Optimal Navigational Escape Routes for Collision Avoidance Using Multiple Object Tracking

Hopkins, Alexis (School: Fort Walton Beach High School)

The purpose of this project is to develop and evaluate combinations of technologies which will ultimately lead the design of a system tuned to collision avoidance. The goal is to observe and record data from potentially dangerous oncoming targets and calculate an escape route to avoid impact and decrease damage. The actual test will be in a controlled environment with safe target encounters. I think that if a system can implement tracking systems, tracking algorithms and estimation algorithms from multiple technologies, then the information produced by that system can be processed to calculate an achievable collision-avoidance (escape) route from threatening oncoming objects in a complex environment. I have performed many measurements and analyses on measured data from sensors and calculated data from 6 defined target profiles. I was able to successfully develop and implement an algorithm based on a vector model in a spreadsheet-based simulation to correctly calculate Collision Avoidance Maneuvers (CAM) for the measured data and calculated target profiles. I was able to successfully develop and implement an algorithm in a spreadsheet to correctly calculate Multiple Object Collision Avoidance Maneuvers (MOCAM). During the analysis of the data produced by the CAM simulation with measured data, I was able to observe limitations in the sensors. Even with the limitations, the system rationally predicted correct CAM operations. This is a very exciting find because my data establishes the system I designed to be more robust than the sensors I used. MOCAM will effectively provide escape maneuvers from potential collisions.

Awards Won:

Fourth Award of $500