**The VEX Preliminary Design Investigation (PDI)**

The PDI is your opportunity to gather and organize your thoughts on your VEX project (either MRR or LAZ). It serves as a start for your project as well as a resource you will be able to look back on during more technical portions. Please be as in depth as possible, the more you include, the more it will help you. The Open Lab TA will grade and discuss your report with you. Make sure all members of the group contribute and understand each portion of the report.

**Sections**

**(Your PDI does not have to answer every question explicitly, but should be detailed enough to help you throughout the course of your project. Each project is different so write about what your project entails.)**

Introduction

(This section should cover the general ideas of the project, as well as research you did on the problem and existing solutions)

* What was the problem statement you were commissioned to solve?
* Give a brief overview of the technology used in the project
* What are the requirements and limitations for this project?
* What are the major course obstacles that you are expected to overcome?

Company Profile

(This section explains your and your company’s credentials. Every member should have a fictitious role in the company.)

* Explain your company’s founding and mission statement
* What are some similar previous works that your company has worked on?
* Introduce each team member’s role and qualifications
* Why should NASA invest in your company?

Resources

Physical Components

(This section lists out all the materials that you plan to use for the project)

* List out the materials that you plan on using and the purpose of each material

Software Requirements

* List out all the languages, IDEs, and libraries that you plan to use for this project.

Procedure

Physical Construction

(This section deals with the mechanical design of the project. This is your opportunity to show the idea come to life in a rough way. Include any preliminary CAD models as well as sketches and relevant designs)

* How does your design work?
  + How does your design overcome the obstacles on the course?
* What makes your design more practical/effective/efficient than other designs?
* How does each portion of your design integrate into one another?
* How do you plan on assembling your project?
* Are you attempting to achieve mechanical motion?
  + What motors are you using?
    - Do you have sample code/libraries for your motors? (This helps a lot)
      * Label/format any figures and/or tables properly
  + If you are attempting linear motion, how will you achieve it (Rack and pinion, actuator etc…)
  + How does the presence of a gear train impact your design, if applicable?
* Is there space for your electronic components? (Wires, motors, sensors etc…)
  + If not at the moment, how do you intend to implement it?
* How do you believe your design will change during the course of the project?
  + Do you need to modify your design for future requirements?

Software Setup

(This section is about how you will achieve functionality of your project. This will not be finalized, but the more in depth you go, the less you will have to think about during the course of the project)

* Give a general overview of what steps your product needs to go through to achieve full functionality
* Are you using any sensors?
  + What sensors are you using?
    - Do you have sample code/libraries for your sensors? (These helps a lot)
* What kind of programming do you need to do other than running sensors/motors?
* Add in any other project-specific requirements and how you attempt to achieve them.

Project Schedule

* Include a project schedule and give a brief description and explanation
* How will you split the project workload?
* How will you maintain your project journal/engineering notebook?

(If your project is heavy in certain aspects like mechanical design or programming, do not split up based on specialty. This will result in an uneven distribution of work.)

Conclusion

* What problems do you expect to run into along the way? How do you plan to solve them?