Super Goggle Digital Design Challenge
#supergoggle #superXR

BLUF

NOTE: This is an update to the original call posted 01 May 2024. Verbiage has been added to emphasize that there is no mandated timeline for request for proposal issuance following Spiral 2 or Showcase. The contact information was also updated to remove a specific point of contact and refer interested parties to the Contact Information section on SAM.gov. These changes can be found in bullet points 13 and 14 of the Government Contracting Terms and Conditions section.

The Department of the Air Force (DAF) is seeking a high-performance, multi-capable goggle that can replicate “outside the cockpit” visual environments for advanced synthetic flight training. Successful solutions could enhance, broaden, and complement current and future training programs for the United States Air Force (USAF), broader Department of Defense (DoD) agencies, and our allies.

OVERVIEW AND CONTEXT

The USAF aims to leverage recent technological advancements in the mixed reality ecosystem. The current state of pilot training is limited by closed systems and outdated technology, driving a need to revolutionize advanced synthetic flight training by replicating "outside the cockpit" visual environments with unprecedented fidelity and capability. This bespoke and lightweight goggle should offer increased visual acuity, greater depth perception, higher refresh rates, a full field of view (FOV) and field of regard (FOR), and the ability to operate in secure environments.

Successful development of this next-generation goggle could significantly enhance, broaden, and complement current and future training programs for the USAF, broader DoD agencies, and our allies. This revolutionary technology, by enabling highly realistic and versatile simulations in deployed environments and locations with reduced space available, would prepare pilots for a wider range of scenarios and threats. Additionally, it fosters innovation and collaboration within the military, industry, and academia while simultaneously strengthening global partnerships through joint training and development. This paradigm shift towards open, collaborative, and interoperable military technology, exemplified by the development of this groundbreaking goggle, holds the potential to transform synthetic flight training and empower the Air Force to operate effectively with allies and partners in a rapidly changing and complex world.

The videos below provide additional context and information for the Super Goggle Challenge.

Joint Simulation Environment (JSE) & Night 1 Summary:
https://youtu.be/sUtCKB9YG8k?si=n1QxvcZaF7AVIeTE

Virtual Test and Training Center (VTTC) Summary:
https://youtu.be/wAsBXDVAZ78?si=jgcGhmCWQDEAwfmF

OBJECTIVES

There are two objectives of the **Super Goggle Digital Design Challenge**:

1. The **first objective** of this AFWERX Challenge is to digitally design a goggle for prototyping and testing within two to four years; this will include requisite subsystems in the near term.

2. The **second objective** is to expand the list of potential vendors and solution providers.

FOCUS AREAS

This Challenge seeks a groundbreaking mixed reality goggle capable of replicating real-world environments for advanced synthetic flight training (from part-task to full missions). Key requirements include exceptional visual fidelity (both AR and VR), precise depth perception, high refresh rates, immersive peripheral vision, minimized neck strain, and secure operation. Interoperability with existing simulators, adaptability to future tech, and compliance with both commercial and military standards are crucial. Additionally, the design should enable training for multiple cockpits within one room. This immersive system pushes the boundaries of VR training, aiming to revolutionize pilot preparation. The Super Goggle Digital Design Challenge will require significant investments in the following focus areas.

1) Architecture

- **Compatible with Open Extended Reality (XR) Standards:** The architecture should work across various XR devices from different manufacturers, reducing the need to create separate versions for each platform. Staying up to date with Open XR ensures the goggle can remain compatible with new and emerging devices as the technology evolves, avoiding potential compatibility issues down the line.
- **Flexible to Multiple Image Generators (IG):** Multiple IGs with modular architecture should easily allow future upgrades or incorporation of new technologies. It is desired that the goggle remain compatible with cutting-edge advancements.

