

Current Projects In Computer Vision, Intelligent Control, and Robotics

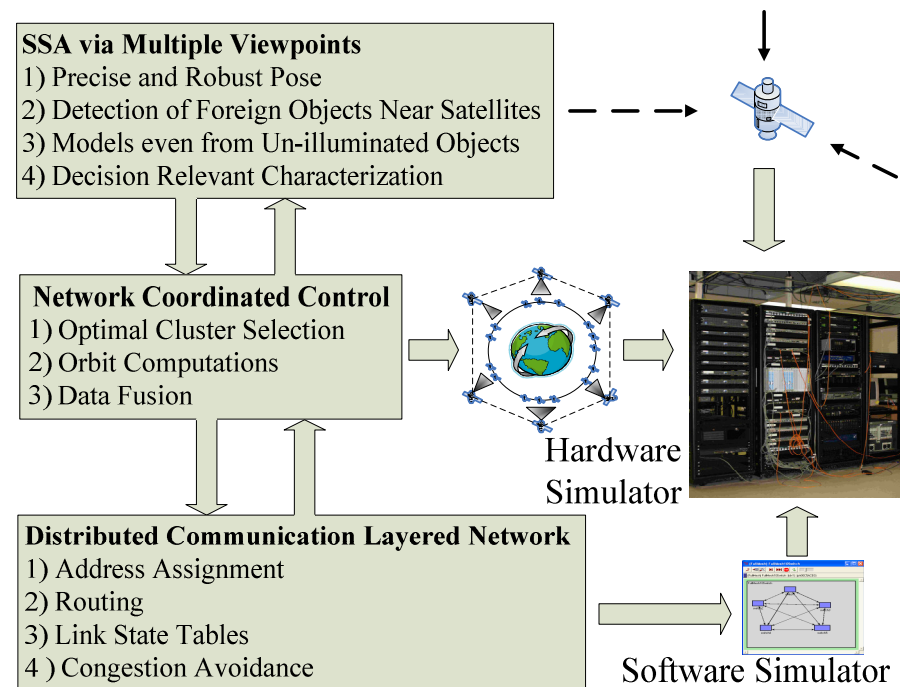
Professor John McInroy
(mcinroy@uwyo.edu)

