Automatic Measurement System for Cargo Volume

Sponsor: Panasonic

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Title Page

- Have a cover page with the course name and semester, project title, team name, team number,

team member listing, section instructor, and date.

• Table of Contents

- List the major sections, along with page numbers.

• Introduction

- Introduce the project. Discuss the background and significance of the project. The customer

requirements should be “set in stone” by this point. Information sources should be seamlessly

integrated.

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• Engineering Specifications

- Present all of the engineering specifications in detail using QFD. Describe your customer

requirements and how you have translated them into engineering targets. Engineering targets

should be well defined, numerical, and complete. It is critical to include how the QFD was

developed and discuss the meaning of the QFD in the text.

• Concept Generation

- Describe the major categories of concepts generated and the methods that were used to

generate these concepts. This should include brainstorming and the morphological charts at a

minimum.

• Concept Selection Process

- Describe the methods used to select the chosen concept. In most cases, concept selection and

scoring matrices should be used. In the main text show in detail the selection methods for at

least your top five concepts and put the rest of the details in an appendix. Be sure to discuss the

advantages and disadvantages of the top five concepts. Make a strong objective argument why

the concept you have chosen is best (with respect to the customer specifications and

engineering requirements).

• Selected Concept Description

- Describe an overview of the chosen concept, using layout drawings and renderings to show how

subsystems (identified by functional decomposition) interact and fit together.

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| - | Engineering Design Analysis |
|  | Analyze the specifications and discuss the engineering fundamentals that will need to be  addressed to achieve the project goals. In particular, what scientific fields are involved and  how are they relevant to the design problem?  Describe the approach that was used to determine the specific parameters (e.g.,  dimensions, shape, materials, variables from algorithms, functionality of circuit boards,  etc.) for your design.  Each engineering decision should have a strong rationale behind it, such as equations or |
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engineering logic. A way to do this is to summarize the steps you have taken to arrive at

your detailed design, and discuss your engineering logic and conclusions for each step. If

you felt you don’t have too much to say, this means many your design decisions were

made randomly and arbitrarily, which might not lead to a satisfactory grade. Since

including derivations and large numbers of basic equations can be cumbersome to read in

a report, put the calculations in a clean appendix. Explain the accuracy and the

applicability of your calculation.

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| - | Design Description |
|  | This should include a detailed layout drawing with dimensions. All materials that will be |

used should be selected to the degree possible. In addition, provide a full description with

drawings of the operation of your device. Software projects are required to explain their

projects in sub-function using animations or flow charts if necessary. It should not only be

clear what the final design is, but how it can be made, how it will work, and why it will

work. List all parts used and their cost.

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|  | In short, the description should be detailed enough for another team to build the final  prototype, using this report as a reference. |
| - | Manufacturing Plan |
|  | The manufacturing plan should include a list of materials and their associated  manufacturing processes. If the prototype can be built in the machine shop, list the |

machine tools and operations that will be used. While a drawing with tolerances is not

necessary, describe where tolerances will be important in your prototype, and where they

are less important.

Analog to the mechanical processes, describe detailed flow charts if the core of one

project is about programming and simulation. Algorithms should still be explained in detail.

Please list the programming language or software and the existing source codes or

libraries you are going to use. As for electrical hardware, provide detailed designs and

layouts for whatever parts which will be fabricated.

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|  | Provide budget considerations. Is the initial budget enough for all the tasks? If not, how  can the monetary problem be resolved? |
| - | Validation Plan |
|  | Describe a systematic means to demonstrate that the engineering specifications have |

been met. Begin thinking about all the experiments that will be necessary to prove that

your engineering specifications have been met. List the engineering specifications that you

will test for, and how the tests will be conducted. For those engineering specifications that

will not be validated via testing or experimentation, what in your engineering analysis

suggests that the specifications will be met? Is experience dictating that these

specifications will be met? Be clear about (1) what it is testing for, (2) how the test will be

conducted, and (3) what are the expected outcomes.

• Project Timeline and Plan

- List / modify all the tasks and their deadlines as appropriate to achieve a successful prototyping

and validation of your design, including a quality Design Expo Presentation and the Final Report.

Summarize the project plan in a figure such as a Gantt chart or something similar.

• Analysis of Potential Problems

- It is expected that you can analyze what could go wrong and how you might recover in the face

of the deadlines ahead.

• Conclusions

• References

• Appendices

- As appropriate, document major categories of design concepts generated.

• Bios