# **Senior Project Final Self-Assessment**

This document is intended as a guide for the senior project team to assess its performance in a number of dimensions. Add additional items that you feel are appropriate.

This self-assessment will be one of multiple elements that your faculty coach uses to arrive at an assessment of the team’s performance for this second term. The other elements that the faculty coach will use include: direct observation of the team, team peer evaluations, reviews by other faculty during the project presentation, sponsor evaluation, and project deliverables. These self-assessments will also be used as part of the SE program’s accreditation and curriculum improvement efforts.

To complete this self-assessment the team should carefully consider each of the questions and provide an honest evaluation of the team’s performance. Your faculty coach will inform you when this self-assessment is due and how to deliver it.

### **Team: AItomotives**

### **Project: Vehicle AI**

### **Sponsor: Daniel Krutz (RIT SE)**

### **Product**

1. Did the team prepare all the documentation artifacts requested by your faculty coach and sponsor? Were these documents carefully inspected prior to delivery? How would you assess the quality of the document artifacts?

The team did provide all of the documentation artifacts requested by the sponsor and coach, and certain artifacts were vetted by the team while creating them, like the architectural diagram and domain model, but overall the quality of the documentation is fairly good. Someone unfamiliar with the project should be able to set up and run the project without significant strife, although the setup may take some time.

2. How well did the team elicit the requirements? What approaches were used to elicit the requirements? Were key requirements missed? What methodology was used to document and validate the project requirements?

The team elicited the requirements well, and formulated the requirements into a deliverables document and on the Kanban board. However, the scope of the requirements were lost on the team relatively often. Each meeting, the team looked at the deliverable document with the sponsor in order to ensure that each deliverable was made in line with the requirements. No key requirements were missed in terms of elicitation.

3. Did the team explore the entire design space before arriving at a final design? Have there been many errors found in the design? Was it necessary to make major changes to any part of the design? What were the reasons for the change?

The team understood how the system was to be designed from a high level, but did not have the experience to understand that this wouldn’t perfectly translate to the tools and libraries we were using. At the beginning of the second term (and in the interim) the team learned of a new tool that would fix many of the issues they were running into. The pivot to refactoring our system for ROS was necessary, as the tools that we had originally used and designed around were incapable of reasonably accomplishing the final goals.

4. How has the development and implementation progressed? What percentage of the product do you estimate was completed? Is the team providing the documentation within the implementation artifacts?

The team delivered a tool that can be used to solve the initial problem, but did not deliver the solution. Estimating a research based problem is very difficult, but the team feels that the solution is 60% to 80% complete. What is needed to solve the problem is a new dataset, or a refined new algorithm, or perhaps both.

Yes, the team will be providing documentation on how to use the tool within the implementation artifacts.

5. What was the team’s testing strategy? Did the team develop a test plan? If so, was it followed? Did the team performing unit testing? Did the team use any test frameworks, such as JUnit? What are the testing results? Were any major defects found during system test? If so, were they fixed? Did the team do regression testing?

The team tested nothing programmatically. Manual testing was necessary, as it is difficult to determine if a test fails or passes without a manual step.

6. Products need to be designed within guidelines and constraints appropriate for each project. It is also important to consider the impacts of the products that are designed. In the following categories discuss the constraints and impacts that have a bearing on your project. Note that all of these categories may not have bearing on your project but your project is probably affected by many of them in ways that you may not think of regularly.

· Economic issues

Procuring a drone is impractical and expensive, and it was a better idea to use simulation software anyways, so the team and the sponsor opted for that avenue instead.

· Environmental issues

Path planning could be used to optimize for the most efficient route in terms of energy used, but this wasn’t the primary focus of the project.

· Social issues

There are no social issues that impacted this project, or vice versa.

· Political issues

There are no political issues that impacted this project, or vice versa.

· Ethical issues

The team had considered some ethical issues as to whether or not this software would be used in a military context.

· Health and safety

There were not health or safety issues as the drone was entirely simulated.

· Manufacturability

In terms of development environments, the team attempted to make the project more manufacturable by automating much of the environment setup for development work, and for running the project.

· Sustainability

There were no sustainability issues that impacted this project.

7. What industry or engineering standards was your project required to adhere to? Were these new standards that the team had to learn? Did your sponsor provide you support for understanding these standards? Did you have to educate your sponsor about these standards?

There were no base standards for this project initially, as it was research based. However, the team had to learn the base standards for the open source tools we were using. These were not provided or supported by the sponsor, and we did not have to educate them as it was out of scope for them to be that involved technically.

8. What standard software engineering practices did you follow? Did your sponsor specify any of these practices for you?

We followed a modified kanban methodology with daily standups, but no processes or practices were necessary or required by our sponsor.

### **Process**

1. What was your process methodology? Was the process appropriate for the project? Did you follow the process or modify it as the project progressed? If you could repeat the project, what would you do differently?

