UAVforge

Montgomery County Community College

Final Report: UAVForge

EGR299 Students and Engineering Faculty

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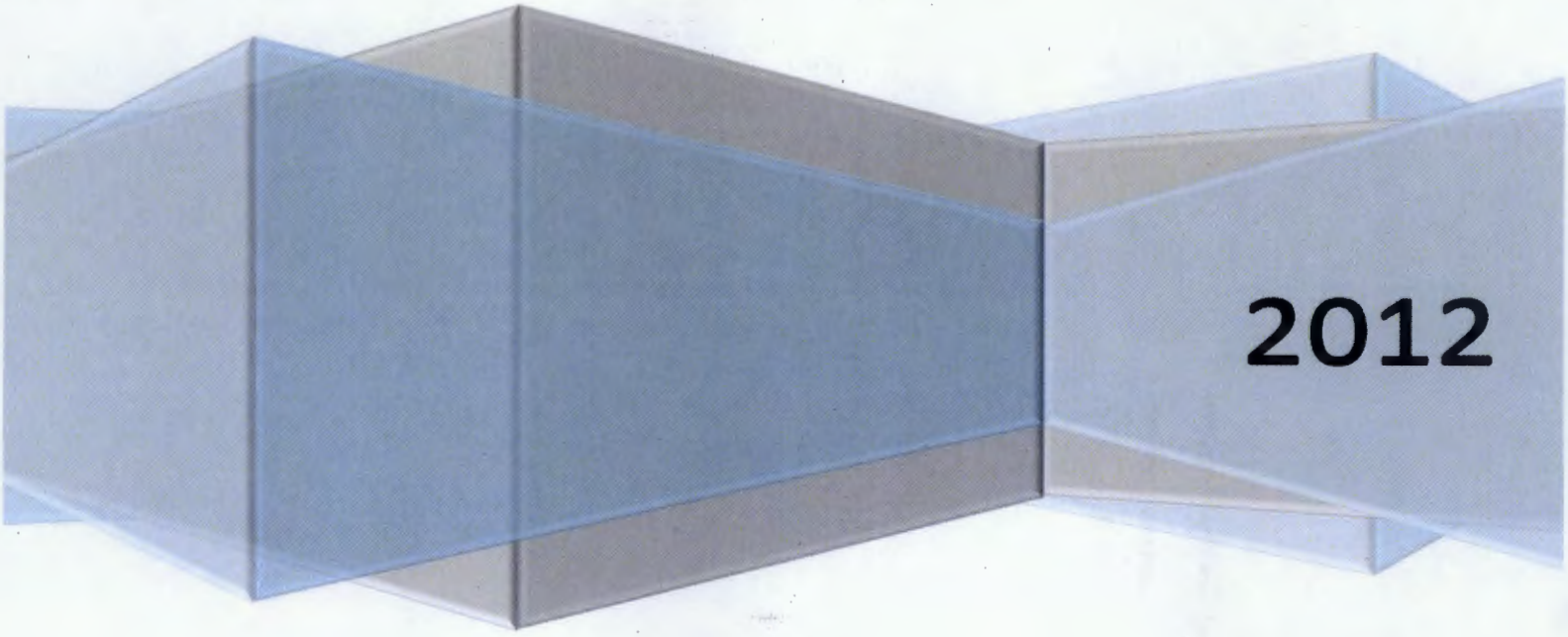

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U.S. DEPARTMENT OF DEFENSE

http://challenge.gov/DoD/212-uav-forge

INTRODUCTION

UAVForge is a Defense Advanced Research Projects Agency (DARPA) and Space and Naval Warfare Systems Center Atlantic (SSC Atlantic) collaborative initiative to design, build and manufacture advanced small unmanned air vehicle (UAV) systems.

This challenge is guided by crowdsourcing. UAVForge provides the virtual environment and tools necessary to collaborate independent of geographic location, education, profession, or experience. Individuals, ad hoc teams or any other formative organizations are encouraged to submit innovative ideas, designs, algorithms, materials, etc. where other members of the crowd could respond, vote, comment and contribute.

CHALLENGE

Design, build, demonstrate and compete with an Unmanned Aerial Vehicle (UAV) air vehicle in a 2012 operational exercise. The UAV must have the following technical performance:

- The complete air vehicle system must fit in a rucksack carried by a single person.
- The air vehicle must take off vertically from a starting location, fly out to an observation location, perform surveillance, return to an end location that is different from the starting position, and land safely.
- The air vehicle system must be able to fly and operate successfully with winds up to 15 miles per hour (24km/h).
- Without previous detailed knowledge of the observation area, the air vehicle system must perform observations for up to 3-hours at a location up to 2.0 miles (3.2km) beyond line of sight from the starting location.
- At the observation area, the air vehicle system must be able to identify persons or activities of interest up to 100 feet (30.5m) away.
- The air vehicle system must send real-time video or pictures from its observation area back to the operator up to 2.0 miles (3.2km) away.
- The vehicle design must consider noise reduction features to make it as quiet as possible so as not to attract unwanted attention.
- The user interface and vehicle controls should be simple and intuitive.
- The air vehicle design should be affordable and producible based on an assessment provided by the manufacturer.

http://www.uavforge.net/uavhtml/

ANNOUNCEMENT FROM UAVFORGE

The goal was to facilitate the exchange of ideas among a loosely connected international community united through common interests and inspired by innovation and creative thought. More than 140 teams and 3,500 registered citizen scientists from 153 countries and territories around the world participated. A highly creative and collaborative spirit was evident both online and in the field. The fact that no team completed the baseline scenario reflects the underlying difficulty of the very real challenges of small perch and stare for operational use. UAVForge has provided DARPA with valuable insight into these challenges. We hope you have equally benefitted from the experience!

http://www.darpa.mil/NewsEvents/Releases/2012/06/28.aspx

ANNOUNCEMENT FROM DARPA

UAVFORGE REVEALS CHALLENGE OF DEVELOPING PERCH AND STARE UAV

June 28, 2012

Robust effort by nine fly-off teams provides insight into difficulty of military mission

DARPA's UAVForge, a crowdsourcing competition to design, build and manufacture an advanced small unmanned air vehicle (UAV), set out to determine if a loosely-connected community of UAV enthusiasts could develop a militarily relevant back-pack portable UAV with specific capabilities. By using a crowdsourcing design approach, the effort sought to inspire innovation and creative thought by lowering barriers to entry and increasing the number and diversity of contributors.

More than 140 teams and 3,500 individuals from 153 countries and territories participated on UAVForge.net—the collaboration portal that hosted the year-long competition. UAVForge concluded recently with nine finalist teams demonstrating air vehicles in a fly-off event at Ft. Stewart, Ga. The fly-off scenario, conducted on a training site, was a simulated military perch-and-stare reconnaissance mission, requiring vertical take-off, navigation to an area beyond the line of sight from the take-off location, landing on a structure and capturing video, and then returning to the starting point. While some teams were able to reach the observation area, none were able to land on a structure and complete the mission.

Persistent, beyond-line-of-sight, soldier-portable perch and stare intelligence, surveillance and reconnaissance (ISR) is a significant mission area of interest that shows promising capability, but hurdles of asset cost and complexity of use must be overcome.

