

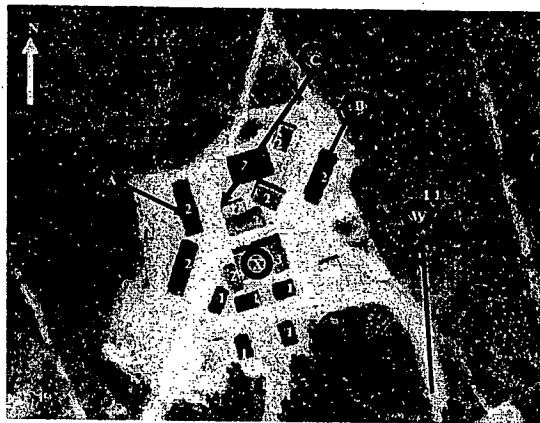
The Need for an Airborne Sensor by the Dismounted Soldier

Situation

Platoon on morning patrol approaches a village and suddenly takes sniper fire.

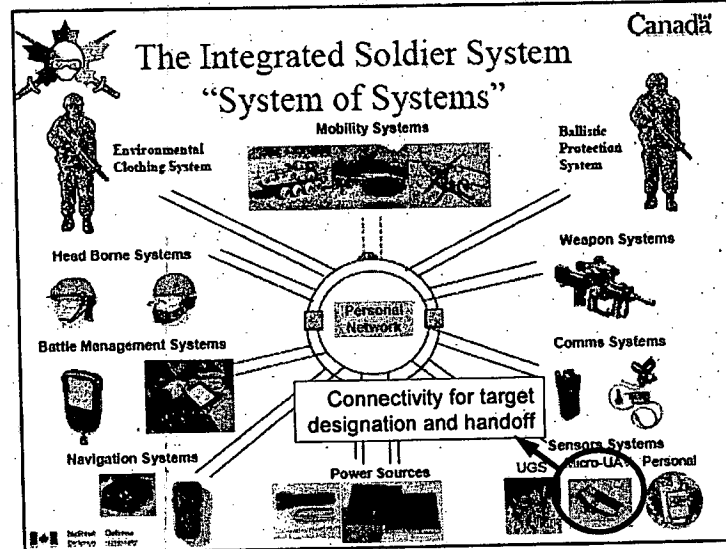
Mission

Platoon to locate and eliminate the sniper(s) while minimizing civilian casualties.

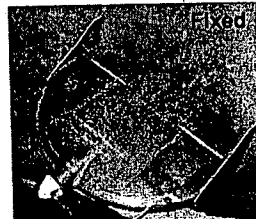




DLR 5 and DSSPM Perspective



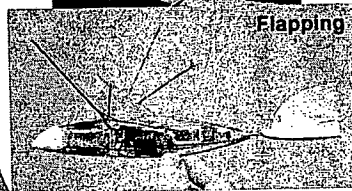
S&T Perspective - Current Options



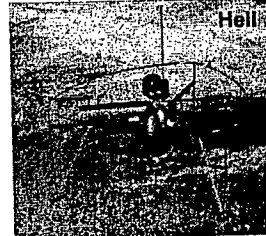
Fixed
IAI Misquito
400 mm span
500 g
60 min endurance
1000 m range
30 g payload



Fan
Honeywell iStar
330 mm dia
7000 g
20 min endurance
1000 m range
1000 g payload



Flapping
Caltech Microbat
200 mm span
12 g
6 min endurance

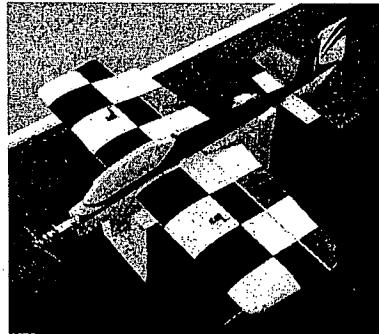


Helicopter
EMT Fancopter
500 mm dia
1500 g
30 min endurance
500 m range

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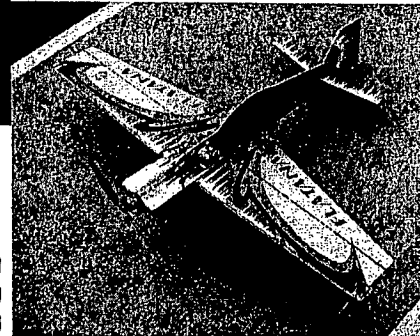


Selected Testbed - Extreme Agility MAV



Sensor suite : 93g
MAV : 450g
Total weight : 543g

● hovering

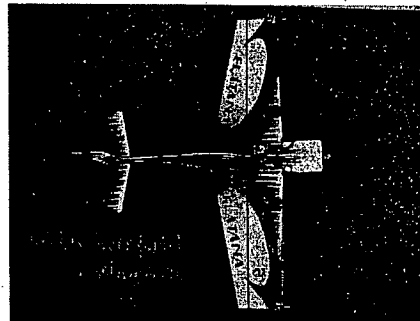


Sensor suite : 101g
MAV : 351g
Total weight : 452g

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EA-MAV Parameter Estimation




Estimate aerodynamic coefficients through flight testing of an instrumented MAV.

