Special Notice

Request for Information: Low Resource Computing

DARPA-SN-26-97

June 18, 2026

Defense Advanced Research Projects Agency
Multi X Office
675 North Randolph Street
Arlington, VA 22203-2114

Request for Information (RFI)
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Low Resource Computing
Defense Advanced Research Projects Agency (DARPA)
Multi X Office (MXO)

OVERVIEW:
Posting Date: June 18, 2026
Responses Due: July 17, 2026, at 5:00 p.m. Eastern Time (ET)
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RFI DESCRIPTION:
The Defense Advanced Research Projects Agency (DARPA) Multi X Office (MXO) seeks information on low resource computing (LRC) paradigms and processes applicable to, but not yet utilized in, microsystems. DARPA is interested in identifying untapped potential for LRC within its operational and technological base. The Department of War (DoW) typically operates in environments with limited power, communication, or physical space, where mission completion depends on the ability to sustain critical computation and adapt at the edge. LRC offers a promising path towards advancing the DoW's mission. DARPA is interested in disruptive concepts at the material, component, runtime, and authoring levels that represent significant advances beyond current practice for fielding robust, ultra-efficient systems.

The goals of this Request for Information (RFI) include:

- Assess the breadth of existing U.S. technologies that could be leveraged or redirected to support LRC
- Explore nontraditional pathways for enabling micro-computation, including through repurposing, retrofitting, or adaptation of existing technologies from legacy silicon to novel architectures
- Strengthen national resilience by uncovering overlooked computational resources that could reduce reliance on complex supply chains and prevent technological strategic surprise

Approaches resulting in incremental improvement and description of existing capabilities or prior work without a clear vision for advancing the field are not of interest. Responses to this RFI may be used to inform future program development.

BACKGROUND:
The history of computing is defined by a persistent struggle against resource consumption. In 1945, the Electronic Numerical Integrator and Computer (ENIAC) heralded the dawn of electronic computation, yet it consumed roughly 150 kilowatts of power, weighed nearly 30 tons, and was limited to thousands of operations per second with the equivalent of less than a kilobyte of working memory. Even at historical electricity rates of roughly one cent per kilowatt-hour, the machine's operational energy and maintenance costs quickly eclipsed the initial cost of its physical materials.

Decades later, the apex of the commercial computing industry follows this same resource-heavy trajectory. Modern data centers, built around advanced graphics processing unit (GPU) clusters to drive artificial intelligence, demand staggering, gigawatt-scale power requirements that necessitate massive, dedicated infrastructure.

However, a profound resource paradox now exists at the opposite end of the spectrum. At the extreme low end, the physical and financial cost of computation has plummeted so far that it is routinely embedded in disposable novelties. A standard silicon chip inside a musical greeting card operates at speeds and memory capacities that vastly outperform early mainframes in a package millions of times smaller. Manufactured for pennies and drawing only a fraction of a milliwatt, this chip is paired with a coin-cell battery that often costs more than the silicon itself before being discarded after a few uses. The computation itself has become virtually free; the physical resources required to sustain, house, and power it have become the critical bottleneck.

While commercial enterprise focuses heavily on scaling upward to exascale capabilities, this trend leaves significant, overlooked potential at the lower end of the computing spectrum. There remains substantial room for improvement and innovation by revisiting architectures through a lens of strict resource scarcity. By optimizing systems for extreme efficiency rather than scale, it is possible to develop highly resilient computing platforms that do not rely on massive infrastructure.

This RFI seeks to determine how the principles of LRC can be leveraged to harness this untapped potential. The intent is to maximize the utility of alternative computational methods to decouple essential computation from heavy infrastructure overhead. By exploring this often-overlooked domain, we aim to discover how constrained computing can provide critical capabilities in austere environments where large-scale processing is unavailable or impractical.

REQUESTED INFORMATION:

DARPA seeks innovative insights to address the technical challenge area(s) described below. Responses are welcome from all capable sources including, but not limited to, private or public companies, individuals, universities, university-affiliated research centers, not-for-profit research institutions, and Federally Funded Research Development Centers and other National Laboratories.

