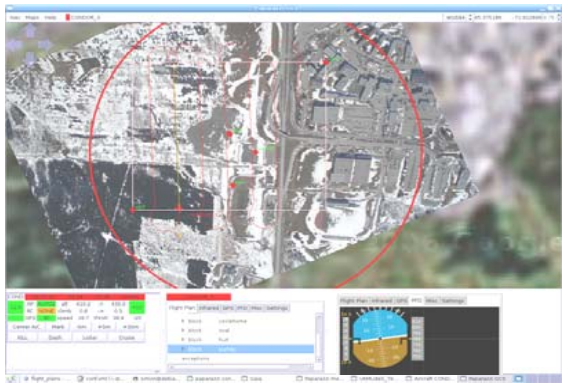
Project Presentation

Simon Jobin
Michaël Lévesque
Charles Vidal



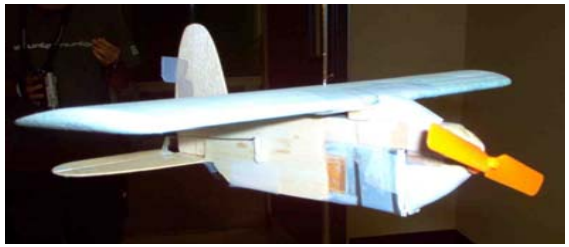
UNIVERSITÉ DE SHERBROOKE

MAV 07

Group Description

4th generation, Toulouse, MAV07

- Extra curricular project
- 4 undergraduate students from different engineering fields
- 3 years of experience, 4 generations of MAV, from teleoperated to unmanned



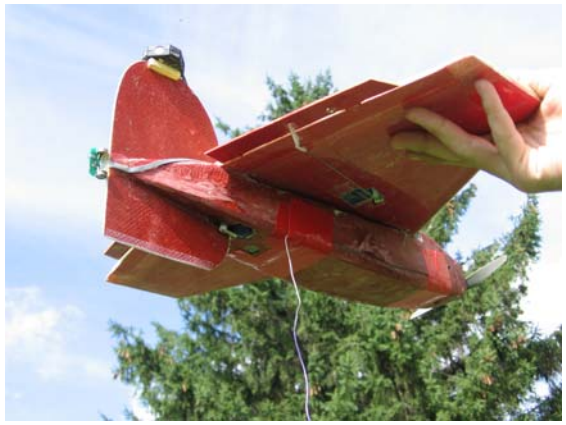
1st prototype, MAV05

2nd prototype, MAV06

3rd generation UVS Canada

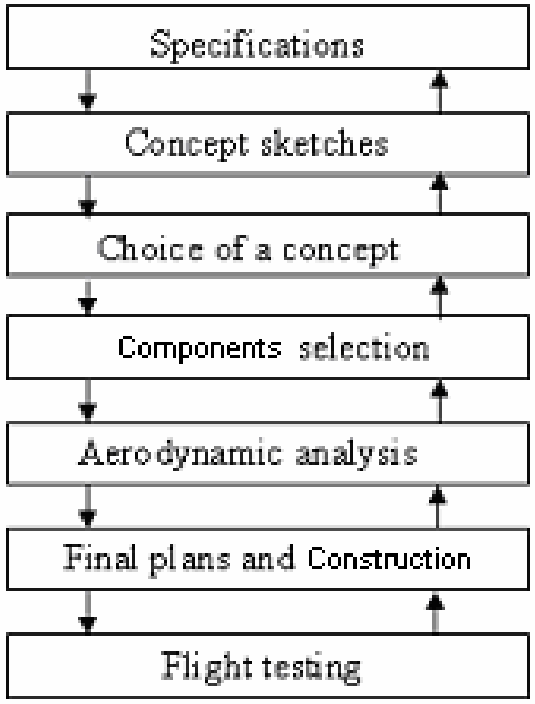
General Overview of UAV

- **General specifications**
  - Weight: 475 g
  - Wingspan: 48 cm
  - Max level speed : 100 km/h
  - Average cruise speed : 60 km/h
  - Stall speed : 40 km/h
  - Flight endurance : 15 min
  - Communication range over 1.5 km
- **Composite wing and fuselage (fiberglass / epoxy with polystyrene core)**
- **Paparazzi autopilot equipped with thermopiles**
- **Constant airplane videolink with small CCD color camera**
- **3 flight modes possible**
  - Manual, assisted and fully autonomous



