

# #1>#2: Essay Evaluation Score

December 5, 2023

The workshop course is provided by technology-oriented engineering department. The goal is to understand technologies but also to foster motivation and active involvement of groupwork. The assignment given to the students was as follows:

1. Kinematic Synthesis of Mechanisms <Train Gap Filler>

The gap between the train and the platform at train stations is a significant safety hazard, often leading to accidents. This risk is especially high for children, the elderly, and individuals with physical disabilities with wheelchairs. The challenge is to devise a mechanism that effectively mitigates this danger.

2. Net Zero X <All Electric Airplane>

The objective of this project is to develop a strategy for reducing CO2 emissions from airplanes. It involves researching the current challenges faced by the airline industry regarding CO2 emissions and conceptualizing an all-electric airplane as a viable solution to significantly lower these emissions.

3. Radioactive <Science Communication on High-Level Radioactive Waste>

High-level radioactive waste (HLW) is created by the reprocessing of spent nuclear fuel. Storage cannot provide the permanent isolation of the wastes from human's environment. This workshop aims to reveal the current conditions and possible disposal methods of HLW, and understand ways of dealing with real social issues.

4. Monster Track <Damages on Infrastructures by Oversized Vehicles>

The oversized loading induced an excessive external load which exceeds load-carrying capacity of bridges, resulted in collapse incidents. Clarify the common challenges in protection of infrastructures during their life cycle from oversized vehicles and come up with initiatives and solutions to this issue.

Around six students formed groups and challenged one of the above problems in seven 3-hour workshops: ideation, interim report, prototyping, final report, and a reflection essay at the end. Each student is requested to create an individual reflection essay including the following descriptions.

- Project description (300-400 words)

Title, goal and conclusion of the project

Process of the project: how you applied design thinking methods

- Contribution (300-400 words)

Your role in the project

Your contribution to the project

- Reflection (200-300 words)

Write freely but we are interested in what you learned from the series of workshops not only professional knowledge and skills but also how to contribute to and facilitate the workshops

The following two essays were prepared by students according to the above instructions.

[STUDENT #1's ESSAY]

Our presentation title is "Train Gap Filler", which statedly reveals our goal of designing new mechanisms. In our project, we first explained the significance of train gap: there is the possibility for the train to hit into the station. However, the gap still causes to some safety and efficiency issues. Therefore, we came up with two designs to fill the train gap and solve this problem; they apply different mechanisms. One used pivot, sliding, gear, and piston (giving three pivots, and would lay

down the platform); this one is comparatively more cost friendly and simpler. The other is formed with pneumatic cylinder (raising the platform) which is more expensive and complicated, yet more reliable and owns higher degrees of freedom. They both have pros and cons, but still aim for the same goal.

I also created four designs by myself, although it is not used in this presentation. Three of them are pretty similar (I actually developed two others based on my first design), which are composed of gears and rack rods. The other one applies fluid (hydraulic) pressure. In my first design, the rack rod is stucked on the door that, when door opens, will drive location fixed gear, location-fixed gear, and rack rod, making the rack rod extending out, so the platform stucked on it will show up and fill the train gap. This is similar to my second design: But the platforms move from vertical to horizontal instead of just move in and out horizontally, so it is no needed to create another space under the door to place the platform when it is kept in (this one just stand close to the wall /door). And my third design, also similar to the last two: But in this design, I added the mechanism of “tension and pulling”, so the platform is laid down and closed up by the wire. And my fourth design is much more different from the last three (I only drew the righthand-side half): You can think the two cylinders are connected syringes, so when one side is pushed in (e.g. door side), the other side (e.g. platform side) will be pushed out. Although my designs are not chosen to be presented, I still contributed some ideas and make innovations by myself which I found very reassured and interested.

