

Opportunity Title: Robust Multilingual End-to-End Speech Recognition

Opportunity Reference Code: ICPD-2023-19

Organization Office of the Director of National Intelligence (ODNI)

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Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at: <https://orise.orau.gov/icpostdoc/index.html>.

If you have questions, send an email to ICPostdoc@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline 2/28/2023 6:00:00 PM Eastern Time Zone

Description **Research Topic Description, including Problem Statement:**

Recent deep learning developments have produced dramatic improvements in the performance of speech recognition technologies. Many advancements are due to end-to-end (E2E) neural network models, which optimize a direct mapping from audio data directly to text information with a single network. However, the supervised manner in which these E2E models are trained does not produce state-of-the-art performance results in adverse conditions, such as noisy audio environments and low-resource language scenarios.

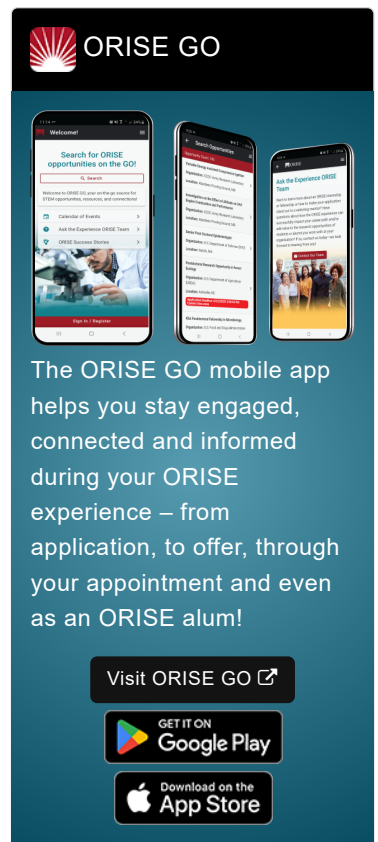
With this project, we aim to identify methods to improve E2E speech recognition performance robustness for noisy audio environments and low-resource language scenarios.

Example Approaches:

- Advanced speech enhancement modules could be developed as a data preprocessing step for noisy audio environments. Although using speech enhancement modules to improve the listening quality of noisy audio is a well-established research technique, it is known to be harmful as a speech recognition front-end module. Solving this degradation issue is an active research challenge.
- Pre-training/fine-tuning approaches could be explored for low-resource language scenarios. Supervised E2E models require large amounts of labeled data to achieve state-of-the-art performance results, which is an obstacle for achieving comparable results for low-resource languages. Exploring approaches using self-supervised learning representation models pre-trained with multiple languages and fine-tuning for low-resource target languages is an active research area that could be explored.





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Relevance to the Intelligence Community (IC):

Speech recognition is a fundamental Human Language Technology (HLT) capability that provides audio content triage capabilities. New state-of-the-art E2E neural network approaches remove onerous large, labeled data requirements needed to develop a speech recognition capability for a language of interest; however, these gains are at the expense of lower performance results in adverse audio environments and low-resource scenarios. The work described above would identify solutions to these issues which are critical to maintaining a competitive edge in language analysis capabilities.

Qualifications **Postdoc Eligibility**

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Key Words: #speech Recognition, #Multilingual, #Deep Learning, #Neural Network, #End-to-end, #Low Resource, #Noise Robustness

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Chemistry and Materials Sciences** ([12](#))
 - **Communications and Graphics Design** ([5](#))
 - **Computer, Information, and Data Sciences** ([17](#))
 - **Earth and Geosciences** ([21](#))
 - **Engineering** ([27](#))
 - **Environmental and Marine Sciences** ([14](#))
 - **Life Health and Medical Sciences** ([48](#))
 - **Mathematics and Statistics** ([11](#))
 - **Other Non-Science & Engineering** ([2](#))
 - **Physics** ([16](#))
 - **Science & Engineering-related** ([1](#))
 - **Social and Behavioral Sciences** ([29](#))