"The teams brought creativity and enthusiasm to the competition," said Jim McCormick, DARPA program manager. "The competition was more constructive than you might expect; there were many examples of teams helping each other."

Since no team completed the fly-off event, the $100,000 prize will not be awarded, and a design will not be manufactured for further testing in a military exercise as originally envisaged.

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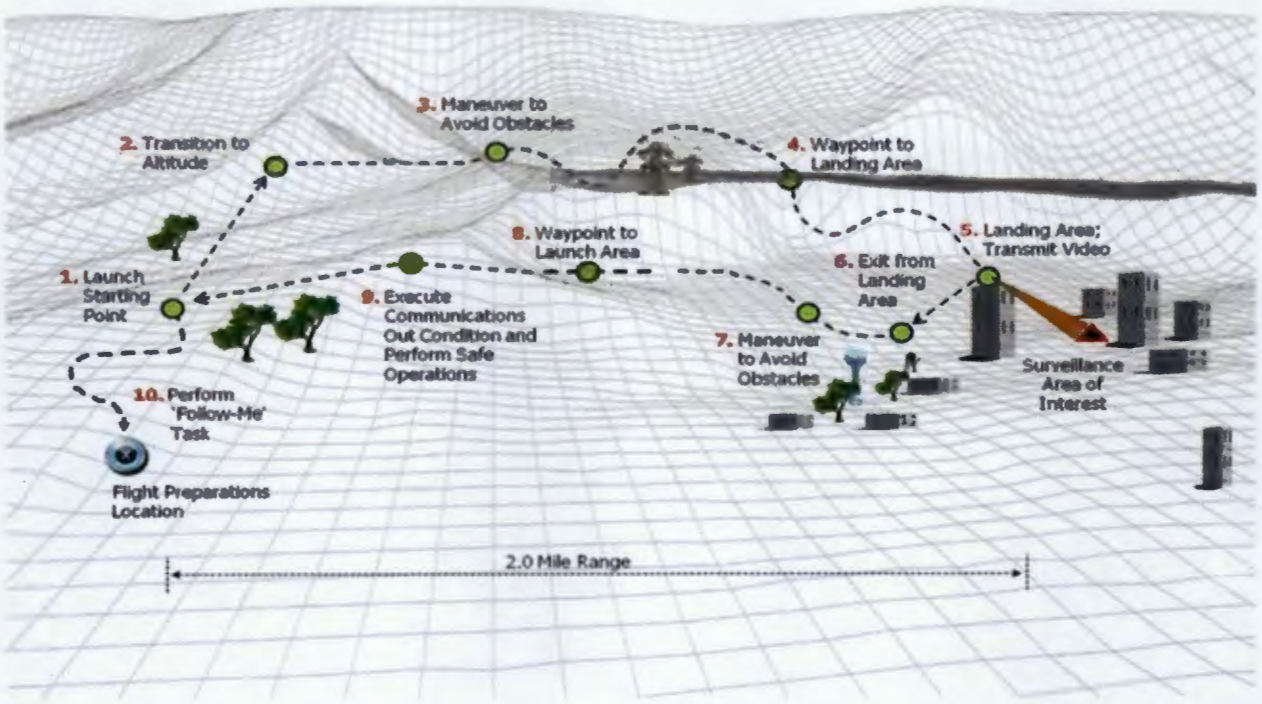
FLY-OFF COMPETITION

Fort Stewart is the largest Army installation east of the Mississippi River. It covers 280,000 acres (1,100km^2), which include parts of Liberty, Long, Bryan, Evans and Tattnall Counties. The reservation is about 39 miles (63km) across from east to west, and 19 miles (31km) from north to south. It is close to the East Coast, and two deep water ports: Savannah, Georgia (42 mi), and Charleston, South Carolina (142 mi). Tank, field artillery, helicopter gunnery, and small arms ranges operate simultaneously throughout the year with little time lost to bad weather.

OBJECTIVES

The primary objective of this initiative is to design, build, and integrate technologies which will enable an air vehicle system to execute vertical take-off and landing with beyond line of sight observations. These capabilities could provide researchers, rescue first responders, and other users a new and valuable tool. These capabilities will be demonstrated and tested in a fly-off that is representative of the mission scenario.



Take-off(s) – Take-offs will be from a common starting location, with headings dependent on weather. Systems requiring take-offs from moving ground vehicles are prohibited. Launch operations and methods will be inspected by the host competition safety inspectors before they are allowed for use in the competition course. After take-off, the air vehicle needs to fly safely below 1,000 feet.

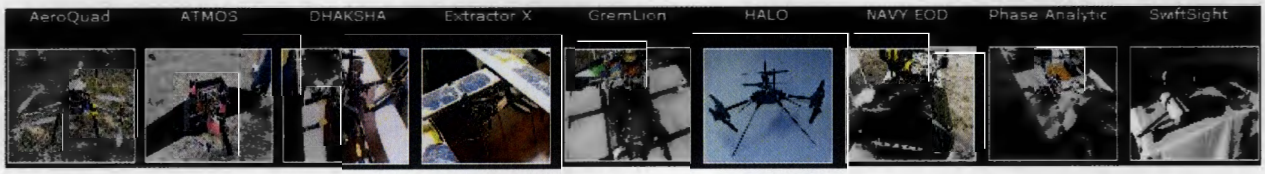
Navigation – Method of point-to-point navigation is to be determined by the designer(s) of the vehicle system. Details of the site location will be provided prior to the flight competition. The air vehicle must stay within the defined flight corridors, operate within the assigned airspace, and avoid predefined no-fly zones. Therefore, the vehicle must operate in a safe, pre-defined altitude window from 5 feet to 1,000 feet above the ground and must remain within 500 feet of the flight corridor.

Obstacle Avoidance – During approach into the observation area, the vehicle will be required to maneuver to avoid obstacles. An autonomous obstacle avoidance system is not required but highly encouraged for this course. Typical obstacles will include negotiating around stationary objects like buildings, water towers, and trees, although dynamic obstacles may be introduced. The landing area will be similar to rooftop structures with HVAC equipment, communications gear, satellite dishes, and poles.

Total Mission Time – Total mission time is defined by the declaration of mission start with permission to turn on the vehicle systems for flight until the vehicle has landed and the vehicle systems are shut off. Total mission time is not to exceed five and half hours, which includes a three hour dwell time for the observation task. Teams will be allowed up to two attempts to complete the mission profile, but the second attempt will be after all other teams have made their first attempt.

Observation - Once the vehicle has flown to the predefined search area, the vehicle needs to identify a vantage point from which to conduct observations. This task can be accomplished by any means which includes landing, adhering, hanging, and/or hovering above or under a physical structure. The system will not be required to visually track or "lock on" to moving objects. However, the system must provide clear information based on real time transmission of video. Items of interest will be located up to 100 feet from the landing area, and may be stationary (as in a building being loaded with supplies) or mobile (such as a person walking with a package).

Mission Completion – Upon mission completion, all landings will be at a designated location different from the starting location. Transitioning to manual control is permitted for landings accomplished at the ending location.



MISSION SCENARIO

You are a member of a team and your mission is to outfit a fictional Task Force with an unmanned remotely operated micro air vehicle system. The entire air vehicle system must fit within a rucksack and a single person traveling by foot must be able to carry and operate the vehicle without assistance.

