MN Space Grant 2014 – 2015

Community College Quadcopter Competition

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:

**Table of Contents (update page numbers before submitting)**

1.0 Introduction…………………………………………………………………….….3

2.0 Elev-8 Build/Fly Progress………………………………………………………....3

3.0 Progress and Plans for Competition Challenges…………………………………..3

4.0 Plans for Competition Flight Day Operations…………………………………….3

5.0 Organizational Chart………………………………………………………………4

6.0 Budget and Parts List…………………………………………………………...…4

7.0 Schedule……………………………………………………………………..….…4

8.0 References………………………………………………………………………....4

9.0 Appendices…………………………………………………………………….......4

1. **Introduction**

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 part of the project might be helpful here.

1. **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. 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. 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.

1. **Progress and Plans for Competition Challenges**

Items you may want to include in this section:

- Plans for the team’s promotional/educational “video” (and progress, if any).

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

- Ideas about how to continue improving your flying capabilities, especially with respect to the “multi-pilot” challenge – you need at least 3 pilots on your team who can fly a quadcopter (it could be the toy) and at least 1 who can fly the ELEV-8 in competition.

- Plans for the “camera mount” challenge: Include at least one (conceptual) sketch. The final CAD design can wait until your 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 3D printing and/or laser cutting. Also discuss what camera(s) is(are) being considered and how you will get both out-view and down-view video. Are you using a tiltable camera mount or more than 1 camera mount?

- Ideas for accomplishing the “close-up imaging” challenge: Will this be the same camera that is being used for general exploration and mapping? (Remember that only one camera may fly at a time). Ideas about how to focus and steady the camera, maximize/optimize resolution, and image targets on both horizontal and vertical surfaces.

- Progress regarding the “exploration” challenge: Plans for generating maps (including elevation and 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).

1. **Plans for Competition Flight Day Operations**

This section describes plans for operations and roles during the competition flight day. These tentative plans will need to be finalized by the next report. Items to be considered are (a) equipment needing 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.

1. **Organizational Chart (and perhaps 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.

1. **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), but someone needs to be watching over those as well as part of the overall budget. Describe or list (separately) your planned future purchases, as many as are known.

1. **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 this might be laid out.

1. **References**

Cite web links or other references you have used. This will definitely include the Elev-8 instruction manual and might include links to instructional videos, Arduino teaching materials, data sheets for sensors, etc.

1. **Appendices**

This section is for supporting other documents. There may not be many yet, but you will need more in future reports. For example, include the list of challenges handed out at the kick-off as Appendix A. This section might also include Arduino code for logging sensor data and/or for controlling servos, supporting calculations, etc.