Humanize before you submit

Likely Turnitin score: **45-80%** - over 20%

Humanize the colored text

Keep humanizing until this report says Ready to submit.

Once the title says Ready to submit, you're covered: if Turnitin flags it after that, get a free month of Pro Bundle ($14.99) - plus $25 if the text came straight from our humanizer. This report isn't covered yet. See terms

Reads as AI - catches 83 of 100 sentences Turnitin flags

Borderline - with blue, catches 95 of 100; marks a bit more than Turnitin

Measured on 1,707 Turnitin reports of 20% or more, October 2026. Papers vary.

Highlights are our estimate - Turnitin may mark other sentences.

EliteWorks is not affiliated with Turnitin.

EliteWorks

MEMORANDUM

Problem Definition: Project SENTRY

ACV Actions operates a digital vehicle marketplace built on transparency, supported by comprehensive inspection data. Their current imaging platform, Viper, and Virtual Lift capture vehicle condition information during routine dealership service visits. However, these systems depend heavily on consistent environmental conditions within the dealership service lanes to function reliably. Currently, dealership lanes are deemed eligible either manually or after the system installation, creating variability in deployment accuracy and quality. Environmental factors such as excessive or limited ambient light can degrade system capture, while high acoustic noise levels can interfere with Viper and Virtual Lift's engine health analysis capabilities [17].

Project SENTRY addresses these challenges through a deployable, cost-effective system that qualitatively evaluates dealership service lanes prior to installation. The system will measure key environmental parameters that affect image and acoustic performance, analyze temporal variations, and generate an objective determination of installation eligibility. Additionally, it will provide data-driven recommendations and mitigation strategies to improve installation readiness. By enabling evidence-based deployment decisions, SENTRY will support ACV Auctions' commitment to transparency, all while ensuring optimal performance of Viper and Virtual Lift across dealership environments.

Conceptual Model

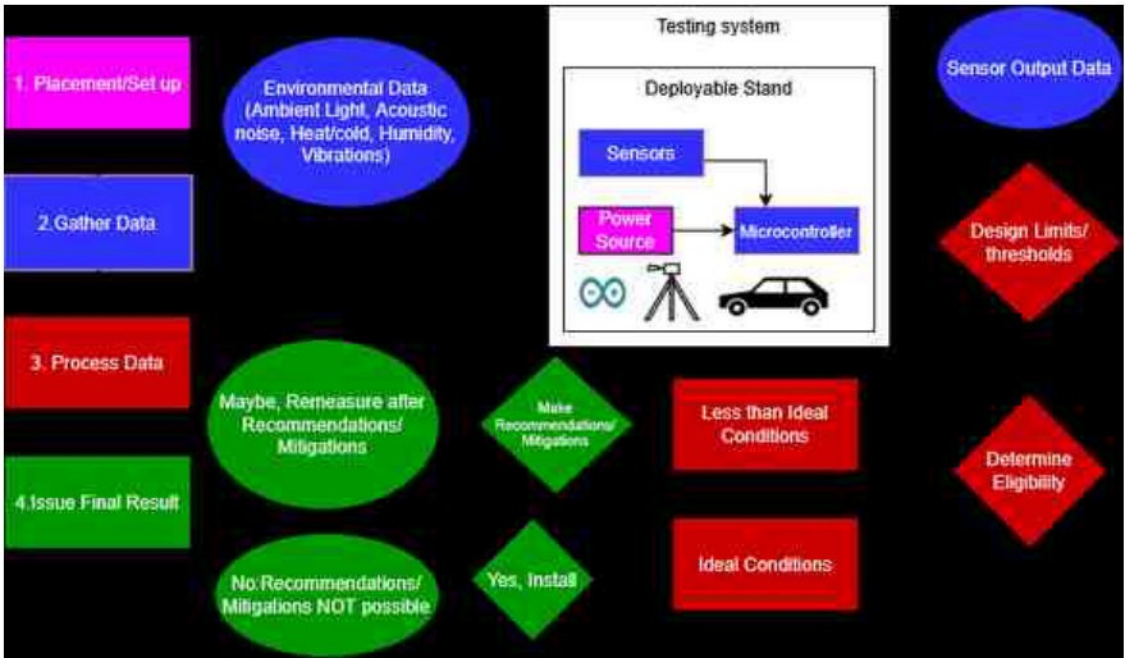


Fig. 1: Conceptual Model using Draw.io [16]

