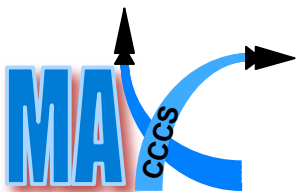




MACCCS (MAX) Kickoff Meeting Welcome!

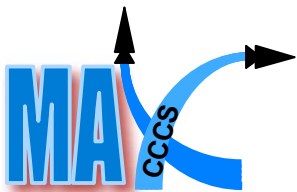
**AFRL Air Vehicles Directorate, AFOSR,
University of Michigan, MIT**

Anouck Girard (UM, PI)
August 29-30, 2007



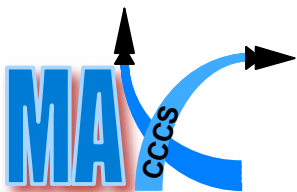
Outline

- Team overview
- Mission
- Brief technical overview
- Management
- Collaboration plans
- Financial
- Logistics (Agenda, etc...)



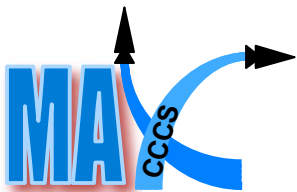
Michigan/AFRL Collaborative Center in Control Science (MACCCS, or MAX)

- An ongoing partnership between:
 - The University of Michigan, Ann Arbor
 - The Massachusetts Institute of Technology, and
 - The Control Science Center of Excellence in the Air Force Research Laboratory's Air Vehicles Directorate
- Initial focus:
 - Cooperative control of unmanned air vehicles
 - Modeling and control of hypersonic vehicles
- Initial center team:
 - Anouck Girard (UM) Corey Schumacher (Team Lead, AFRL)
 - Carlos Cesnik (UM) David Doman (Team Lead, AFRL)
 - James Driscoll (UM) AFRL Center of Excellence Team
 - Emilio Frazzoli (MIT)

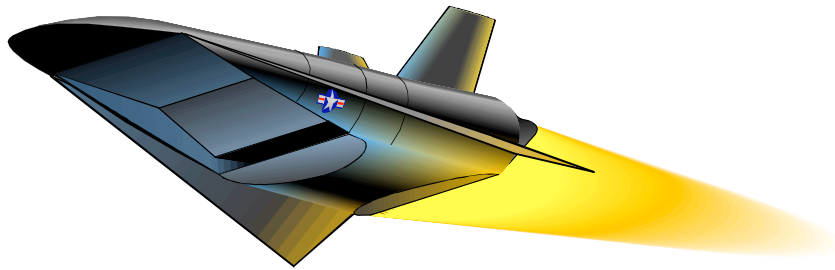


MAX Mission

- Mission
 - To play a vital role in research and development of key technologies in aeronautical control sciences, particularly those that the Air Force deems critical to its future leadership position
- Vision
 - To establish, sustain and amplify an internationally recognized center of excellence in control science research and education, through strategic, robust interaction between the faculty and students at the participating universities, and AFRL



Hypersonic Vehicles



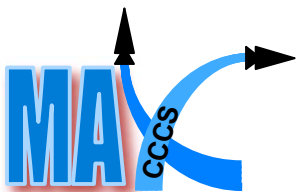
- Development of simple low-order models that can characterize the main aerothermoservoelastic effects coupled with propulsion in a 6 DOF flight dynamics simulation of HSV
- Determination on how to appropriately modify vehicle configuration to improve dynamic controllability without compromising vehicle performance



