2017-2018 Community College Quadcopter Challenge

The NASA Connecticut Space Grant Consortium is pleased to support a community college based program to improve STEM recruitment and retention. This program is designed to:

(1) increase the number of community college students who graduate with STEM degrees and/or transfer to STEM programs at four year institutions,
(2) increase the ability of community college faculty members to deliver aerospace/aeronautical-related content in areas of interest to NASA, and
(3) enhance the diversity of students pursing STEM education at Connecticut community colleges.

These objectives will be accomplished by the use of small model helicopters (quadcopters) in competitions between student design groups from the Connecticut community colleges. These design groups will be led by faculty advisors at the various community colleges.

Quadcopters will be used for the competition/challenge because quadcopter kits are readily available. Experience has shown that compared to fixed-wing, radio-controlled airplanes, students can quickly learn to pilot quadcopters and they can be operated in small spaces (including indoors) with no infrastructure (which is not the case with fixed-wing, radio-controlled airplanes). Each student team will start by building and learning to fly a basic quadcopter from a commercially-available kit (each team will use the same brand of kit, for uniformity). Students will then significantly modify their kits in order to mount sensors, actuators, and electronics necessary for the challenge. This will also involve some mechanical design and fabrication, giving the students experience with computer-aided design (CAD) software, 3-D printing, and laser cutting. In addition, the students will have to learn microcontroller programming and integration of electronics, sensors, actuators, and data-logging to ensure that their modifications function properly.

Competition and Team Setup:

- Five student teams of five students each will be selected to participate, each advised by a community college faculty member
  - Faculty Advisor will receive a $2,000 compensation
  - Each student participant will achieve "significant engagement" level over the course of one year – 80 hours with $1,000 stipend
- Each team contributes to diversity goals – at least 40% women and at least 20% under represented
- Each team will build the quadcopter and create a plan to collectively work together to finish the challenge. Each team will design and implement modifications to achieve the expected outcomes and Challenge Requirements.

Challenge Requirements & Evaluation:

- **10% Videos**: 1-2 minutes long each, to possibly post on YouTube, peer-rated at the competition
- **10% Rotor protection**: CAD-drawn (at least), required whenever flying the ELEV-8 quadcopter
- **10% Multi-pilot**: at least 3 team members must demonstrate basic flying skills, not timed
- **10% Camera mount**: CAD-drawn, must be fabricated using 3-D printing and/or laser cutting, must be switchable between out view & down view within 60 seconds, may not use Velcro or tape
- **10% Close-up imaging:** take images (while in flight) of target on horizontal and vertical surfaces

  or

  Arduino-logged sensor pack: log air temperature, air pressure, relative humidity, and ambient magnetic field to an SD card with real-time clock stamps on all data; also be able to measure temperature and magnetic field of surface samples to identify environmental anomalies
- **40% Exploration:** General characterization and mapping of an "exploration region": take photos and/or video, log environmental conditions using sensors, ultimately generate 3-D map(s) (i.e. include elevation variation) with real units
- **10% Unique (flight hardware) feature**: does not have to be useful for accomplishing challenge goals, , must be non-trivial

Quadcopter Challenge Plan:

Step I:

- Interested Faculty should recruit student participants.
- Submit an application.
  - The Faculty or Staff Advisor should submit the application via email (csgcinfo@hartford.edu). The email must include the following

    (1) a single PDF containing the **Contact and Demographic Info** form for the faculty advisor and all participating team members

    (2) a single PDF containing the **Grant Verification Forms** for the faculty advisor and students, and

    (3) a single PDF containing the appropriate **Team Info**, faculty narrative, and the student application information.
  - Faculty Narrative (3 pages maximum)
    - Goals and objective of the project
    - Methodology – a brief description of the structure of the program at your institution.
    - Expected Outcome

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

- Student application material must include the following for each student
  - Pre-Program Survey (attached)
  - Transcript showing full-time student status
- Proposals must be typed in no smaller than 10 point font, double spaced with margins of at least 1" on 8 1/2" x 11" paper.
- **Follow the Guidelines of the Special RFP for this Challenge on the NASA CTSGC.**

