



COLLEGE OF ENGINEERING AND COMPUTER SCIENCE

FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

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for the degree of Doctor of Philosophy (Ph.D.)

“Dynamics aware trajectory planning with parabolic blends”

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Virtual Dissertation

DEPARTMENT:

Ocean and Mechanical Engineering

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ABSTRACT OF DISSERTATION

Dynamics aware trajectory planning with parabolic blends

The technical sophistication of mobile robots has greatly increased with modern hardware and processing power. As the capabilities have increased, so have the demands. However, many trajectory generation techniques still rely solely on kinematic constraints of vehicles. This dissertation presents a novel way to generate a full-state trajectory that incorporates the dynamics of a marine vehicle. The approach is accomplished by an adaptation of parabolic blends, which includes a conversion to the body fixed frame. The new parabolic blend technique is coupled with four different non-linear controllers. These controllers can capitalize on the trajectory being defined for the position, velocity, and acceleration to various degrees. The results of on water experimentation is also presented, which includes a set of systems identification experiments and multiple tracking runs for two of the four proposed control laws.

BIOGRAPHICAL SKETCH

Born in Brooklyn, NY

B.S., Florida Atlantic University, Boca Raton, FL, 2017

M.S., Florida Atlantic University, Boca Raton, FL, 2019

Ph.D., Florida Atlantic University, Boca Raton, Florida, 2021

CONCERNING PERIOD OF PREPARATION

& QUALIFYING EXAMINATION

Time in Preparation: 2017 - 2021

Qualifying Examination Passed: Spring 2019

Published Papers:

P. Rajendran, T. Moscicki, J. Wampler, K. von Ellenrieder, and S. K. Gupta, “Trajectory planning for unmanned surface vehicles operating under wave-induced motion uncertainty in dynamic environments,” *International Journal of Advanced Robotic Systems*, vol. 17, no. 6, 2020

P. Rajendran, T. Moscicki, J. Wampler, B. C. Shah, K. von Ellenrieder, and S. K. Gupta, “Wave-aware trajectory planning for unmanned surface vehicles operating in congested environments,” in 2018 IEEE International Symposium on Safety, Security, and Rescue Robotics, pp. 1-7, 2018.