

The Preliminary Design Investigation (PDI)

The PDI is your opportunity to gather and organize your thoughts on your RAD project. It serves as a benchmark point in 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. Your RAD mentor will grade and schedule a meeting with you to discuss your report. 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 problem does your RAD project attempt to solve?
- Why is this problem relevant today?
- What approach are you taking to solve this problem?
- Are any other companies/products attempting to solve this problem?
 - How does your approach differ from theirs?
 - Do you believe your product will be a better solution to the problem?

Resources

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?
- What makes your design more practical/effective/efficient than other designs?
- Are the parameters of your design what consumers will be looking for? (Is it the right size, shape, easy to use etc..?)
- How do you plan on manufacturing each component of your design? (3D printing, laser cutting, woodworking etc...)
 - Is this the most efficient way to do so?
 - How does the manufacturing type help with the functionality(waterproof/strength)
- How does each portion of your design integrate into one another?
- Are you attempting to achieve mechanical motion?
 - What motors are you using?

- Why are they the best for your project? (Do research, a motor can make or break a project)
- Do you have sample code/libraries for your motors? (This helps a lot)
- If you are attempting linear motion, how will you achieve it (Rack and pinion, actuator etc...)
- Is there space for your electronic components? (Wires, motors, sensors etc...)
- How do you believe your design will change during the course of the project?

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
- What microcontroller are you using (Arduino, Raspberry Pi, etc...)
 - Why did you pick this?/What performance will you need out of your microcontroller?
- Are you doing any sort of data acquisition?
 - What sensors are you using?
 - Why are they the best for your project? (Do research, a sensor can make or break a project)
 - Do you have sample code/libraries for your sensors? (These help a lot)
- What kind of programming do you need to do other than running sensors/motors?
- Are you using any external electronic components (H-Bridges/transistors etc...)
 - How will these help the efficiency of your project
- Add in any other project-specific requirements and how you attempt to achieve them.

Cost Estimate

- Include all chosen sensors and motors (Purchasing materials early is better.)
- Include costs of manufacturing materials (acrylic, wood, etc... Ask if you do not know)

Project Schedule

- Include a project schedule
- How will you split the project workload?

(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?
- Do you believe your project is feasible with the limits given? (\$100, One semester)