** Applicants should consult the scoring rubric for more information on how proposals will be evaluated according to these criteria.*

Reminder:

- **All forms are available on the NASA CTSGC website.**
- **All proposals and attachments must be submitted together in a single email, and should be submitted to csgcinfo@hartford.edu.**

Step II: If selected:

- Kick-off: WebEx meeting in October 2017
- Training Workshop: at the University of Hartford or at any affiliate campus
  - Learn to solder – if needed
  - Learn to program Arduino microcontrollers – if needed
  - Learn to use CAD software – if needed
  - Learn about 3D printing / laser cutting – if needed
- Build an ELEV-8 quadcopter kit
  - Design, and draw (using CAD software) rotor protection on ELEV-8
  - Fabricate and install the Rotor Protection **(No team should operate any QC without the rotor protection – safety first!!)**
  - Learn to fly quadcopters using toys, simulation software, commercial quads, etc.
- Design modifications to accomplish challenge goals
  - Write Preliminary Design Review (PDR): covers the ELEV-8 build, preliminary plans for accomplishing the challenge goals (report format attached)
- Submit PDR by January 2018

Step III:

- All teams meet at the University of Hartford to review the PDRs on January 2018
- Implement and test modifications to accomplish challenge goals
  - Continue to build and test all the proposed modifications to accomplish the task.

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

- Demonstrate quadcopter capabilities at challenge event in April 2018 (Day and time are TBD) at the University of Hartford
    - Oral Flight-Readiness Review(FRR): present modified ELEV-8, discuss design & test results
    - Write Post-competition Final Report: present competition results (e.g. maps, sensor data, covers new/modified designs, ELEV-8 modifications and testing). Report format attached - very similar to the PDR report.
    - Post-program survey

Challenge Timeline:

Sept 1, 2017		Applications are due
Oct 2017		Kick-off meeting Advisor/students Training Workshop
Oct/Nov 2017		ELEV-8 quadcopter kit are ready
Nov/Dec 2017	20 Hours	Training • Learn to solder • Learn to program Arduino microcontrollers • Learn to use CAD software • Learn about 3D printing / laser cutting Build an ELEV-8 quadcopter kit
January 2018		PDR: all Teams meet at the University of Hartford
February & March 2018	40 Hours	• Design, CAD, build, install rotor protection on ELEV-8 • Learn to fly quadcopters using toys, simulation software, commercial quads, etc.
March 2018	5 Hours	Design modifications to accomplish challenge goals
April 2018	5 Hours	Implement and test modifications to accomplish challenge goals
April 2018	5 Hours	Demonstrate quadcopter capabilities at the challenge event
May 2018	2 Hours	Write Post-competition Final Report: present competition results

Budget:

	#	$ each	Total	
Faculty Advisors	5	$2,000	$10,000	
Student	25	$1,000	$25,000	
Supplies				A kit will be provided for each team

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Team Info

Contact Information	
Team Advisor	
College Address	
Home Address	
Phone	
Official School Email Address	
Team Name	

Institution	
❑ Asnuntuck Community College	❑ Northwestern CT Community College
❑ Capital Community College	❑ Norwalk Community College
❑ Housatonic Community College	❑ Quinebaug Valley Community College
❑ Manchester CT Community College	❑ Three Rivers Community College
❑ Middlesex Community College	❑ Tunxis Community College
❑ Naugatuck Valley Community College	

Team Members		
Name	e-mail	Major

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Survey of Skills

Name	

	Please rate your skills				
Skills	**None**	**Below Average**	**Average**	**Good**	**Excellent**
Soldering	☐	☐	☐	☐	☐
Program Arduino microcontrollers	☐	☐	☐	☐	☐
Basic Programing knowledge	☐	☐	☐	☐	☐
Programing using C/C++ language	☐	☐	☐	☐	☐
Use CAD software	☐	☐	☐	☐	☐
3D printing	☐	☐	☐	☐	☐
Laser Cutting	☐	☐	☐	☐	☐
Typical Machine Shop tools	☐	☐	☐	☐	☐

Purpose & Objective: Briefly describe the purpose and objectives of this project, and your participation in your college's team.

