

Autonomous, Highly Maneuverable Miniature Helicopter System AHMMH-1

Features:

- Open source research tool
- 100's of successful flights to date
- Rugged, reliable X-cell 90 R/C class helicopter
- Custom assembled, tuned, and maintained by NTC
- Engineering support for upgrades/changes
- Several systems deployed and operating

Airframe Specifications:

R/C Designation:	X-cell 90
Weight:	16 lb
Length:	4.5 ft
Rotor span:	5 ft
Payload:	2-6 lb
Ceiling:	5,000 ft +
Radius:	3 mile
Endurance:	1 - 3 hr

Avionics Components:

- DSP Design TP-400 300 MHz PC-104 Computer
 - ▶ 256 Mb RAM, Flash Memory up to 1Gb
 - ▶ QNX real-time operating system
- Inertial Sciences ISIS IMU
 - ▶ Rate Gyros, Accelerometers: 50Hz update
- Honeywell HPB200WTTA Barometric Altimeter
- Ashtech G12 GPS
- Wireless Ethernet, Wireless Modem Comm links

Ground Station:

- Laptop based ground station, running under QNX or Windows (Linux available on request)
- ▶ TCP/IP communication of waypoints
 - ▶ Tilcon-based portable graphics
 - ▶ Downlink of all vehicle state variables
 - ▶ Monitoring of GPS, uplink status
 - ▶ Easily reconfigurable/customizable

HILsim Development Environment:

Integrated QNX/Windows real-time simulation / visualization system with servos and flight computer in the loop. Design and develop against a high-fidelity nonlinear simulation before you fly.



Description:

The AHMMH-1 system is a full suite of R/C flight hardware, avionics, ground coordination and development environment, and engineering support for engineers and researchers interested in designing and flying advanced autonomous control algorithms. The rugged, maneuverable X-cell 90 has thousands of R/C flight hours behind it, and the high-bandwidth, MIT-designed avionics system provides the opportunity to work and modify algorithms at various levels, from stability augmentation to high-level autonomy.

A QNX development environment is available which provides real-time testing with hardware in the loop and visualization of helicopter behavior. Source code is available for all of the software modules. In addition, the architecture and layout of the avionics box are ideal for incorporating additional sensors, replacing or upgrading components, and integrating on-board algorithms. In short, the AHMMH-1 is 'research ready'.



Operational History:

The AHMMH-1 system was developed by MIT for research in the area of aggressive autonomous flight. Over the past 5 years, continuous improvement and upgrading of the system have made it reliable, well documented, and easily upgraded. It has demonstrated aggressive flight and maneuvers such as hammerheads, split-S maneuvers, and axial rolls. No other UAV has demonstrated so many maneuvers, so many times. To date two MIT systems have flown over 40 'closed-loop' flights, ranging from augmented R/C flight (in which the pilot work load/skill level required is significantly reduced) to short maneuver demonstrations, to full 'aerial ballets': aggressive flight to way points with maneuvers interspersed.

In 2002, the system was transitioned to Nascent Technology. Since that time three more systems have been built and delivered, and are currently operational and supported by NTC. We provide support, upgrades, and consulting as needed by the customer.



contact us at:

NASCENT TECHNOLOGY
37 LIBERTY AVE, LEXINGTON, MA 02420
phone: (617) 968-4552
email: info@nascent-tech.com