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. You need not answer each question in detail, rather, use the questions as a guide for the kinds of items to assess. Add items 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.

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**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?

A few requested document artifacts were not prepared; these related to the simulation that was not built. Instead, a supplemental document has been created to describe the team’s attempts to use MRDS. Sahil skimmed over documents as he collected artifacts to upload to EDGE and create the artifacts CD. Quality is assessed by characteristics of detail and clarity.

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?

Requirements elicitation was not conducted in the second quarter. Professors Ken Shu and Wayne Walter were interviewed in the previous quarter to gather the initial requirements. Joe also discussed design of the graphical user interface with Professor Walter. The final product was not reviewed officially with the sponsor beyond a wide audience demonstration during the final presentation.

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?

We looked at having more of the system software functionality on the robot’s microcontroller (MCU). We also looked at having a very close binding to the RP10, but it was decided to try and use a more general approach. We haven’t found too many errors in design; no issue required major refactoring. The defects arose mainly from our assumptions of the robot’s capabilities and required us to scale back some areas of the API. There are some things that could be improved, such as the data structures for motor bays and the motors. There weren’t any major changes to the API.
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?

We did a bottom-up approach to development. First, software for the robot MCU and serial communication protocol were developed. When protocol and robot code had been tested and finished through prototypes, the team started work on the first iteration of the API. When we got our first version done, then we started working on the GUI's. It's is estimated that we accomplished 100% of the goals of the API. Our UI's are probably 80-90% feature complete. We have a user manual, good internal documentation of the code, and design documents.

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?

Paul volunteered to be the testing lead, composing acceptance and unit test cases in a test plan. Unit test cases were built in an automated suite with NUnit, a variant of JUnit for the Microsoft .NET framework. Executable tests were created late into the project (in the past few weeks). Most of the bugs were based on boundary assumptions in the API and are currently being fixed. Regression testing will be conducted after the last fixes are completed.

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.

No significant economic, environmental, social, political, ethical, health and safety, manufacturability, or sustainability issues affected the project.

7. What industry and 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?

No standards applicable.

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 spiral process methodology was applied to the project. With many risks involved from the robot hardware to the software simulation environment, the process was appropriate. Unlike first quarter, the process was followed in the second quarter. Risks dictated the priority tasks in each cycle. If the project was repeated, more strict process should have been applied in the first quarter to focus research on the most critical unknowns. Early on, we were just gathering information without any direction, obscuring the status of our efforts.

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?

The embedded domain applied to MCU development. To gain expertise, we studied product documentation, P08201 artifacts, talked to third parties (i.e., Microsoft Developer Network), created prototypes, reverse engineered MRDS samples, and acquired a MRDS book. The sponsor supported us only indirectly by giving us resources to look at or people to talk to. For MRDS or Solidworks, the sponsor did not provide support.

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 website?

In the second quarter, progress was tracked using a ticket database that was linked to the team wiki on the project website. Each ticket stored a single task and was closed when the task was completed. New tickets were created at the start of the cycle to compose a work breakdown. Tickets were counted at the end of each cycle to compute slippage and total project completion. The metrics were actually never presented during meetings. Team members were too slow in closing tickets; metrics were computed up to a week or more after the associated cycle ended. However, the slippage metric gave insight in how much work to schedule. We usually scheduled more than we could complete.

4. Did the team conduct effective meetings?

Meetings were effective in bringing everyone together to discuss issues or get work done. Unlike face-to-face meetings, e-mail was an unreliable form of communication as some team members would not respond promptly or at all. However, group meetings to complete a project deliverable like this document were not effective as only a few people were actively engaged. The alternative solution was to have individuals complete a draft of deliverables and then review them with the team, reducing meeting time.

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 milestones. The simulation was a failure as the developers couldn't resolve severe bugs. The software could not drive the RP10 due to chronic hardware problems. Both of these issues caused slippage as tasks were repeatedly pushed into future cycles. Both milestones could have been met with more direct support from people adept with MRDS and the electronics respectively.

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 had to adopt new technologies related to RP10 hardware, the Mindstorms environment, and MRDS. The FreeScale MCU was chosen simply because the last team used it. Mindstorms was chosen as an alternate hardware platform due to Karl's part-time job experience with it. Usage of MRDS was a project requirement. The sponsor provided no support for learning these technologies. In applying the technologies, we built a MCU prototype. For MRDS, a sample was reverse engineered.

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?

Process
No review process was established. Professor Vallino also conducted a design review with team early in the second quarter. Kyle reviewed the API user manual.

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

The desired version of Solidworks was acquired very late as Kyle had to wait for the administrators to deliver it. By the time Kyle received it, he already had an alternate working process to import the 3-D model into MRDS.