Career Potential: Please describe your academic and career goals, and how this project will help you achieve these goals.

If your team is selected to participate in this challenge, will you be able to spend about 80 to work on this project during the spring 2015 semester (compensation is $1,000):

Yes ☐ No ☐

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Community College Quadcopter Challenge

2017 – 2018

Preliminary Design Review

Team Name

[Insert a Meaningful Photo or Figure (like a logo)]

Written by: (full names of all students)

Advisor:

Institution:

Report Date: (insert submission date)

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Table of Contents *(update these page numbers, and delete this text before submitting)*

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

1.0 Introduction of Project and Team Members

Introduce the overall project with a general description of what you are trying to accomplish and why you are doing it. Also introduce your team members and include a team photo with individuals identified, either on the photo or in a caption. Team roles will be described in the organizational chart later but a brief description about who will be working on what parts of the project might be helpful here.

2.0 Elev-8 Build/Fly Progress

Report using both text and photos (note: every photo, diagram, and graph needs a number and a caption) on the overall build of the Elev-8 kit which should be done by now. Comment about as how building went, especially what was challenging, and any deviations you made from the instruction manual. Fully describe your rotor protection. This must include CAD diagrams for documentation (though you aren't required to use CAD for fabrication). Also include some comments on how and why the design was chosen, the material(s) used, price, how it was fabricated (does not have to be using laser cutting or 3D printing), and the final weight and dimensions. Include photos of the rotor protection on (and possibly off) the quadcopter. Discuss progress in learning to fly the ELEV-8 as well as toy quadcopters, quadcopter simulators, etc. If you have posted your ELEV-8 build video (due earlier), include a link.

3.0 Progress and Plans for Accomplishing Challenge Goals

Items you may want to include in this section:

- Plans for the team's other videos (and progress, if any).

- More about rotor protection, especially if it is still evolving.

- Ideas about how to continue improving your flying capabilities. Remember that one video (due in the spring) needs to show every team member doing some basic flying (of the ELEV-8 or a commercial quadcopter or a toy) and you will want at least 2 pilots on your team who can fly the ELEV-8 pretty well for the challenge date.

- Plans for the camera mount challenge: Include at least one (conceptual) sketch. The final CAD design can wait until the Critical Design Review, but if you already have CAD for a final design, include it here. Explain your plans for fabricating the camera mount. Remember that this task must utilize CAD and 3D printing and/or laser cutting for the fabrication. Also discuss what camera(s) is (are) being considered and how you plan to switch between out-view and down-view – manually or using a servo mechanism.

- Ideas for accomplishing the close-up imaging challenge: Will this be the same camera that is being used for general exploration and mapping? Include ideas about how to focus and steady the camera, maximize/optimize resolution, and image targets on horizontal and vertical surfaces.

- Progress regarding the exploration challenge: Plans for generating maps (including elevation with real units), plans for learning to program Arduino microcontrollers and use them with sensors to measure physical parameters, plans for accomplishing a sample return (e.g. collecting a fluid sample from the exploration area).

- Some discussion of your unique capability – what is being considered and why.

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

4.0 Plans for Challenge Flight Day Operations

This section describes plans for operations and roles during the challenge flight day. These tentative plans will need to be finalized by the next report. Items to be considered are (a) flight equipment that needs to be switched out during exploration (if any), (b) how the video camera will switch between out-view and down-view, (c) how to get real units on maps (e.g. how to establish horizontal and vertical scales), (d) who will play what roles during flights, etc.

5.0 Organizational Chart and Description of Roles

Create an organizational chart (an "Org chart" – look up examples on the internet to see what this might look like) stating team roles and listing who is fulfilling each. Describe here (or else in the Introduction) who is involved in each part of the project and explain (briefly) what each part entails.

6.0 Budget and Parts List

List all parts (in an Excel spreadsheet). Include vendor, cost, and any other details that may be relevant (such as weight). In this report it is OK not to list travel costs, scholarships, stipends to advisors, and institutional indirect (if any), but someone (perhaps the adviser) needs to watch over those as well, as part of the overall budget. Describe or list (separately) your planned future purchases, as many as are known.

