

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 HBCU Students to participate in the xTech Historically Black Colleges & Universities – Student Competition. xTechHBCU Student is a forum for eligible HBCU students across the U.S. 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 or seek a patent for their designed solutions as final winners of the competition. The competition finals will be held at the 2023 Black Engineer of the Year Award Science, Technology Engineering, and Mathematics Conference from February 9-11, 2023.

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 will provide a structured and focused entry path for eligible undergraduates to submit novel concepts and technology solutions directly to the U.S. Army. Participants will receive detailed feedback from Army and DOD stakeholders; and will have access to training, mentorship, networking opportunities through the xTechHBCU Student Accelerator.

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.

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 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: Climate Change](#)
- [Topic 2: Health](#)
- [Topic 3: Artificial Intelligence & Machine Learning](#)

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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. The registration information and submission upload must be received by **5pm ET on October 31, 2022**. Submissions received after the deadline will not be considered.

Register now by selecting the xTechHBCU Student competition tile at:
<https://www.xtechsearch.army.mil/>

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.

Detailed feedback from the judges will be provided to the participants throughout each phase of the competition. The purpose of 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.

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 their 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 envisioning.

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%

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Solution – 20%
Impact – 20%
Market Knowledge – 10%
Why me? – 20%
Idea Visuals – 10%

Upon conclusion of the pentachart evaluation period, up to 20 applicants will be selected to receive a prize of \$2,500 each and an invitation to Part 2: Finals at the 2023 BEYA STEM Conference from 9-11 February 2023.

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 Part 1 winners will be invited to conduct a final pitch, in-person or virtual, at the 2023 BEYA STEM Conference in February 2023. 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 three winners will be selected and will receive a first-place prize of \$8,000, a second-place prize of \$5,000, or a third-place prize of \$2,000.

Part 3: Prototype Development

Part 2 winners will be invited to develop a prototype or seek a patent for their innovative technology solution. 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 \$65,000. Other non-monetary incentives are provided through the xTechHBCU – Student Competition to help participants engage with the Army.

<i>Phase</i>	<i>Number of Winners</i>	<i>Prize</i>
Part 1: Pentachart	Up to 20	\$2,500 each
Part 2: Finals	Up to 3	1 st Place - \$8,000 2 nd Place - \$5,000 3 rd Place - \$2,000
	Total	\$65,000

VII. Proposed Schedule

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

Date	Activity
September 14, 2022 – October 31, 2022	Part 1 Submissions open
November 30, 2022	Finalists Announced
December 2022 – February 2023	xTechHBCU Student Accelerator
February 9-11, 2023	Part 2: Finals
February 13, 2023	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.xtechsearch.army.mil/>

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.xtechsearch.army.mil>

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APPENDIX A – xTechHBCU Student Competition Topic Definitions

Topic 1: Climate Change

The U.S. Army faces a challenge to its core purpose: "to deploy, fight, and win the nation's wars by providing ready, prompt, and sustained land dominance as part of the Joint Force" because of the effects of climate change. The risks of climate change have been deemed a threat to national security. The hazards associated with unpredictable, extreme weather threats undermine the ability of the Army to address readiness challenges, as well as increases the risks of armed conflict in places across the globe. The Army is seeking technologies that can help mitigate the effects of climate change.

Background & Problem Definition

The U.S. Army faces an existential challenge to its core purpose: "to deploy, fight, and win the nation's wars by providing ready, prompt, and sustained land dominance as part of the Joint Force"¹ because of the effects of climate change. The risks of climate change have been deemed a threat to national security.² The hazards associated with unpredictable, extreme weather threats undermines the ability of the Army to address readiness challenges, as well as increases the risks of armed conflict in places across the globe.

The Department of Defense is one of the largest producers of carbon dioxide emissions. If the Pentagon was a country, it would be the 55th largest emitter of CO₂ in the world.³ The Army has set the following goals as part of its climate strategy:

- Achieve a 50% reduction in Army net greenhouse gas (GHG) pollution by 2030, compared to 2005 levels
- Attain net-zero Army GHG emissions by 2050
- Proactively consider the security implications of climate change in strategy, planning, acquisition, supply chain, programming documents and processes

The xTechHBCU Student Competition is looking for solutions to help the Army achieve these climate tech goals. How would you use technology to solve this problem?