2) User Experience

- **Visuals**: A cutting-edge visual system capable of seamlessly integrating with the jet's symbology while offering exceptional image quality. The display must boast a pixel density to ensure crisp visuals across all elements. An immersive viewing experience is crucial, necessitating a wide field of view encompassing both central and peripheral vision, coupled with high-performance video display specifications. Night vision compatibility is paramount, ensuring optimal performance and readability in low-light and night environments. Finally, good

pass-through quality is essential, allowing for clear viewing of the real world when necessary.

- **Control of Visual Perception of Time of Day:** Aligning the virtual environment's lighting and visual cues with the actual time of day outside should enhance the feeling of presence and immersion.
- **Ease of Use**: The digital design must prioritize ease of use for Department of Defense (DOD) personnel across multiple branches. Intuitive design and minimal training should enable users to don or doff the goggle and calibrate the system in under one minute. To ensure inclusivity, the design must seamlessly accommodate individuals with vision correction, including glasses, contacts, and other assistive devices.
- **Usable for 1.5-3 hours**: The operational window, functional time frame, and comfort should all work together for the goggle to be usable for 1.5 - 3 hours at a time by an experienced user.

3) Hardware/Head Mounted Display (HMD)

This focus area encompasses considerations such as refresh rate, latency across the system, field of view (FOV), tracking accuracy, comfort levels, upgradability, and Sensitive Compartmented Information Facility (SCIF) compatibility.

Desired Capabilities:

- **Field of View (FOV):** Achieve a wide field of view (120x105) for rapid scanning of hand motion inside and outside the cockpit, ensuring accurate real-time hand gesture tracking and representation, along with reliable target recognition and distance detection capabilities.
- **Resolution:** High resolution and clarity with an 8K para display utilizing one or two displays with optional peripheral lenses, higher resolution sensors in the head-mounted display (HMD), dedicated rendering hardware, precise lens manufacturing, multi-GPU technology, Open XR compatibility, and high-speed cabling for optimal performance (necessary for Security, see below).
- **Comfort:** Ensure acceptable comfort levels for 1-3 hour sessions with audio, mitigate cybersickness, maintain visual range without negative training effects, and promote training throughput while reducing fatigue.
- **Tracking:** Precise positional tracking accommodating various solutions, supporting operational training in day and night environments with cockpit lighting synchronization, and compatibility with simulated darkness, daylight, and night vision. Additionally, provides high-quality cameras, software, and lenses for clear eye motion scanning within the cockpit, enables multiple trainees in mixed reality environments with matched lighting, and ensures depth perception capabilities.
- **Security Considerations:** Security and Sensitive Compartmented Information Facility (SCIF) compatibility with features such as offline update capability with signed firmware, onsite repair for key components, compliance with TAA standards for chips/parts, and adherence to a hardware component report standard, all while optimizing the form factor.

Additional Areas of Interest

It is critical to note that security is a common thread throughout each of the focus areas. The super goggle design should be able to integrate into the security requirements of the DAF.

WHO SHOULD PARTICIPATE

The USAF welcomes involvement from individuals or teams in industry, academia, investing, and government. We encourage working with partners or teams to meet or exceed the evaluation criteria.

What do you stand to gain?

- Potential to receive funding for concept development and/or rapid prototyping and prospective further development of your solution within the USAF
- Potential long-term contract or agreement and continuing business relationships with the USAF and other government agencies
- Chance to inform and shape our nation's elite warfighting capability, positively impacting our Airmen and creating a more resilient and mission-ready military force
- Opportunity for teaming and technology development
- Potential invitation to attend the Challenge showcase event and network with peers, the USAF and DoD, customers, and other investors
- Official recognition for you and your organization, if selected, through publication on internal and external USAF communication channels

PROCEDURES

The submission and evaluation process evolves over three spirals.

1. **Spiral 1 Solution Submissions**: Offerors submit the web form and optional supplemental document. The Government will evaluate solution submissions against the criteria within this Call. Selected offerors will be invited to Spiral 2.