The job of the Task Force is to conduct observations of suspicious activities occurring within the vicinity of two nondescript buildings in an urban area. Due to security in the region, all operations must be conducted beyond line of sight so as not to compromise your presence. If the UAV system is detected the mission will be jeopardized. The total observation time may require up to three hours of pictures and/or video to document the facts. Once key observations have been made, the team must quickly retreat to their designated rendezvous location. It is possible the vehicle will be handed off to another member of the Task Force to ensure mission success. Sign up, we need your help!

FINALISTS

The Baseline nine finalist teams were:

- **AeroQuad** – Its origin is based on crowd sourcing. They are a geographically dispersed community scattered around the world and because of this development is highly modular.
- **ATMOS** – Its system makes use of an innovative UAV design: the ATMOV. Due to the intelligent layout and sizing of the propellers and their neat integration in the flying wing design, the ATMOV has the ability to combine hover and VTOL functionality with efficient horizontal flight.
- **DHAKSHA** – The team consists of well experienced professors, post graduate and Ph.D. students from the Division of Avionics, MIT campus, Anna University, India. Team DHAKSHA's airframes are of varying sizes ranging from 240mm to 1 meter with different configuration (4 rotors to 8 rotors) categorized by 0.2 Kg to 2.5kg class Vehicle (without payload) built using CF and other composites.
- **Extractor X** – Its tandem wing tilt rotor system taps of the advantages of a helicopter and a fixed wing. Like a helicopter, it is maneuverable, capable of VTOL and has the ability to carry out missions in harsh environments.
- **GremLion** – The team is from the National University of Singapore. The GremLion UAV is a unique unmanned coaxial rotorcraft, constructed based on sophisticated mechanical design.
- **HALO** – A low cost, compact, lightweight, VTOL Co-Axial Tri-Rotor Small UAV. The system features long endurance, a full FCS, two cameras, GPS hold, altitude hold, autonomous waypoint control.
- **Navy EOD** – Controllable 3 ways: direct RC control, keyboard/joystick control through laptop, and autonomous waypoint flight. System is hot swappable so batteries can be changed without loss of video.
- **Phase Analytic** – Its vehicle's small size allows for small visual/noise signature. It can land and take off from pitched roofs and uneven terrain.
- **SwiftSight** – It is a complete unmanned communications platform designed for ease to use, continuous communications beyond line of sight, and unrivalled platform stability and reliability. Its versatility, ease of use and beyond line of sight capability renders it an exciting new platform for its class.
- ***icarusLabs*** *– The team is comprised of 10 individuals who are passionate enough about airplanes to do this whole competition in their spare time. The icarusLabs UAV is a dual-motor blended-wing-body design that incorporates a ducted fan system for VTOL capabilities along with the range of a traditional fixed-wing UAV.*

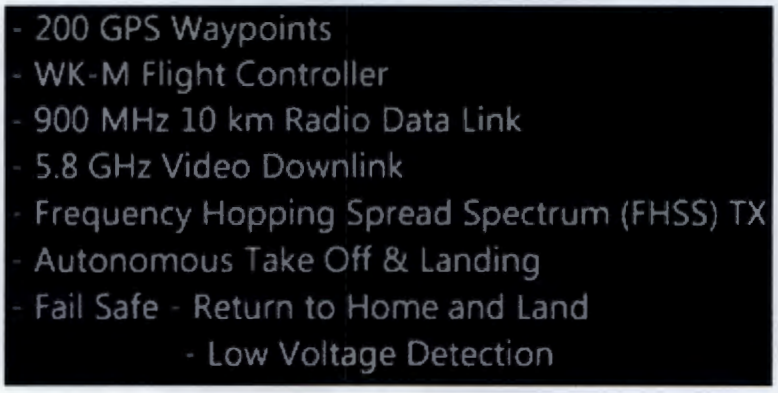
Announcement from Team icarusLabs (Massachusetts Institute of Technology)

It is with heavy hearts that we must announce we are dropping out of the UAVForge fly-off competition. A number of factors, including testing damage to the vehicle we presented at the live video demo, necessitated that we build another vehicle for the fly-off. Unfortunately, a variety of problems arose with this new vehicle during testing and we were unable to fix them in the short time between vehicles completion and leaving for the fly-off. After a consultation with DARPA, we agreed it would be best to not spend resources to attend a competition we would be unable to meaningfully compete in.

FINAL RESULTS

	Baseline	Pass	Advanced	Build	Cost	Score
	Date of Attempts (Click date for detail)	Did team complete Baseline?	Date of Attempts (Click date for detail)	NWUAV Assessment (30 pnts possible)	Est. cost to build each UAV (USD)	Final
AEROQUAD	5/11 , 5/12	--	5/12	25	$3,979	39.1
ATMOS	5/14 , 5/16 , 5/16 , 5/19 , 5/20	--	5/16	24	$4,960	37.3
DHAKSHA	5/16 , 5/19 , 5/20	--	5/19	16	$--,---	31.5
EXTRACTOR X	5/16 , 5/18 , 5/19	--	--	23	$2,081	32.0
GREMLION	5/14 , 5/16	--	--	14	$--,---	19.2
HALO	5/14 , 5/15 , 5/15 , 5/18	--	5/12 , 5/15	27	$9,487	47.7
NAVYEOD	5/14 , 5/16 , 5/16 , 5/18 , 5/19	--	--	25	$9,375	36.5
PHASE ANALYTIC	5/11 , 5/13 , 5/15	--	--	25	$2,398	30.5
SWIFTSIGHT	5/11 , 5/13 , 5/15, 5/15	--	5/15	23	$4,119	37.3

Best UAV: HALO (Middlesex University Autonomous Systems Lab -UK)



CHRONOLOGY OF EVENTS *(last event first)*

20 MAY 2012

Last day with teams on-site. ATMOS and DHAKSHA fly their last baseline attempts.

Team ATMOS (Baseline)

08:00 - Start setup; team intends baseline scenario using two UAVs in fully autonomous operations without video
09:33 - First UAV Airborne
09:37 - Second UAV Airborne
09:39 - First UAV circling over the MOUT; second UAV passing the COW
09:40 - First UAV down by shipping containers across from city hall
09:41 - Second UAV circling over the MOUT
09:43 - Second UAV down in the lake northeast of the MOUT
10:05 - Both UAVs recovered with the help of fishermen on the lake; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	4	---	---	---	---	4.0
Obj. 2	4	---	---	---	---	4.0
Obj. 3	3	---	---	---	---	3.0
Obj. 4	1	---	---	---	---	1.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	12	---	---	---	---	12.0

Notes: Team has two UAVs airborne simultaneously, both operating autonomously.

Team DHAKSHA (Baseline)

08:00 - Start setup, pending flight clearance; team intends to test communications before baseline scenario (Team conducts communications test)
09:50 - Resume setup
09:52 - Airborne, transition to forward flight
09:55 - Over MOUT
09:58 - Circling the observation area
10:00 - Lost control communications, UAV in stable hover with video to the ground station; operator en route to MOUT
10:05 - Operator establishes local manual control
10:06 - UAV lands on the bank under local manual control; ground station has video at the LZ
10:09 - Airborne
10:10 - UAV lands on the gas station; lost video; team intends to reposition UAV by hand to restore communications
10:16 - Cease operations due to rain

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	4	---	---	---	---	4.0
Obj. 2	4	---	---	---	---	4.0
Obj. 3	4	---	---	---	---	4.0
Obj. 4	2	---	---	---	---	2.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	14	---	---	---	---	14.0

Notes: For this attempt the team employs two antennae mounted to the man-lift approximately 75 feet above the ground. UAV transmits video from perch position in observation area to GCS at LZ.

