



REQUEST FOR PROPOSALS

FOR CHALLENGE PROBLEMS IN AREAS OF INTERESTS FOR IEEE AEROSPACE AND ELECTRONIC SYSTEMS SOCIETY: RADAR

Abstract

IEEE Aerospace and Electronic Systems Society (AESS) Board of Governors (BoG) plans to fund the development of challenge problems and solutions in technical areas of AESS. The challenge problems are intended to stimulate excitement about research problems of interest to members of AESS. The IEEE AESS BoG has elected radar systems for its first challenge problem as that is the most active area of research in the AESS community. This request for proposals (RFPs) is for a development of challenge problem in the area of radar systems. One proposal in response this RFP will be funded to develop the proposed challenge problem. It anticipated that IEEE AESS will fund through future RFPs four developers of solutions to the challenge problem after it has been developed and documented.

1. Introduction

IEEE Aerospace and Electronic Systems Society (AESS) Board of Governors (BoG) plans to fund the development of challenge problems and solutions in technical areas of AESS. The challenge problems are intended to stimulate excitement about research problems of interest to members of AESS. Following the development and publication of a challenge problem, IEEE AESS BoG will solicit proposals for the investigation and development of solutions to the challenge problem. It anticipated that four or five proposals for solutions will be funded and those solutions will be presented at an IEEE AESS sponsored conference in a special session. It anticipated that solutions will have varying levels of complexity and the multiple solutions will lead to confidence in the technical solutions and implementations in real-world systems.

The IEEE AESS BoG has elected radar systems for its first challenge problem as that is the most active area of research in the AESS community. This request for proposals (RFPs) is only for development of a challenge problem in the area of radar systems. The challenge problems may be software, hardware, or a mixture of software and hardware. The specific topic and implementation details of the challenge problem are left to the proposer. It anticipated that four proposals for solutions will be funded through future RFPs and those solutions will be presented at an IEEE Radar conference in a special session. It anticipated that solutions will have varying levels of complexity and the multiple solutions will lead to confidence in the technical solutions and implementations in real-world radar systems.

The RFP is organized as follows. Section 2 gives the objectives of this first challenge problem, while Section 3 provides the program details and schedule. Section 4 defines the format and requested content for the proposal. Section 5 summarizes the selection criteria and Section 6 provides concluding remarks.

2. Objectives

This RFP solicits proposals for the development of challenge problem in the area of radar systems. While the topic and specific details of the challenge problem are to be determined by the proposer, the problem should fit with active area of research that is regularly part of the IEEE Radar Conference. The challenge problem will be published in the proceedings of the IEEE Radar Conference. The delivery of the challenge problem will include software for computer simulations and performance assessment and any hardware needed to implement the challenge problem. The developer should consider making arrangements for any special purpose software and/or hardware to be provided by a vendor as part of the program.

3. Program and Schedule

Proposals are due September 15, 2024 and should be submitted via e-mail to **W. Dale Blair** at dale.blair@gtri.gatech.edu and **Sabrina Greco** at maria.greco@unipi.it. Proposals should include a cost estimate that shall not exceed \$24,000. Challenge problem developers should scope their problem so that one working in the area of your problem can provide a meaningful contribution for less than \$25,000. The IEEE AESS BoG will select a challenge problem proposal for funding before October 1, 2024 and funding will be made available prior to November 15, 2024. The challenge problem developer will deliver a problem description prior to January 1, 2025 so that proposals for solutions can be developed prior to February 1, 2025. The challenge problem will be due on February 15, 2025 and the delivery of the challenge problem shall include a final technical report with presentation, paper submission to 2025 IEEE Radar Conference that describes the problem, and software and hardware needed to implement the challenge problem.

While the challenge problem will be made available publically, it is anticipated that IEEE AESS through future RFPs will award four grants for \$24,000 for four investigators to develop solutions to the challenge problem. It should be assumed that any solution developer will have knowledge and experience in the area of the challenge problem and have access to standard software and hardware tools.

Table 1. Planned Schedule for Radar Challenge Program

EVENT	DUE DATE
Proposals for Challenge Problem: Radar	September 15, 2024
Selection of Radar Challenge Problem for Funding	October 1, 2024
Funding to Developer of the Radar Challenge Problem	November 1, 2024
Description of Challenge Problem for Proposers of Solutions	January 1, 2025
Proposals for Solutions for the Radar Challenge Problem	February 1, 2025
Technical Report and Delivery of Challenge Problem	February 15, 2025
Selection of four Proposed Solutions for Radar Challenge Problem	February 15, 2025
Paper Describing Challenge Problem for IEEE Radar Conference	March 15, 2025
Papers Describing Solutions for the Radar Challenge Problem for the IEEE Radar Conference	April 15, 2025

4. Format and Content of Proposals

Proposals should not exceed 10 pages in 12 pt font. Biographical information may be included in an appendix and that is not subjected to the limits. Proposals should include the following sections.

Abstract: Abstract for the proposal with less than 250 words.

Introduction: Introduce the reader to the area of research of your proposed challenge problem, summarize the research surrounding your problem, and explain your connection to the area.

Motivation: Motivate the investment of IEEE AESS in your proposal challenge problem.

Technical Description of Problem: Provide a technical description of the proposed challenge problem with references.

Performance Metrics: Describe the metrics by which contributors will be scored and ranked, and include any performance constraints. Describe the collection method for the metrics. Metrics for the complexity, cost, or computational cost of the different solutions will likely be needed.

Implementation Plan: Explain the implementation plan for your challenge problem. For example, a software program will be provided to simulate the radar data based on truth scenarios, collect the results of the proposed solution, and compile results. Requirements should be specified in general terms and include scenarios for development and evaluation. If your challenge problem includes hardware, you might need to develop an agreement with the hardware provider for a discounted price. Any such agreements should be addressed in your proposal and your final report.

Milestone Schedule and Developers: Include a milestone schedule that includes one in progress report and one briefing. Also, provide a list of all proposed deliverables. Deliverables should include a technical report with presentation, problem description for solution proposers, paper for 2025 IEEE Radar Conference that describes the problem, and software and hardware needed to implement the challenge problem.

Anticipated Participants: Provide a list of researchers who are anticipated to participate in the development of solutions to your challenge problem.

Key Investigators: Provide very brief biography of key investigators that will be developing the challenge problem.

Cost: Provide a cost estimate for the development of your challenge problem. Costs may include materials and supplies and employee labor.

References: Provide references to key research in the area of your proposed challenge problem.

5. Evaluation Criteria

Proposals for the challenge problem will be judged on the

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| 1. IEEE AESS area of interest | 20% |
| 2. Anticipated interest of solution developers | 20% |
| 3. Anticipated success of proposed program | 20% |
| 4. Subject matter expertise of developers | 20% |
| 5. Anticipated impact on real-world radar systems | 20% |

6. Concluding Remarks

It is anticipated that this RFP will lead to funding for the development of solutions for this challenge problem in order to stimulate excitement in the radar community. The challenge problem will also be made available to the public.