NXT Robot Formal Report Format

Your team is responsible for composing a single group report that gives a detailed description of your group's robot design. The audience of this report is your instructor/TA. The tone should be formal.

The two main purposes for writing this report are to document your robot design and to demonstrate formal report writing skills. Grading is stricter most other lab reports, so please follow the specified report format, edit unclear/wordy text, and have multiple members of your group proof read the report!

Your report should contain graphs, tables drawings and equations that will clarify the text. You also need to make sure to reference all ideas, equations, figures or quotes that you take from other sources.

Your group is acting as a sub-team within a larger design team. Therefore, the intended audience for the report is the larger design team. Your goal is to convey the results of your performance analysis, your prototype testing (such as your component test results), and your recommendations for your design of the robot machine. **A common test to know how well your report is written if a reader (with proper background knowledge) would be able to reproduce your analysis and testing, and build your final design from reading the report without having to ask your group any questions. Note that the scenario of a sub-team performing work for a larger team, including reporting, is how Boeing designs jets and Microsoft writes software.**

Report Format
A technical report should be a professional document. Graphs, tables, and drawings should be used to clarify the text. The three main parts of a common technical report format are shown below in figure 1:

I. FRONT PAGES
The front pages include a cover page, table of contents, list of figures, and list of tables. The page numbers are Roman (ex: ii, iii, etc.) and there are no numbers on the cover page (although it is considered the first page).

Cover Page
The first page of the technical report should be unnumbered and includes:
- Name of the report
- Group number
- Group member names
- Class and section (ENGR 100A)
- Date
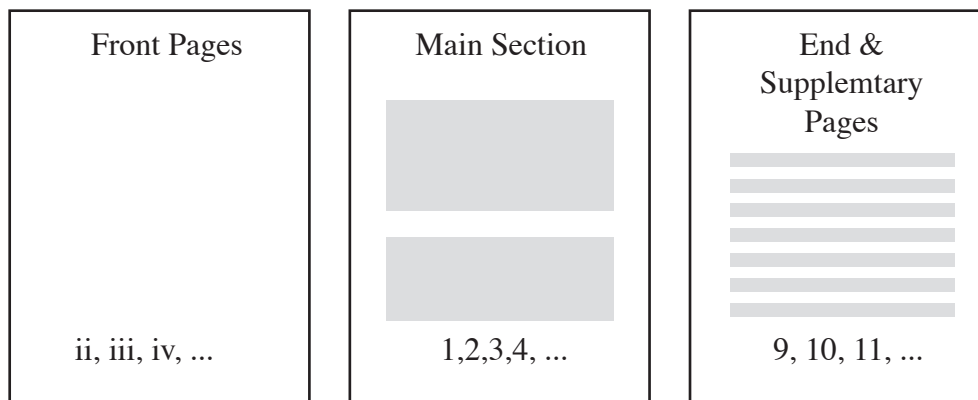
Figure 1: Structure of the formal robot report format

Each item should be centered and separated by enough space to fill the whole page and give the cover page a good appearance.

Table of Contents
This is a listing of the major sections in the report and the page numbers on which they begin. The table of contents does not list itself but includes the page numbers of the pages that appear in the front of the report, major sections, and appendixes.

List of Figures
This is a list of all of the figures in your report and the page numbers on which they are found. Do not include this section unless you have at least three figures in your report.

List of Tables
This is a list of all of the tables in your report and the page numbers on which they are found. Do not include this section unless you have at least three tables in your report.

Figure 2 shows a sample of the front pages.

II. MAIN SECTION
This is the main part of the report. The page numbers begin with one and are numbered using Arabic/Hindu numbers (ex: 1, 2, 3, 4, etc.). After the executive summary, each major section should be numbered and titled as shown in figure 3.

