OCEAN SAVIOR FROM ABOVE

sUAS OPERATIONS DURING NEAR-SHORE OCEAN RESCUES

PHASE II: A PROPOSED COMPREHENSIVE SOLUTION AND REVIEW OF CURRENT TECHNOLOGIES AND CONCEPTS

Principal Investigator: A. Michael Shekari
Faculty Adviser: John Robbins, Ph.D.

ABSTRACT

Approximately 4000 people drown every year in the United States, 50-75 percent of which perish in open water environments (Branche & Stewart, 2001). In Volusia County, Florida, alone over 30 fatal drownings were recorded by the Volusia County Beach Safety Division between January 2012 and June 2017 (Shekari, 2018). To reduce drowning deaths in Volusia County, it is proposed that a small unmanned aircraft system (sUAS) solution be utilized for near-shore ocean rescues. The research examines the technical and financial feasibility of a comprehensive sUAS solution that is capable of detecting and predicting rip currents, detecting distressed bathers, and responding to drowning emergencies by reviewing relevant technical concepts and costs associated with implementing the solution with commercially available components.

RESEARCH QUESTION

Is it feasible for Volusia County Beach Safety to obtain and utilize a comprehensive near-shore ocean rescue sUAS system to enhance beach safety, especially the rip current hazard using technology and knowledge availability, costs of acquisition using commercially available sources, and potential benefits as evaluation criteria?

TECHNOLOGY & KNOWLEDGE AVAILABILITY

A comprehensive literature review across multiple fields related to ocean rescue showed that all the required knowledge and technology for the proposed ocean rescue sUAS is already available. There are already several working examples of sUAS delivering personal flotation devices to distressed swimmers around the world, such as the Little Ripper in Australia shown in figure 3. The natural geomorphological forces that generate rip currents are also well understood and there are proven methods of detection and prediction using remote sensing in-situ measurements, and computer modeling. Multispectral camera and computer vision technology has also progressed to a level where it is feasible to train the computer to detect bathers in distress and initiate emergency response efforts.

POTENTIAL BENEFITS

According to National Safety Council estimates (2017), each drowning death prevented by ocean rescue sUAS will save approximately $730,000 worth of economic damage to the community. Further more, each non-fatal hospitalization prevented by the system will save approximately $12,400 for a one-day admission (Florida Dept. of Health, 2018). There is also an unmeasurable moral and ethical benefit for the preservation of human life from a premature death due to unintentional injury.

CONCLUSIONS & RECOMMENDATIONS

Based on the available knowledge and technology, approximate costs, and potential benefits, it is very feasible for Volusia County Beach Safety to acquire and utilize a near-shore ocean rescue sUAS. All the needed components for the system are already commercially available or from the open-source community. Even with the initial costs of acquiring the system likely near $200,000, the value of life and economic damage saved by preventing a single drowning with the sUAS significantly exceeds the costs by several times.

With the feasibility of the rip current detection and prediction functions of the comprehensive near shore ocean rescue sUAS demonstrated through literature review and working examples of ocean rescue sUAS around the globe, it is recommended that the concept be put forward for trials in Volusia County on a limited basis as proof of concept.

REFERENCES