In the first part of the thesis, a direct collocation method is introduced to solve a Six Degree of Freedom (6DoF) of a nonlinear dynamics model of an airship. First the airship flight trajectory planning is formulated as a nonlinear optimization problem. The optimal control problem is then converted into a nonlinear programming (NLP) problem. The dissipative energy function of the airship is chosen as the performance index. Path constraints are imposed on the state and control variables. Several method of discretization are used. This NLP problem is then numerically solved by the Matlab solver `fmincon`. Simulation results are used to demonstrate the effectiveness of each discretization technique in solving such problems.

In the second part of the thesis, a sensing system is develop for a mobile heat treatment system used in treating the canker citrus disease. Thermal sensors, pressure sensor, and depth sensor are installed inside a retractable tent that mounted on a truck. Multiple Arduino boards are programmed to help controlling the sensors and extracting the data. A GUI is used to display the data in a manner that the truck operator can monitor the treatment process. Data and wiring diagram are presented.

Major: Aerospace Engineering

Educational Career:
Bachelor's of Aerospace Engineering, BS, 2014, University of Central Florida

Committee in Charge:
Yunjun Xu, Chair, Mechanical & Aerospace Engineering
Kurt Lin, Co-Chair, Mechanical & Aerospace Engineering
Tuhin Das, Mechanical & Aerospace Engineering

Approved for distribution by Yunjun Xu, Committee Chair, on June 22, 2017.

The public is welcome to attend.