University of Colorado at Boulder

AEROSPACE ENGINEERING SCIENCES

Seminar

Aude Marzuoli

Georgia Institute of Technology

Data-Driven Analysis of the Resilience of the Air Transportation System

The air transportation network constitutes a critical infrastructure enabling the transfers of passengers and goods, with a significant impact on the economy at different scales. Air transportation is intrinsically coupled with other transportation modes. Over the past few years, several perturbations have highlighted the interdependencies of transportation modes and raised questions regarding the resilience and the performance of the multimodal transportation system. From a theoretical standpoint, air traffic patterns can be represented as flow networks at different granularities, from aggregated trajectories to sector-to-sector transitions. Their robustness can be quantified using network science techniques. From an operational perspective, mitigating the impact of severe disruptions on the air transportation network, but also on other transportation modes, is a key concern, along with improving the recovery process. The Asiana Crash at San Francisco International Airport in July 2013 is examined through a comprehensive case study. The perturbation resulting from the crash took different forms and varied in scale and time frames: cancellations and delays snowballed through the US airspace, highway traffic near SFO airport was impacted by congestion in previously never congested locations, and transit passenger demand exhibited unusual traffic peaks in between airports in the Bay Area. Thousands of passengers found themselves struggling to reach their original destination. Passenger reaccommodation varied greatly from airline to airline and airport to airport. In the context of Collaborative Decision Making, a multimodal passenger-centric reaccommodation scheme could have significantly reduced the impact of the crash on passengers. Moreover, assuming better information sharing and collaborative decision making, we show that there was enough capacity at the neighboring airports to accommodate most of the diverted flights and reoptimize the allocation of flight diversions to the Bay Area airports. The present research is part of an effort to pursue further data-driven research on interdependent transportation networks to increase their resilience. The end goal is to form the basis for optimization models behind providing more reliable passenger door-to-door journeys and improved transportation performance.

Friday, October 2, 2015
2:00 – 3:00 pm
DLC Bechtel Collaboratory

Biography:

Aude Marzuoli received a PhD in Aerospace Engineering from the Georgia Institute of Technology in May 2015, with a focus on Air Transportation, Network Optimization, Data Mining and Control Theory. She previously worked for NASA Ames, SESAR Joint Undertaking in Brussels, the French National School for Aviation (ENAC) in Toulouse, and collaborated with Verizon, the FAA, Delta Airlines, MIT, UC Berkeley and Cambridge University on various projects. She was the recipient of the 2013-2014 AIAA Guidance, Navigation and Control Graduate Award. She obtained a Master in Aerospace Engineering from the Georgia Institute of Technology and a Master in Electrical Engineering and Computer Science from Supelec in 2012. She attended the Lycee Henri IV in Paris for the Classes Preparatoires in Mathematics and Physics.