



# 2014 Student UAS Competition Awards Banquet

21 June 2014

SUAS Competition  
Goods and Other  
Ranking  
Prizes  
Awards



<http://www.seafarer-auvsi.org>





# 12th Annual AUVSI Student UAS Competition

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6/21/2014

# 2014 SUAS Event Photo



# 2014 SUAS Competition Rules

FINAL

## 2014 Rules for AUVSI Seafarer Chapter 12<sup>th</sup> Annual Student UAS (SUAS) Competition

FINAL

Revision 1.0

24 October 2013



The Seafarer Chapter of the Association for Unmanned Vehicle Systems International (AUVSI) continues the Student UAS (SUAS) Competition aimed at stimulating and fostering interest in unmanned systems, technologies, and careers. The focus is on engaging students in systems engineering a total solution to a challenging mission, requiring the analysis, design, fabrication and demonstration of a system capable of completing specific autonomous aerial operations.

FINAL

- 60 pages
- New non-RFP format
- Organized for Teams
- Task Hierarchy
- Many New Tasks

# SUAS Competition Overview

- Rules released at start of School Year
- Used for basis of College course work
- Technical Journal Paper – 20 technical pages
- Flight Readiness Review (FRR) Presentations
- Flight-Mission Demonstration

# Overall Competition Schedule

Activity	Date(s)	Notes
Draft Rules Posted	Mon, September 30, 2013	Open for comments.
Team Written Comments	Mon, October 7, 2013	<b>Deadline, 11:59 PM EDT.</b>
University Day	Thurs, October 10, 2013	Conference Call-in 11:00 – 12:30 PM EDT.
Final Rules Posted and Registration Open	Thurs, October 24, 2013	Final rules. 8-week registration period starts.
Application and Registration Fee	Thurs, December 19, 2013	<b>Deadline, 11:59 PM EST.</b>
Refund Registration Fee	Wed, April 30, 2014	<b>Deadline, 11:59 PM EDT.</b> Last day to withdraw and have registration fee refunded.
Fact Sheet	Wed, May 7, 2014	<b>Deadline, 11:59 PM EDT.</b>
Journal Paper Submission	Wed, May 28, 2014	<b>Deadline, 11:59 PM EDT.</b>
Proof of Flight Video	Wed, June 4, 2014	<b>Deadline, 11:59 PM EDT.</b>
Base Access Information Data	Wed, June 11, 2014	<b>Deadline, 11:59 PM EDT.</b>
Competition	Wed, June 18, 2014 5:00 PM EDT.	Check-in / Orientation Notice of Risk; Disclaimer of Liability; Waiver of Claims Form
	Thurs, June 19, 2014	Safety Inspections / Oral briefings
	Fri & Sat, June 20-21, 2014	Flight-Mission Demonstration
	Sat, June 21, 2014	Awards Banquet
	Sun, June 22, 2014	Rain day for flying

# Judges and Scoring

- Stable of 80 Judges and 3 Scores
- Judges Per Phase
  - 36 Judges for Journals
  - 25 Judges for FRR Presentations
  - 25 Judges for Flight-Mission Demonstration
    - Additional Boundary Judges Required
    - 3 Judges flew in from CA (Airware & Aerospace Corp)
    - 1 Judge flew in from Yuma, AZ

# Lead Judges/Scorer

- Dr. Dan Edwards- Naval Research Laboratory (former SUAS competitor and advisor)
- Kerstin Elledge - Booz Allen Hamilton (sponsor)
- Tom Sanders- CTSi (Premier Sponsor)
- Mark Schon - Mark Schon, LLC
- Ed O'Shea - Compass Systems (Sponsor)
- George Uhall - Compass Systems (Sponsor)
- Kim McEligot – Head Scorer – Johns Hopkins Univ/Applied Physics Laboratory (Sponsor)



# Safety Checks, SRIC, IR & Food Lines



# Air Drop Task Target



# Student FRR Presentation Judging



# The Flight Line & Pre-Mission Brief



# Getting Airborne and Staying There



# General Team Stats

- 48 Schools Registered
  - 18 International Schools and 3 High Schools
- 33 competed for Journal Papers
- 28 competed On-Site for FRR Presentations
- 27 competed for Flight-Mission Demo – all flew

# Detailed Mission Stats

- 27 Teams Took off and Flew
- 3 Catapult Launchers
- 13 Autonomous Takeoffs
- 9 Autonomous Landings
- 25 Autonomous Navigations
- 17 Target Acquisition
- 2 Secret Message
- 3 Autonomous Recognition
- 1 Actionable Intelligence
- 1 Off-Axis Target
- 4 Pop-Up Emergent Target (Rescue Randy fireman)
- 2 SRIC message (Simulate Remote Information Center)
- 12 Interoperability
- 2 IR Targets
- 10 Air Drop
- 2 Class A Flight Mishaps

