

SOI for CDI RFP FY2016

SECTION 1:

Project Title: Documentation and web presence for public release of USGS Automated Imaging System.

Description:

The USGS Automated Imaging System combines embedded computing hardware and control software developed to solve and simplify the problem of deploying remote automated science quality image sensors. The first generation of this system has been deployed for various data acquisition applications at field sites around the world, however the small team of USGS scientists capable of building and deploying the system is unable to support the growing demand for the system by researchers both within and outside of USGS. The development team is seeking funding to produce a full set of documentation, simplify deployment and build procedures of the system, and release documented source code, in order to allow and encourage its replication and use among researchers.

Cost Center: Astrogeology Science Center

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Deliverables:

1. Publication of full documentation of system design, component specification, configuration procedures and end-user manual.
2. Development and release of installation and provisioning scripts.
3. Publication of source code for the controls system and user interface.
4. Documentation of source code and plugin development API.
5. Web presence to provide repository for all the above.

CDI SSF Elements: Monitoring, Assessment & Research, Science Project Support, Data & Information Assets, Science Planning, Science Acquisition, Science Processing, Science Analysis, Science Publishing & Sharing.

SECTION 2: Budget

<i>Budget Category</i>	<i>Funding Requested</i>	<i>Matching Funds</i>
Personnel Salary & Benefits		
PI: Rian Bogle @ 280 hrs	\$18,200	\$35,081
Co-I: Dennis Dye @ 40 hrs	\$3,000	\$5,980
Total	\$21,200	\$40,761
Travel Expenses		
Travel to CDI for PI	\$2,000	\$0
Other Direct Costs:		
Equipment (Control System for Testing)	\$1000	\$0
Supplies, Publication costs	\$2500	\$2,100
Total Direct Costs	\$26,700	\$43,361
Indirect Costs (%)	69%	54%
Grand Total	\$45,123	\$66,775

Many Earth Science and Remote Sensing problems require or can be facilitated by the use of automated, science-quality machine vision systems. The contexts for these systems range from time-lapse recording of geomorphic changes, plant phenology changes, ecosystem change, riverine and coastal sediment flux, to real-time measures of photometry, and even atmospheric particulate monitoring. These systems fill an important gap in remote sensing data sets in their ability to provide both fine spatial and temporal resolution data sets otherwise unavailable from air and space borne systems. Additionally they provide options for non-contact, in-situ monitoring of critical physical, climatic, or ecosystem variables that may otherwise be too costly or logistically prohibitive to sample.

Implementing these systems requires the knowledge and skill for development and integration of software and hardware for image sensors, sensor control, power, data storage, and telemetry systems, which few teams in the broader research community have the ability to provide on an as needed basis, nor are there commercial products which can provide the high level of data quality, simplicity, and flexibility. The combined expertise required to successfully implement a system in a timely manner is often prohibitive to its use in smaller teams and budgets both in and outside the USGS.

Leveraging our experience in developing multiple imaging systems for a wide range of research applications, we have developed and refined the design, and implementation of a generic “Automated Imaging System” (AIS) in order to provide researchers with a easily replicable, fully integrated and tested system. Multiple collaborative projects both internal to USGS and in academic research (e.g., DOE Green Ocean Amazon, LCS research on phenology-carbon-climate relations, LRS research for Essential Climate Variables) have benefited by replicating and deploying the AIS around the world, from the desert southwest US, to the Brazilian Amazon, to the Arctic Circle. In each case these deployments have relied upon the AIS development team in USGS to build, configure, and test the systems, and train the users.

In order to truly meet the goals of ease of replication, and configuration; the additional step of developing and publicly releasing a complete set of documentation, manuals, installation scripts, and source code are still required. Without these, teams and individuals cannot leverage the development and testing of this system already completed by USGS. Unfortunately, no funding is available to the AIS development team to provide for this crucial step in the wider adoption of this type of system.

We propose to utilize CDI funding to develop and publish the necessary documentation, manuals, and scripts necessary for building, installing and using the AIS as well as providing a web presence as the central repository for documentation, user forums, issue tracking, and source code.