The team opted for a version of kanban that utilizes a kanban board and daily standups. The more the project progressed, the less focus the team placed on process, and this overall hurt the teams progress in the project, but it was not entirely detrimental, just a bit unorganized. Much of this was due to the fact that some of the work was very difficult to be parallelized.

2. Was there a large requirement to learn the problem domain? What approach was used to gain domain expertise? Did your sponsor provide adequately support? What forms of support did you receive?

Yes. The project was research based, and essentially we were given a problem statement and the internet to solve that problem. The team was constantly changing our understanding of how we were going to achieve the clear end goal. We often discussed the requirements with the sponsor, and attempted to best formulate how we would achieve this end goal.

3. What mechanisms did the team use to track project progress? Did they give the team and sponsor adequate insight into project progress and issues? How well did the team track its project progress? How often did these artifacts get updated on the department project sites?

The team often discussed deliverables with the project sponsor and the deliverable plan that was ever changing as new information was discovered. The team internally utilized a kanban board to track issues and progress as we developed them, but this often took a backseat to simply crossing off the deliverables on the deliverable plan as they were delivered. Of course, the team also updated the hours spent working and did a 4UP weekly, but these were not updated on the project site on a regular basis.

4. Did the team conduct effective meetings?

WIth the sponsor, and without the sponsor, yes. Much of the team’s progress happened while in meetings with each other, as knowledge was shared and architecture was developed, and problems were solved in a collaborative manner.

5. Did the team meet all project milestones? Which milestones, if any, were missed or were met ahead of schedule? What contributed to schedule changes? What could the team have done differently to ensure that milestones were met?

The team did not meet all of the project milestones. There was domain misunderstandings between the project team and deliverables we were attempting to deliver, and the deliverable schedule often shifted because of this. There were also real life and external factors that contributed to this, but this was to be expected and should have been allotted for. Specifically, the team did not deliver a drone that made informed decisions based on the output of the neural net, and instead had a drone that would make decisions based on reward calculations alone. The team could have done a much better job estimating. A lot of the estimations were based on nothing at all, and this is something we should have done differently.

6. Was the team required to adopt new technologies? What were these technologies? What approach did the team use for selecting the appropriate technology for the project? Did the sponsor provide any support for learning these technologies? How well did the team ramp up on the new technologies and begin to apply them effectively?

The team was required to adopt new technologies. These included tools like MissionPlanner, Ardupilot, ROS, and others. Some research was done to see how well certain tools would solve the problem that was provided to us, however we often chose the first technology we found, as it seemed to integrate well with solutions we had already chosen. Much more research time was necessary in order to figure out how well the tools would actually solve the problem, but this was a difficult thing to quantify and estimate. The sponsor provided no support in these technologies, as we were the technical experts. Ramping up to use these new technologies took time, and often one or two team members became experts with that respective tool.

7. How well did the team maintain quality control over the project artifacts? Have all artifacts been reviewed for adherence to quality standards? What was the review process used by the team?

Quality control was extremely basic for the team. It often essentially boiled down to, “Does this solve the problem? Does this work? How well does it work?” And this was all reviewed by manual tests and scenarios that the team would perform. We also made sure that these solutions would follow our predetermined architecture.

8. Did the team have any issues with configuration management? How were these problems solved? What percentage of project artifacts is under configuration control?

Configuration of the system we were using was a challenge that we solved using Docker. Often the team ran into issues where the project would work on one person’s machine and not on another’s, and Docker helped to solve this problem. Roughly 70% of the teams artifacts were under configuration management by Docker, as EXACT wasn’t, as well as whatever the specific team members were utilizing as an IDE, or other development tools.

9. What was the set of metrics that the team tracked? Did the team gather these metrics on a consistent basis? What did the team learn from the review of these metrics?

The team had established metrics to track, but these metrics were rarely tracked. We had discussed things like “Amount of time a ticket is in progress without making progress,” and similar metrics to that. Consistently, the team only tracked hours worked, and deliverables that were finished.

### **Communication and Interaction**

1. How well did the team communicate project progress to the sponsor? What regular communication did the team have with the sponsor? Did the team been maintain this communication to the satisfaction of the sponsor? Were any adjustments needed in the communication over time? Were these changes initiated by the team or the sponsor?

The team had weekly progress meetings with the sponsor, and sometimes bi weekly meetings when conflicts would arise or when there was no notable progress to show because the features were still in development. Overall, the team communicated well with the sponsor, and managed expectations to a reasonable degree, and the sponsor and coach have confirmed this, and confirmed their satisfaction with the team. No major adjustments were necessary other than the corner cases already discussed (ie: no tangible progress, we’ll meet the following week.)

2. Did the team need to provide technical input to the sponsor? How well did the team educate the customer in these areas? What mechanism did the team use?

Due to the fact the the sponsor has a technical background, often we would discuss some implementation details, but the sponsor didn’t require this information, and often was more interested in high level design. The sponsor requested that there be artifacts and documentation on maintenance and use as part of the team’s deliverables, but was largely disinterested in learning the technical details of the system.