# Humorous

- UT Austin gets the “Lawn Mower” award
- Location, location, location! A lot of good target characteristic but bad position identified.
- Read and follow the rules, even the easy ones like journal format. Font and School Name in Footer rules do count!
- UCSD brings Weller soldering station to every flight
- Green ribbon on small plastic egg is hard to find in tall grass.
- That’s not good, when Safety Pilot starts running away...
- Dawn’s face when a bus load of 30 UMD VIPs show up with no Base Access passes!
- Emergent target definition: “Firefighter on the ground. He has something that looks like dynamite or a flare”



# Emergent Target



# Emergent Target – Up close



# Quotes Overheard by Judges:

- The Gilman School “Don’t worry, they won’t blame us, we are just a high school”
- “Just go! See what happens.”
- Pilot “is it tracking?” Mission Control “Don’t go into that now”
- “What a great picture of us” to Lead Judge. “Can’t that be a target?”

# Goods

- Record number of flights in a day
- Best completion time of any competition
- Lowest number of mishaps
- Most flights of autonomous navigation ever
- RF & Safety Checks went very quick overall
- Multiple Frequency Bands were highly successful
- Quickest in/out – most teams were ready
- Lowest # of timeouts only 5 time in-pits
- New Rules seemed to be well accepted
- Egg drop was fun and added new dimension to event
- Awesome IR Primary and Secondary targets provided

# Others

- Some teams didn't have failsafe set for safety check
- SRIC log in was successful by several teams, but other's indicated they needed Username. We have identified that different Vendor's Software has different characteristics
- Wi-Fi Frequencies are familiar and inexpensive for teams, but are vulnerable to interference and can cause problems for the team
- Teams still need to learn and practice better RF and EMI control
- New tasks offer new challenges to the best teams

# Next Year

- Provide Lessons from Your Experience from this Competition
- Make Recommendations for Changes to Rules, Facilities, etc.
- Rules Will Change Again – Expect More Challenges, Perhaps;
  - More Complex RF Environment – Wi-Fi and other RF Transmitters OK
  - SRIC Message to Coordinate Activity
  - Improved rules for new Tasks, and expand on Physical Delivery task
  - Improve Thermal Imaging target descriptions
  - Detect and Avoid Airspace Obstacles (Virtual)
- Mobile RF directional detection and localization may be used
- University Day – Call in – It's FREE (it's BEFORE Registration)
- Registration Window (Including Payment) Will Close **mid-Dec**

# 2014 SUAS Team Special Awards

- Best Overall Rotary Wing Award
- Arthur Reyes Memorial Safety Award
- Best Overall High School
- JustJoe Sportsmanship Award (new in 2014)

# 12<sup>th</sup> Annual SUAS Competition – Top Ranking

## Overall Placement

1. North Carolina State University
2. Cornell University
3. Delhi Technological University (India)
4. Kansas State University - Manhattan
5. Technion, Israel Institute of Technology
6. Embry Riddle Aeronautical University - ANDRONE
7. Rutgers University
8. Université de Sherbrooke (Quebec, Canada)
9. University of Texas - Arlington
10. Mississippi State University