19 MAY 2012

Baseline attempts continue and DHAKSHA performs advanced behaviors.

Team Extractor X (Baseline)

07:30 - Start setup; team intends full baseline scenario
08:41 - Hover check
08:57 - Airborne, transition to forward flight
09:01 - Approaching ROC, struggling against gusty winds
09:02 - UAV departs controlled flight; UAV down in a narrow strip of grass between a tree and the road by the ROC
0904 - UAV recovered with damage; does not appear to have impacted the tree; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	3	---	---	---	---	3.0
Obj. 3	3	---	---	---	---	3.0
Obj. 4	0	---	---	---	---	0.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	9	---	---	---	---	9.0

Notes: UAV dynamically unstable in winds from the NNE at 10 MPH at ground level.

Team Navy EOD (Baseline)

07:30 - Start setup, pending flight clearance; team intends full baseline scenario.
09:30 - Airborne; UAV departs controlled flight; UAV down in trees north of the LZ
09:33 - Vehicle recovered with damage; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	3	---	---	---	---	3.0
Obj. 3	3	---	---	---	---	3.0
Obj. 4	0	---	---	---	---	0.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	9	---	---	---	---	9.0

Notes: For this attempt the team employs a directional antenna suspended approximately 75 feet above the ground in a tree. UAV loss attributed to faulty motor controller leading to a loss of power to one propeller.

Team DHAKSHA (Baseline)

07:30 - Start setup pending flight clearance; team intends full baseline scenario
10:31 - Hover check
10:36 - Airborne; transition to forward flight
10:42 - Over MOUT traffic circle
10:44 - Over gas station
10:47 - Comms lost; UAV establishes very stable hover over the traffic circle; team en route to MOUT to assume local manual control
10:51 - Before team arrives, UAV makes rapid descent to pavement with significant damage on impact
10:52- UAV recovered; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	4	---	---	---	---	4.0
Obj. 2	4	---	---	---	---	4.0
Obj. 3	4	---	---	---	---	4.0
Obj. 4	1	---	---	---	---	1.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	13	---	---	---	---	13.0

Notes: For this attempt the team employs a directional antenna suspended approximately 75 feet above the ground in a tree. Team has also constructed a small directional antenna and mounted it to their UAV.

Team ATMOS (Baseline)

11:15 - Start setup pending flight clearance; team intends fully autonomous baseline scenario without video
13:49 - Resume setup
13:51 - Airborne, transition to forward flight with apparent difficulty due to wind
13:53 - Passing the ROC
13:54 - Lost control link to ground station
13:55 - Entering the MOUT
13:57 - UAV appears to transition to semi-hover over the soccer field
13:57 - UAV down northeast of the bank with damage; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	4	---	---	---	---	4.0
Obj. 3	3	---	---	---	---	3.0
Obj. 4	1	---	---	---	---	1.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	11	---	---	---	---	11.0

Notes: Vertical take off and landing hampered by moderate winds that impinge upon large sail area of UAV in rotor-borne flight configuration. UAV performs well in wing-borne flight mode but is unable to land because of wind.

Team DHAKSHA (Advanced Behaviors)

15:30 - Start setup; team intends to test repaired UAV and conduct baseline scenario and/or advanced behaviors in the LZ

15:52 - Hover check

17:08 - Airborne; team intends figure-8 (AB3) and comms out (AB1)

17:18 - Figure-8 and comms out capabilities demonstrated as planned, including autonomous landing under comms out conditions; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	15	---	---	---	---	15.0
Obj. 3	15	15	---	---	---	15.0
Obj. 4	---	---	---	---	---	---
Obj. 5	---	---	---	---	---	---
Obj. 6	---	---	---	---	---	---
Obj. 7	---	---	---	---	---	---
Total	33	15	---	---	---	33.0

Notes: Team demonstrates repairability by rebuilding their UAV. UAV is ready for flight 5 hours after the morning mishap.

18 MAY 2012

HALO, Extractor X, and Navy EOD attempt the baseline objectives. Rain prevents DHAKSHA from attempting baseline objectives.

Team HALO (Baseline)

08:21 - Start setup; team intends to conduct full baseline scenario
08:25 - Airborne
08:27 - UAV departs controlled flight; UAV down east of the road in the trees
08:36 - Vehicle recovered with extensive damage
09:02 - Cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	5	---	---	---	---	5.0
Obj. 2	5	---	---	---	---	5.0
Obj. 3	1	---	---	---	---	1.0
Obj. 4	0	---	---	---	---	0.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	11	---	---	---	---	11.0

Notes: For this attempt the team employs a directional antenna suspended approximately 75 feet above the ground in a tree. UAV demonstrates erratic behavior during transition to forward flight, cause of failure is unknown.

Team Extractor X (Baseline)

07:27 - Start setup; team intends to conduct full baseline scenario
08:22 - Hover check; team suspends operations to replace failed servo
09:35 - Hover check
10:00 - Airborne; transition to forward flight
10:04 - Past the ROC at high altitude struggling under gusty winds
10:05 - UAV down in trees east of the road between the COW and MOUT
12:07 - UAV located in the trees about 75 feet above the ground; cease operations (UAV recovered by local tree service on May 20th)

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	3	---	---	---	---	3.0
Obj. 3	3	---	---	---	---	3.0
Obj. 4	0	---	---	---	---	0.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	9	---	---	---	---	9.0

Notes: Operator recovers UAV from multiple departures from controlled flight where vehicle performs uncommanded 360 rolls about the longitudinal axis (aileron rolls). After the last departure the pilot is unable to recover the vehicle

Team Navy EOD (Baseline)

14:40 - Start setup, team intends to conduct full baseline scenario
14:55 - Airborne
14:58 - Over MOUT; operator loses video and control
15:00 - UAV down behind cemetery
15:02 - UAV recovered with damage; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	3	---	---	---	---	3.0
Obj. 3	3	---	---	---	---	3.0
Obj. 4	0	---	---	---	---	0.0
Obj. 5	0	---	---	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	9	---	---	---	---	9.0

Notes: For this attempt the team employs a directional antenna suspended approximately 75 feet above the ground in a tree. Mishap attributed to loss of video and command link between UAV and GCS.

17 MAY 2012

ATMOS and HALO conducted on-site repairs and tests most of the day HALO was set up and ready by the end of the day, but unable to fly due to heavy rain.

16 MAY 2012

Blocks 2 and 3 attempt baseline objectives and ATMOS performs advanced behaviors.

Team Extractor X (Baseline)

07:23 - Start setup; team intends to conduct full baseline scenario
07:42 - Hover check
07:51 - Airborne, transition to forward flight
07:52 - Departs controlled flight; impacts trees before falling to the ground
08:03 - UAV recovered with damage, team intends to continue with backup vehicle
08:15 - Team unable to continue, cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	3	---	---	3.0
Obj. 2	3	---	4	---	---	3.5
Obj. 3	2	---	1	---	2	1.7
Obj. 4	0	---	0	---	0	0.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	8	---	8	---	2	8.2

Notes: None.

