Opportunity Title: Radio Frequency Emitter Detection and Tracking via Passive and Active Techniques
Opportunity Reference Code: ARL-R-ESS-400037-F1

Organization DEVCOM Army Research Laboratory

Reference Code ARL-R-ESS-400037-F1

Description The U.S. Army Research Laboratory (ARL) seeks a highly motivated, well informed, cross-disciplinary and skilled graduate student with experience in digital signal processing (DSP), radio frequency (RF) signal processing, RF waveform design and characterization, and electromagnetic spectrum sensing. This opportunity will involve the design, simulation, and validation of DSP algorithms via Matlab and Python and the integration of the algorithms into existing RF data capture systems. The algorithm development will include signal processing for detection of RF signals, various forms of geolocation via multiple data collection nodes, and signal feature extraction.

The opportunity will also involve the collection of RF data with preexisting systems, post-processing this data for algorithm validation and potential real-time implementation of these algorithms. Part of the position will be to learn to use the preexisting radar and RF sensing system to collect data and conduct real-time experiments. This system is based on Xillinx RF system-on-a-chip (RFSoC) technology and has both web based and SSH interfaces. It is desirable that the candidate for the position have some prior experience working with the RFSoC technology. Furthermore, experience with a standard RF spectrum analyzer, vector network analyzer, and other general RF benchtop equipment would be beneficial.

ARL Advisor:

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About ARD

ARL's Army Research Directorate (ARD) focuses on exploiting concept development, discovery, technology development, and transition of the most promising disruptive science and technology to deliver to the Army fundamentally advantageous science-based capabilities through laboratory's 11 research competencies. This intramural research directorate also manages the laboratory's essential research programs, which are flagship research efforts focused on delivering defined outcomes.

About ARL-RAP

The Army Research Laboratory Research Associateship Program (ARL-RAP) is designed to significantly increase the involvement of creative and highly trained scientists and engineers from academia and industry in scientific and technical areas of interest and relevance to the Army. Scientists and Engineers at the CCDC Army Research Laboratory (ARL) help shape and execute the Army's program for meeting the challenge of

developing technologies that will support Army forces in meeting future operational needs by pursuing scientific research and technological developments in diverse fields such as: applied mathematics, atmospheric characterization, simulation and human modeling, digital/optical signal processing, nanotechnology, material science and technology, multifunctional technology, combustion processes, propulsion and flight physics, communication and networking, and computational and information sciences.

About ELECTROMAGNETIC SPECTRUM SCIENCES (ESS)

Novel approaches to sensing and operating across the entire electromagnetic (EM) environment; counter-sensing across the EM spectrum; protection from EM effects; emerging concepts for RF, radars, and electronic warfare (EW).

A complete application includes:

- **Curriculum Vitae or Resume**
- **Three References Forms**
  - An email with a link to the reference form will be available in Zintellect to the applicant upon completion of the on-line application. Please send this email to persons you have selected to complete a reference.
  - References should be from persons familiar with your educational and professional qualifications (include your thesis or dissertation advisor, if applicable)
- **Transcripts**
  - Transcript verifying receipt of degree must be submitted with the application. Student/unofficial copy is acceptable

If selected by an advisor the participant will also be required to write a **research proposal** to submit to the ARL-RAP review panel for :

- Research topic should relate to a specific opportunity at ARL (see Research Areas)
- The objective of the research topic should be clear and have a defined outcome
- Explain the direction you plan to pursue
- Include expected period for completing the study
- Include a brief background such as preparation and motivation for the research
- References of published efforts may be used to improve the proposal

Questions about this opportunity? Please email ARLFellowship@orau.org.

Qualifications Past experience with RF signal processing.

Past experience with RF signal identification algorithm development

Past experience with data collection via software defined radio technology

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Past experience with RF system on a chip (RFSoC) technology

Point of Contact ARL

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Bachelor's Degree, Master's Degree, or Doctoral Degree.
- **Academic Level(s):** Bachelor's Degree (Journeyman Fellow), Master's Degree (Journeyman Fellow), or Doctoral Degree (Postdoctoral Fellow).
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12)
  - **Communications and Graphics Design** (2)
  - **Computer, Information, and Data Sciences** (17)
  - **Earth and Geosciences** (21)
  - **Engineering** (27)
  - **Environmental and Marine Sciences** (14)
  - **Life Health and Medical Sciences** (51)
  - **Mathematics and Statistics** (11)
  - **Physics** (16)
  - **Science & Engineering-related** (2)
  - **Social and Behavioral Sciences** (29)