February 8, 2013

Title: INTENT TO SOLE SOURCE

SOLE SOURCE: "Sigma-Point Kalman Filter V-IMU Development" using Tanenhaus and Associates, Inc., and Dr. Alexander Bogdanov.

REQUIREMENTS/SPECIFICATIONS:

SOLE SOURCE:
Pursuant to OAR 580-062-0020(8) the Portland State University Office of Contracting and Purchasing Services has determined that due to unique and specialized expertise in inertial measurement and related state-of-the-art equipment, Tanenhaus and Associates, Inc., qualifies as a Sole Source. As a result, this sole source notification is posted.

A Statement of Work is attached to this 'Intent to Sole Source' for your review.

An entity may protest this determination in accordance with OAR 580-061-0145 no later than February 15, 2013, 5:00 P.M. PST. Protests must be submitted to the Purchasing and Contracting Office, Portland State University, University Center Building (UCB), Room 465, 527 SW Hall Street, Portland, OR 97201, or to P.O. Box 751-PUR, 97207-0751.

For added information, please contact Bill Terry, Contracts Officer, at 503.725.9869, or wterry@pdx.edu.

PSC Statement of Work

Title: Sigma-Point Kalman Filter V-IMU development

PSU PI: Eric A. Wan, Research Associate Professor
Department of Electrical and Computer Engineering

PSC Name: Dr. Alex Bogdanov

Overview:
Tanenhaus and Associates, Inc. (TAI) is designing an accurate production Inertial Measurement Unit (IMU) / Integrated Navigation System (INS) based on arrays of precision Micro Electro-Mechanical Systems (MEMS) inertial sensors. The array based IMU is referred to as a "Virtual" IMU. The overall goal of this project is to improve performance, optimization of low drift errors for the V-IMU, and implementation of real time INS algorithms embedded into hardware to demonstrate real time performance. Funding for this effort comes from a Phase II Navy SBIR, titled ''Low Cost Low Drift High Accuracy Miniature Inertial Navigation System (INS)", Contract No: N68335-11-C-0287, Brian Concannon, AIR 4.5.6, NAVAIR.

PSC SOW:

Dr.Bogdanov will provide expertise and development of algorithms to assist Dr. Wan in support of TAI efforts. Dr. Bogdanov will specifically be responsible for Matlab coding of the Sigma Point Kalman Filter (SPKF) algorithms applied to reduce IMU drift error.

Research and Development will focus on both optimized sensor array low drift error control and closed loop Sigma Point Kalman Filter performance as an integrated solution. TAI and PSU will provide all necessary data, specifications, and conduct additional tests to evaluate performance. Dr. Bogdanov will develop algorithms in collaboration with Dr. Wan, and then be responsible for implementation and testing in MATLAB. PSU will receive the MATLAB code. Dr. Bogdanov will also assist TAI engineers to convert the Matlab code to C++ embedded code. Specific tasks include:

1) Initial data analysis and noise modeling.
2) Upgrade the design and implementation of initial calibration, bias estimation, and alignment procedures based on TAI low drift error solutions.
3) Design and implement SPKF based INS for open loop operation.
4) Design and implement SPKF based INS using gravitational tilt derived from accelerometers as a reference.
5) Design and implement SPKF based INS with GPS as an external reference.
6) Design and implement SPKF based INS with a 3D magnetometer as external references.
7) Optional: Design and implement tightly coupled SPKF based INS (i.e., combining all output of gyros and accelerometer arrays within the SPKF)

Deliverables:

Dr. Bogdanov will provide PSU with all MATLAB code developed under this contract. A final report will also be provided that describes all algorithms developed.