Time & Location: July 1, 2020 at 1:00 PM in Virtual
https://ucf.zoom.us/j/97386306955?pwd=cUljQzFlYy8xdVV1cDE1U2ExdjhZZz09
Title: CONTROL STRATEGIES FOR MULTI-CONTROLLER MULTI-OBJECTIVE SYSTEMS

The focus of this dissertation is control systems that are controlled by multiple controllers each having its own objective function. The control of such systems is important in many practical applications such as economic systems, the smart grid, military systems, robotic systems, and others. To reap the benefits of feedback in such systems, this dissertation, we consider a sampled closed-loop implementation. Such an implementation requires only measurements of the state vector at pre-specified instants of time and hence is much more practical and cost-effective when compared to the continuous closed-loop implementation. The necessary conditions are derived for the general linear-quadratic system and the solutions developed for the Nash and Stackelberg controls in detail for the scalar case. While both Nash and Stackelberg are important approaches to develop the controls, we then considered the advantages of the Leader-Follower Stackelberg strategy. In such systems, one controller has an advantage over the other in that it has the capability of designing and implementing its control first, before the other controller. With such a control hierarchy, these controllers are designated as the leader and as the follower. To take advantage of the leader control is designed by anticipating and taking into consideration the follower's control. The follower becomes the sole controller in the system after the leader's control has been implemented. In this study, we describe such systems and derive in detail the controls of both, the leader and follower. In this dissertation, we consider two models, one static and the other dynamic and illustrate the results with an example in each case. The final part of the dissertation considers an application in microeconomics. We consider a dynamic duopoly problem and we derive the necessary conditions for the Stackelberg solution with one firm as a leader controlling the price in the market.

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The public is welcome to attend.