Department of Commerce
Research Performance Progress Report – Grants Online Electronic Template

Award Information: Complete Boxes 1 – 23 with the requested information
Box 1. Federal Agency – Department of Commerce/NOAA

Box 2. Federal Award Number – Assigned Award Number for the project

Box 3. Project Title
Launching WebCOOS: Webcams for Coastal Observations and Operational Support

Box 4. Award Period of Performance Start Date

Box 5. Award Period of Performance End Date
August 30, 2023

Box 6. Principal Investigator's Last Name
Hernandez

Box 7. Principal Investigator's (PI) First and Middle Name
Debra

Box 8. PI Job Title
SECOORA Executive Director

Box 9. PI's Email
debra@secoora.org

Box 10. PI's Phone Number
843.906.8686

Box 11. Authorizing Official's (AO) Last Name

Box 12. AO First and Middle Name

Box 13. AO Job Title

Box 14. AO Email

Box 15. Signature of Recipient Authorized Representative – Non Applicable

Box 16. Submission Date and Time Stamp

Box 17. Reporting Period End Date

Box 18. Reporting Frequency – Semi-annual

Box 19. Report Type – Not Final or Final
Not final

Box 20. Recipient Name
SECOORA

Box 21. Recipient Address
Post Office Box 13856, Charleston, SC 29422

Box 22. Recipient DUNS

Box 23. Recipient EIN

Accomplishments: Boxes 24 – 27 are required the first initial progress report. Subsequent reports will be prepopulated with the information from the previous report and have a limit of 4,000 characters. Comment Box 28 is required but will not be pre-populated in subsequent reports.

Box 24. What were the major goals and objectives of this project?

Box 25. What was accomplished under these goals?

Goal 1) Engage demonstrated webcam operators and other end-users
Obj. 1.1) Identify & engage Tier 1 & 2 users: 51%
Presented preliminary shoreline detection algorithms to Tier 2 users involved in Coastal Imaging Research Network (CIRN). Conducted multiple site visits with Tier 2 users
Obj 1.2) Develop, assess and disseminate stakeholder appropriate outreach and education materials: 51% Complete

Refined documentation on WebCOOS website. Ran small pilot study of RipSnap at Wrightsville Beach. Updating user interface and adding additional types of rip currents for the detection tool

Obj 1.3) Identify testers within the network and conduct survey to assess ease-of-use, utility of various analyses and informational products, and willingness to pay for webcam imagery or downstream product access or customization. 5%

Initiated a citizen science-based community monitoring program with the Rosemont community in Charleston County. Rosemont community members will be providing guidance and review and comment on developed products.

Goal 2) Operationalize the WebCAT system to a national webcam data management network

Obj 2.1) Select camera providers and maintain webcams: 30%

Maintained video cameras and data streams from 2 cameras at Oak Island, NC.

Obj 2.2) Develop interactive web portal to access live webcam feeds, historical archive footage, and webcam products: 30%

Began transition to a nationally scalable data storage system. This objective is behind schedule.

Obj 2.3) Standardize webcam imagery and metadata documentation and delivery: 51%

Schema-based camera metadata profile is in use, continuous iteration for the life of the project.
Developed standardized practices for extracting time period from a video based on file name and embedded metadata.
Tested python script for standard image products on datasets 6 months in length from two cameras.
Identified need for specifying how overlays will be delivered back to individual webcam hosting sites.

Obj 2.4) Develop end-to-end data management workflow integration: 33%

Streaming and archiving 10-min clips from RTSP endpoints is in place. API for retrieving Cameras and their service endpoints available

Obj. 2.5) Integrate quality assurance and quality control (QA/QC) mechanisms : 17%

Collected data for different types of rip currents to improve accuracy of rip detector by reducing false negatives. Continued to work on hybrid ML+ flow analysis method to improve accuracy/performance.

