

AFRL RESEARCH TOPIC CALL FOR FY14

RY15-2

1. **Research Title:** “Integrated GPS/IMU/Optical Navigation System”
2. **Individual Sponsor:**
Dr. Jacob Campbell, AFRL/Rywn
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3. **Academic Area/Field and Education Level:** Electrical Engineering and Computer Science / Computer Vision, Integrated Navigation, Sensor Integration (MS or Ph.D. level)
4. **Objectives:** This research will expand on the knowledge gained by implementing an integrated optically and GPS-aided inertial measurement unit (IMU) based navigation system. The objective of the topic is to develop a study integrated filter design which would enable a tightly integrated navigation system.
5. **Description:** There is a great need for the military to develop non and degraded-GPS (less than 4 satellites) precision navigation technologies in order to be able to operate in environments where GPS is degraded (such as indoors or in high threat situations). The integration of optical sensors and an IMU has shown promise of providing GPS-level position accuracy in GPS-degraded environments. However further development and characterization of such systems is necessary in order to provide a system which is also integrated with GPS. The focus of this research should not be on optical navigation only- it should focus on using established optical navigation techniques. These techniques should then be examined to determine the proper integration with a GPS/IMU navigation system. This includes the transition from a full GPS solution (more than 4 satellites) to cases where there are less than 4 satellites.
6. **Research Classification/Restrictions:** None at this time
7. **Interest in Summer USAFA Cadet:** Yes
8. **Eligible Research Institutions:** Place an X in all that apply.

X Universities (DAGSI & AFIT)

AFIT (only)

X USAFA