3. Was this an effective team? What has been contributing to and detracting from the team’s effectiveness? What are the team’s weak points? What are the team’s strong points? What changes could the team have made to make it more effective?

Yes and no.

Yes, because the team made significant tangible progress in developing the system, and the team is in general satisfied with the product delivered, of course with retrospective caveats of things we would have done differently. The team worked effectively together in meetings often, and was overall productive.

However, the team often did not work well separately. Often when working questions would arise that the team needed to answer together, because knowledge about the tools we were using were scattered between all of us, and sometimes scattered between the relative information experts in that aspect of the system.

Doing more research about the tools we were using upfront, and allotting ample amount of time to become familiar with the limitations and use cases of the tools would have made the project go much more smoothly, but it’s difficult at that point for the team to know what they don’t know.

4. What mechanism did the team use to communicate with the faculty coach? Was communication with the coach effective? Were there any trouble spots with the faculty coach communications? What could the team or faculty coach have changed to make their communication more effective?

Weekly project meetings with the coach over Zoom, and communication was broadly effective. To make communication more effective, the team could have met more often, and managed expectations better, but we don’t feel these things are issues to begin with.

5. Did the team need to interact with department staff personnel, i.e., the office staff or system administration? Was this been handled in a professional manner? Were there any problems with these interactions?

Aside from our sponsor, we had to interact with a graduate student who was the information expert on the machine learning algorithm that we were utilizing. We could have met with this person more often, but the meetings were effective.

6. Does the team have a complete website with all project artifacts stored and up-to-date on the software engineering department webserver? How often were entries on the webserver updated?

Yes, updated sporadically as necessary.

7. How well has the team made presentations to the sponsor and faculty coach? Was the final project presentation done in a professional manner? Was the poster presentation done in a professional manner? What could have been done to improve the team’s presentations?

The final presentation and final poster were both done in a professional manner. The team also performed weekly demos for the project sponsor, and the project coach, when he was in attendance. These demos were sometimes done live, and sometimes we would play a pre-recorded video demo.

8. Does the technical report adequately document the project and its results? Was the paper of high technical and editorial (language, style, grammar, etc.) quality? Did all teammates contribute to the paper? Did the sponsor contribute to the paper? Did the sponsor review the paper?

The paper consisted of appropriate technical and editorial details. All teammates contributed to the technical paper. The paper was not reviewed by our sponsor, nor did he contribute directly to it.

### **Preparation and Resources**

1. Did the team possess adequate management and process skills (team building, planning, risk management, change management, process definition and tracking, etc.) to carry out the project? If not, how could the program provide better preparation?

The process methodologies we'd been taught were broadly focused on the world of industry, giving an insight into how development works in academia would have been helpful.

2. Did the team possess adequate technical skills (requirements, design, coding, testing, quality reviews, etc.) to carry out the project? If not, how could the program provide better preparation?

The teams technical skills from a pure SWEN perspective were on the mark, but we could have used further specific training in research based development.

3. What technical resources (or skills, training, tools) were missing, if any, that would have helped make the senior project experience more successful?

A course in the basics of machine learning would have made the project easier, or even just a course on research based development.

4. Were the facilities adequate for you to perform your work on the project?

There were no facilities given to perform work on our project. The primary cause of this was the coronavirus pandemic. We had to work remotely.

### **Achieving Customer Satisfaction**

1. In the team’s opinion did the work satisfy the project sponsor? Are there areas where you think you exceeded the sponsor's expectations? Were there any weak spots in this regard?

As we did not deliver an important portion of the featureset detailed by the sponsor, our work did not meet the needs of the sponsor as well as it could have. However, what we did deliver was reliable and open for extension, and the customer expressed satisfaction with this.

### **Achieving Team Satisfaction**

1. Did the project satisfy the team’s expectations for learning? What could the team have done differently to improve the team’s learning experience? What could the faculty coach and department have done differently to improve the team’s learning experience?

The project provided ample opportunity to engage in and learn about new technologies and techniques. Focusing more on the research side of things could have helped us learn more, but the couch did just about all that could be expected of him.

### **One Piece of Advice**

1. What one piece, or more, of advice would you give to future senior project teams to help them be successful?

* Stick to the process more
* Ask more questions
* Do more research in order to develop a better understanding and implementation plan
  + Develop a sense of direction as to where the project is going, and how you’re going to get there
  + Make sure the plan is feasible and well estimated
  + Allot enough time in order to figure these things out
  + Manage the sponsor’s expectations based on the implementation plan you’ve developed
* Learn to adapt to changing situations. Because this is a research project, what is being worked on today may not be important tomorrow
* Ask more questions to people who know the answer. This may even include leaving comments on Github repos or Discord servers in open source communities to seek answers
* Manage expectations and estimations as new information is uncovered. Estimate initially, re-estimate as necessary, but revisit these estimations regularly.
* Make your efforts known, if something took 4x as long as you thought it was going to, make it known