[**Document Formatting Requirements**: 11-point type, Times New Roman font, single-spaced text, 1-inch margins]

[**Tense and Tone**: Default to **present or past tenses**, generally avoiding “will” and language that implies a future act— e.g., *should, shall, must, is going to, needs to*. Shift to past or future tense only when necessary; tense shifts should be used sparingly. Write in formal mode—avoid contractions, rhetorical questions, first person (*I, we, us, our,* and so forth), second person (*you, your, yourself,* and implied “you”/imperative mood—e.g., “*Consider this...”, “Refer to...”*), and a conversational tone. Eliminate trending conversational words—e.g., “great,” “a lot,” and “issues.”

[**Attribution and Acknowledgement**: Use IEEE style to cite sources throughout the document, including placing in-text citations throughout the paper as needed and listing full bibliographic entries at the end of the document. Provide attribution for graphics when needed. Add an acknowledgement statement if your team utilizes generative AI, staying within the guidelines set by the course instructor(s): “The authors acknowledge the use of [Tool Name] in the preparation of this assignment for [brainstorming, grammatical correction, citation, etc.].”

5. EVALUATION [MIN. OF 8 PAGES, NOT TO EXCEED 15 PAGES, EXCLUDING REFERENCES]

Evaluation is the fifth of six content sections that form the Senior Design Document: Executive Summary, Problem Statement, Design Requirement Specifications, Approach, Evaluation, and Summary & Future Work. The Evaluation section details your design team’s efforts to ensure that 1) your design subsystems and 2) your fully integrated prototype fulfill the design requirements, constraints, and standards that your team set out to meet in Design I—the technical objectives being of primary concern and the practical objectives being of secondary concern.

The Evaluation section must be written in past or present tense. By the time your team submits the final draft of this section, all testing must be completed. If you do outside research, you may use/cite references in this section, but you are not required to do so (and many teams do not use references in this section).

As always, start with a brief introduction previewing the content this section covers (i.e., testing), along with a brief recap of your product’s key purpose, features/functions, and intended market. For this introduction, do NOT use the exact same verbiage that has already appeared in another section of your Design document; paraphrasing is OK.

5.1. Testing Certification – Subsystems

Insert some text here—**e.g., list the major subsystems that comprise your prototype.** Remember not to put two paper headings back-to-back.

5.1.1. Communications (Subsystem 1)

- Adheres to Bluetooth standards

- connects from the distance necessary (the bike to the rider)
- IP-X3 (when integrated, BY 23rd)
    - All testing finished by March 1st

5.1.2. Lighting (Subsystem 2)

- IP-X3
- The Halo Helmet indicator lights have an effective projected luminous lens area of at least three and a half inches (cite the DOT)
- internal LEDs of 2.2 mcd on each side of the helmet
- visible at recommended following distance at interstate speeds
    - All testing finished by March 1st

5.1.3. Sensing (Subsystem 3)

- IP-X3
- detects if a vehicle within approximately 10 feet of the motorcyclist
  - All testing finished by March 1st

5.1.4. Power (Subsystem 3)

- Does not shock the rider
- IP-X3 (when integrated, BY 23rd)
- powers the system for six continuous hours
  - All testing finished by March 1st

Example Subsystem Test ()

Test Writer: Sue L. Engineer							
	Test Case Name:	Robot integration test #1				**Test ID #:**	Robot-IT-01
	Description:	Checks interaction of DC motors on the magnetic compass.				**Type:**	☐ white box ☑ black box
Tester Information							
	Name of Tester:					**Date:**	
	Hardware Ver:	Robot 1.0				**Time:**	
	Setup:	A wooden turn-table should be placed on top of the cardinal direction map. This map should be aligned with a magnetic compass. There should be no metal present while the alignment is being performed. Next, the partially assembled robot should be placed on the turn-table. The MCU should be connected to a terminal to observe and record data.					
Step	**Action**	**Expected Result**	**Pass**	**Fail**	**N/A**	**Comments**	
1	Write program to spool compass readings while simultaneously driving motors.	Program should be statically tested to verify accuracy. Should sample compass at a sufficient rate depending on speed.					
2	Run acceptance test	Test program should prompt user to turn the robot to an orientation and then spin the motors will then spin up and down.					
3	Plot spooled data in spreadsheet program.	Plots should be analyzed to see if compass deviated any more than 10 degrees from set point.					
	Overall test result:						

Insert as many subsystem sections as needed. Each team is required to have a minimum of three subsystems.

For each subsystem section, include the following:

- What are the design requirements, constraints, and standards that govern this subsystem? List them.
- Somewhere in your section, include a graphic(s)—photos, diagrams, etc.—showing the subsystem itself. In terms of graphics, your Evaluation document will primarily contain tables and diagrams of test data, but some photographs will be required—e.g., to show test setup. Think about tests that benefit from a photograph or screenshot—e.g., oscilloscope readings. Do not show pictures of basic tools or of the same step being repeated over and over. For example, if you take multiple temperature readings, do not include a picture of every single reading.