To be considered responsive, submissions must address at least one category from Section 1 (Physical Resources). Respondents may optionally address a category from Section 2 (Logical Resources) in conjunction with a Section 1 category to provide a more comprehensive operational concept.

1. Physical Resources (Responses must address at least one)
   a. Low Power:
      - Describe approaches that enable meaningful computation within ultra-constrained energy budgets (e.g., nanowatt systems, passive operation, or energy-scavenging architectures).
      - Highlight techniques that minimize power draw at the architectural, component, or algorithmic level without requiring external power grids.

   b. Low Memory:
      - Identify paradigms capable of executing essential tasks within severely restricted volatile or non-volatile storage capacities (e.g., systems operating in kilobytes or bytes of memory).
      - Emphasize novel data structures, compression, or state-minimization techniques.

   c. Low Reliability:
      - Propose methodologies for achieving useful and trustworthy computation over inherently unreliable, noisy, or degrading physical hardware.
      - Focus on error resilience and fault tolerance over mere error correction and fault isolation.

d. Low Technological Level:
- Identify methods utilizing low-precision manufacturing, legacy fabrication, or primitive technological ecosystems.
- Include concepts for extracting computation or data from high-technology artifacts using low-technology tools (e.g., a purely optomechanical CD player, a biological antenna array, computational origami techniques for circuit lithography).

2. Logical Resources (Optional; may only be addressed in conjunction with a Section 1 category)

a. Low Trust:
- Describe frameworks for effective computation in environments where data sources, inputs, or system components cannot be inherently trusted. For example, a traditional trusted boot chain matters little if your flash is corrupted; however, substantially all the intended computation may be possible.
- *Note: Responses in this category should focus on functional resilience, consensus, and validation of computation, rather than offensive cyber exploitation or traditional adversarial defense.*

b. Low Privilege:
- Detail computing paradigms that accomplish complex tasks while operating under minimal system access, authorizations, or permissions. These could be abstractions that are not available with the lowest level of resources.
- Highlight strategies that avoid dependencies on root, administrative, or hypervisor-level access.

c. Self-Hosting:
- Identify systems capable of native, user-directed, autonomous self-programming and self-modification without reliance on external cross-compilation toolchains or host machines (conceptually analogous to early microcomputers capable of programming themselves).
- Emphasize architectures that allow the system to adapt, recompile, or generate its own operational code entirely on device.

d. Low Complexity of User Experience:
- Describe systems requiring minimal cognitive load, training, or complex human-machine interfaces to operate effectively.
- Highlight approaches that allow users to deploy, interact with, and extract value from the computational resource in austere environments under stress.

The following are not of interest to this RFI:
- System-level mission concepts or operational architectures that do not clearly identify the underlying LRC methodologies, hardware adaptations, or extreme constraint gaps that must be closed
- Architectures that inherently rely on persistent high-bandwidth connectivity; continuous access to commercial power grids; or pristine, climate-controlled environments
- Incremental improvements to existing commercial processors or standard size, weight, and power (SWAP) reductions that do not represent a fundamental paradigm shift in how essential computation is executed
- Software, algorithms, or artificial intelligence / machine learning approaches that assume access to cloud offloading, expansive memory buffers, or high-performance computing backends, rather than addressing native execution under severe resource scarcity

- Solutions that rely on conventional, high-tier central processing units (CPUs) or GPUs operating at standard commercial power levels to accomplish core tasks

WORKSHOP:
DARPA plans to hold an invitation-only in-person workshop in August 2026 in Hanover, New Hampshire, for the purpose of reviewing and discussing current and future research relevant to this RFI, discussing the submissions received, developing new insights, and identifying challenges.

The workshop format will be a combination of group discussion and formal presentations. Based on DARPA's interests and RFI submissions, DARPA may invite white paper submitters to provide further information in formal presentations at the workshop. Information discussed at this workshop may assist in the formulation of possible future areas of DARPA research related to LRC paradigms and related matters. Topics and discussion will remain at the unclassified level.

DARPA intends to provide further details on the workshop via email to the RFI respondents invited to attend by July 24, 2026.

SUBMISSION INSTRUCTIONS:
Responses to this RFI should be submitted no later than the due date and time listed in the overview section.

