

講演会

Nonlinear Control Problems in Human Head Rotation and Binocular Vision

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2016年5月19日(木) 15:00-16:00 京都大学工学部総合校舎 213 講義室

Abstract:

We discuss problems that can be applied to controlling the rotational motion of human eyes and head. The Eye-Head system move to acquire a point target and the control task is to direct the head and the eye-pair towards the general target direction and, if the target is close by, to focus on the target. Roughly speaking, the former task is accomplished by versional eye movements and the latter task of pinpointing the eyes on a specific point is accomplished by vergence eye movements. In this talk we introduce a dynamic model of the head and the eye movement system separately. Choosing the impressed external torques as the control inputs and the coordinates of the gaze direction as the corresponding outputs, we feedback linearize the constructed nonlinear input/output system. The control signals are synthesized so that the output tracks a suitably chosen trajectory while the states of the dynamical system satisfy well known Listing's and Donders' constraints introduced in the talk.

Biography:

Bijoy received the B. Tech and M. Tech degrees in Electrical and Electronics Engg. from BITS Pilani and the Indian Institute of Technology, Kanpur, India, and the Ph.D. degree in Engineering Sciences from the Decision and Control Group of the Division of Applied Sciences, Harvard University, Cambridge, MA, in 1977, 1979 and 1983, respectively. From 1983 to 2007 Bijoy was with the Department of Electrical and Systems Engineering, Washington University, St. Louis, MO, USA, where he was a Professor and Director of the Center for BioCybernetics and Intelligent Systems. Currently he is the Dick and Martha Brooks Regents Professor of Mathematics and Statistics at Texas Tech University, Lubbock, TX, USA. He received the Donald P. Eckmann award in 1988 from the American Automatic Control Council, the Japan Society for the Promotion of Sciences Invitation Fellowship in 1997, the Chinese Academy of Science Invitation Fellowship in 2016. He became a Fellow of the IEEE in 2000, and a Fellow of the International Federation on Automatic Control in 2014. Currently he is the IEEE Control Systems Society Representative to the IEEE-USA's Medical Technology Policy Committee. Bijoy had held visiting positions at Tokyo Institute of Technology, Osaka University and Tokyo Denki University, Japan, University of Padova in Italy, Royal Institute of Technology and Institut Mittag-Leffler, Stockholm, Sweden, Yale University, USA, Technical University of Munich, Germany, Chinese Academy of Sciences, China and Indian Institute of Technology, Kharagpur, India. Bijoy's current research interest is in BioMechanics and Control.

主催：京都大学情報学研究科数理工学専攻制御システム論研究室

共催：IEEE Control Systems Society Kansai Chapter

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