Configuring MRDS originally was a series of learning events. MRDS was not installed on any computers in the senior project lab originally, then the only administrator for the machines installed an outdated version of MRDS. MRDS installs, by default, to the user?s profile and can only be run by that user. Our work-around was to install the software to the Cyberdyne team account and expand our account storage space from 250MB to 400MB. To run the DSS side of MRDS, certain ports must be unlocked, at which point we were given administrative access to the machines in the senior project lab, and Kurt, our system administrator, was no longer a time-delay issue. MRDS requires Microsoft Visual Studio 2008 for its services, which meant installing that package to the machines. Unfortunately, MRDS requires that Visual Studio be installed before installing MRDS, so finally we reinstalled MRDS.

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?

Slippage, project completion percentage, and test passage metrics were collected. The first two stated metrics were not consistently tracked until the team got into more of a routine of closing work tickets in a timely fashion each cycle. Test passage data was updated after major changes to the code base or additions of new tests.

Slippage indicated how to better estimate the amount of work that could be completed in a cycle. Project completion gave an overall picture of the amount of work being achieved towards the total. Test passage indicated the robustness of the API.

**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 entire team attends a weekly status meeting with the sponsor. In addition, the two mechanical engineers meet on a separate day. E-mails are exchanged throughout week as necessary. The satisfaction of sponsor is unknown.

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?

In team meetings and e-mail exchanges, the team provided the sponsor with technical input about the platform hardware: MCU, encoders, motors, batteries, etc. The sponsor had a background already appropriate for such input. However, only a broad overview of MRDS was provided.
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?

The team is more effective this quarter than last as team members collaborated more on shared tasks (i.e., the mechanical problems or Mindstorms). We still all get along well. However, the team members could communicate more with each other to keep everyone up-to-date and aware of current issues. Some senior project teams met daily, even if for a short amount of time, but probably were more connected.

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?

The team communicated with the faculty coach by e-mail and weekly meetings. The faculty coach has been quite effective, particularly with process suggestions.

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?

The team worked with the System Administrator, Kurt, in order to install MRDS. This required waiting periods for him to obtain the software, install it, obtain the correct version of the software, and install that. After the correct software was installed, we found that it was only accessible through his account due to a software problem. There was significant interaction to determine a work-around, and then slight delays in incrementally overcoming other issues such as storage limits and access restrictions before being given Administrative rights. Afterwards, the team was given permission to do what he would have needed to do, thus ending interaction.

Additionally, in an attempt to acquire the proper version of SolidWorks, the modeling side worked with various members of the ME and MMET department. On the ME side, Bill Finch was used as the initial go-to person for the proper version of SolidWorks. From there, the next place was the MMET department, where meetings were held with MMET professor William Leonard and MMET computer lab manager Steven Parish. Both departments pointed to the same contact, CaDimensions as their supplier of SolidWorks. Problems resulted in the acquisition of the newest version of SolidWorks. RIT deals with the one supplier of the software and there were issues regarding acquisition of a license for the 2009 version. RIT maintains student versions of SolidWorks, which spans 2 years (i.e. Student Edition 2008/2009), however the version is only equivalent to the commercial version of the first year. It seems that CaDimensions was very slow in getting a new license to RIT even though we already paid for the license. By the time the proper version was finally installed and ready to use, it was well into the second term of Senior Project and we had already successfully brought the files into MRDS using Blender and .obj files.

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

Yes, most documentation is on the wiki on the web server. Otherwise, it is stored in the SVN repository, accessible from the wiki or a SVN desktop client. Most entries seemed to be updated daily during a cycle and then were never updated again.

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?

Communication and Interaction
The final presentation was done in a professional manner with comprehensive coverage of the project. The poster could have been reviewed more yet was completed to a degree to satisfy the basic poster requirements. The final presentation improved upon the interim presentation. The total time of each speaker was more balanced. Non-speakers sat down instead of standing behind the podium.

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 technical report is currently a work in progress. Aaron wrote the first draft, and Sahil made final edits and filled a few remaining gaps in content. The sponsor neither contributed to nor reviewed the paper.

9. How well did the team work with other senior project teams, coordinating access to lab space and equipment, sharing experiences and ideas, etc.?

Not applicable.

**Achieving Customer Satisfaction**

1. In the team’s opinion did the work satisfy the project sponsor? Were there any weak spots in this regard?

As we had problems with the simulation and the hardware, we didn't satisfy the project sponsor in all expected aspects. However, we did deliver well-designed software with a demonstration of its capabilities. The end result is mixed.

**Achieving Team Satisfaction**

1. Did the project satisfy the team’s expectations for learning? Were there any weak spots in this regard? What could have been done differently to improve the team’s learning experience?

The team had no explicit expectations for learning. However, it was the most challenging process exercise in comparison to previous courses in the curriculum. The learning experience would have been better if the P08201 team was available for discussion on platform design decisions and domain knowledge.