Airplane Design

- **Iterative design: 40/48 cm wingspan**
- **Elevon control : Pitch and roll by the same two surfaces**
- **Flying wing configuration**
  - **Auto-stable model**
  - **Optimize the lift surface**



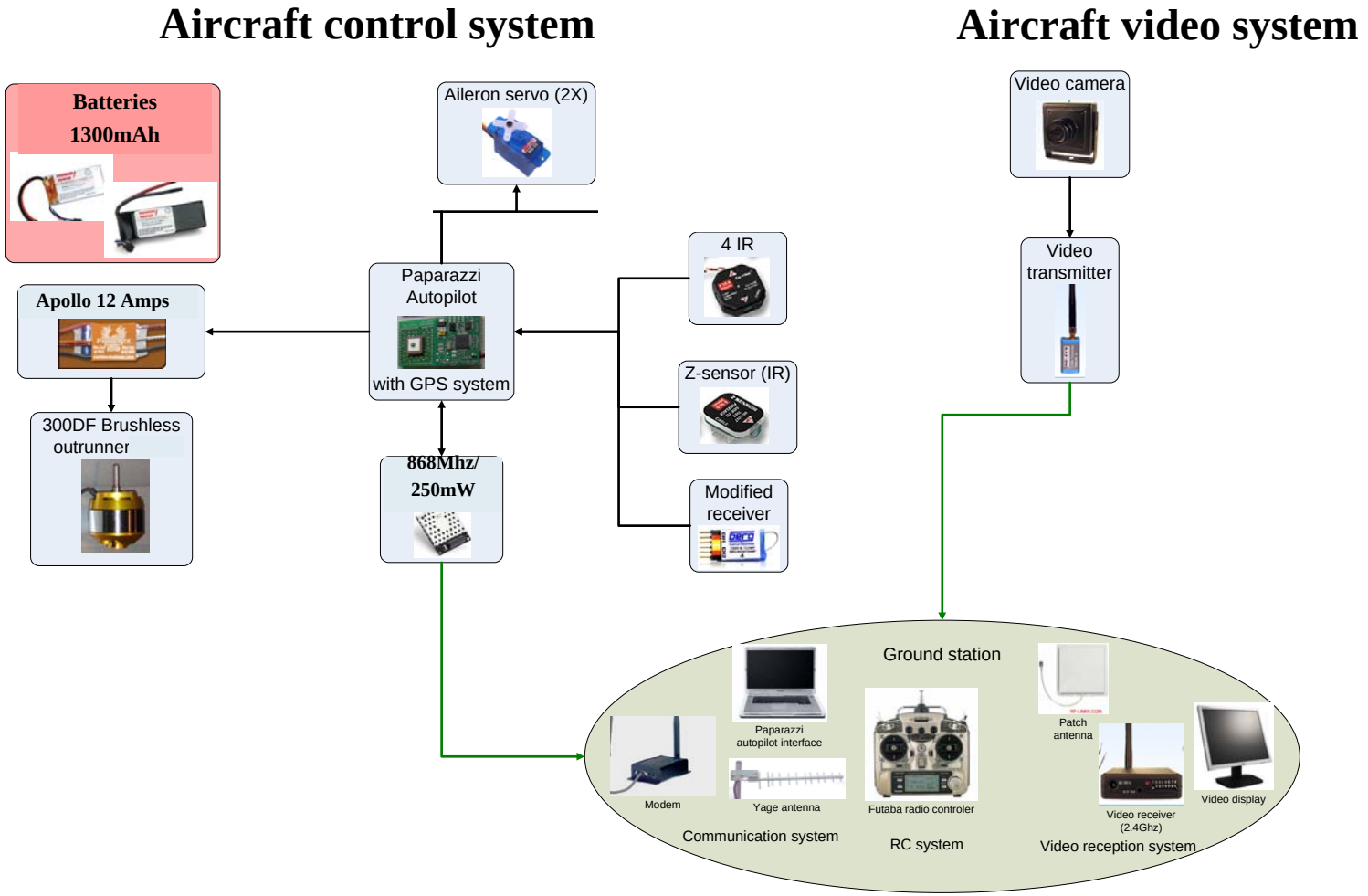
Fabrication Techniques

- **Wing**
  - Hot wire cutting of foam core following airfoil geometry
  - Use of Mylar® sheet for perfect surface finish
  - Vacuum bagging

- **Fuselage**
  - Fuselage covered with differents kinds of fiber density to reinforce particuliar places
  - Vacuum bagging

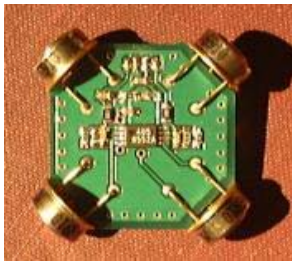
- **Aircraft assembly**
  - Electronic components are installed in the fuselage core by grooving their shape