2. **Spiral 2 Oral Demonstration**: Selected offerors will be invited to provide additional information to elaborate on and discuss their proposed concept/technology/solution. The Government will evaluate oral demonstrations against the criteria within this Call. Selected offerors will be invited to submit proposals in Spiral 3.

3. **Spiral 3 Request for Commercial Solution Opening (CSP)**: Offerors whose solution submission and oral demonstration are evaluated and determined to hold sufficient technical merit will be invited to submit a full written proposal. Instructions and evaluation criteria will be provided in the Spiral 3 Request for Commercial Solution Proposal.

SUBMISSION OF SOLUTION FOR SPIRAL 1

Participation in this challenge requires a completed submission using the afwerxchallenge.com website: https://afwerxchallenge.com/emergingtechnology/mixed- reality-xr-super-goggle-challenge/overview. The submission period opens on 12 March 2024 and ends on 26 April 2024 at 4:59 PM Pacific Time.

1. The Form includes the following fields:
    a. **Solution title**: Provide the concise name of your solution.
    b. **Executive summary**: Explain your solution in 500 characters or less.
    c. **Solution description**: Explain in detail how your proposed solution or potential new capabilities fulfill requirements, close capability gaps, or provide potential technological advancements in support of the Challenge mission. Describe the unique aspects of your technology and the proposed work as it relates to the applicable Challenge mission focus area, including key attributes such as data sources, automation, user experience, cyber security, and ability to integrate with other systems.
    d. **Focus Area:** Which focus area(s) does your solution address?
    e. **Value proposition**: Describe how your solution can benefit the USAF. Provide an assessment of how the solution brings value to the warfighter.
    f. **Inputs and outputs**: List the inputs and outputs that your solution needs and produces (if applicable) so an integration effort can more easily be defined. Include key partnerships and/or technology enablers to your approach.
    g. **Solution maturity**: Indicate the development stage of your proposed solution, e.g., idea, prototype/experiment, complete application (has been tested and is ready for launch), or commercially available. Identify whether the effort includes the pilot or demonstration of existing commercial technology (identified as commercially ready and viable technology) or the further development of commercial technology for potential defense applications.
    h. **Scalability**: Identify the ability of the solution to scale rapidly across USAF and other agencies, and whether the proposed solution can provide a reasonable management approach for technical delivery and schedule.
    i. **Proof of concept**: Can you provide a test or proof of concept (PoC) for your solution, before potential implementation at scale? If yes, provide the timeline required to complete the test or PoC.
    j. **Implementation**: Provide the timeline required to implement your solution, including potential lead time for parts order/shipment.
    k. **Digital Engineering**: Digital Engineering and Acquisition will be a primary pillar of this initiative. Please outline your digital engineering strategy.
    l. **Keywords**: Specify any descriptive keywords that may be useful for a search related to your solution.
    m. **Offeror Information**: Provide a point of contact name, email address, phone, and address.

Attachment: Attachments are supplemental data. Supplementary documents shall not exceed five (5) single-sided written pages using 12-point font.

Note:

- Public submissions can be edited until the submission deadline.
- Participants can attach private files that are only made visible to the evaluation team.
- If submission fields are left black, the submission will not be considered.
- Extensions will not be granted.

EVALUATION CRITERIA FOR SPIRAL 1:

A designated team of Government and Government contracted personnel will evaluate Challenge submissions to determine which solutions should advance to Spiral 2. The Government will use the following evaluation criteria, giving each item equal importance:

- **Relevance:** demonstrates alignment with the Challenge purpose and focus areas
- **Technical merit:** product/technology works as stated in support of mission objectives and demonstrates feasibility
- **Innovation:** demonstrates a novel, unique, or previously underutilized approach when considered against the Government application
- **Integration potential:** manufacturability, functionality, and maintainability as part of a system
- **Scalability:** meets or exceeds the needs of mission profiles for broad impact across the USAF
- **Impact:** expected benefits to the USAF and Airmen

ORAL DEMONSTRATION CONTENT FOR SPIRAL 2:

