

The Field Robotics Center

Seminar Series

Thursday, 14th April

NSH 1507 12:00 – 1:00pm

Food will be served



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Real-Time Monitoring and Prediction of the Pilot Vehicle System (PVS) Closed-Loop Stability

Abstract: Human pilots are complex, adaptive and non-linear controllers. It is important for the safety of the manned aircrafts to study and understand the human pilot behavior. Considerable resources are invested during the design phase of an aircraft to ensure that the aircraft has desirable handling qualities. However human pilot exhibit wide range of control behavior which is a function of external stimulus, aircraft dynamics and human psychological properties (workload, stress factor, confidence, pucker factor etc..). This variability is difficult to address comprehensively during the design phase and may lead to undesirable pilot-aircraft interaction such as Pilot Induced Oscillations (PIO). This emphasizes the need to keep track of human pilot performance during flights to monitor the Pilot Vehicle System (PVS) stability.

It can be costly and dangerous to study human pilot on manned aircraft for all possible scenarios. This work explores the use of remotely controlled aircraft for human pilot studies in the longitudinal axis of the aircraft. To replicate different flight conditions additional failures (time delay, elevator rate limit, and actuator failure) were injected during the flight. To model human pilot a McRuer pilot model was used and the pilot model parameters were estimated online using a Kalman Filter approach. The estimated parameters were then used to analyze the stability of closed loop PVS and predict the onset of pilot related Loss of Control (LOC) events.

Speaker Bio : Tanmay Kumar Mandal is an Aerospace Engineering Ph.D. candidate in Interactive Robotics Laboratory at West Virginia University. He received his Dual Degree (B.Tech + M.Tech) in Aerospace Engineering from Indian Institute of Technology Kharagpur in 2011. His current research interests are aerial robotics, guidance, navigation, control, and sensor fusion. He has more than four years of hands on experience on designing and flight testing unmanned aerial systems.



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