**Android enabled programmable camera positioning system**

Military utility studies of new infrared imaging technology and processing algorithms often require extensive field testing. These tests generally include the coordination of many sensing systems for day/night operation over long durations in stressing environments. Clearly, automation of these systems is desirable in order to reduce the physical and mental demands on the test team and to ensure measurement repeatability.

For this project, AFRL/RYMT requires an automated infrared camera positioning system. This system will be capable of automatically slewing between target points defined by GPS coordinates at various times according to a preprogrammed test script. To execute this mission, the positioning system must be capable of sensing its own position and orientation in order to calculate the required target acquisition geometry. The positioning system must also be capable of generating an image acquisition command signal to the attached infrared camera (i.e. an electronic trigger to begin and end image collection). Positioning systems such as this exist already but we believe that this work may be done at a significantly reduced price per system by exploiting the sensors and computing power available in commercial Android smart phones.

In considering options to optimize cost versus performance, the student team is free to investigate and propose an alternate solution to this problem.

The students will be responsible for developing hardware for: azimuth and elevation control of a 30 lb sensor; the interface between the hardware and the smart phone; a trigger for the infrared imager; and a software capability for mission scripting. The ability to capture context imagery with the smart phone’s internal camera (or to log other internal smartphone data) would also be beneficial. The hardware solution should be flexible enough so that it may mounted upright for pointing above the horizon or inverted for imaging below the horizon. Elevation pointing range should be 0 to 90 degrees and azimuthal pointing range should be 0 to 360 degrees.