For the main section of the report, use the following organization and headings:
1.0 Introduction
This section outlines the parameters of the robot project or the problem definition/specification. Additionally, it addresses the project purpose and what your group hopes to accomplish. After reading this section, a person should know in broad terms what your team was trying to do and the goals. At the end, briefly outline how the report is organized with a sentence like "This report will discuss ... in the following sections".
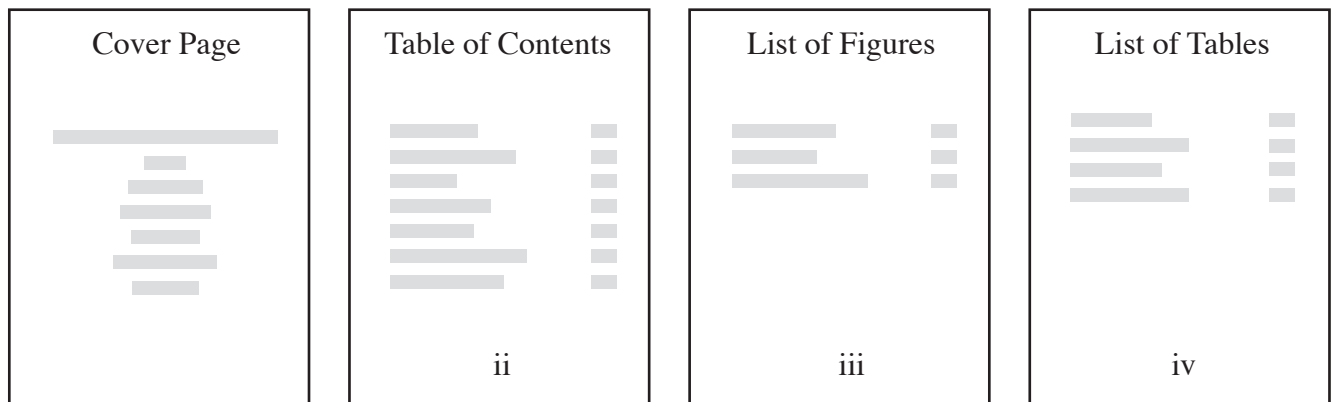
Figure 2: Front pages example

2.0 Robot Construction

This section presents details about your group's robot body design. Start with an introductory paragraph that describes the robot's body in general. Use a multiple view layout (pictures or drawings), as shown in figure 4, to illustrate the robot's shape and size. Use subheadings to describe the main features of the robot (for example, 2.1 Gearing, 2.2 Light Sensors, 2.3 Bumpers, etc).

3.0 Design Specification

This section outlines the programs written for your robot. The subheadings should be the design parameters of the particular robot project. Before each sample of NXT code, write several sentences explaining what the program does and its logical flow. These initial comments will help a reader more easily decipher the code. Then include a figure showing the program (for NXC code, include the code in the appendix). You may include arrows and text boxes to further explain the program. The code must be readable, so use multiple screen shots if necessary.

4.0 Design Process

Explain the process your team used to create with the final design. Most likely your group built and programmed multiple robots before you guys found a working solution. Trace through the history of your design process by describing each robot you guys built, what worked and what failed, and how you fixed the problems (construction or programming) with redesigns. Be careful to not repeat the same information in section 2.0.
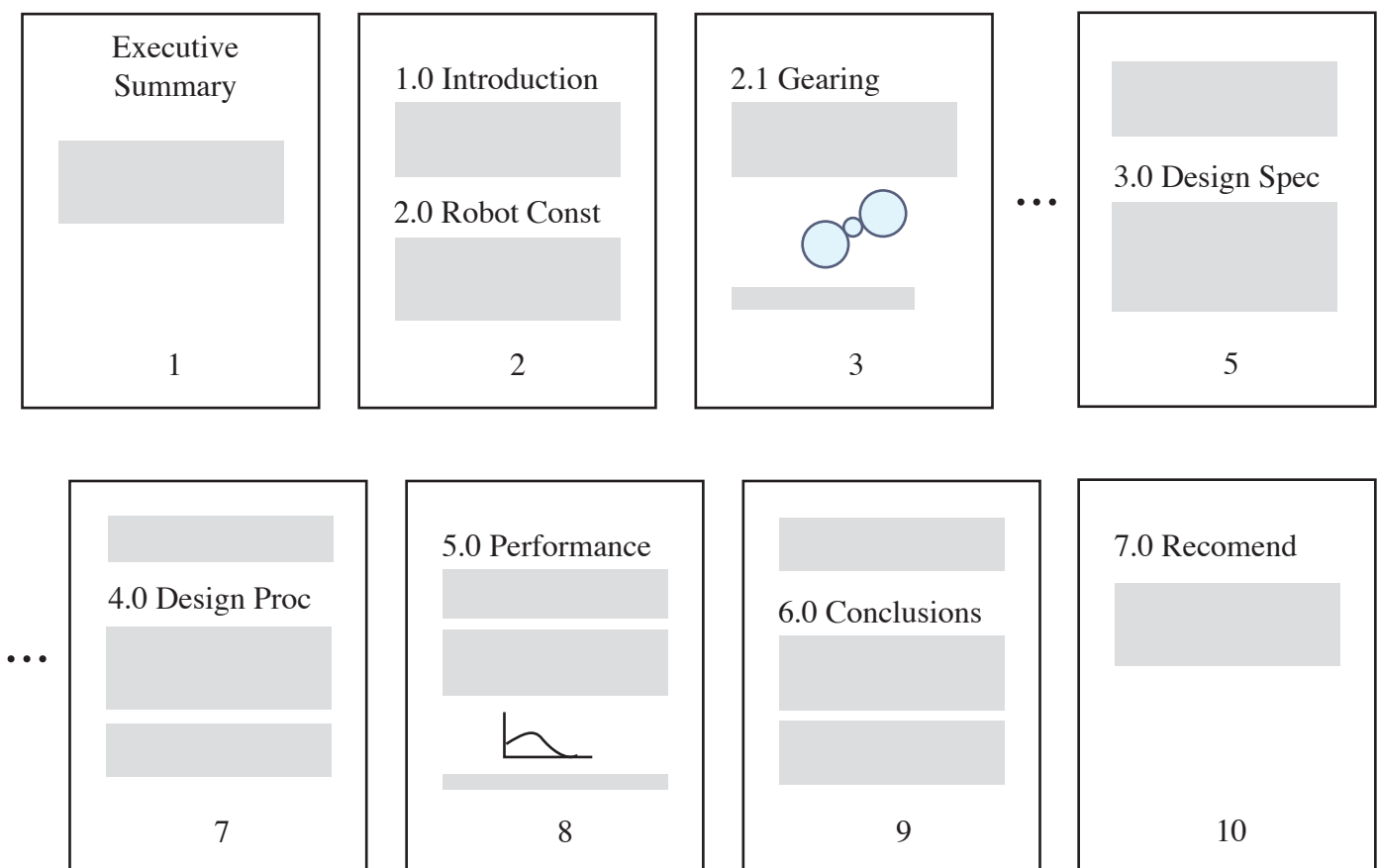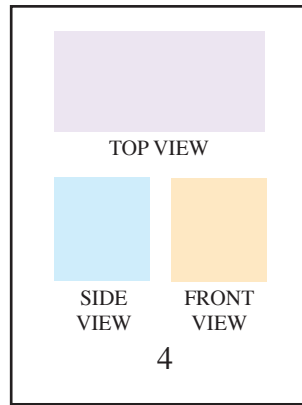

Figure 3: Main section example

Figure 4: Mulitple view layout example

5.0 Performance Results & Discussion

This section briefly presents the results of your robot in the competition (pts = score). Was the outcome of the competition more or less as your group expected? What caused the machine to fail or succeed? Was the failure due to the hardware or software design? Even if you have negative information to report, the writing should be confident. You can mention that recommendations will follow, but be careful not to make recommendations in this section.

6.0 Conclusion

This section should be a brief, bottom-line summary. It needs to explain how your group's robot met the design criteria and team goals outlined in the introduction (general, no specifics). Do not mention any new ideas in the conclusion section; instead restate the key points from the body of the report.

7.0 Recommendations

With the new information you have acquired from the competition, how would your group change its design if they have to do it over? Remember to provide justification for each recommendation. Concentrate recommending changes for parts of your design that didn't work.

III. END & SUPPLEMENTARY PAGES

This final section includes additional information to support the main section. This section allows readers to learn more detailed information about your project but this information does not really fit in the main section. Generally this includes references and appendices.

References

Reference the ideas, theories, figures or quotes that your group used from other sources. Listing of references should follow the format described in "Referencing your work".

Appendices

This section includes additional background and/or supplemental that a reader may need to better understand your design. If you used NXC, your group's code listings would be placed here.