Team DHAKSHA (Baseline)

08:19 - Start setup; team intends to conduct full baseline scenario
09:02 - Airborne
09:05 - Passing the ROC
09:06 - Lost video, UAV holds position in a very stable controlled descent to approximately 40 ft. above the ground level remains in very stable hover
09:13 - Operator driving to the MOUT to take manual control
09:13 - UAV landed manually, team intends to continue attempt from the LZ
10:01 - Airborne
10:05 - UAV begins to lose video while flying near the ROC, team decides to return to the LZ
10:08 - Touchdown at LZ, cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	4	---	3	---	---	3.5
Obj. 2	4	---	5	---	---	4.5
Obj. 3	4	---	5	---	0	3.0
Obj. 4	0	---	0	---	0	0.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	4	---	5	---	---	4.5
Total	16	---	18	---	0	15.5

Notes: First communications loss likely resulted from team members moving GCS equipment while UAV inflight over MOUT facility. After lost comms, UAV demonstrated extremely stable hover, maintaining precise altitude and position.

Team GremLion (Baseline)

10:35 - Start setup, team intends to conduct full baseline attempt
10:59 - Hover check
11:16 - Airborne via manual control
11:17 - Hover over LZ; switch to autonomous waypoint navigation
11:18 - Vehicle appears to lose power and crash north of launch field
11:23 - Vehicle recovered with extensive damage; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	2	---	2	---	---	2.0
Obj. 2	3	---	2	---	---	2.5
Obj. 3	0	---	2	---	0	0.7
Obj. 4	0	---	0	---	0	0.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	5	---	6	---	0	5.2

Notes: Back-up UAV with modified landing gear used for this attempt. Overheated flight motor believed to be the cause of the power loss and subsequent mishap.

Team ATMOS (Baseline)

10:15 - Start setup; team intends to conduct full baseline scenario
10:26 - Stop setup due to technical difficulties
11:24 - Resume setup
11:33 - Airborne; transition to forward flight; unexpected autonomous behavior; operator assume manual control
11:34 - Vehicle impacts LZ in forward flight; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	4	---	---	---	---	4.0
Obj. 3	0	---	---	---	0	0.0
Obj. 4	0	---	---	---	0	0.0
Obj. 5	0	---	---	---	0	0.0
Obj. 6	0	---	---	---	---	0.0
Total	7	---	---	---	0	7.0

Notes: Team planned on using 3G cellular signals to transmit imagery from UAV to GCS. Team unable to solve interface incompatibility with Verizon cellular system and cannot transmit imagery from UAV to GCS.

Team NavyEOD (Baseline)

11:35 - Start setup, team intends to conduct full baseline scenario
11:49 - Airborne
11:52 - Over the MOUT hospital
11:53 - Descending over the soccer field
11:54 - Pilot loses video and control of UAV
11:56 - Over soccer field goal posts at an auto hover; trying to land but won't auto land without comms
12:02 - Vehicle gradually decends with considerable forward motion until touchdown in grass and flipping over
12:05 - Vehicle recovered by team; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	4	---	---	3.5
Obj. 2	3	---	5	---	---	4.0
Obj. 3	3	---	5	---	4	4.0
Obj. 4	0	---	0	---	0	0.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	9	---	14	---	4	11.5

Notes: None.

Team ATMOS (Baseline)

12:10 - Start setup; Team intends to fly fully autonomously, landing in soccer field for full baseline attempt
12:26 - Flight check
13:05 - Airborne
13:07 - UAV passes ROC
13:08 - UAV over MOUT circling west side of soccer field
13:14 - UAV flys into soccer field after a long spiraling decent
13:15 - Vehicle recovered with damage
13:17 - Spontaneous team celebration; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	4	---	---	3.5
Obj. 2	4	---	5	---	---	4.5
Obj. 3	4	---	5	---	4	4.3
Obj. 4	1	---	1	---	1	1.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	12	---	15	---	5	13.3

Notes: None.

Team NavyEOD (Baseline)

13:40 - Start setup; team intends to conduct full baseline scenario
13:50 - Airborne
13:52 - Over the ROC
13:53 - Lost communications
13:55 - Pilot reports intermittent communications
13:56 - Vehicle gradually decends near gas station; moving forward quickly; UAV contacts grass and flips over
13:57 - Vehicle recovered; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	3	---	---	---	---	3.0
Obj. 3	3	---	5	---	---	4.0
Obj. 4	0	---	2	---	---	1.0
Obj. 5	0	---	0	---	---	0.0
Obj. 6	0	---	---	---	---	0.0
Total	9	---	7	---	---	11.0

Notes: None.

Team ATMOS (Advanced Behaviors)

17:17 - Start setup for user interface (AB3); Team instructed to fly figure eight pattern

17:26 - Power up; airborne; start figure eight pattern

17:29 - UAV Completes multiple circling movements significantly disrupted by wind ultimately impacting the ground

17:30 - Vehicle recovered with damage; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	---	---	---	---	---	---
Obj. 2	---	---	---	---	---	---
Obj. 3	10	15	---	---	15	13.3
Obj. 4	---	---	---	---	---	---
Obj. 5	---	---	---	---	---	---
Obj. 6	---	---	---	---	---	---
Obj. 7	---	---	---	---	---	---
Total	10	15	---	---	15	13.3

Notes: UAV extremely unstable in winds while in rotor-borne flight mode. Directional control weak in wing-borne flight mode and UAV was unable to perform figure eight maneuver without considerable sideslip.

15 MAY 2012

DHAKSHA and Extractor X are on-site for pre-trials. SwiftSight, HALO, and Phase Analytic make baseline objective attempts. SwiftSight and HALO perform advanced behaviors.

Team SwiftSight (Baseline)

09:14 - Start setup; team intends to conduct full baseline scenario
09:23 - Airborne
09:27 - Approaching MOUT from the East
09:28 - Hovering over soccer field. Landed on the northeast corner; bounced or caught by wind and inverted
09:32 - Rotors still turning; ground station has video; operator intends to upright the UAV using the camera arm; recovery team disconnected power before this was communicated
09:34 - Recovery team has UAV in hand, minor damage
09:39 - Cease Operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	4	---	4	---	---	4.0
Obj. 2	3	---	5	---	---	4.0
Obj. 3	3	---	5	---	2	3.3
Obj. 4	2	---	1	---	0	1.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	12	---	15	---	2	12.3

Notes: Team demonstrated cellular communications capability. After the mishap, the team was receiving video from UAV while UAV was inverted on the ground.

Team HALO (Baseline)

09:45- Start setup, team intends to conduct full baseline scenario
10:49 - Airborne
10:50- Following the road
10:51 - Over the ROC
10:55 - Over the traffic circle in the MOUT. Video link intermittent
10:57 - Losing comms over church
10:58 - Team decides to return back to the launch/recovery area
11:01 - Returning UAV over ROC
11:09 - Touchdown; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	5	---	5	---	---	5.0
Obj. 2	5	---	5	---	---	5.0
Obj. 3	5	---	5	---	5	5.0
Obj. 4	1	---	0	---	0	0.3
Obj. 5	1	---	0	---	0	0.3
Obj. 6	5	---	5	---	---	5.0
Total	22	---	20	---	5	20.7

Notes: For this attempt the team employs a direction antenna raised approximately 75 feet above the ground in a tree.