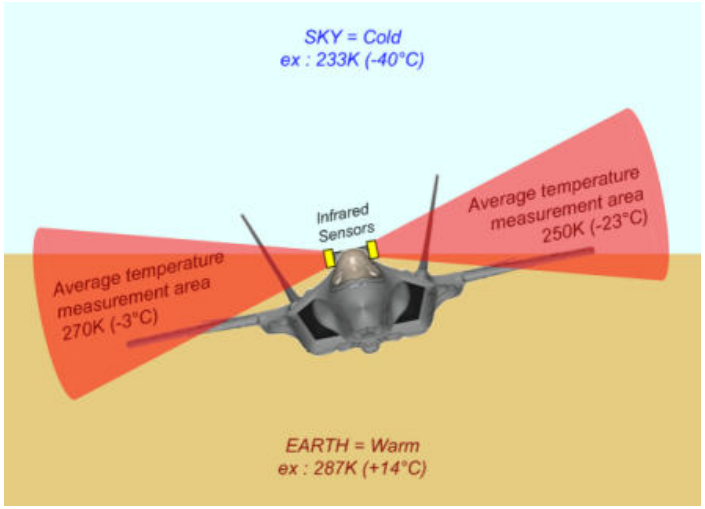
Schematics of Components



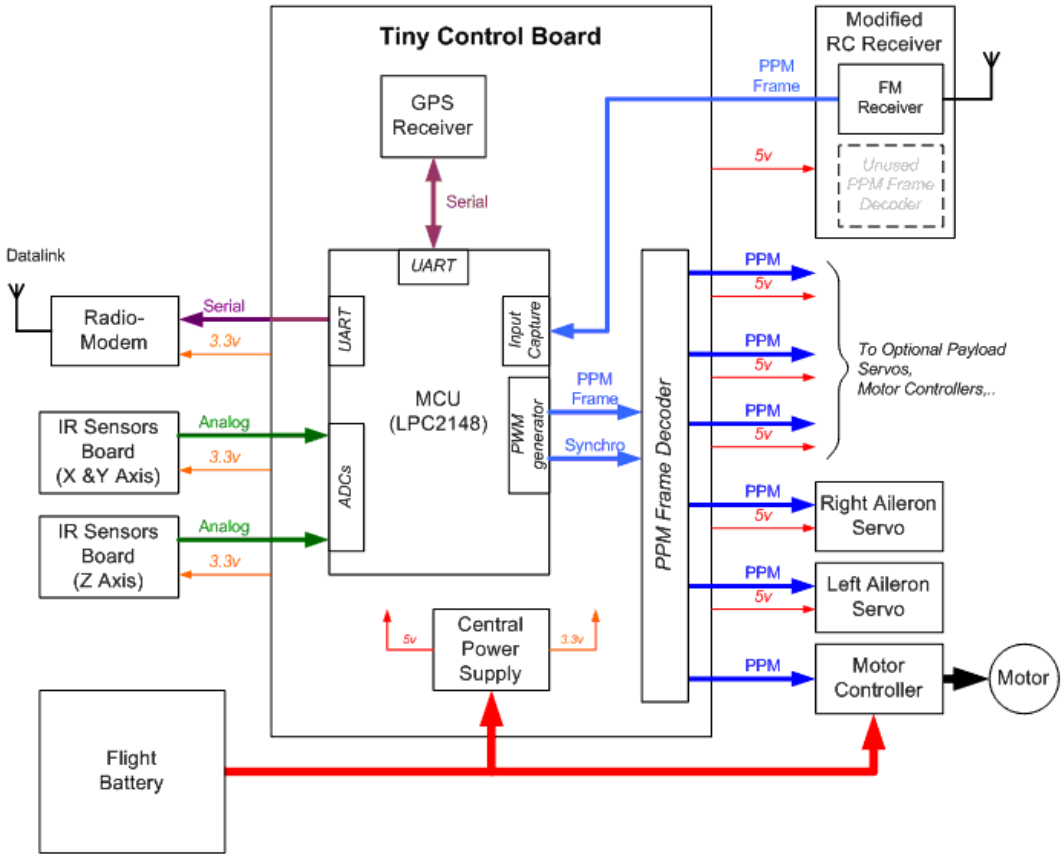
Paparazzi

- Stabilisation is made through IR sensors, based on temperature difference between the earth and the sky