University of Wyoming, Dept. of
Electrical and Computer Engineering

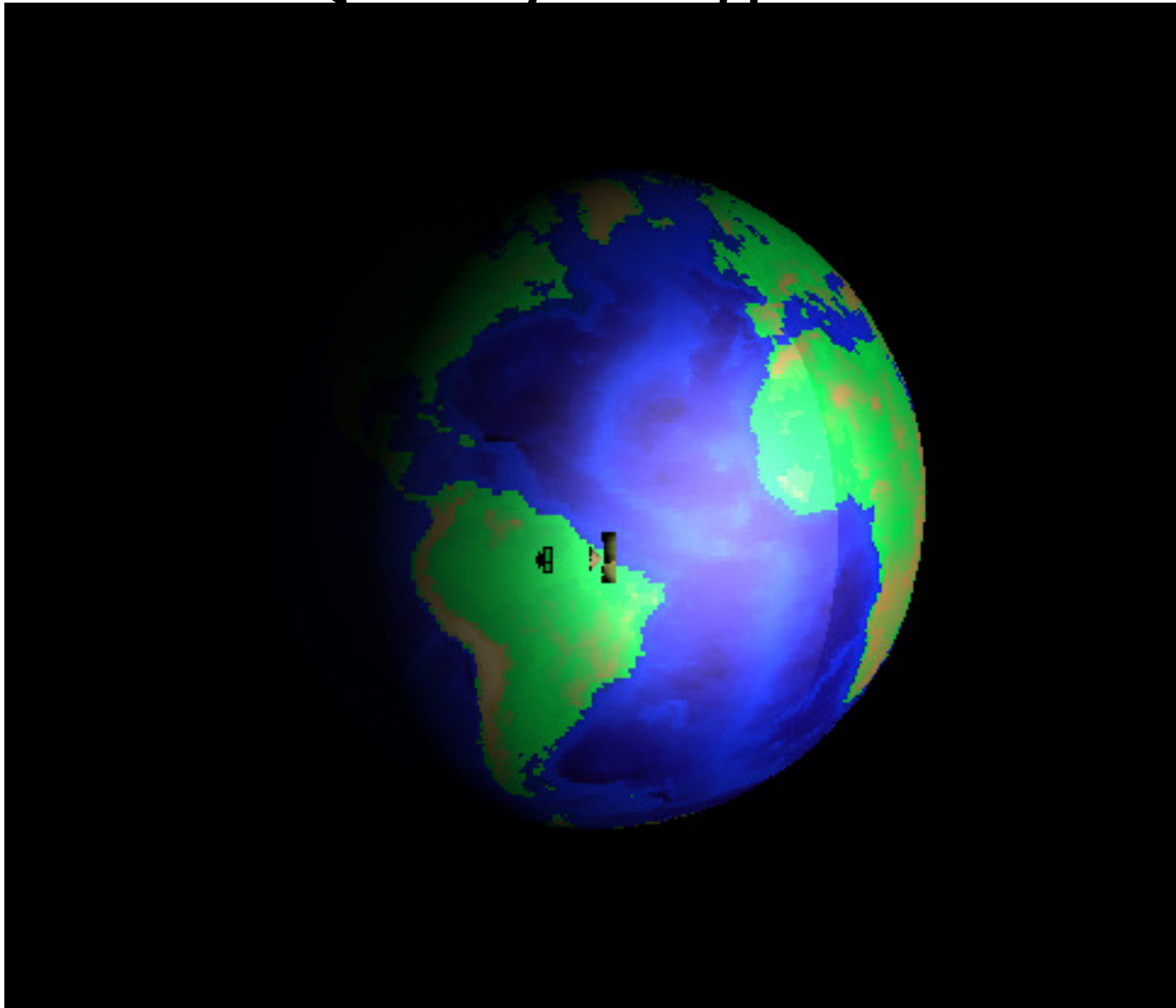
- The University of Wyoming is currently seeking graduate students in computer vision, intelligent control, and robotics. Students should have a strong background and/or interest in mathematics, image processing, control systems, computer vision, and optimization.
- A very brief description of some current projects follows.

Computer Vision on Nano-Satellites for Space Situational Awareness (SSA)