7.0 Schedule

This will include past as well as future dates, sort of like a journal. Detail how the past semester went (what you got done, how long it took, etc.). Lay out a timeline for the upcoming semester and what you are hoping to accomplish and by when. Look up "Gantt Chart" to see one way in which a schedule might be laid out. In addition to listing deadlines and tasks, add names of team members to the schedule (i.e. include who will be in charge of getting each part done). Spread the load!

8.0 References

Cite web links or other references you have used. This will definitely include the ELEV-8 instruction manual and our project's web site. This might include links to instructional videos you found useful, additional Arduino teaching materials, data sheets for sensors and other electronics, etc.

9.0 Appendices

This section is for supporting other documents. There may not be many yet, but you will need more in future reports. For example, in this report at least include the list of challenges announced at the kick-off – call that Appendix A. This section will eventually include the Arduino code you use for logging sensor data and/or for controlling servos, supporting calculations (like weight sums used to help you decide whether or not you can fly all your equipment at the same time or need to swap things out), etc.

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Community College Quadcopter Challenge

2017-2018

Final Report

Team Name

[Insert a Meaningful Photo or Figure (like a logo)]

Written by: (full names of all students)

Advisor:

Institution:

Report Submission Date:

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Table of Contents *(update these page numbers and delete this text) before submitting)*

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

1.0 Introduction *(Remove all explanatory text before submission; start with the text from your PDR and improve/expand on it as need be)*

Introduce the overall project with a general description of what you are trying to accomplish. Also introduce your team members and include a team photo with individuals identified, either on the photo or in a caption. Team roles will be described in the organizational chart later but a brief description about who has been working on what part of the project might be helpful here.

2.0 ELEV-8 Build/Fly Progress (Including Rotor Protection)

Report, using both text and photos (note: every photo, diagram, and graph needs a number and a caption), on the overall build of the ELEV-8 kit or any other kit that you used. Comment about as how build went, especially what was challenging, and any deviations you made from the instruction manual (such as installing a different flight controller board). Describe your rotor protection. Include CAD diagrams with key dimensions – at least one at an oblique (angled) view. Include comments on how and why the design was chosen, designs that didn't make the final cut and why (maybe), the material(s) used, price, how it was fabricated (does not have to be using laser cutting or 3D printing), and the finished weight. Include photos of the rotor protection on (and possibly off) the quadcopter. Discuss the process of learning to fly, including your experiences with toy quadcopters, commercial quadcopters, flight simulators, etcetera, if any. If you have posted your build video on-line, include a link. If you have posted your piloting video on-line, include a link.

3.0 Progress and Plans

Items you will want to include in this section:

- Plans and progress on the team's piloting, unique feature video, and (main) promotional/educational video.

- Talk about how you accomplished "precision" flying skills and if every team member was able to participate.

- Document the "camera mount" task: Include at least one (conceptual) sketch plus the final CAD design from which the camera mount was printed, complete with dimensions and at least one oblique view. If it has been fabricated, include photos of the camera mount with and without the camera in place, in both the "down-view" and "out-view" configurations. Discuss fabricating the camera mount. Discuss the camera(s) selected. Discuss and illustrate your out-view and down-view solutions. Explain when you will use which view and describe how you will switch between the two views – manually swap mounts, manually tilt the camera in a single mount, remotely tilt a single mount in flight, etc.

- Describe your preparing for the "close-up imaging" challenge: did you use the same camera that is being used for general exploration and mapping? Discuss ideas about how to focus and steady the camera, maximize/optimize resolution, and image targets on both horizontal and vertical surfaces. Include test photos taken of detailed targets on both horizontal and vertical surfaces.

- Describe your preparation regarding the "exploration" challenge: What sensors did you carry? Why were they selected? How were they logged? How did you mount them? (Note – the nearby running motors might mess up the readings on some types of sensors – check that out in advance!) Did you identify any "anomalies" in temperature, magnetic field, etcetera? Discuss the Arduino microcontroller programming that was done including issues you had, if any. Include figures/photos of hardware and

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

discuss flight operations associated with sample return (e.g. collecting a fluid sample or granular sample from the exploration area).