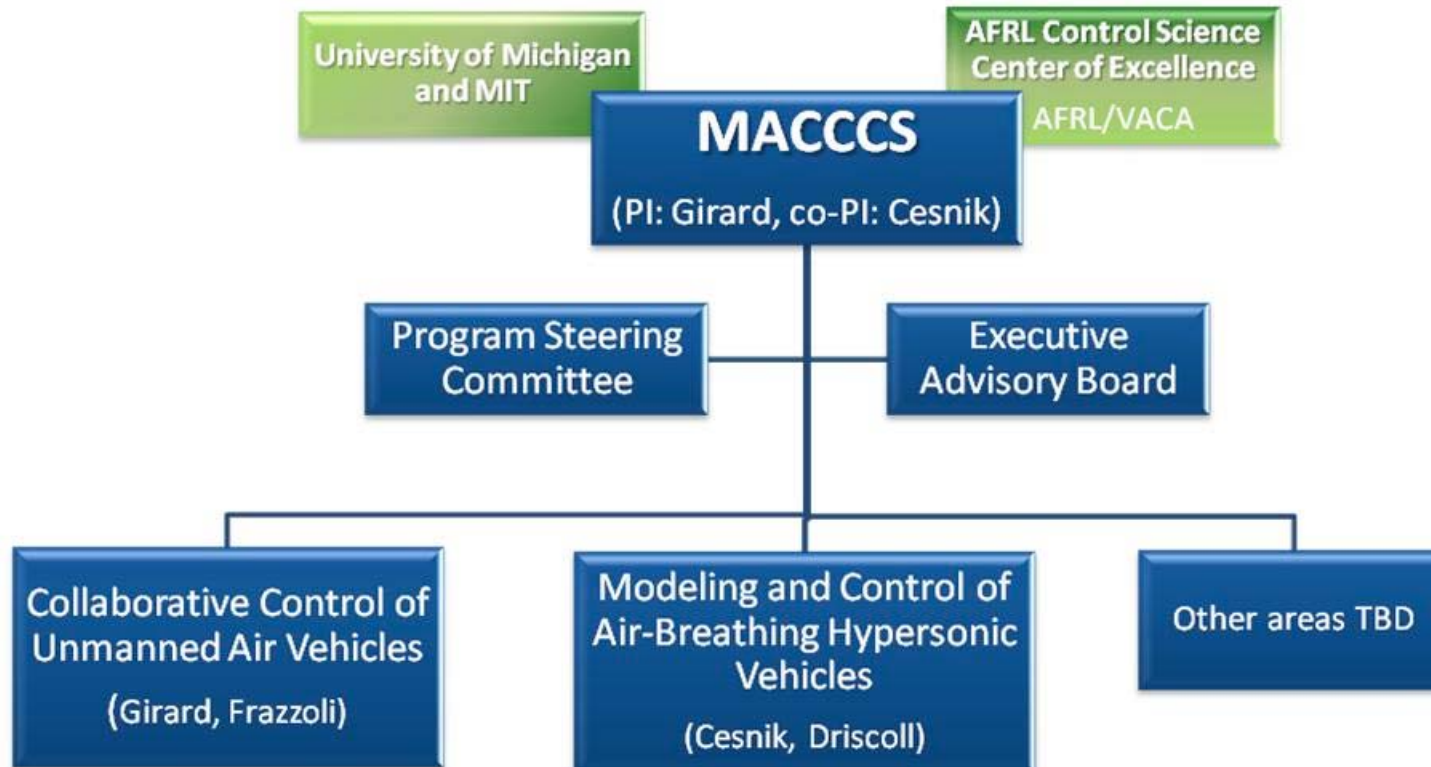
Cooperative Control of Unmanned Air Vehicles



- Supervision and control for collaborative heterogeneous systems
 - Mixed-initiative operations
- Dynamic mission planning
 - Provably efficient, scalable and robust



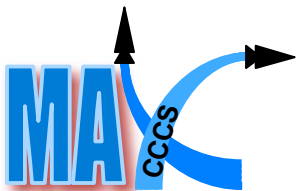
Management



Collaboration Plan

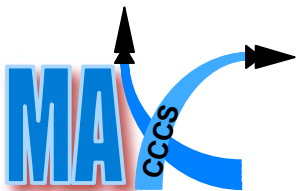
- Regular visits, including summer visits
- Formal yearly reviews
- Seminar series
- Scientist in residence
- Post-doctoral researchers

- Collaborations initiated:
 - AFRL and MIT → UM
 - Organizational meeting at UM, May 2007
 - UM and MIT → AFRL, Summer 2007
 - John Baker
 - Torstens Skujins
 - Anouck Girard
 - Emilio Frazzoli
 - Carlos Cesnik and Jim Driscoll
 - MIT → UM
 - Emilio Frazzoli giving controls seminar at UM, Nov 30, 2007



Budget

- Total funding: \$4,650,000 (MI cost-share: \$550,000)
- Evenly distributed funding between areas
- Common/director's fund (reviews, travel etc...)
- 8 graduate students
- Additional students on fellowship
- First year: 1 post-doc for HSV, 1 for UAV
- Future years: common fund allows flexibility
 - One postdoc and two graduate students in years 2-4



Agenda

- **Wednesday, August 29th**

- 12:00 Lunch
- 1:00 Welcome (Banda)
- 1:15 Introductory Remarks (Wissler)
- 1:20 Center Overview (Girard)
- 1:35 UAV Cooperative Control – Introduction (Schumacher)
- 2:00 Stochastic Dynamic Programming and Operator Models for UAV Operations (Girard)
- 2:30 Dynamic Vehicle Routing with Complex Mission Specifications (Frazzoli)
- 3:00 Coffee break
- 3:30 Dean's remarks (Munson)
- 3:45 Air-Breathing Hypersonic Vehicles – Introduction (Doman)
- 4:15 Hypersonic Vehicle Modeling (Cesnik)
- 4:45 Propulsion Model (Driscoll)
- 5:15 Coffee break
- 6:00 Reception (McDivitt Room, FXB)

- **Thursday, August 30th**

- 8:30 Executive board lab tours
- 9:30 Executive board panel discussion (closed)
- 9:30 FXB Lab tours
- 11:30 Executive board panel feedback to steering committee
- 12:00 Adjourn