Team Phase Analytic (Baseline)

11:17 - Start setup, team intends to conduct full baseline scenario
11:49 - Hover test; Team intends to follow the road to the MOUT using video
11:50- Airborne
11:52 - UAV departs controlled flight; came to rest in deep grass just north of the LZ with no apparent damage

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	2	---	---	---	---	2.0
Obj. 2	3	---	---	---	---	3.0
Obj. 3	1	---	---	---	0	0.5
Obj. 4	0	---	---	---	0	0.0
Obj. 5	0	---	---	---	0	0.0
Obj. 6	0	---	---	---	---	0.0
Total	6	---	---	---	0	5.5

Notes: None.

Team SwiftSight (Baseline)

13:36 - Start setup. Team intends full perch and stare baseline attempt, flying concurrently with HALO
14:12 - Airborne
14:17 - Over the MOUT
14:19 - Descending near traffic circle; hits light pole approximately four feet off the ground
14:20 - UAV recovered, minor damage; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	4	---	4	---	---	4.0
Obj. 2	3	---	5	---	---	4.0
Obj. 3	3	---	5	---	5	4.3
Obj. 4	2	---	1	---	3	2.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	12	---	15	---	8	14.3

Notes: Team demonstrated cellular communications capability. After the mishap, the team was receiving video from UAV while UAV was inverted on the ground.

Team HALO (Baseline)

13:36 - Start setup; team intends full perch and stare baseline attempt, flying concurrently with SwiftSight
14:15 - Airborne
14:19 - Over the COW
14:22 - Over the MOUT traffic circle
14:26 - UAV descends over the church, until they start losing communications; team then decides to return to LZ
14:29 - Team changes intent to land at helipad near Range Control, due to high winds and limited battery power remaining (recovery operator en route to helipad)
14:39 - Team decides to continue to LZ. Recovery operator assumes manual control for immediate landing
14:40 - Touchdown in the road between the ROC and the LZ. UAV did not have sufficient battery power to maintain controlled descent; UAV damaged; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	5	---	5	---	---	5.0
Obj. 2	5	---	5	---	---	5.0
Obj. 3	5	---	5	---	5	5.0
Obj. 4	1	---	0	---	0	0.3
Obj. 5	1	---	0	---	0	0.3
Obj. 6	4	---	4	---	---	4.0
Total	21	---	19	---	5	19.7

Notes: For this attempt the team employs a directional antenna raised approximately 75 feet above the ground in a tree. High headwinds during the return flight from the MOUT facility exhaust battery power, resulting in a landing short of the LZ.

Team HALO (Advanced Behaviors)

15:00 - Team intends to conduct advanced behaviors
16:00 - Start setup
16:14 - Hover checks
16:25 - Airborne for follow me task (AB6)
16:32 - HALO lands after following vehicle around MOUT
16:35 - Team intends to perch on bank to demonstrate transition from flight to surveillance mode
16:42 - Airborne
16:45 - HALO touches down on top of bank; team demonstrates video surveillance
16:50 - Airborne
16:51 - UAV lands at start location; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	---	---	---	---	---	---
Obj. 2	---	---	---	---	---	---
Obj. 3	---	---	---	---	---	---
Obj. 4	---	---	---	---	---	---
Obj. 5	---	---	---	---	---	---
Obj. 6	10	---	10	---	15	11.7
Obj. 7	---	---	---	---	---	---
Total	10	---	10	---	15	11.7

Notes: Pilot had difficulty dealing with winds gusting to 25 MPH during attempt at landing on rooftop perch position. Follow me was not truly autonomous, as it required GCS operator to periodically update home waypoints.

Team SwiftSight (Advanced Behaviors)

15:00 - Team intends to conduct advanced behaviors
16:24 - Hover checks. Team intends to conduct an acoustic test and hope that winds die down
17:30 - SwiftSight completes (AB5) acoustic test (82 dBa)
17:40 - Airborne for follow me (AB6) and figure eight advanced behaviors (AB3). Following operator around MOUT
17:44 - UAV upset in flight, recovers normal flight attitude just prior to impacting the ground
17:46 - UAV recovered with broken wheel motor
18:01 - Airborne for figure eight
18:06 - UAV unable to complete figure eight due to high winds; lands in soccer field; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	2	---	---	---	---	2.0
Obj. 2	10	---	---	---	---	10.0
Obj. 3	15	---	15	---	---	15.0
Obj. 4	5	---	---	---	---	5.0
Obj. 5	---	---	---	---	---	---
Obj. 6	10	---	15	---	5	10.0
Obj. 7	---	---	---	---	---	---
Total	42	---	30	---	5	42.0

Notes: UAV had extreme difficulty dealing with winds gusting to 20 MPH while under manual control and while operating autonomously during "follow me."

14 MAY 2012

Teams continue Baseline Objectives.

Team GremLion (Baseline)

08:20 - Start setup, team intends to conduct full baseline scenario

08:28 - Team intends to conduct flight test

08:52 - Airborne, vehicle hovers through a sequence of modes with a great deal activity from the operating team

08:53 - Vehicle climbs approximately 60 ft.; operator commands vehicle to proceed to a waypoint; vehicle does not go in the intended direction instead flying south over crowd towards the trees; Operator takes over manual control; UAV experiences extreme attitude excursions arcing back over the crowd to crash 10 yards west of the launch point and clear of the crowd

08:53 - Extensive damage is evident, LiPo batteries begin to smoke and burn

08:54 - Small fire burns out quickly

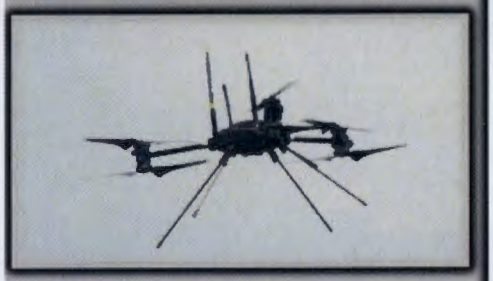
08:58 - Cease operations; team intends to make repairs

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	2	---	2	---	---	2.0
Obj. 2	1	---	2	---	---	1.5
Obj. 3	0	---	0	---	0	0.0
Obj. 4	0	---	0	---	0	0.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	3	---	4	---	0	3.5

Notes: None.

Team HALO (Baseline)



08:33 - Team intends to do comms checks over the MOUT
09:22 - Airborne
09:35 - Touchdown; team returns to LZ
09:52 - Start Setup; team intends to do baseline objectives
10:00 - Airborne
10:06 - Approaching the ROC
10:08- UAV ascendes to approximately 300m; still receiving video but appear to lose control link
10:09 - Vehicle performs lost communications behavior and returns to launch
10:10 - UAV heading back to LZ,reduced altitude down to 150m
10:15 - Touchdown in LZ; team intends to replace batteries and continue with baseline objectives
12:00 - Airborne
12:04 - Passed the ROC
12:08 - UAV making its way towards traffic circle
12:09 - Vehicle descends to 50m and still has command link
12:12- Vehicle heading back to LZ
12:19 - Touchdown at LZ; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	5	---	5	---	---	5.0
Obj. 2	5	---	5	---	---	5.0
Obj. 3	5	---	5	---	5	5.0
Obj. 4	0	---	0	---	0	0.0
Obj. 5	0	---	1	---	0	0.3
Obj. 6	5	---	5	---	---	5.0
Total	20	---	21	---	5	20.3

Notes: None.

