SOCOM20-D002 TITLE: Human Geography 3D (HG3D) Street View

TECHNOLOGY AREAS: Information Systems, Sensors, Battle Space, Human Systems

ACQUISITION PROGRAM: Program Executive Office - Special Reconnaissance, Surveillance and Exploitation

The technology within this topic is restricted under the International Traffic in Arms Regulation (ITAR), which controls the export and import of defense-related material and services. Offerors must disclose any proposed use of foreign nationals, their country of origin, and what tasks each would accomplish in the statement of work in accordance with section 5.4.c.(8) of the solicitation.

OBJECTIVE: The objective of this topic is to develop an automation algorithm for extracting 3D geospatial data from crowd-sourced imagery and fusing it with human geography to deliver a street level view of complex terrain in denied areas. Dynamic processing of crowdsourced imagery allows users to obtain near-real-time information about locations, events, people, and places. The open standards nature of this capability will enable greater horizontal integration between Special Operations Forces (SOF) operators, Mission Planners, and partner nations across limited bandwidth tactical environments. The capability will extend SOF reach to rehearse and exercise with tagged imagery based on pre-defined classes that support SOF-unique missions. This geospatial situational awareness enables SOF to pivot quickly to relevant areas to support operations.

DESCRIPTION: USSOCOM is exploring options that provide Special Operations Force operators with a near-real-time 3D street level view of areas from crowd-sourced imagery. The capability to automate extraction of 3D geospatial data from crowd-sourced imagery and fuse the data with human geography will expand mission rehearsal and operations in denied areas. The open standards streaming capability will further enable integration of the crowd-sourced data into handheld devices. The tactical open standard will provide a data format for integration of synthetic intelligence during mission rehearsal and exercise engagements with partner nations.

Operating system key features shall include but not limited to the following:

1. Render crowd-sourced imagery in open standards format(s).
2. Assess the feasibility of combining crowdsourced 3D imagery with other 3D human terrain data.
3. Assess the feasibility of combining crowdsourced 3D imagery with handheld devices.
4. As part of this feasibility study, the offeror shall address all viable overall system design options with respective specifications.

Key Military applications: Imagery, Execution of Tactical Operations, Mission Planning, Tactical System Integration, Mission Command, Sensor Integration

Planning/Action Mission and Command:

1. Create Common Situational Understanding, Mission Command On-The-Move, Enable Unified Action Partner Collaboration
2. Unify Tactical and Operational Common Operational Picture
3. Create, Communicate, and Rehearse Orders during Exercises
4. Operational Adaptability and Decision-Making

PHASE I: Conduct a feasibility study to assess what is in the art of the possible that satisfies the requirements specified in the above paragraph entitled “Description.”

The objective of this USSOCOM Phase I SBIR effort is to conduct and document the results of a thorough feasibility study to investigate what is in the art of the possible within the given trade space that will satisfy a needed technology. The feasibility study should investigate all known options that meet or exceed the minimum performance parameters specified in this write up. It should also address the risks and potential payoffs of the innovative technology options that are investigated and recommend the option that best achieves the objective of this technology pursuit. The funds obligated on the resulting Phase I SBIR contracts are to be used for the sole purpose of conducting a thorough feasibility study using scientific experiments and laboratory studies as necessary. Operational prototypes will not be developed with USSOCOM SBIR funds during Phase I feasibility studies.

Operational prototypes developed with other than SBIR funds that are provided at the end of Phase I feasibility studies will not be considered in deciding what firm(s) will be selected for Phase II.

PHASE II: Develop, install, and demonstrate a prototype system determined to be the most feasible solution during the Phase I feasibility study on the Austere Environment Virtual Planning Tool.

PHASE III DUAL USE APPLICATIONS: This system could be used in a broad range of military applications where SOF and general purpose forces require 3D geospatial data at a street level view of complex terrain in denied areas. This 3D view will allow SOF to exploit tactical data to plan operations, conduct rehearsals, and remotely coordinate actions on the objective with organizations that are not collocated with the ground tactical commander. This capability could also be adopted by first responders, federal law enforcement (Secret Service), and for organizations that require a need to conduct a "walk through" of a specific area prior to execution of a task.

REFERENCES:

Special Operations Forces in Unlit Spaces: Understanding the World's Dark Spots in the Context of SOF Operational Planning, 2014. https://www.ausa.org/sites/default/files/LWP-101-Special-Operations-Forces-in-Unlit-Spaces-Understanding-the-Worlds-Dark-Spots-in-the-Context-of-SOF-Operational-Planning.pdf

Large-Scale Semantic 3D Reconstruction http://www.grss-ieee.org/community/technical-committees/data-fusion/data-fusion-contest/

List of Street View Services https://en.wikipedia.org/wiki/List_of_street_view_services

Data and Analytics Platform that measures Ground Truth https://www.premise.com/sentiment-and-surveys/

Integrating Terrain Surface and Street Network for 3D Routing, Lee, Jiyeong & Zlatanova, Sisi. (2009). 3D Geo-Information Sciences. 10.1007/978-3-540-87395-2

The Future of Data Collection, https://spatialnetworks.com/assets/downloads/SNI_DGI_2018_Final.pdf

"Urban 3D challenge: building footprint detection using orthorectified imagery and digital surface models from commercial satellites," Goldberg, Wang, Christie, Brown. SPIE (2018), https://doi.org/10.1117/12.2304682

KEYWORDS: Crowd Source, Austere Environment, 3D Data, artificial intelligence, surveillance and reconnaissance, Georeferenced Imagery

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