How Control Theory can contribute to Stock Trading Research

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Friday, November 22, 2013
3:30 – 4:30 pm • 1500 EECS

ABSTRACT: In this talk, I will describe some open problems in the world of stock trading which are ideally suited for researchers who are well versed in control theory. These problems fall under the umbrella of “technical analysis” and involve using feedback control algorithms for buying and selling stock in a so-called model-free context. That is, a model for the stock price is neither assumed nor identified. To date, in the finance literature, the case for “efficacy” of such stock-treading strategies is based on statistics and empirical back-testing using historical data. In our new framework, instead of drawing conclusions based on statistical evidence from the past, our control-theoretic point of view leads to robust certification theorems describing various aspects of performance. To illustrate how such a formal theory can be developed, I will concentrate on linear feedback and how it relates to trend following, one of the most well-known technical analysis strategies in use. Finally, it should be noted that the main point of this talk is not to demonstrate that control-theoretic considerations lead to new “market beating” algorithms. It is to argue that strategies which have heretofore been analyzed via statistical processing of empirical data can actually be studied in a formal theoretical framework.

Bio: Professor Barmish is a Fellow of both the IEEE and IFAC for his contributions to the theory of robustness of dynamical systems. He received the Best Paper Award for Journal Publication in Automatica, covering a three-year period, on two consecutive occasions from the International Federation of Automatic Control. He has also given a number of plenary lectures at major conferences. In December 2012, Professor Barmish was named by the IEEE Control Systems Society as the winner of the 2013 Bode Prize. In conjunction with this field award, he will provide a keynote plenary at the 2013 IEEE Conference on Decision and Control, to be held in Florence, Italy.