Team ATMOS (Baseline)

12:32 - Start Setup; team intends to conduct baseline operations without video
12:55 - Balloon released, tethered at 80m
13:06 - Airborne; transition to forward flight and autonomous waypoint navigation
13:07 - Operator lost communications; UAV last seen northeast of the LZ circling to the left
13:08 - Recovery team observes vehicle circling north of the LZ
13:10 - Recovery team reports vehicle down in the trees
13:20 - Vehicle recovered on the east side of the road
13:47 - Cease operations, team intends to make repairs

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	4	---	---	3.5
Obj. 2	4	---	5	---	---	4.5
Obj. 3	1	---	1	---	0	0.7
Obj. 4	0	---	0	---	0	0.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	8	---	10	---	0	8.7

Notes: UAV appears very similar to soaring raptor in flight making visual identification and tracking difficult. Moderate winds make tethered balloon difficult to use.

Team NavyEOD (Baseline)

13:40- Start setup; team intends to conduct full baseline scenario
14:19- Airborne
14:21- 5800 feet from launch zone
14:22- UAV over soccer field, control link lost
14:23- Video lost, UAV lands autonomously in front of city hall, vehicle takes off to return home in programmed lost comms behavior; vehicle flying stably to the south at approximately 50 ft. altitude
14:24- Vehicle impacts a tree and falls to the ground
14:25- Vehicle recovered with damage
14:41- Cease operations due to weather

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	4	---	---	3.5
Obj. 2	3	---	5	---	---	4.0
Obj. 3	3	---	5	---	4	4.0
Obj. 4	0	---	0	---	0	0.0
Obj. 5	0	---	0	---	0	0.0
Obj. 6	0	---	0	---	---	0.0
Total	9	---	14	---	4	11.5

Notes: Several teams asked to mount antennae in the trees. An official decision is made to employ the man-lift to avoid the risk of team personnel climbing trees. This and all subsequent attempts are made with a directional antenna raised approximately 75 feet above the ground in a tree.

13 MAY 2012

SwiftSight and Phase Analytic continue baseline objective attempts. ATMOS unable to attempt baseline attempt due to weather.

Team SwiftSight (Baseline)

07:40 - Start setup, team intends to conduct full baseline scenario
07:44 - Stop setup pending flight clearance
08:00 - Resume set-up. Team intends full perch and stare scenario
08:13 - Hover check
08:23 - Airborne, waypoint navigation
08:31 - Over fork in the road south of the MOUT, new waypoint sent, ground station lost video and control
08:33 - UAV down, settled into a tree
08:35 - Cease operations
09:14 - Recovery team has UAV in hand and reports loss of rotors and structural damage

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	4	2	---	---	---	3.0
Obj. 2	3	3	---	---	---	3.0
Obj. 3	2	1	---	---	0	1.0
Obj. 4	0	0	---	---	0	0.0
Obj. 5	0	0	---	---	0	0.0
Obj. 6	0	0	---	---	---	0.0
Total	9	6	---	---	---	7.0

Notes: Team demonstrated cellular communications capability. After the mishap, the team was receiving video from UAV and was able to control UAV articulated arm while UAV was in a tree.

Team Phase Analytic (Baseline)

08:35 - Start setup, team intends to conduct full baseline scenario
08:44 - Stop setup, pending flight clearance
09:34 - Vehicle setup and currently erecting their tower
10:10 - Team intends to fly around the field in a hover test
10:21 - Airborne; hover test successful
10:23 - Airborne
10:23 - Vehicle departs controlled flight, less than 1/4 mile out
10:32 - UAV recovered; it doesn't appear to be structurally damaged but battery is dead
10:45 - Cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	2	2	---	---	---	2.0
Obj. 2	2	3	---	---	---	2.5
Obj. 3	1	1	---	---	0	0.7
Obj. 4	0	0	---	---	0	0.0
Obj. 5	0	0	---	---	0	0.0
Obj. 6	0	0	---	---	---	0.0
Total	5	6	---	---	0	5.2

Notes: None.

12 MAY 2012

AeroQuad attempts Baseline Objectives and Advanced Behaviors, HALO attempts Advanced Behaviors, block 3 arrives for orientation. Block 3 teams arrived at Fort Stewart on Saturday, May 12th. Extractor X, DHAKSHA and NavyEOD completed orientation activities in preparation for Pre-Trial flights to be held the following day.

Team AeroQuad (Baseline)

07:30 - Start setup, team intends to conduct full baseline scenario
08:06 - Ready to launch
08:32 - Hover test
08:37 - Airborne; climbing up to treetop level
08:40 - Over the ROC
08:41 - UAV entering the MOUT; over power station
08:42 - Directly above soccer field west of the hotel
08:46 - Above the power station, appears to be heading back towards the launch site
08:48 - Parallel to power station heading back towards ROC, out of the MOUT area
08:49 - At the ROC en route to launch site
08:52 - UAV descending
08:53 - Touchdown, cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	3	---	2	---	2.7
Obj. 2	4	3	---	4	---	3.7
Obj. 3	4	4	---	3	5	4.0
Obj. 4	1	1	---	0	1	0.8
Obj. 5	0	0	---	0	0	0.0
Obj. 6	4	2	---	3	---	3.0
Total	16	13	---	12	6	14.1

Notes: Team employed UAV completely rebuilt following hard landing during Baseline Objectives attempt on 11 May. Video feed from UAV to GCS lost at approximately 55m over observation area and team decides to abort the mission and return to base (RTB).

Team AeroQuad (Advanced Behaviors)

09:00 - Start setup, team intends to conduct advanced behaviors
10:11 - UAV is in place for comms out demo (AB1)
10:13 - UAV takes off
10:13 - Touchdown
10:19 - AeroQuad takeoff for user interface demo (AB3); airborne
10:21 - Touchdown, vehicle completed figure eight maneuver
10:22 - Will attempt comms out, auto-land in soccer field; vehicle airborne
10:25 - Vehicle lands in soccer field, bounces and flips; team repositions vehicle and attaches camera
10:28 - Vehicle takes off to return to AB start
10:29 - Touchdown; cease operations
11:17 - Team completes (AB4) acoustic tests (77.4 dBa)

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	2	---	---	---	---	2.0
Obj. 2	5	---	---	---	---	5.0
Obj. 3	20	10	---	---	---	15.0
Obj. 4	20	20	---	---	---	20.0
Obj. 5	---	---	---	---	---	---
Obj. 6	---	---	---	---	---	---
Obj. 7	---	---	---	---	---	---
Total	47	30	---	---	---	42.0

Notes: Very maneuverable and quiet UAV. Position hold erratic. Autoland descent rate too high.