Goal 3) Automate and validate downstream processing of webcam data;

Obj 3.1 Further develop detection algorithms: 51%

Included a python-based tide module to shoreline extraction to allow processing at pre-defined tide levels.
Performed 2 site visits and georectified webcam imagery at Oak Island, NC to provide comparisons between image products derived from webcams versus traditional georectified coastal monitoring cameras.
Commenced drone data collection of sediment rips. Working on process to automate drone flights with "droneML" that helps spot rip-sand structures that may be conducive for rips.

Obj 3.2) Develop operational prototype products: 51%

Making changes to RipSnap based on pilot study. Investigating hybrid ML+flow based rip detection. Investigating drone ML for ML assisted data collection by drone

Developing inexpensive raspberry pi camera setup for remote installations. This includes the computer, camera, software, power, and connectivity via local ethernet or cellular hotspot. Initial setup monitoring site flooding-related data for water level and rainfall.

Obj 3.3) Validation of prototype: 10%

Continued testing of prototype algorithms for shoreline and wave runup detection on video datasets 6 months in length, and validation/improvement of prototype rip current detection approaches.

Obj. 3.4) Operationalization of approach and resultant output: 10%

Developed batch processing scripts for continuous download and processing of video data for shoreline tracking.

Goal 4) Nothing to report.

Box 26. What opportunities for training and professional development has the project provided?

UCSC added 1 undergraduate (Mona Zhao) and 1 MS student (Donnie Stewart) to help with image/video segmentation and drone field experiments

Box 27. How were the results disseminated to communities of interest?

Draft results on post-nourishment beach width change were provided to Oak Island, NC camera hosting homeowners

Box 28. What do you plan to do during the next reporting period to accomplish the goals and objectives?

Objective 1.1) Identify and engage Tier 1 and 2 users

Continue participation in Coastal Imaging Research network monthly meetings.
Conduct update meeting with the NOAA NWS meteorologists from Wilmington and Morehead City.
Contact and include Santa Cruz Fire Department Lifeguard Headquarter on the Santa Cruz Wharf with potential for adding surfcam for rip detection
Continue engagement with underserved communities and build upon the Rosemont initiative to expand to other underserved communities.

Objective 2.1) Engage with identified cameras of opportunity

Engage the UNCW Center for Marine Science to include intracoastal webcams into the WebCOOS network.
Install UCSC webcam and integrate rip detection

Objective 2.2) Develop interactive web portal to access live webcam feeds, historical archive footage, and webcam products

Implement a Catalog on WebCOOS landing page (sites, metadata, data availability, data download instructions)

Migrate WebCOOS landing page to link out from SECOORA. Continue transition to a nationally scalable data storage system

Objective 2.3) Standardize webcam imagery and metadata documentation and delivery

Continued refinement of metadata schema

Transfer standard image product code to Axiom to test automated processing.

Objective 2.4) Develop end-to-end data management workflow integration

Extending API to expose API for search for available data for each camera (browse raw and processed videos and products for each site)

Obj 2.5) Integrate quality assurance and quality control (QA/QC) mechanisms

Work on developing (QA/QC) mechanisms for video imagery

Objective 3.1) Further develop detection algorithms

Test shoreline detection algorithms using new Currituck County cameras.

Objective 3.2) Develop operational prototype products

Monitor pi camera setups for problem issues to be corrected or adapted

Objective 4.1) Develop, validate and operationalize a 'situational monitoring and reporting' tool

Products: Comments are required in Boxes 29 – 32 are required the first initial progress report. Subsequent reports will be prepopulated with the information from the previous report and have a limit of 4,000 characters. If the comment is blank, the "Nothing to Report" checkbox must be checked.

Box 29. Publications, conferences papers and presentations

Braun, J. and J.W. Long, *The Use of Existing Webcams to Identify Maximum Total Water Level and Dune Erosion Events*, Young Coastal Scientists and Engineers Conference – Americas, Myrtle Beach, SC, October 29-31, 2021.

