In the lecture on “Quadrotor Dynamics and Control”, Prof. Schoellig derives the dynamic equations of a planar quadrotor model and equivalent linearized equations based on the equilibrium hover configuration of the rotor. Different control techniques including PD, PID, LQR, Exact linearization and L1 adaptive control are explored to provide a brief overview on implementing them. In addition, the problem of trajectory tracking control is explained in detail, ending with a brief discussion on learning enabled control strategies[1].

In their master’s thesis, Sabatino has developed the mathematical model of the dynamics of quadrotor using Euler’s and Newton’s laws. A linear controller model, Linear Quadratic Regulator(LQR) is obtained by linearizing the non-linear model. In addition, two linear feedback control strategies, one based on static feedback linearization and another based on exact dynamic feedback linearization are developed.

@misc{sabatino2015quadrotor,

title={Quadrotor control: modeling, nonlinearcontrol design, and simulation},

author={Sabatino, Francesco},

year={2015}

}

In their paper, Tserendondog et al. presents the experimental results for multiple pole placement of higher order quadrotor characteristics equations which are used in developing linear state feedback control technique for stabilization of hovering quadrotor. The equations of quadrotor dynamics are presented and converted to their state space representation. The quadcopter stabilization via pole placement is discussed by implementing a PID control technique. The results of the selected poles were stimulated in MATLAB and their implementation in real model is predicted[3].

[3] <https://www.ijareeie.com/upload/2017/september/18_Experimental.pdf>

Kurak et al. presented the non-linear mathematical model for dynamics of 6-Degree of Freedom (6 DOF) based quadcopter. This model was linearized for hovering mode and different control system designs were implemented to control the position, altitude, and the orientation of the quadcopter. For this purpose, the Linear Quadratic Optimal Control and the Linear Quadratic estimator with Kalman Filter controller designs for both continuous and discrete time are proposed for real-time control applications of the quadcopter. The results were simulated for trajectory tracking based on control strategies implemented[4].

[4] <http://pen.ius.edu.ba/index.php/pen/article/view/164>

@article{kurak2018control,

title={Control and Estimation of a Quadcopter Dynamical Model},

author={Kurak, Sevkuthan and Hodzic, Migdat},

journal={Periodicals of Engineering and Natural Sciences},

volume={6},

number={1},

pages={63--75},

year={2018}

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