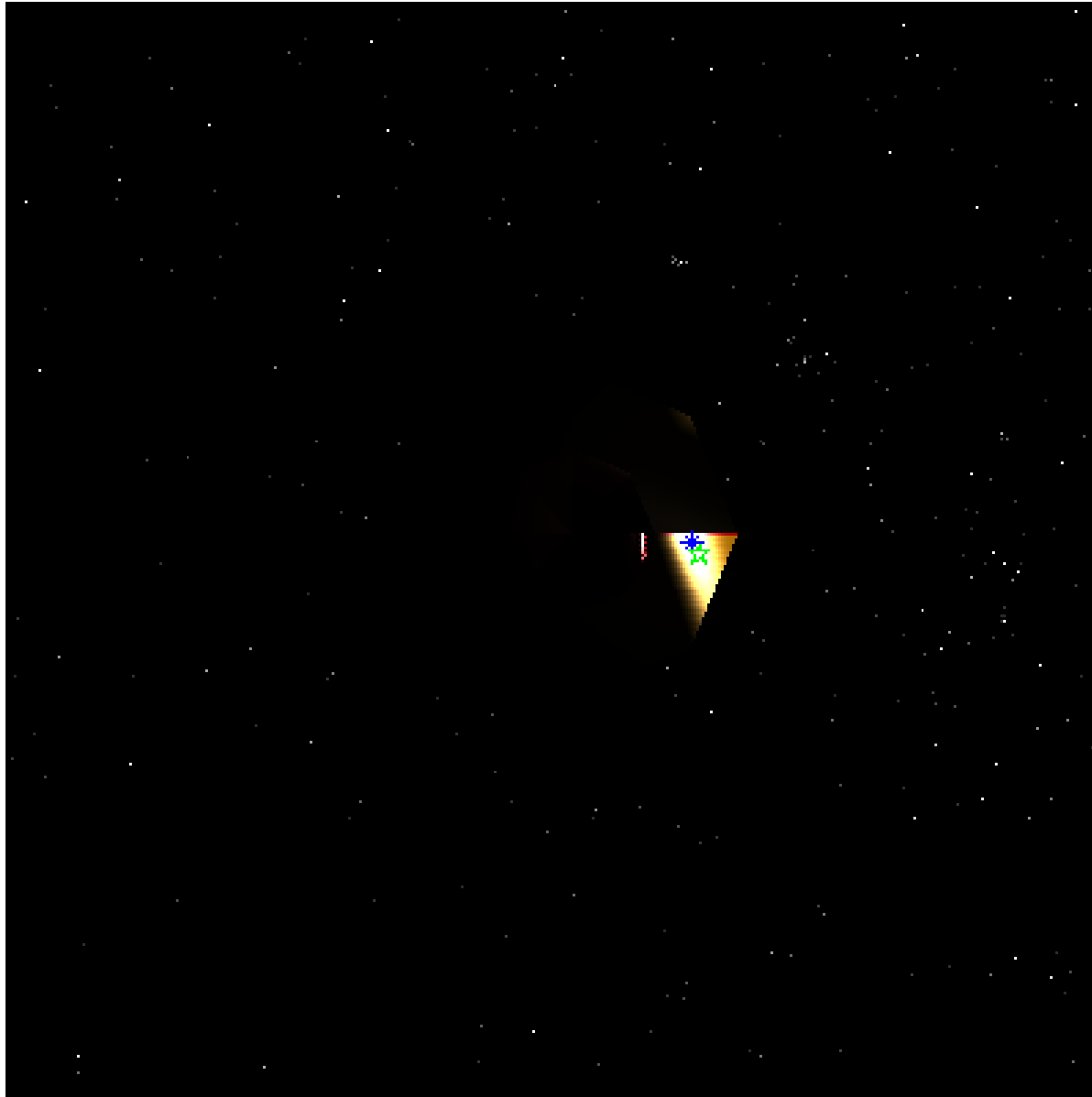
- New algorithms will be developed which process data from multiple apertures to form: (a) precise and robust position/attitude measurements; (b) detection of foreign objects surrounding distant satellites; (c) 3-D satellite models even from un-illuminated objects; and (d) full characterization of the algorithms so the network coordinated control can make optimal decisions.



Spacecraft Maneuvers to Obtain High Quality Images



View of Satellite



Situational Awareness for Unmanned Ground Vehicles (UGV)

- Currently, UW is developing the mechanical portions of a system for detecting motion in an image, even when the camera is moving. This motion detection is aimed at situational awareness—the UGV needs to be aware of nearby moving objects. The purely mechanical camera stabilization performed under the existing contract would be supplemented with situational awareness image analysis and decision making. This extension would ensure that the final system will be able to both detect motion and make preliminary assessments about the nature of that image motion. As humans move, they visually scan using eye and head movement. These surveillance techniques could be incorporated into the image jitter system. Glances toward events of interest indicated by non-visual sensors could also be implemented. This would greatly increase situational awareness. For instance, loud noises would result in immediate visual inspection in that direction. If a vehicle starts tipping in a direction, it would alert the operator and be ready to instantly look there for problems .



Real-Time Flame Recognition and Understanding Using a Mobile, High Performance, Stereoscopic Computer Vision System

- Firefighting is an extremely dangerous job that is ripe for automation. To recognize and understand flames, the University of Wyoming (UW) would develop a stereoscopic computer vision system integrated into a motion platform. This system would be used to measure the three dimensional flame-front and its propagation in real-time. In addition, it would incorporate a very rudimentary portion of a firefighter's knowledge, so very basic firefighting plans could be formulated and executed automatically, subject to a human's approval.