Issei Mori,Akila de Silva, Gregory Dusek, James Davis, andAlex Pang,``Flow-based Rip Current Detection and Visualization''

Box 30. Technologies or techniques

Development of inexpensive, small SBC(single board computer) raspberry pi camera setup for remote installations. This includes the computer, camera, software, power from location/battery/solar and connectivity via local ethernet or cellular hotspot. Initial setup also monitoring and collecting site flooding-related data for water level and rainfall.

Box 31. Inventions, patent applications, and/or licenses

Nothing to Report.

Box 32. Other products

Aiming to develop a smartphone app beta version for rip detection.

Participants & Other Collaborating Organizations – Note that all comments boxes are required and the first report will always be blank. For comments boxes 33, 35 &36 subsequent reports will be pre-populated with the information from the previous report. Comments boxes have a limit of 4,000 characters. For comments boxes 34 – 36, if the comment box is blank, the "Nothing to Report" checkbox must be checked.

Box 33. What individuals have worked on this project?

PI: Debra Hernandez, SECOORA Executive Director
Lead Science PI: Dwayne Porter, Univ. SC
UofSC Graduate Student/Coordinator: Louisa Schandera
Senior Software Developer: Jeremy Cothran
Co-PI: Joseph Long, Univ. NC Wilmington
UNC Undergraduate Student: Kelsea Edwing, Summer Banning
UNCW Graduate Student: Jeremy Braun
Co-PI: Alex Pang, Univ. California Santa Cruz
UCSC Graduate Students: Akila de Silva, Donnie Stewart, and Issei Mori
UCSC Undergraduate Student: Mona Zhao
Co-PI: Kyle Wilcox, Axiom Data Science
Axiom Project Manager: Lauren Showalter

Box 34. Has there been a change in the active other support of the Project Director/Project Investigator(s) or senior/key personnel since the reporting period?

No

Box 35. What other organizations have been involved as partners?

Nothing to report

Box 36. Have other collaborators or contracts been involved?

Homeowners on Oak Island, NC
Rosemont community, Charleston, SC

Impact – Note that all comments boxes are required and the first report will always be blank. For comments boxes 37 - 43 subsequent reports will be pre-populated with the information from the previous report. Comments boxes have a limit of 4,000 characters. For comments boxes 37 - 43, if the comment box is blank, the "Nothing to Report" checkbox must be checked. For

comment box 44, only the percent is required (even if it is a zero), the explanation is not required.

Box. 37. What was the impact on the development at the principal discipline(s) of the project?
Nothing to report

Box 38. What was the impact on other disciplines?
Nothing to report

Box 39. What was the impact on the development of human resources?
Nothing to report

Box 40. What was the impact on teaching and educational experiences?
Nothing to report.

Box 41. What was the impact on physical institutional and information resources that form infrastructure?
Nothing to report.

Box 42. What was the impact on technology transfer?
Nothing to Report.

Box 43. What was the impact on society beyond science and technology?
Nothing to report

Box 44. What percentage of the award is budget was spent on foreign countries?
Enter Percent: 0%

Changes/Problems – Note that all comment boxes are required fields and have a limit of 4,000 characters. If the comment box is blank, the "Nothing to Report" checkbox must be checked.

Box 45. Changes in approach and reason for change
Nothing to Report.

Box 46. Actual or anticipated problems or delays and actions or plans to resolve them
Axiom experienced some human and hardware resource limitations that have delayed completion of Obj. 2.2, which is now behind schedule. During the next two months, an updated milestone and task schedule will be developed with the entire project team.

Box 47. Changes that had a significant impact on expenditures

Nothing to report

Box 48. Significant changes in use or care of human subjects, vertebrate animals, biohazards, and/or select agents

Not Applicable.

Box 49. Change of primary performance site location from that originally proposed

Nothing to Report.

Project Outcomes – Note that the comment box is a required field and has a limit of 4,000 characters

Box 50. What were the outcomes of the award?

Nothing to report