Think big! Not only does the Army use fuel to power land and air vehicles, but they require access to food and water for their Warfighters in far-reaching places across the globe. Technology solutions that achieve results in the three Lines of Effort (Installations, Acquisition & Logistics, and Training) are all ripe for innovation that will enable the Army to operate in a climate-altered world. Technological achievements in one small area do work to impact the goals of the whole. You are not tied to just one topic area. Your solution may cover more than one topic.

Example Ideas for Innovation

Your technology solution can fall into any area! The Army has Installations all around the world. These require energy and water, often in harsh environments. Are there alternative means of generating electricity? Or creating structures that are more efficient?

¹ https://www.army.mil/e2/downloads/rv7/about/2022_army_climate_strategy.pdf

² https://www.army.mil/e2/downloads/rv7/about/2022_army_climate_strategy.pdf

³ <https://www.forbes.com/sites/niallmccarthy/2019/06/13/report-the-u-s-military-emits-more-co2-than-many-industrialized-nations-infographic/?sh=44f0ff8c4372>

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The Army needs a lot of “stuff”. Do you have an idea to help them anticipate their needs and optimize getting the items that they need? How can the Army create climate-resilient supply chains and minimize any waste along the way?

Ultimately, the Army also needs a force that is climate-informed. How can the Army better harness technology to ensure that its training helps create Soldiers that understand climate impacts?

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.

- [United States Army – Climate Strategy](#)
- [Army introduces strategy to combat climate change threats](#)
- [Department of Defense Climate Adaptation Plan](#)
- [Federal Sustainability Resources – Council on Environmental Quality Guidance](#)
- [Department of Defense Progress Data and Agency Progress](#)
- [Department of Defense Sustainability Report & Implementation Plan](#)
- [Army Installations Strategy](#)
- [Army Climate Resilience Handbook](#)

Topic 2: Health

Within the U.S. Army, the Soldier is the foundation of all defense capabilities. Mental and physical health for the Soldier is priority for the Army. The Army is prioritizing technologies that reduce Soldiers’ mental and physical burden and allow them to react faster than their adversaries. The Army’s focus from 2022 through 2027 will be for preventative care when thinking about digital wellness (such as the effects of the digital world on young people’s health), mental health, physical health, and the prevention of harmful behaviors like suicide. The Army is interested in technologies that help provide better mental and physical health solutions to the broader society and to the Soldier.

Background & Problem Definition

The world runs on people. But as technology advances, we are seeing that people’s health is being put more and more at risk as they engage in a technology-dependent society. As people spend more time in front of screens and phones, numerous statistics are showing a decline in physical and mental health in young people year over year. People are eating less healthy, sleeping less, and depression rates among people are at a record high. Statistics also show these effects are exacerbated in marginalized communities with fewer paths and resources leading towards recovery and health.

Within the Army, the Soldier is the foundation of all defense capabilities. Mental and physical health for the Soldier is priority for the Army. The Army is looking for technologies that reduce Soldiers’ mental and physical burden and allow them to react faster than their adversaries is a priority. The Army’s focus from 2022 through 2027 will be for preventative care when thinking about digital wellness (such as the effects of the digital world on young people’s health), mental health, physical health, and the prevention of harmful behaviors like suicide. Only 50% of Soldiers met the nutrition targets of eating 2 or more servings of fruits per day (30%) or 2 or more servings of vegetables per day (40%). 38% of Soldiers attained 7 or more hours of sleep during work/duty weeks, which is consistent with data from 2019.

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"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

Mental and Physical Health is a priority for the next generation of innovators and technologies. The U.S. Army is interested in technologies that help provide better mental and physical health solutions to the broader society and to the Soldier. In this Challenge, we are looking to support new, innovative ideas that have the business potential to become successful health technology companies that will change the lives of the U.S. Soldier and of society. We are focusing on three areas that are of critical importance: Mental Health, Sleep Health, and Nutritional Science.

Example Ideas for Innovation

Your idea could be anything in these three focus areas, such as creating a platform for sharing mental health resources, delivering on-demand physical lab tests using an app, or using nutritional science to power unique, individualized meal plans to Soldiers for combat zones.