- Discussion (briefly) the main candidates considered for your "unique capability" and explain which one was selected and how it was implemented. Include figures, photos, and/or data relating to the unique capability.

4.0 Budget and Parts List

List all parts (use an Excel spreadsheet format). Include vendor, cost, and any other details that may be relevant (such as weight). In this report it is OK to skip listing travel costs, scholarships, stipends to advisors, and institutional indirect (if any).

5.0 References

Cite web links and any other references you have used. This will definitely include the ELEV-8 build instruction manual and our project's website. It might include links to instructional videos, Arduino teaching materials, data sheets for sensors, etc.

6.0 Appendices

This section is for other supporting documents. For example, include the full list of challenges handed out at the kick-off as Appendix A (if any). Include all Arduino flight code for logging sensor data and possibly for other functions like controlling servos, flashing warning LEDs, etcetera. Include supporting calculations, if any.

7.1 Acknowledgements and Words of Wisdom

Explicitly list specific people and institutions you'd like to thank including your adviser(s), your institution (for agreeing to field your team in this event), people at your institution who have helped out and NASA's CT Space Grant Consortium (CTSGC) for funded this project. Conclude this with 3-5 "Words (Phrases) of Wisdom" you'd like to share with potential future quadcopter challenge participants. These might be comments or bullet points listing some things that you found particularly useful or things you wish you'd known earlier or things you want them to try (or to avoid). One of my favorites, to motivate your thinking, is **"Learn from the mistakes of others – you cannot possibly live long enough to make them all yourself!"**

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Appendix A – Faculty Report Form

Directions: Appendix A is used for CTSG's annual reporting to NASA Office of Education

Section I – Grant Recipient Profile

First Name:		Last Name:	
Pro-Sum Number (If applicable):			
Award Type:			
Award Amount:			
Project Title:			
Project Description:			
Project Period:			
Institution:			
Official affiliate email address:		Phone:	
Permanent Address:			
City:		State:	Zip Code:

FACULTY INFORMATION ONLY	
Department:	

STUDENT INFORMATION ONLY			
Birth Date:		Major:	
Gender:	☐Male ☐Female	Ethnicity:	☐Hispanic or Latino ☐Not Hispanic or Latino
Race:	❑ American Indian or Alaskan Native ☐ Asian ☐ Some Other Race ❑ Native Hawaiian or other Pacific Islander ☐ White ❑ Black or African American		
Disability?	☐	If yes, please elaborate:	
Have you served in the United States Military Service?	☐Yes ☐No		

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Section II – Project Information

1. This project provides support for the following components (mark all that apply):	
Student/Student Teams: ❑ On-Site University Research Experience ❑ On-Site NASA Center Experience ❑ Student-Led Flight project(s) ❑ Student-Led non-flight project(s) ❑ Travel (Visit a NASA Center, present a paper, attend a workshop, conference, symposium)	**Educational Enhancement:** ❑ Seminar/Lecture/Symposium ❑ Competition Sponsorship ❑ Design Project Development ❑ Course Development (New or Revised) ❑ Pre-Service educator workshop
Other: ❑ Other (Explain):	

2-A. Project Activity Dates (mm/dd/yyyy):			
Start Date:		End Date:	
2-B. What was the duration of your project activity:			
☐ Short Event (≤ 2 Days)		❑ Long Event (>2 Days)	
☐ Multi-Month (Semester/ Quarter)		☐ Year-Long (12 Months)	

3. If the project activity was held in the US at a location other than a NASA center, please provide the city, state, & zip code of the location:	
City:	
State:	
ZIP Code:	

4. How many online STEM-based teaching tools were created and/or maintained as a result of this activity/project? *An online STEM-based teaching tool is defined as a resource for K-12 and informal educators and higher education faculty that provides support to improve educators' STEM knowledge and/or enhances student interest and proficiency in STEM*	

5. Does this activity provide opportunities for students to participate in an existing NASA-sponsored project?
❑ Yes ☐ No ☐ N/A
If yes, please explain:

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

6. New and Revised Courses - If your project included higher education course development during the period of this report, please answer the following questions:	
How many higher education course(s) have been developed using NASA-related content/support? (If zero, enter 0)	
How many higher education courses have been revised using NASA-related content/support? (If zero, enter 0)	

If courses have been created or revised, please give the following information:

Course Name	Course Number	Credits	Brief Description

Section III – Participant Information

1. Please enter the total number of direct and indirect attendees reached via this activity. Direct participants are individuals that are direct beneficiaries of the activity (i.e. participants and or attendees that may have registered for the activity) indirect participants are individuals that indirectly benefit from the NASA activity and/or can only be estimated (i.e. students that participate in revised courses that were developed via activity funds).