- Measure accelerations, angular rates, air speed and motor rpm using a wireless link.
- Employ time-based parameter estimation methods to deduce airplane aerodynamic coefficients.



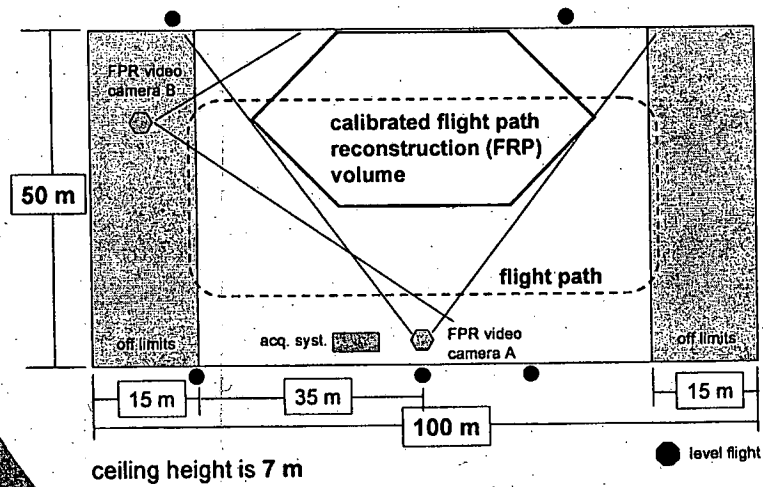
34 g


20 g

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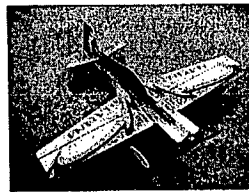
Indoor Test Site for Parameter Estimation



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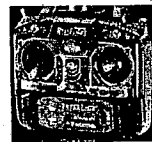


Hovering Control Developmental Environment

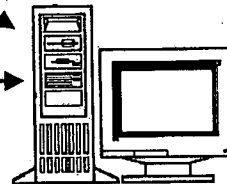


3-axis acceleration
 angular rate

aileron
 elevator
 rudder
 commands



desired position



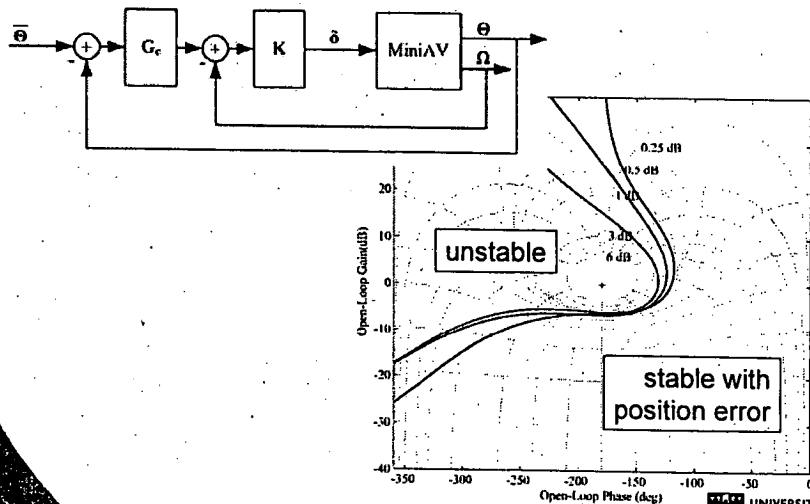
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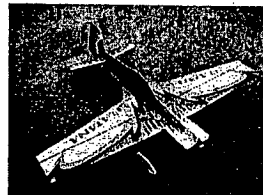
Control Algorithm Synthesis



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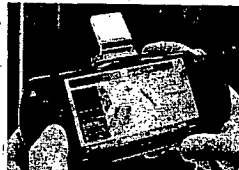
Prototype System for User Trials



onboard computer
& sensors

desired position
system status
geo-referenced data

mission planning
& execution



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Summary

- Operations will continue in complex terrain environments and will require that the CF be equipped to enhance the combat capabilities of the soldier.
- Man-portable autonomous robots are seen as a means to give the soldier a decisive advantage over the adversary.
- Current MAV concepts are too slow, heavy, fragile or mechanically complicated.
- Platform concepts that enable 3D flight may provide a new path towards the desired MAV functionality. Control and datalink concepts will be generally applicable to platforms of this class.

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