Measure of Success

Category	Metric	Target	Standard / Justification
Illuminance	Light measurement accuracy	±5% over 10-2000 lux	Covers dim bays to daylight exposure; lighting levels based on IES service-area recommendations and Class B lux meter tolerance (ANSI C136.1) [1], [3].
Acoustic Noise	Sound level accuracy	±2 dB	Matches Class-2 sound level meter tolerance defined in ANSI S1.4 and IEC 61672-1; calibrated using IEC 60942 acoustic calibrator [4]-[6].
Temperature	Temperature sensing accuracy	±0.5 °C	Required to detect CMOS sensor noise variation and meets environmental monitoring accuracy recommended in ASHRAE and IEC 60068 testing practices [7]-[9].
Relative Humidity	Humidity sensing accuracy	±3% RH	Consistent with typical environmental monitoring accuracy defined in ASHRAE guidelines and IEC environmental classifications [8], [10].
Repeatability	Measurement repeatability	≤10% variation	Based on ISO 5725 measurement repeatability principles for field instrumentation [11].
Lighting Uniformity	Spatial illumination variation detection	Detect ≥20% variation	Illumination gradients above ~20% degrade machine vision performance in imaging systems [2].
Logging Interval	Environmental sampling interval	10 seconds	Captures minute-scale environmental changes and follows industrial environmental monitoring practice [8].
Continuous Logging	Monitoring duration	≥2 hours	Captures operational changes such as daylight shifts, HVAC cycles, and service traffic [9].
Time Synchronization	Timestamp accuracy	±1 second	Enables correlation between lighting, acoustic, and environmental measurements; consistent with precision timing standards [12].
Eligibility Output	Automated environmental classification	Eligible / Eligible with Mitigation / Not Eligible	Python-based processing compares measurements against lighting, acoustic, and environmental standards to produce deployment decisions [1], [4], [8].

Timeline

The Gantt chart below illustrates the project timeline. All tasks were divided into phases to be followed as the semester progressed, each with specific deadlines. The first phase includes planning; the second phase is further development and setup; the third phase is integration; and the final phase is validation and final delivery to wrap up the project. The project's success will be measured during the validation phase. Changes in internal deadlines and overall will be made accordingly during each phase.

The timeline is in Appendix A.

Appendices

Appendix A: Timeline

The project timeline is presented in Figures 2 through 6 below. These figures illustrate the full Gantt chart spanning from February 9, 2026, to May 4, 2026, and are organized into the four primary phases of the project: Planning, Development & Setup, Integration, and Validation & Final Delivery. Each figure highlights the scheduled tasks within its respective phase, including assigned team members, estimated durations, and start and end dates. Recurring weekly team meetings and ACV meetings are also held throughout the project duration. The percentage completed for each task reflects the current progress and will be updated frequently to track task status. All listed hour estimates represent planned project work outside of scheduled class time and do not include in-class instruction or lecture hours.

Figure 2. Timeline of Feb 2nd - Feb 27th.

Figure 3. Timeline of March 2nd - March 29th.

Figure 4. Timeline of March 23rd - April 19th

Figure 5. Timeline of April 20th - May 6th

Initial Design Memo

Figure 6. Planned Vs. Actual

Appendix B: References

- [1] Illuminating Engineering Society, *IES Lighting Handbook,* 10th ed., New York, NY, USA, 2011.
- [2] R. Szeliski, *Computer Vision: Algorithms and Applications,* Springer, 2010.
- [3] ANSI C136.1-2014, *American National Standard for Roadway and Area Lighting Equipment.*

- [4] ANSI S1.4-2014, *Specifications for Sound Level Meters.*
- [5] IEC 61672-1:2013, *Electroacoustics – Sound Level Meters.*
- [6] IEC 60942:2017, *Electroacoustics – Sound Calibrators.*
- [7] E. R. Fossum, "CMOS Image Sensors: Electronic Camera-On-A-Chip," *IEEE Trans. Electron Devices,* vol. 44, no. 10, pp. 1689–1698, 1997.
- [8] ASHRAE, *ASHRAE Handbook – HVAC Applications,* Atlanta, GA, USA, 2019.
- [9] IEC 60068-2, *Environmental Testing Procedures.*
- [10] IEC 60721-3-3, *Classification of Environmental Conditions.*
- [11] ISO 5725-1, *Accuracy (Trueness and Precision) of Measurement Methods,* 1994.
- [12] IEEE Standard for a Precision Clock Synchronization Protocol for Networked Measurement and Control Systems, IEEE Std 1588-2019 (Revision of IEEE 1588-2008), pp. 1–499, 2019.
- [13] "Simple Gantt Chart," Vertex42.com. https://www.vertex42.com/ExcelTemplates/simple-gantt-chart.html
- [14] B. Murdock, C. Dickson, R. Rolince, and F. Scarantino, " Initial Design Memo – Group #8 LED Driver," , 2024. [Online]. Available:
- [15] Grammarly Inc., "Grammarly," Online writing assistance tool. [Online]. Available: https://www.grammarly.com
- [16] JGraph Ltd, "Draw.io," *diagrams.net,* 2026. [Online].
- [17] ACV Auctions, "," Buffalo, NY, Google Slides, 2026.