Offerors invited to participate in Spiral 2 shall address the following:

a. Expanded details of the potential solution that was provided in the Spiral 1 solution submission.
b. A live demonstration of the potential solution utilizing relevant and/or analogous data.
c. Should the solution require assistance with testing, validation, and/or capacity for scaling within the USAF, identification of the magnitude, type, and scale of assistance required for follow-on activities.
d. Rough order of magnitude (i.e., bottom-line estimated price) of the solution provided in Spiral 1.
e. The solution submission will identify all intellectual property (IP) in the technology, all owners and licensors thereof, and associated restrictions

on the Government's use of that IP.

f. The oral demonstration should be able to address detailed Q&A from DoD stakeholders, including both technical and operational subject matter experts.
g. The purpose of the showcase is to provide networking opportunities with Government/non-Government communities interested in solutions. Information presented will only impact evaluations if the content at the showcase is not consistent with the content of solution submissions and oral demonstrations.

EVALUATION CRITERIA FOR SPIRAL 2:

Oral demonstration evaluation criteria are listed below, with each item of equal importance.

a. **Responsiveness** of the solution in addressing the Challenge mission focus areas.
b. The **technical merit** of the proposed solution adequately addresses the Challenge mission focus area and demonstrates the feasibility for the Government to pursue the proposed solution.
c. The **Rough Order of Magnitude** will be considered for affordability determinations only.
d. **Does the Oral Demonstration conform to the Spiral 1 submission** (Yes or No). There should be no material changes between the Spiral 1 Submission and the Spiral 2 Oral Demonstration and Showcase.

Note:

- Each offeror will be allowed a specified amount of time for their oral demonstration. This will include time for Q&A.
- Offerors who fail to upload their video within the prescribed timeline or miss their allotted time slot for an oral demonstration may be disqualified from participation in the Challenge.
- If technical difficulties occur during the oral demonstration, the solution provider is required to reach out to the AFWERX team within 5 min of the scheduled time. Otherwise the solution provider relinquishes their time slot.
- Spiral 2 demonstrations may be recorded for Government evaluation purposes.

COMMERCIAL SOLUTION PROPOSAL (CSP) CONTENT AND EVALUATION FOR SPIRAL 3:

Offerors invited to participate in Spiral 3 will be provided a CSP, which will detail instructions to offerors and explain the basis for evaluation.

WHAT'S NEXT

The submission period opens on 12 March 2024 and ends on 26 April 2024 at 4:59 PM Pacific Time.

- Submissions shall be made at afwerxchallenge.com, and all required fields must be completed to be accepted.
- Communication to all successful and unsuccessful Challenge participants will be sent via email.
- Oral demonstrations will be completed either online or in-person. Evaluations will be completed during the oral demonstrations. Offerors selected to participate will receive notification via email.
- The showcase will take place as an online or in-person event. Offerors selected to participate will receive notification via email.
- All dates are subject to change. We'll communicate any changes via sam.gov and afwerxchallenge.com.

GOVERNMENT CONTRACTING TERMS & CONDITIONS

Future contracting opportunities related to the Super Goggle Challenge will be posted to any/all Government points of entry such as sam.gov, sbir.gov, afwerxchallenge.com, etc.

