MN Space Grant 2015 – 2016

Community College Quadcopter Challenge

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: (submission date – presumably on or near the due date of Dec. 1, 2015)

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1. **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.

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 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.

1. **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.

1. **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.

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 (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.

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 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!

1. **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.

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, 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.