

**REQUEST FOR INFORMATION (RFI)**  
**ONR RFI Announcement # N00014-16-RFI-0001**  
**Title: Imaging through obscurants**

**I. DISCLAIMER:**

This announcement constitutes a Request for Information (RFI) for the purpose of determining market capability of sources or obtaining information. It does not constitute a Request for Proposals (RFP), a Request for Quote (RFQ) or an indication that the Government will contract for any of the items and/or services discussed in this notice. Any formal solicitation that may subsequently be issued will be announced separately through Federal Business Opportunities (FedBizOpps). Information on the specific topics of interest is provided in the following sections of this announcement. Neither ONR nor any other part of the federal government will be responsible for any cost incurred by responders in furnishing this information.

**II. BACKGROUND:**

The Office of Naval Research (ONR) C4ISR Department (Code 31), Image Sensing and Processing (ImSP) Program objective is to detect, classify/identify, and localize/geolocate air, sea-surface, and ground targets. The primary interest is for systems working in visible and infrared (near, short wave, mid wave and long wave) regions of the electromagnetic spectrum. However, passive millimeter wave region is also of interest due to its superior atmospheric transmission properties in degraded visual environment (clouds, dust, fog, rain). Long range imaging through such environments is a thrust within this program. Both active (where source of illumination is under user control) and passive (using ambient illumination) ImSP systems operating in visible and infrared spectral bands are of interest. Exploiting multiple modalities associated with electromagnetic waves (spectral, polarimetric, temporal and quantum signatures) in addition to conventional spatial imaging is expected to provide additional information about the targets and hence improve performance under challenging environmental conditions. ONR ImSP program is also interested in exploring systems that do not form images in a traditional sense and yet are able to achieve the primary objectives through unconventional measurements augmented by sophisticated inverse processing operations. ONR ImSP is interested in supporting basic and applied research that advances state of the art in these broad areas.

**III. SPECIFIC INFORMATION OF INTEREST:**

The US Fleet Forces are often present in congested waterways throughout the world for a variety of humanitarian and military purposes. To maintain situational awareness (SA) and to support target detection, tracking, and identification, electro-optical (EO) and infrared (IR) sensors could be employed for their superior resolution and image-forming mode of operation, in contrast to radar. However, the short wavelengths associated with EO-IR make imaging far more susceptible to performance degradation from scattering by ubiquitous water-based aerosols, which typically generate a large, non-information carrying, background radiation that overwhelms the ballistic signals that do carry information about the scene. Imaging through dense fog is the intrinsic hard problem, as a strongly scattering medium fills the entire working volume. Imaging through cloud layers, haze, or fog can be improved via post processing by exploiting prior information about the scene, but the deleterious effect of the scattering medium on the

signal-to-background ratio remains the key limitation, which depends on the image acquisition mode as well as the optical properties of the water-based aerosols.

The ONR Code 312 EO-IR Technologies Focus Area seeks information on both active and passive solutions to imaging through obscurants, including fog, haze, rain, and snow, but excluding dust or smoke. Active imaging techniques employing, for example, structured laser-light illumination and/or temporal gating are of interest, along with passive imaging techniques employing, for example, a judicious choice of spectral band(s), polarization diversity, high-speed multi-frame acquisition, or other mode of acquisition together with advanced processing to achieve a substantial overall improvement. Solutions that invoke unique material (e.g., spectroscopic) properties of relevant obscurants would also be of interest. Solutions can exploit all or any portion of the electromagnetic spectrum ranging from the UV to the far IR, including the conventional bands referred to as electro-optic (EO), near-infrared (NIR), short-wave IR (SWIR), mid-wave IR (MWIR), and long-wave IR (LWIR), but excluding active mm-wave operation.

#### **IV. SUBMISSION INSTRUCTIONS and FORMATTING REQUIREMENTS**

a. Responses are requested no later than **19 February 2016 at 4:00PM Eastern Standard Time (EST)**. Any response received after this date will also be considered but may not be included in initial reporting or assessments.

b. All responses should be in PDF format and emailed to the technical point of contact: **Ravi Athale (ravindra.athale@navy.mil)**. The subject line of the email should read as follows “RFI: Imaging through Obscurants”.

c. All responses must be unclassified. No classified responses will be accepted under this RFI. All information received in response to this RFI that is marked proprietary will be handled accordingly. Responses to this notice will not be returned.

d. Required content and submission organization:

1. Cover Sheet – RFI number, company name and address, technical point of contact, printed name, title and email address and date.

2. Technical description of the proposed concept or capability, including a concise description of the underlying principles, a realistic assessment of limits of performance, and a comparison to existing capabilities. Technical challenges, risks, and risk mitigation strategies should be outlined. Experimental and/or theoretical evidence to validate/support the technical solution should be provided. This section should not exceed 5 pages, single-spaced, 12 point font, including charts, graphs, or other illustrations.

3. Relevant past experience. A one-page description of past relevant experience should be included. Response may include ROM cost estimates that will be considered only for planning purpose.

4. Small Business Concerns, Historically Underutilized Business Zone (HUBZone) Concerns, Service-Disabled Veteran-Owned Small Business (SDVOSB) Concerns, Small

Disadvantaged Business (SDB) Concerns, Women-Owned Small Business (WOSB) Concerns and Veteran-Owned Small Business (VOSB) Concerns are all highly encouraged to respond to this RFI.

## **V. QUESTIONS AND POINT OF CONTACT**

Questions of a technical nature regarding this RFI may be sent to the following Technical Point of Contact:

Name: Ravi Athale

Title: Program Officer

Office of Naval Research

Division Code: 31

Address: 875 N. Randolph St, Arlington, VA 22203

Email Address: [ravindra.athale@navy.mil](mailto:ravindra.athale@navy.mil)