Appendix C: Letter Outlining Revisions from Initial Design Memo

Associate Professor

Subject: Response to Reviewer Comments and Resubmission of Initial Design Memo

Dear ,

We truly appreciate your response when reviewing our initial design memo for the EE494 Senior Design Project. We have gone through all the comments and modified them accordingly. In the revised memo, the focus of the design for the project was made clearer, and all appropriate references and technical standards were added. All sections of the latest memo appear consistent. The updated design memo has been submitted as a revised design memo under the title, "**Project SENTRY".**

As noted below, we address each comment of the reviewer and the changes that were made.

Reviewer's Comment:

"Overall, when I read this, it reads like a project that has been done already. The submission lacks references to others' work, and images appear without citation."

Author Response: We thank the reviewer for pointing out the references missing from the first submission. The updated memo properly references all external information sources, standards, and concepts cited in that memo. We added references on the standards for environmental measurements, machine vision, and acoustic measurements. ANSI S1.4 and IEC 61672 for sound level measurements, ASHRAE for environmental monitoring, imaging and lighting were added as the appropriate standards wherever it was necessary.

Furthermore, all figures and conceptual diagrams, along with citations where appropriate, have been updated with proper captions. The references are now included in **Appendix B** of the revised memorandum.

Reviewer's Comment:

"There is no design here. This is an existing product and method that has been developed. You will need to demonstrate design for senior design."

Author response:

We concur with the reviewer that the first memo did not sufficiently address the project's engineering design aspect. In consultation with ACV, the project direction has been altered to focus on designing and developing a deployable environmental qualification system to assess whether dealership service lanes meet the operational requirements for ACV's Viper and Virtual Lift imaging systems.

Initial Design Memo

The updated project focuses on developing a portable sensing platform to measure environmental parameters of ambient illumination, acoustic noise, temperature, and humidity. The system incorporates sensor integration, data acquisition, threshold evaluation, and automated eligibility classification for dealership outlay specifications. This updated direction has a greater focus on system architecture, sensing design, measurement accuracy, and data analysis, which basically form an engineering design project.

Reviewer's Comment:

"For your problem statement, think about who the client is, what the problem is, why it is important, stakeholders, criteria for success, and constraints."

Author Response:

The section "**Problem Definition"** in the revised memo has been rewritten to address these aspects clearly. The modified copy identifies ACV and states the technical problem (environmental conditions that could affect the performance of imaging technologies). Further, it explains why the problem is important for reliable vehicle inspections and marketplace transparency. We also looked at relevant actors, including dealership operators, inspection technicians, and ACV's engineering teams. In addition, the design constraints are now clearly articulated, including cost, measuring accuracy, portability, and practicability of deployment.

Reviewer's Comment:

"For your measures of success – focus on standards and four to six quantifiable metrics."

Author Response:

The Measures of Success section has been significantly changed to include performance measures that are quantifiable and standard-based. All metrics now have a measurable threshold and justification grounded in recognized technical standards.

- The illuminance measuring instrument is accurate within ±5% at 10–2000 lux, according to IES recommendations and ANSI standards for lighting equipment.
- The sound level meter being used for this project meets the specifications of the ANSI S1.4 and IEC 61672 standards, which allows for acoustic noise measurements with an accuracy of ±2 dB.
- The precision level for temperature detection is reflected as ±0.5°C, and humidity is ±3% RH, as per the standard environmental monitoring practices.
- Measurement of repeatability limits based on ISO 5725 guidelines.

A corresponding standard or technical justification was added for every metric to ensure the criteria are grounded in engineering practice.

Reviewer's Comment:

"Conceptual model does not include relevant standards or influencing factors."

Author response:

The conceptual model has been updated, showing the system workflow and decision-making process more clearly. The revised figure now adds environmental inputs, sensing components, and data acquisition with threshold evaluation and eligibility determination. Moreover, to include ambient lighting, acoustic noise, humidity, and temperature effects on imaging system performance, these variables have been explicitly added to the model as influencing environmental parameters.

Reviewer's Comment:

"Timeline is inconsistent and implies hardware decisions (such as ESP32) were made before the project started."

Author Response:

The timeline has been updated to better reflect the design process, not pre-decisions on implementation. The focus of the early phases of the project is now research, requirement analysis, and sensor evaluation, which must take place before the hardware selection is done. The updated Gantt chart categorizes this project into four stages: planning, development and setup, integration, and validation. The amended timetable now reflects a typical engineering design pathway, which ensures no design decision is made before sufficient investigation and analysis.

Closing Statement

We appreciate the valuable feedback given over the Initial Design Memo. Following the feedback we have managed to improve the clarity, structure, and engineering focus of the design memo to a great extent. The modified document now better captures the design aspects of the project, includes relevant standards and references, and has a better-defined problem statement in line with the requirements of the EE494 Senior Design course.

Thank you for your time and consideration.

Sincerely,

EE494 Senior Design Project Team