

## ESE Seminar Announcement

**Bijoy Ghosh**

**Center for BioCybernetics and Intelligent Systems  
Texas Tech University, Lubbock, TX, USA**



Friday, May 8, 2015  
Green Hall, Room 0120  
10:10AM

### EYE AND HEAD ROTATION FROM A DONDERIAN PERSPECTIVE

**Abstract:** We study problems that can be applied to controlling the rotational motion of the human head and a pair of human eyes on it. Human head and eyes move to acquire a point target and the control task is to direct the eye-pair towards a 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 pin pointing the eye on a specific target is accomplished by vergence eye movements. The head moves towards the general direction of the target while image on the retina is stabilized by a backward rotation of the eye. The eye and head movement systems are viewed as control systems, constrained by Donders' Law, and we synthesize an appropriately defined optimal control after introducing a suitable cost function. Separately, we also introduce asymptotically stabilizing controllers in the neighborhood of an equilibrium point for the movement systems. Our simulated controller performance is compared with data obtained from a laboratory in Munich. In this talk, we make contact with nonlinear control and Riemannian geometry.

**Bio:** Bijoy Ghosh is a Regent Professor of Mathematics and Statistics at Texas Tech University, where he directs the Center for BioCybernetics and Intelligent Systems. Bijoy received the AACC's Eckmann award in 1988, Japan Society invitation fellowship in 1997, Fellow of IEEE in 2000 and Fellow of IFAC in 2014. He has held visiting positions at Tokyo Institute of Technology, Osaka University, University of Padova, Royal Institute of Technology, Institut Mittag-Leffler, Technical University of Munich, Yale University and Boston University. Bijoy's research interests are in Control Theory, Neuroscience and BioInformatics.