Participants	Direct Interaction	Indirect Interaction
Pre-Service Teachers		
Higher Education Faculty		
Undergraduate		
Graduate		
Post-Doctoral		
Community College		
Total Participants		

2. Direct Funded: Please enter the total number of direct student participants who received monetary support (regardless of the amount). This should be a subset of the total Direct Student Participants recorded in the table above. Direct funded student participants do not include recipients of reimbursements (i.e. travel, supplies, meals, etc...)	

3. Direct Significant Investment: Please enter the total number of direct student participants who received a significant investment. (The total number of significant investment students is a subset of the total number of direct funded participants.) *A significant investment is defined as participants receiving significant personal investment(s) of 3K or greater in financial support. 160 or greater hours of direct contact, or some of other support considered "significant"). For some projects the minimum level determining significant investment may be greater.*	

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

4. Faculty/Researcher Participant Information: Please enter the number of Faculty/Researcher participants by institution type. *Faculty/researcher participants encompass faculty (tenure and non-tenure), researcher, participant, research assistant and, staff.*	
Institution Type:	**Number of Faculty/Researcher Participants:**
Higher Education/College	
K-12	
Other (Explain)	
Total	

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Appendix B – Student Report Form

Directions: Appendix B is used for CTSG's annual reporting to NASA Office of Education. Each student must complete this form.

Section I - Student Profile

First Name:		Last Name:	
Date of Birth:		Major:	
Project Title:			
PI / Project Leader:			
Period of Performance:			
Institution:			
Phone:		Phone Alternate:	
Email (official school email address):		Email Alternate:	
Permanent Address:			
City:		State:	Zip Code:
Gender:	❑ Male ☐ Female	Ethnicity:	❑ Hispanic or Latino ☐ Not Hispanic or Latino
Race:	❑ American Indian or Alaskan Native ☐ Asian ☐ Some Other Race ❑ Native Hawaiian or other Pacific Islander ☐ White ☐ Do not wish to provide ❑ Black or African American		
Disability?	☐	If so, please elaborate:	
Are you a U.S. Citizen?		❑ Yes	☐ No
Are you a first generation college student?		❑ Yes	☐ No
Have you served in the United States Military Service?		❑ Yes	☐ No

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant

Section II - Longitudinal Tracking Data (Next Step)

Please select the appropriate category relevant right now. Indicate where or to what company/institution your next professional and/or academic step will take you.			
☐	**Still Enrolled in Current Degree Requirements**	Expected Graduation (mm/yyyy):	
		Degree Pursuing: (ex.: BS/ BA, MS, etc.)	
☐	**Graduated and Pursuing Advanced Degree**	Institution:	
		Degree Pursuing: (ex.: MS, PhD, etc.)	
		Area of Study:	
☐	**Post- Graduation Employment**	Seeking STEM Employment	
		Employed in STEM (Aerospace) Position[1]	
		Employed in STEM (non-Aerospace) Position[1]	
		Employed by NASA/JPL[2]	
		Employed in STEM Academic Field[3]	
		Employed in K-12 STEM Academic Field[3]	
		Non-STEM Employment	

1 Employed in a STEM position with government, for profit, or non-profit organization
2 2 Civil service employee or JPL employee
3 Faculty, teacher, or other academic position (K-Higher Education) in a STEM field
4 Employment or pursuing advanced degree in non-STEM industry, academia, or other government

NASA CT SPACE GRANT CONSORTIUM
203 Dana Hall, University of Hartford (Lead Institution), 200 Bloomfield Avenue, West Hartford, CT 06117
860.768.4813 ctspgrant@hartford.edu www.ctspacegrant.org @CTSpaceGrant