.mil/article/269618/army_expands_mental_health_support_by_implementing_the_brandon_act
- https://www.ausa.org/news/sleep-behavioral-health-still-challenge-soldiers
- https://www.defense.gov/News/News-Stories/Article/Article/3321282/physician-says-dod-focused-on-improving-mental-health-of-force/
- https://www.army.mil/article/266225/devcom_soldier_centers_tube_foods_fuel_high_altitude_pilots
- https://www.dvidshub.net/news/440120/science-behind-army-comprehensive-body-composition-study-usariem-completes-critical-data-collection
- https://www.dvidshub.net/news/447441/nutritions-role-total-force-fitness-examined-conference