Team HALO (Advanced Behaviors)

09:00 - HALO intends to perform autonomous transition, comms out, ease of use, and acoustic signature advanced behaviors before attempting Baseline Objectives again
10:44 - Airborne for comms out demonstration (AB1)
10:46 - Comms out, vehicle remains in stable hover, until the operator restores comms
10:47 - Touchdown at AB start
10:48 - Airborne for second attempt at comms out (AB1)
10:49 - Comms out; vehicle proceeds to designated comms out location
10:51 - Comms restored; operator commands autonomous recovery; vehicle returns to AB start and lands autonomously
10:57 - Airborne; to fly figure eight for user interface demo (AB3) and platform hovers
11:03 - Team demonstrates camera functionality
11:05 - Vehicle completes a quick figure eight over the field and returns to AB start
11:05 - Touchdown; cease operations
11:14 - Team completed (AB4) acoustic tests (76.1 dBa)

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	4	4	---	---	---	4.0
Obj. 2	15	19	---	---	15	17.0
Obj. 3	20	25	20	---	---	21.7
Obj. 4	20	20	---	---	---	20.0
Obj. 5	---	---	---	---	---	---
Obj. 6	---	---	---	---	---	---
Obj. 7	---	---	---	---	---	---
Total	59	68	20	---	15	62.6

Notes: Very stable and quiet UAV. Autoland accuracy and descent rate control very good. Excellent integration of GCS and UAV.

11 MAY 2012

Block 2 teams start Pre-trials. Block 1 teams continue Baseline Objectives.

Team Phase Analytic (Baseline)

07:30 - Start setup. Team intends full perch and stare mission
08:11 - Hover and communications check
08:25 - Cease operations due to sensor problems

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	2	---	---	1	---	1.5
Obj. 2	1	---	---	0	---	0.5
Obj. 3	0	---	---	0	0	0.0
Obj. 4	0	---	---	0	0	0.0
Obj. 5	0	---	---	0	0	0.0
Obj. 6	0	---	---	0	---	0.0
Total	3	---	---	1	0	2.0

Notes: Team unable to launch for attempt at Baseline Objectives.

Team AeroQuad (Baseline)

07:30 - Start setup, team intends to conduct full baseline scenario
07:46 - Stop setup pending flight clearance
08:27 - Resume set-up
08:48 - Airborne
08:49 - Heading down the road
08:50 - Temporarily loses GCS visual
08:53 - Flying over power station, hotel, city hall
08:54 - Operator loses video and controls; air vehicle makes uncontrolled descent to hard landing between power station and butcher shop
08:55 - Recovery team has UAV in hand with damage
08:58 - Recovery team returns UAV to launch; cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	2	---	2.5
Obj. 2	4	---	---	4	---	4.0
Obj. 3	4	---	---	3	4	3.7
Obj. 4	0	---	---	0	0	0.0
Obj. 5	0	---	---	0	0	0.0
Obj. 6	0	---	---	0	---	0.0
Total	11	---	---	9	4	10.2

Notes: Team loses video from UAV to GCS and command of UAV over observation area. UAV makes hard landing south of the observation area. Unsuccessful attempt at Baseline Objectives made with Cellular phone tower On Wheels (COW) in the vicinity of the ROC off. Following Baseline Objective attempt, team conducts tests of Radio Frequency Interference (RFI) from COW using alternate UAV. Tests confirm COW does not cause RFI.

Team SwiftSight (Baseline)

07:30 - Start setup; team intends to conduct full baseline scenario
08:24 - Stop setup pending flight clearance
09:06 - Start setup
09:20 - Stop setup pending flight clearance
09:41 - Resume setup
09:45 - Vehicle on launch pad
09:46 - Hover check, team demonstrates autonomous landing
09:48 - Hover checks that result in hard auto landing, vehicle damaged
10:05 - Cease operations

Judges Scorecard

Evaluator	1	2	3	4	5	Average
Obj. 1	3	---	---	---	---	3.0
Obj. 2	3	---	---	---	---	3.0
Obj. 3	0	---	---	---	0	0.0
Obj. 4	0	---	---	---	0	0.0
Obj. 5	0	---	---	---	0	0.0
Obj. 6	0	---	---	---	---	0.0
Total	6	---	---	---	0	6.0

Notes: Team does intend to demonstrate Baseline Objectives. Team does demonstrate autoland capability of UAV. Descent rate on landing results in UAV rebounding into the air and damage to one wheel.

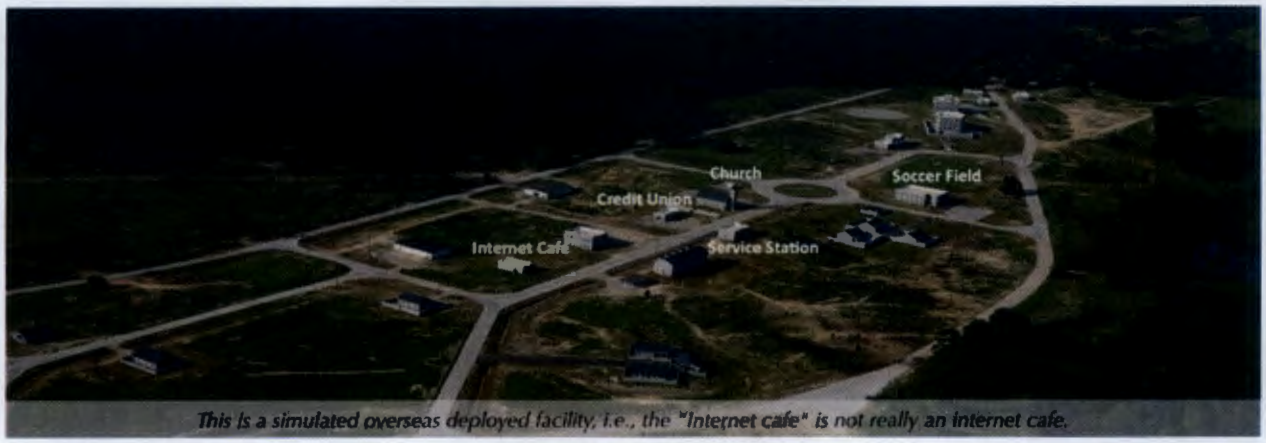
10 MAY 2012

Block 1 teams start Baseline Objectives, Block 2 teams arrived at Fort Stewart on Thursday, May 10th. ATMOS, HALO and GremLion completed orientation activities in preparation for Pre-Trial flights to be held the following day.

09 MAY 2012

Block 1 teams begin Pre-trials. AeroQuad, Phase Analytic and SwiftSight conducted pre-trial flights for system verification, safety checks, and familiarization with the local area and flight procedures. Teams also investigated RF compatibility among each other.

- All teams cleared safety checks
- AeroQuad flew the designated route manually and perched on the Internet cafe
- Phase Analytic flew over the soccer field
- SwiftSight flew over the soccer field

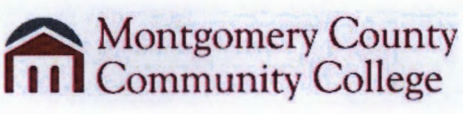


This is a simulated overseas deployed facility, i.e., the "Internet cafe" is not really an internet cafe.

08 MAY 2012

Block 1 teams on-site! The first three teams arrived at Fort Stewart on Tuesday, May 8th. Phase Analytic, AeroQuad and SwiftSight completed orientation activities in preparation for Pre-Trial flights to be held the following day.


UAVforge


Montgomery County
Community College