Background and Problem Statement References:

- "More Technology Use Linked to Mental Health Issues in At-Risk Adolescents"
 - 2017, Duke University <https://today.duke.edu/2017/05/more-technology-use-linked-mental-health-issues-risk-adolescents>
- "Interactions between sleep, stress, and metabolism: From physiological to pathological conditions"
 - 2015, Department of Psychobiology, Universidad Federal de Sao Paulo
 - <https://www.sciencedirect.com/science/article/pii/S1984006315000607>
- "Concerns about the future of people's well-being"
 - 2018, Pew Research Center
 - <https://www.pewresearch.org/internet/2018/04/17/concerns-about-the-future-of-peoples-well-being/>
- "The implications of emerging technology on military human performance research priorities"
 - 2020, Journal of Science and Medicine in Sport
 - <https://www.sciencedirect.com/science/article/pii/S1440244020307866>
- "Depression Rates in the US Tripled When the Pandemic First Hit—Now, they are even worse"
 - 2021, Boston University Research
 - <https://www.bu.edu/articles/2021/depression-rates-tripled-when-pandemic-first-hit/>
- Digital Wellness Research
 - Boston Children's Hospital
 - <https://digitalwellnesslab.org/research/>

Supplemental Materials

- U.S. Army Health of the Force Report, 2021
 - <https://phc.amedd.army.mil/Periodical%20Library/2021-hof-report-web.pdf>
- U.S. Army Public Health Update
 - <https://phc.amedd.army.mil/Pages/default.aspx>

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Topic 3: Artificial Intelligence & Machine Learning

The U.S. Army is an organization that is primarily run by people, and of the million people that work in the Army, all of them perform discrete tasks, from filling out long contracting forms to procuring tanks, to driving a variety of Army vehicles. As AI and ML tools are invented, the Army is looking to find places they can be implemented to increase efficiencies, decrease costs and, most importantly, make the modern-day Warfighter safer and more capable. The implementation of AI/ML has the potential to replace/augment the functions that humans previously performed, such as coordinating large numbers of machines, solving complex problems, or quickly learning and providing insights with large amounts of data.

Background & Problem Definition

In the last two decades, massive strides have been made in mathematics and computer science leading to the development of Artificial Intelligence and Machine Learning algorithms. The implications of these systems are coming to fruition and manifesting themselves in the world and will play a role in all our lives in the following decades. AI and ML, at their core, are systems that can mimic, augment, or enhance the natural intelligence that humans display. Their implementation has the potential to replace/augment the functions that humans previously performed, such as coordinating large numbers of machines, solving complex problems, or quickly learning and providing insights with large amounts of data.

The Army is an organization that is primarily run by people, and, of the million people that work in the Army, all of them perform discrete tasks, from filling out long contracting forms to procuring tanks, to being the driver of tanks overseas and everything in between. As AI and ML tools are invented, the Army is looking to find places they can be implemented to increase efficiencies, decrease costs and, most importantly, make the modern-day warfighter safer and more capable.

“The U.S. Army is looking for the most innovative... solutions in Artificial Intelligence, Machine Learning and Autonomy that will lead to more informed Army decision-making, facilitate autonomous operations, and increase the speed and scale of military action.” – U.S. Army

Example Ideas for Innovation

- An ML tool that can analyze massive amounts of satellite imagery to identify trucks, weapons, or people. Thus, reducing the burden on intelligence analysts from manually scanning over images.
- An AI tool that can predict the most efficient path for formations of troops to move through a region, considering geographies, roads, and variables such as weather.
- An AI tool that can scan and analyze the performance reports of newly trained soldiers, making custom recommendations for improving their capabilities.
- An ML tool that can ingest communication reports from foreign adversaries and use Natural Language Processing to determine the quality and intent of the communications.
- An AI tool that can holistically assess the qualities of recruit candidates for jobs in the Army, while also keeping in mind the Army’s Diveristy, Equity and Inclusion goals and initiatives (see reference below)

Supplemental Materials

- <https://www.defense.gov/Spotlights/Artificial-Intelligence/>
- https://www.army.mil/article/249169/ai_research_strengthens_certainty_in_battlefield_decisions_making

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- <https://www.c4isrnet.com/artificial-intelligence/2021/08/12/army-futures-command-outlines-next-five-years-of-ai-needs/>
- <https://www.nationaldefensemagazine.org/articles/2021/10/12/army-soliciting-wide-array-of-ai-technologies>
- <https://executivegov.com/2022/04/army-selects-23-small-businesses-for-ai-ml-innovation-research-contracts/>
- https://www.rand.org/pubs/research_reports/RR3139-1.html
- https://www.army.mil/article/253814/message_from_the_secretary_of_the_army_to_the_force