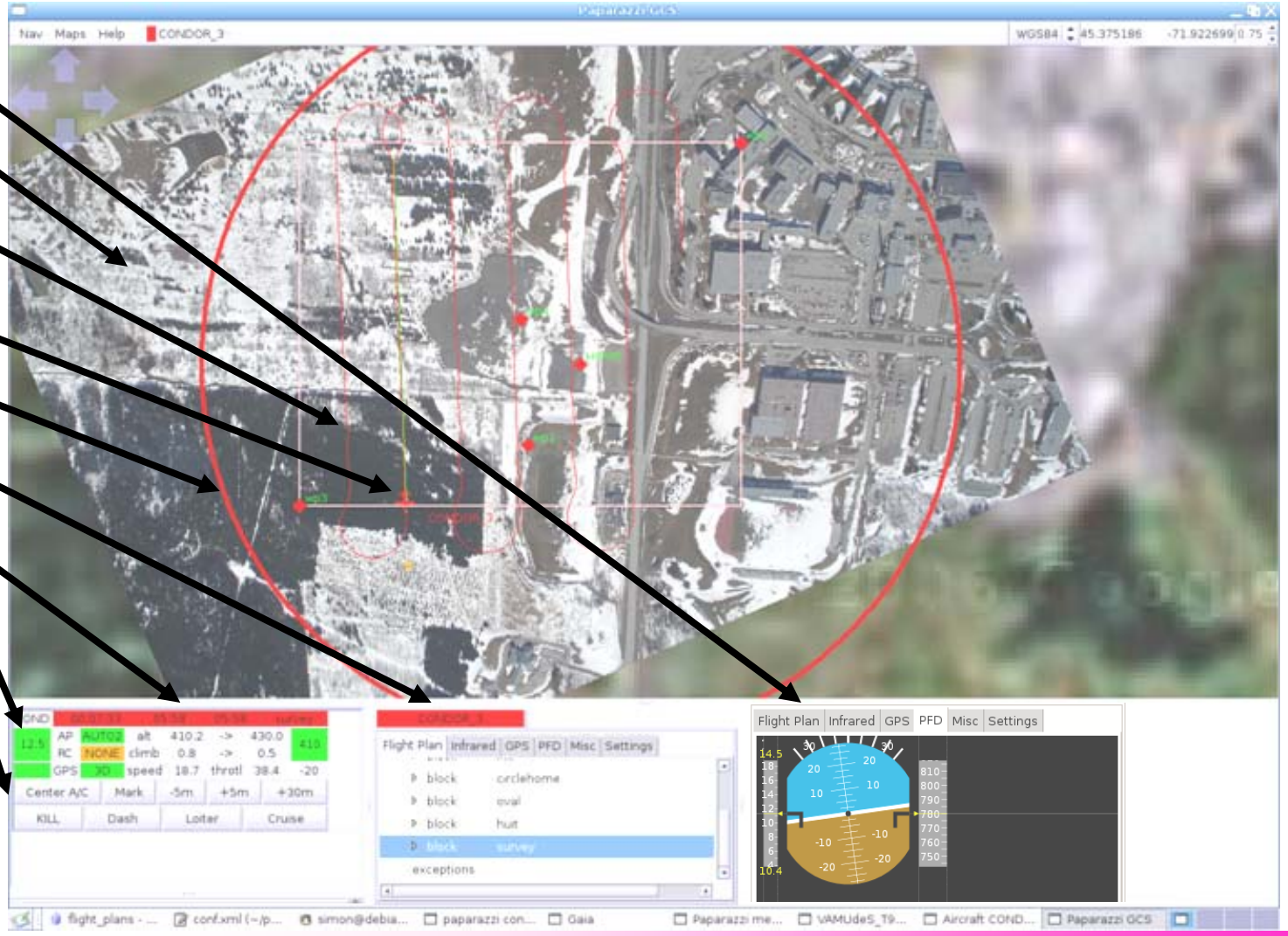


- Classic loops are used for stability and navigation
  - Roll rate
  - Pitch rate
  - Navigation
  - Climb rate



Ground Control Station

- PFD
- Terrain map
- Aircraft path
- Aircraft position
- Max area permitted
- Aircraft notebook
- Aircraft telemetry
- Battery voltage
- Re-tasking command



Flight Routine and Flight Crew

- **Flight routine**
  - Mission is programmed, and tested in software simulation
  - Plane is verified prior to take off (motors, visual check up of plane)
  - GPS fix is obtained
  - Communication between plane and GCS is verified
  - Plane is launched manually
  - Low altitude manual flight is performed to verify infrared sensors
  - AUTO1 (assisted mode) is activated by the pilot to test flight stability
  - Then AUTO2 (autonomous mode) is activated
  - Prior to landing, plane is switched back to MANUAL by the pilot and is landed manually

- **Flight crew (3 people)**
  - *Pilot*
  - *GCS supervisor*
  - *Video watcher*

Safety Features

- Return home function
- Instant Kill switch
- Video system
- Flight plan Simulator

Sponsors

Platine / Platinum

POLYMÈRES technologies

GROUPE CMI
Conseillers en management et informatique

Or / Gold

Gestion FÉRIQUE

Département de génie électrique et de génie informatique

AGEG Ingénierie Sherbrooke

CRIAQ

ÉdenAir 8000 inc.

Le Réseau UNIVERSITÉ DE SHERBROOKE

GREAT HOBBIES

Association des ingénieurs pour la recherche et le développement de l'Estrie

CAE

Bell Helicopter
A Textron Company

Argent / Silver

Pratt & Whitney Canada
Une société de United Technologies

HOUDE 1935
LE FABRICANT DE MATELAS

Le Réseau UNIVERSITÉ DE SHERBROOKE
Génie

DMR conseil
une société Fujitsu

Bronze

Département de Génie mécanique

MAV 07