## Flight-Mission

1. Cornell University
2. North Carolina State University
3. Embry Riddle Aeronautical University - ANDRONE

## Journal

1. North Carolina State University

## Flight Readiness Review (FRR) Presentation

1. Delhi Technological University (India)

## Best Overall Rotary Wing

1. Politehnica University of Bucharest (Romania)

## Best Overall High School

1. The Gilman School, Maryland (12th overall)

## Dr. Arthur Reyes Safety Award

1. North Carolina State University

## Just Joe Sportsmanship Award

1. Rutgers University

**Total of \$51,750 prize money to  
33 Schools that competed**



# Total Ranking with Prize Money and Prize Barrels

School	Overall Rank	Flight Rank	Oral Rank	Journal Rank	Cash Award	Prize Barrels	Award
North Carolina State University	1	2	3	1	\$8,600	13	Safety
Cornell University	2	1	8	4	\$4,850	8	
Delhi Technological University	3	8	1	2	\$3,850	8	
Kansas State University - Manhattan	4	5	2	5	\$2,800	6	
Technion, Israel Institute of Technology	5	10	5	3	\$2,350	6	
Embry Riddle Aeronautical University - ANDRONE	6	3	10	11	\$2,200	8	
Rutgers University	7	7	4	14	\$2,000	5	Sportmanship
Universite de Sherbrooke	8	4	13	13	\$2,300	9	
University of Texas, Arlington	9	6	12	15	\$1,800	9	
Mississippi State University	10	11	15	6	\$1,600	5	
University of Toronto	11	13	23	8	\$1,500	5	
The Gilman School	12	12	21	18	\$1,300	5	Best HS
University of Texas, Austin	13	15	11	21	\$1,400	7	
University of Missouri	14	9	16	27	\$1,300	6	
Politechnica Bucharest Phoenix	15	19	17	7	\$2,300	8	Best Rotorcraft
University of California, San Diego	16	22	9	12	\$ 900	4	
Virginia Commonwealth University	17	14	26	22	\$1,000	5	
Polytechnique Montreal	18	16	22	20	\$ 700	3	
Christopher Newport University (CNU/IMPRINT)	19	18	14	31	\$ 800	4	
California State University, Northridge	20	25	6	9	\$ 500	2	
Great Mills High School	21	17	19	30	\$ 700	3	
Cal Poly - Pomona	22	21	25	25	\$1,100	5	
Anadolu University	23	24	18	26	\$ 700	3	
University of California, Riverside	24	23	24	24	\$1,000	5	
M.S. Ramaiah Institute of Technology	25	27	7	10	\$ 700	3	
Istanbul Technical University - ITU Multicopter Team	26	20	27	33	\$1,200	6	
R. V. College of Engineering	27	26	20	17	\$ 800	4	
Georgia Institute of Technology	28			16	\$ 250	1	
California State University, Fullerton	29			19	\$ 250	1	
Stevens Institute of Technology	30			23	\$ 250	1	
Embry Riddle Aeronautical University - Prescott	31			28	\$ 250	1	
University of Alberta	32			29	\$ 250	1	
Istanbul Technical University - Hezarfen Team	33			32	\$ 250	1	

# Ranking with Prize Barrel Details

School	Prize Barrels	Prize Barrels
North Carolina State University	13	Flight, Auto Takeoff, Auto Nav, Auto Landing, Target Detection, Secret Message, Actionable Intel, Emergent Target, SRIC, Interoperability, Primary IR Target, Air Drop, Participation
Cornell University	8	Flight, Auto Nav, Target Detection, Secret Message, Auto Recognition, Emergent Target, Air Drop, Participation
Delhi Technological University	8	Flight, Auto Takeoff, Auto Nav, Auto Landing, Target Detection, Interoperability, Air Drop, Participation
Kansas State University - Manhattan	6	Flight, Auto Takeoff, Auto Nav, Auto Landing, Target Detection, Participation
Technion, Israel Institute of Technology	6	Flight, Auto Nav, Target Detection, Interoperability, Air Drop, Participation
Embry Riddle Aeronautical University - ANDRONE	8	Flight, Auto Takeoff, Auto Nav, Auto Landing, Target Detection, SRIC, Interoperability, Participation
Rutgers University	5	Flight, Auto Takeoff, Auto Nav, Target Detection, Participation
Universite de Sherbrooke	9	Flight, Auto Nav, Target Detection, Auto Recognition, Off Axis Target, Emergent Target, Interoperability, Primary IR Target, Participation
University of Texas, Arlington	9	Flight, Auto Takeoff, Auto Nav, Auto Landing, Target Detection, Emergent Target, Interoperability, Air Drop, Participation
Mississippi State University	5	Flight, Auto Nav, Target Detection, Air Drop, Participation
University of Toronto	5	Flight, Auto Takeoff, Auto Nav, Auto Landing, Participation
The Gilman School	5	Flight, Auto Takeoff, Auto Nav, Air Drop, Participation
University of Texas, Austin	7	Flight, Auto Takeoff, Auto Nav, Auto Landing, Target Detection, Interoperability, Participation
University of Missouri	6	Flight, Auto Takeoff, Auto Nav, Auto Landing, Air Drop, Participation
Politechnica Bucharest Phoenix	8	Flight, Auto Takeoff, Auto Nav, Auto Landing, Target Detection, Auto Recognition, Interoperability, Participation
University of California, San Diego	4	Flight, Auto Nav, Interoperability, Participation
Virginia Commonwealth University	5	Flight, Auto Nav, Target Detection, Interoperability, Participation
Polytechnique Montreal	3	Flight, Auto Nav, Participation
Christopher Newport University (CNU/IMPRINT)	4	Flight, Auto Nav, Target Detection, Participation
California State University, Northridge	2	Flight, Participation
Great Mills High School	3	Flight, Auto Nav, Participation
Cal Poly - Pomona	5	Flight, Auto Nav, Interoperability, Air Drop, Participation
Anadolu University	3	Flight, Auto Takeoff, Participation
University of California, Riverside	5	Flight, Auto Nav, Target Detection, Interoperability, Participation
M.S. Ramaiah Institute of Technology	3	Flight, Auto Nav, Participation
Istanbul Technical University - ITU Multicopter Team	6	Flight, Auto Takeoff, Auto Nav, Target Detection, Air Drop, Participation
R. V. College of Engineering	4	Flight, Auto Nav, Target Detection, Participation
Georgia Institute of Technology	1	Participation
California State University, Fullerton	1	Participation
Stevens Institute of Technology	1	Participation
Embry Riddle Aeronautical University - Prescott	1	Participation
University of Alberta	1	Participation
Istanbul Technical University - Hezarfen Team	1	Participation