Unclassified responses to this RFI should be submitted to DARPA-SN-26-97@darpa.mil. NO CLASSIFIED INFORMATION SHOULD BE SENT TO DARPA-SN-26-97@darpa.mil.

Classified responses should be coordinated with DARPA prior to submission. Respondents wishing to provide a classified response should send an e-mail to DARPA-SN-26-97@darpa.mil with the subject line "Classified Coordination Requested." Respondents should allow at least three (3) business days for processing requests. NO CLASSIFIED INFORMATION SHOULD BE SENT TO DARPA-SN-26-97@darpa.mil.

To the maximum extent possible, respondents should submit non-proprietary information. If proprietary information is submitted, it must be appropriately and specifically marked. It is the respondent's responsibility to clearly define to the Government what is considered proprietary data. Any proprietary information should be clearly labeled as "Proprietary." DARPA will disclose submission contents only for the purpose of review by DARPA staff, other Government agencies, or DARPA Support Contractors/SETAs.

NOTE: DARPA intends to conduct individual discussions with respondents as necessary to gain a full understanding of the technical and partnership models submitted. DARPA will contact respondents individually via e-mail.

FORMAT INSTRUCTIONS:
Responses to the RFI should be concise. Respondents should submit a single integrated response addressing the areas described above. DARPA will only review responses submitted as an unprotected Microsoft Word/PowerPoint document or PDF file. The technical response section is limited to no more than 4 pages per the Section 1 category using 11-point font and 1-inch margins on 8.5-inch by 11-inch page size. Technical response sections addressing both a Section 1 and a Section 2 category together can be a maximum of 8 pages. Effective responses that can be provided in fewer pages are encouraged. Any submitted material in excess of these limits may or may not be reviewed without confirmation.

Responses should adhere to the following formatting instructions:

1. Cover page (1 page)
    a. Title
    b. Organization(s)
    c. Respondent's technical and administrative points of contact (names, addresses, phone and fax numbers, and email addresses)
2. Technical response (4 pages maximum for a Section 1 category, or 8 if a Section 1 and a Section 2 category are addressed together)
    a. A discussion of the capabilities/challenges addressed (from your perspective)
    b. Theoretical and/or simulation discussion
    c. Development strategy (especially versus requested metrics)
    d. Identification of current data (if any)
    e. Estimated time to availability and risk assessment (technical and other)
3. References (2 pages)
    a. All references to previously published work. If applicable, include a list of Government sponsors of previous or ongoing work and their contact information.
4. Summary slide
    a. One slide that summarizes the main idea and development strategy, visually and succinctly indicating new insights, main objectives, underlying technical mechanisms, fundamental assumptions and limitations, key innovations, expected impact, and/or other unique aspects of the response.

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Subscribe to DARPA MXO's newsletter for timely updates on research opportunities, upcoming events, ways to work with us, and more.

DARPACONNECT:
Entities who have not worked with DARPA before are encouraged to learn more about DARPAConnect, an initiative established to facilitate collaboration between DARPA and potential performers. The DARPAConnect team offers customized support, resources, and guidance on how to prepare your ideas for high-impact conversations with DARPA program managers. Please visit DARPAConnect.us to access a digital hub of online resources, including a curriculum for self-paced learning, personalized support, and in-person and virtual events. In addition to the self-paced online materials, the DARPAConnect team is able to schedule one-on-one conversations to discuss your specific ideas, questions, and paths to DARPA. You can use the contact form at DARPAConnect.us or email the DARPAConnect team directly at darpaconnect@darpa.mil to request assistance.

ADMINISTRATIVE:
This announcement contains all information required to submit a response. No additional forms, kits, or other materials are needed. All administrative and technical questions should be directed to DARPA-SN-26-97@darpa.mil. Please refer to the Special Notice number (DARPA-SN-26-97) in all correspondence.

This RFI is issued solely for information and program planning purposes and does not constitute a formal solicitation for proposals or proposal abstracts; any so sent will be disregarded. In accordance with FAR 15.201(e), responses to this notice are not offers and cannot be accepted by the Government to form a binding contract. Submission of a response is strictly voluntary and is not required to propose to subsequent Announcements (if any) or Solicitations (if any) on this topic. DARPA will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that DARPA is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI.