

## Requirements on the Final Report of Course Project

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In the semester each team needs to submit a **Final Report of the course project**. Please carefully and thoroughly read the follows for detailed requirements on the format and contents of the report. The grade of your report will be determined by its *completeness, clarification, technical soundness, and professionalism* of the representation.

- **Format of the Report:**

The report should be **at least 5 pages** excluding cover page, table of content, source code and references. The report should use **single spaced lines**. The font of the main text body should **not be larger than 12pt**. The page margin should not be more than 1.25" \* 1.25". If a figure, picture or table is used, it should not be larger than a half page. Do not separate each section on different pages. All the pages except the cover page need to be numbered.

Use a separate page for all references. Absolutely include all references you use for the project (including webpages where you find sample codes for your project).

- **Contents of the Report:**

The report MUST include the following components:

- **Cover Page:** including NYCCT & department name, your project title, course title, class section number, semester & year, all team member's names, instructor's name, report submission date
- **Table of Contents**
- Main body of the report (**at least 5 pages!**):
  - **Title of your project**
  - **Abstract and detailed description** of your project: the tasks your finished system can achieve; the functionalities and features your project has.
  - **System Design:** to clearly explain the system design. Use block diagram and flowchart help the explanation. Include pictures to show the entire finished system.
  - **Major Subsystems/Components Design:** Detailed description of the design of major subsystems/components of your project
  - **Testing Procedure & Analysis:** Detailed testing procedure, activities and testing data analysis you conducted on both component and system levels
  - **Circuitry or Wiring Schematics:** No hand-written schematics allowed!

- List of devices and parts used for your project. (Detailed description is not necessary here)
- Final Results, Conclusion and Discussion: you can include screenshots or pictures to show final results of your code/system/project here.
- Appendix: Source code of your complete sketch. (Note: Use a smaller font-size here!)
- References

- **Detailed Requirement on the Content:**

1. Cover Page: Include your team name (if applicable), all team members' names and CUNYFirst IDs. Indicate submission date, the class name and section number.
2. Project Title: A clear, well-defined title that clearly and precisely reflects the main task, feature or functionality of you project.
3. In the main body of the report, expand the title to clearly describe and explain the task your project achieved. In other words, you need to technically clarify your project by detailed descriptions. For example, for a tape-track following mobile robot project, you need to clarify the colors of the tape and the floor, and the shape of the tape-track (circle or arbitrary shape?). Please be technically specific as much as possible!

In addition, if necessary, clearly specify any relevant technical measure, not just verbal description, which is applicable to the task of your project. For example: a flying robot can reach 200ft in height as the maximum; an obstacle-avoiding robot can avoid all obstacles by keeping a spacing at least 0.5ft away from an object; an tape-track following robot will not be off the tape for more than 5cm during its movement. In other words, if necessary, provide certain technical specifications for your project.

4. Clearly describe and state the project setup and initial conditions under which your system functions.

For example, for an obstacle-avoiding robot project or a tape-track following robot project, you need to clearly explain the setup of the field where the robot runs, the robot's starting position, and the shape and size of the tape-track. During the final demonstration, an enclosed area with a size of 8\*8fts may be set up for you robots to run.

5. System Design: **EXTREMELY** important!

Include a **block diagram** and a **flowchart** to show your system design. Also you need to describe and explain the design. For example, you can use a block diagram to show how the system is made of and how you integrate things together. You can also use a flowchart to show how your robot works and how data/command flows through the system from the sensors to the actuator (motors).

6. Major Subsystems/Components Design: **EXTREMELY** important!

Explain the design of the major subsystems/components of your project: mechanical component, electrical component and programming component. For example, you can use an AutoCAD graph to show the mechanical component such as your robot layout, the number and assembly of wheels.

In addition, you must explain the design (circuit and code) on how to control motor speed and/or direction by H-bridge, how to use the sensors with Arduino, Bluetooth communication in your system.

7. Testing: Explain the detailed testing procedure and activities you conducted on each component and on the entire system; present any issue or problem you encountered through the testing and technical solution you used.

For example: for testing of motor, you find out if duty cycle is too low, the motor does not spin. After you increase the duty cycle, it spins. The reason is the Arduino UNO's PWM freq is only 490Hz, and when duty cycle is too low, torque generated in every period is not great enough to make the motor spin.

Another example: for testing of sensor, how you calibrate the sensor? How you use or create a given condition and calibrate the sensor?

Some other testing activity regarding sensor may be: you find out the reading is not always the same (which is normal!). The solution you can use to overcome this issue is to read in more than one readings and then do average.

**Note:** you MUST include testing for each major component (motor, sensor, Bluetooth, .... ) and the entire system!

8. Circuitry schematics or Wiring schematics: You must use software to draw the circuitry or wiring schematics, such as *Fritzing*, *MultiSim* or *Eagle*. No hand-written schematics are allowed!

9. You can include pictures and screenshots to help explain the system design, major subsystem design, and final results/conclusion. But limit their size to half page as maximum!

10. Appendix: Include the source code of your complete sketch to the end of the entire report. Note: Use a small size (9pt or 10pt font size) here!

**Please submit the report ONLY via the Blackboard. For me to assign a grade, every member in a team MUST submit a copy of the report you team write onto the Blackboard!**

**Due date: TBA on the Blackboard**