سمینار بین المللی پژوهشکده مخابرات نظری
و قطب علمی سیستم‌های دسترسی مخابرات

سخنران:

Dr. Ali Zaidi

Postdoc at Chalmers University of Technology, Sweden

عنوان سمینار:

Stabilization of Linear Systems over Gaussian Interference Channels

زمان: سه‌شنبه ۹۳/۶/۲۵ – ساعت: ۱۱:۳۰ –۱۰

مکان: اتاق برق ۶ – دانشکده مهندسی برق

دانشگاه صنعتی شریف

Abstract:

Rapid advances in sensing and wireless technologies have led to significant interest in the understanding and development of wireless networked control systems. Networked control systems consist of spatially distributed agents such as plants, sensors, actuators, and controllers. These agents need to communicate to meet certain control objectives, and in many applications this communication should preferably take place over wireless links to reduce cabling cost and to provide flexible and mobile solutions. A major hurdle in implementing wireless networked control systems is the interference which happens due to the cross-talk between various agents while using shared communication resources. There are also external sources of interference such as other radio devices communicating in the neighborhood. In certain situations, interference can be a major factor limiting performance of a networked control system.

In this talk, we consider the problem of remote stabilization of linear systems (plants) over interference channels. The linear systems are assumed to have random initial states; the sensors have average transmit power constraints; and the communication links between the sensors and the remote controllers are modeled as Gaussian channels. The objective is to stabilize the plants in mean-square sense. We present necessary conditions as well as sufficient conditions for mean-square stabilization of linear systems over the given Gaussian interference channel. The necessary conditions are arrived at using information theoretic tools. The sufficient conditions are obtained using delay-free sensing and control schemes. The necessary and the sufficient conditions reveal the effect of communication parameters such as transmit powers, channel interference, and channel noise on the stability of linear systems. Furthermore, the gaps between the necessary conditions and the sufficient conditions are evaluated. It is shown that delay-free linear sensing and control schemes can be close to optimal in some regimes. Moreover, in certain special cases, they are shown to be exactly optimal.

About Speaker:

Ali Zaidi received Master and PhD degrees in Telecommunication from KTH Royal Institute of Technology, in Oct. 2008 and Nov. 2013, respectively. From Feb. to Aug. 2014, he was a postdoc at Chalmers University of Technology, Sweden. His research interests include information transmission, information processing, and feedback control in wireless networked systems.