

Simultaneous visual and IR UAV imaging of littoral systems for AI driven change detection

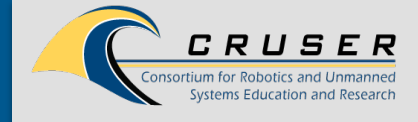


Figure 1: Carmel River State Beach (Approx. 400m long), shown closed (left, December, 2016) and open (right, January 2017). Red arrows indicate regions of breach events. Water quality in Carmel Bay (offshore the beach) decreases when the river is open vs. closed. Colored insert is sample infrared (IR) UAV image (red is warm) taken of the Carmel River plume (purple) surrounded by the beach (orange) discharging into Carmel Bay (dark blue).

Methodology

- Combine visual and infrared UAV imagery using structure-from-motion and in-situ observations
 - Location will be Carmel River State Beach (Figure to left)
 - In-situ measurements will be made (Winter FY18) from inside and outside the river mouth.
 - UAV surveys will provide morphological and water quality spatial variability
- UAV images will be combined with an existing deep learning (AI) model to improve classification and annotation of heterogeneous littoral environments including infrastructure.

Deliverables

- Interdisciplinary research projects for (at least) two METOC thesis students
- Development of quantitative UAV change detection methods for littoral environments
- Development of a deep learning model for heterogeneous littoral image classification
- Technical, scientific reporting and publication

Why/Objectives

- Rapid change and significant damage to infrastructure occur in littoral systems after extreme events

Objectives:

- Quantify the morphological change of littoral systems in response to extreme events (beach breaching)
- Monitor the water quality of the river after the breach (Figure1 inset)
- Use UAV visual and IR imagery to expand a deep learning model to account for landscape heterogeneity for deep learning change detection and prediction of vulnerable areas.



FY18 Call for Proposals

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