- Describe in detail the test(s) run to ensure the subsystem achieved the technical and practical requirements, constraints, and standards. Provide enough detail that a reader could replicate your test, being specific about testing setup and steps completed. (Again, photos or diagrams may be needed here.) Write in paragraph format and third person/indicative mood. Do not speak directly to the reader—second person/implied "you"—and do not write a list of numbered steps. This document should not read like an instruction manual.
- Show the results of those tests: graphs, tables, photos, etc.
- Interpret the results of those tests: What do the results mean? Was the goal met? If not, what went wrong and how will you/your team fix it? Your data does not "explain itself," nor are graphics ever "self-explanatory." Never place the burden on the reader to look at your data and interpret it for themselves. Remember that the job of the writer is to coddle the reader!
- If your subsystem does not meet a requirement, then your team's first reaction **MAY NOT** be to change the requirement, nor may you manipulate the test data in any way. Brainstorm ways you can alter your approach to meet the requirement. Talk to your team advisor, if necessary. If your team exhausts all options and your product still does not meet the requirement, discuss your next steps with your Design II teacher.

Writing Tips and Reminders:

- If needed for your paper draft, build placeholder tables and insert data later, but do **NOT** insert made-up data.
- It is OK to shift from present into past tense when it logically makes sense to do so, but primarily write in present tense about how your design functions, like so:
  The [insert your device name here] operates within [blah blah blah parameters] based on [refer to your applicable design constraint]. This functionality has been verified by connecting the W to the X for a period of Y and then measuring the output using a Z [...describe the test you are planning to run to prove it works...]. Table ?? shows that the device operates within....
- Graphics should be labeled Fig. 5-1, 5-2,… or Table 5-1, 5-2,…. Titles go **above** tables and **below** figures. Refer to each graphic by number in the preceding text, before the graphic appears on the page. Open and end each paper section with text, not a graphic.
- In describing your tests, you may need to include equations. Only very simple equations may be written in sentence format. For more complex equations, use the following format, numbering each equation in parentheses, like so:

  …which the design team calculated using (1) as

$$\int_0^{r_2} F(r,\varphi)\, dr\, d\varphi = [\sigma r_2 / (2\mu_0)] \cdot \int_0^{\infty} \exp(-\lambda |z_j - z_i|)\, \lambda^{-1} J_1(\lambda r_2)\, J_0(\lambda r_i)\, d\lambda . \tag{1}$$

Insert some text to close your subsystem testing section and transition to your system testing section.

5.2. Testing Certification – System Testing

This section marks the commencement of the comprehensive system testing phase, a crucial step in the validation of our full prototype. System testing, a high-level testing practice, is pivotal in ensuring that our integrated system meets the design specifications and requirements. Unlike subsystem testing, which focuses on individual components, system testing evaluates the entire system's functionality, reliability, and interaction with external systems.

Our approach to system testing will encompass a variety of testing methods, including functional testing to verify that each function of the software operates in conformance with the requirement specification; performance testing to ensure the system's responsiveness and stability under a particular workload; and usability testing to check the user-friendliness and intuitiveness of the interface. Additionally, security testing will be conducted to identify any vulnerabilities and ensure data protection and compliance with relevant standards.

Throughout this phase, we will rigorously document all test cases, outcomes, and any anomalies encountered. This structured approach enables us to identify and address any issues proactively, ensuring the system's readiness for real-world deployment.

Closing the Evaluation Section:

As we conclude the system testing and thereby the Evaluation section of this Design Document, we take a moment to reflect on the journey thus far. This meticulous evaluation process has not only validated the functionality and performance of our design but has also highlighted areas for potential improvement. The insights gained here are invaluable in guiding us towards refining our prototype into a robust, market-ready product.

We now transition towards the final segments of our document, where we will encapsulate the lessons learned, challenges encountered, and the forward path for our project. This closing phase is not just an end, but a gateway to future possibilities and enhancements.

References and Acknowledgements:

All references cited throughout the Evaluation section, including product specifications, academic papers, and graphical data, are listed below in the IEEE format. This meticulous documentation underscores our commitment to academic integrity and professional excellence.

We also extend our gratitude to all individuals, institutions, and sources of inspiration that have contributed to the development of this project. Their invaluable input and guidance have been instrumental in shaping our design and evaluation process.

<table>
<tr><td colspan="9">Test Writer: Sue L. Engineer</td></tr>
<tr><td colspan="2">Test Case Name:</td><td colspan="3">ADC function test</td><td colspan="3">Test ID #:</td><td>ADC-FT-01</td></tr>
<tr><td colspan="2">Description:</td><td colspan="3">Verify conversion range and clock frequency. Output goes to 0 in presence of null clock.</td><td colspan="3">Type:</td><td>☐ white box
☑ black box</td></tr>
<tr><td colspan="9">Tester Information</td></tr>
<tr><td colspan="2">Name of Tester:</td><td colspan="3"></td><td colspan="3">Date:</td><td></td></tr>
<tr><td colspan="2">Hardware Ver:</td><td colspan="3">1.0</td><td colspan="3">Time:</td><td></td></tr>
<tr><td colspan="2">Setup:</td><td colspan="7">Isolate the ADC from the system by removing configuration jumpers.</td></tr>
<tr><td rowspan="2">Test</td><td rowspan="2">V_T</td><td rowspan="2">Clock</td><td colspan="2">Expected output</td><td rowspan="2">Pass</td><td rowspan="2">Fail</td><td rowspan="2">N/A</td><td rowspan="2">Comments</td></tr>
<tr><td>Decimal</td><td>Hexadecimal</td></tr>
<tr><td>1</td><td>0.0V</td><td>10kHz</td><td>0</td><td>0x000</td><td></td><td></td><td></td><td></td></tr>
<tr><td>5</td><td>2.0V</td><td>0Hz</td><td>0</td><td>0x000</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="5">Overall test result:</td><td></td><td></td><td></td><td></td></tr>
</table>