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Bird Strike Committee Proceedings

8-12-2006

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Stewart, Bruce; Pascarelle, Sebastian; Pinezich, John; Kelly, T. Adam; Smith, Andreas; and Maher, Robert, "AN ACOUSTIC / RADAR SYSTEM FOR AUTOMATED DETECTION, LOCALIZATION, AND CLASSIFICATION OF BIRDS IN THE VICINITY OF AIRFIELDS" (2006). *2006 Bird Strike Committee USA/Canada, 8th Annual Meeting, St. Louis, MO.* Paper 11.
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From *Abstracts of the Proceedings of the 8th Bird Strike Committee USA/Canada Annual Meeting*, 21-24 August 2006, St. Louis, Missouri USA (www.birdstrike.org)

(10) AN ACOUSTIC / RADAR SYSTEM FOR AUTOMATED DETECTION, LOCALIZATION, AND CLASSIFICATION OF BIRDS IN THE VICINITY OF AIRFIELDS

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Bird-aircraft collisions present a significant threat to military and commercial aircraft, and as bird populations and air traffic continue to grow, and airport/airbase operations continue to expand, the problem will steadily get worse. To help mitigate bird strike hazards, we propose a multi-sensor system consisting of ground radar and acoustic sensors that can directly monitor bird activity and provide an alert when a threat condition occurs. Radar offers a large detection range and the ability to detect in all weather conditions, while acoustic sensors allow the ability to detect targets in the midst of clutter and add the capability to classify. A multi-sensor approach ensures that the system can provide bird strike monitoring capability in any situation with a low false alarm rate. As the Phase II effort of an Air Force STTR project, we have constructed and tested a microphone array adapted from state-of-the-art undersea warfare sensor technology that measures accurate angles to any acoustic source (broadband or narrowband) and a parabolic dish microphone which provides high-gain data on targets of interest. A test was conducted near Panama City / Bay County International Airport in conjunction with the Merlin Bird Detection Radar designed by DeTect, Inc. Results of this test will be presented and show that the acoustic array is capable of detecting, localizing in angle, and tracking multiple targets simultaneously, including birds, bats, aircraft, automobiles, people, and boats. The parabolic dish microphone was able to provide very high-gain acoustic data on several of these targets. The radar data was used as truth data for acoustic sensor performance evaluation and to determine situations in which the acoustic data can benefit the radar. Altogether, almost three days of continuous acoustic and radar data were collected, and analysis of these data show that the hybrid radar-acoustic system can provide bird strike avoidance capability.