- This Call falls under Commercial Solutions Opening (CSO) FA2280-23-S-C001. A copy of the CSO can be obtained by searching for the FA2280-23-S-C001 at sam.gov. This Call and subsequent awards shall comply with all requirements of the CSO.
- In the event of a conflict between the information contained on afwerxchallenge.com and the USAF solicitation on sam.gov, the CSO on sam.gov shall control.
- The announcement of AFWERX events, considered to possess high potential for further efforts, may be made at afwerxchallenge.com. FAR-based contracting instruments, Other Transaction (OT) for Prototype Projects 10 USC 4022, to include follow-on production OTs, may support the accomplishment of these events.
- All announcements made at both sam.gov (formerly fbo.gov) and afwerxchallenge.com website(s) are considered to satisfy the reasonable effort to obtain competition per 15 USC 3719 (e) and 10 USC 4022 (b)(2).
- Possibilities exist to work with existing prime contractors on USAF contracts through submissions provided in response to this Challenge.
- All FAR-based actions will follow post-award synopsis procedures per FAR subpart 5.3 accordingly.
- Subject Matter Experts advising the Government team may include firms contracted by other participating DoD branches (U.S. Army, U.S. Marine Corps, U.S. Navy, and U.S. Coast Guard). These firms are contracted to provide advisory and assistance services to the USAF or other DoD branches. These firms are an important supporting element in ongoing efforts; however, they may be asked to provide limited advice on potential solutions. It is the responsibility of participating firms to protect their intellectual property or other proprietary information as necessary.

- Notice to Offeror(s): The Government reserves the right to cancel this open Call, either before or after the closing date. If the Government cancels this open Call, the Government has no obligation to reimburse an offeror for any costs.
- The submission deadline is noted in the section labeled "What's Next." The submission deadline is controlled by the AFWERX Challenge server time and is not dictated by local participant computer time. AFWERX Challenge shall not be held responsible for discrepancies in computer times, delays due to internet connectivity, server performance due to large numbers of participants utilizing the software simultaneously, or other factors outside of AFWERX Challenge's control. No exceptions will be made for late submissions regardless of the reason. It is advisable to complete submissions well in advance of the submission deadline.
- This Call may result in the award of prototype projects, which include not only commercially available technologies fueled by commercial or strategic investment, but also concept demonstrations, pilots, and agile development activities that can incrementally improve commercial technologies, existing Government-owned capabilities, and/or concepts for broad defense and/or public application(s). The Government reserves the right to award a FAR Part 12 procurement contract or an Other Transaction (OT) under 10 USC 4022 agreement, including prototype and follow-on production, or no contract instrument at all, as a result of this Call. Consistent with 10 USC 4022, awards of follow-on production contracts must be made through the use of competitive procedures unless the award of an initial OT provides for a follow-on production contract and the OT participant successfully completed the prototype project.
- In accordance with Section 5.8 of the CSO, non-Government advisors may participate as non-scoring members during evaluations. For this Call, non-Government advisors include Collaboration.Ai LLC, theDifference, BAE Systems, J.F. Taylor and Aptima.
- Foreign-owned businesses may independently submit a solution or do so as part of a teaming arrangement with one or more U.S.-owned businesses. Foreign participation is subject to small business and domestic sourcing restrictions and incentives in this CSO, or as may be imposed in the future by the President pursuant to the Defense Production Act, 50 U.S.C. 50 U.S.C. 4501, et. seq., or the Department of the Air Force. The ability of foreign-owned businesses to obtain a contract award or OTA based upon a submission may depend upon the ability of the foreign-owned business to obtain necessary clearances and approvals to obtain proscribed information, and the ability to comply with U.S. laws, regulations, and contractual terms.
- AFWERX Challenge participants who advance to deliver virtual pitches during the Commercial Solutions Opening (CSO) solicitation process are eligible to use the AFWERX Challenge CSO as a contracting vehicle for opportunities with any interested programs. Currently, the CSO initiates the Request for Proposal (RFP) timeline at the Spiral 2 or Showcase date. There is no time limit between Spiral 2 or a Showcase event and the subsequent release of an RFP or contract award. Any Department of Defense (DoD) agency may utilize an AFWERX Challenge participant who has progressed to virtual pitches to request a proposal or finalize a contract or agreement award between the agency and the successful pitching offeror (commercial company).
- Agency-level protests submitted under Spiral 1 or Spiral 2 shall be submitted to

the Contracting Officer. Contract information can be found on SAM.gov. Agency-level protests submitted in response to Spiral 3 solicitations shall be submitted to the Contracting Officer soliciting and executing the award.