For this project, I was firstly suggested the application of hydraulic pressure to drive the whole system. I think that kind of gave Takato some ideas of making his design (Design 2). As the result, I asked him if he needs any help with the final presentation, since I can thoroughly understand his design, but he himself is strong and smart to handle it. Anyways, I worked on my part only, which is the summary. I feel sad that I did not have enough time to summarize the whole project and our achievements during the presentation time, having most of my part being omitted. So I want to put it here. Overall, I looked back on all we have done during this quarter. In the very beginning, we learned the basics of Fusion 360, the software to draw designs, so we are able to create 2D sketches (side-view) and extend it into 3D models. Furthermore, I make our model to be movable. We took our first Fusion Homework and created a pivot (cylinder) overgoes the model, so the model can rotate on it. Although we were trying to make a motor, so it can rotate automatically, but due to the time limitation, we did not do that. And then, we discussed about the mechanisms used in our daily life, we each suggested one to two example(s), for instance bicycle, mechanical pen, wireless charging, and for me, I picked the key and mop. And finally, we voted for the “train gap” to be the topic of this final presentation. We aim to cover up the gap between the train and station to prevent people from being tripped on it or drop anything into the gap, and thus interrupt the whole process of train and people’s movement. After we decided our topic, we each created one to two designs, but we only chose two from all and extended on them (I originally want to show everyone’s works but some members lost their designs, so I did not do so). And in all, we want to minimize the cost and gap distance, and simplify the mechanism for our design to achieve the ideal state. Although we have not had the chance to discussed on it in deep.

In my perspective, I think this class have taught me a lot, including the aforementioned mechanisms, physics, and software application knowledge and also collaboration skills. Since we are in groups and required to work and present together, it is significant to have high efficiency of communication about everything, like choosing topics, deciding work distribution, exchanging and discussing ideas. At the beginning, we did not know each other well and felt awkward talking to each other, so most of the time we were in silence, needing the TA to guide the process. But now, we can discuss very smoothly, and the TA only need to assist us and answer some of our questions instead of talking all the time. Furthermore, we are not only discussing with our groupmates but also people from other groups. From these experiences, I also learned to talk to people I am unfamiliar with without awkwardness or shyness; this also gives improvement when I am doing presentation. In addition, I think the work of asking question, giving feedback, or summarizing the class has helped me a lot. Initially, to be honest,

I hate this work since I really feel uncomfortable talking in front of many people. Yet after several times of practice, I think I have more courage and can feel more relaxed doing so. On the other hand, giving feedback trains me to think critically by myself but not just listen to what others say. It also makes me develop my expression, so I can quickly, effectively, and precisely convey my idea to the presenter(s). So overall, I appreciate to have this class that teaches me the presenting, thinking, and collaborating skills.

[END of STUDENT #1's ESSAY]

[STUDENT #2's ESSAY]

After much discussion we had decided to improve and add on a platform of some sort, more specifically to cover the gap that is found between the train itself and the train platform. If we were to cover the gap, we will reduce the risk of accidents regarding the gap such as belongings falling down as well as your foot getting stuck or someone falling onto the platform due to the gap. Our goal is to create a gap that will make it more convenient and safer for people, more specifically, disabled people, to get on and off the trains. Working as a team, we had come up with two different solutions (Gap Closer 3000 and Mechanism 2) to potentially cover the gap and essentially create a gap filler of some sort.

Once we had decided to do train gaps, we had used the WWWWH (Who, What, Where, When, How) template and filled in all the necessarily details we needed to ensure that we had covered everything that we needed to in the presentation. Besides that, we also considered the pros and cons for each design and evaluated where exactly the mechanism was going to be inputted in, which had been decided to be onto the platform instead of the train due to the fact that it would essentially be easier to input on and would not require to break apart the train to input onto it which would take more time than placing on onto the platform.

Going through the two mechanisms, the Gap Closer 3000 uses pivot and sliding, as well as a gear and piston to function. Mechanism 2 on the other mostly uses a pneumatic cylinder which allows the platform to rotate more freely.

The Gap Filler 3000 is a lot less complicated than Mechanism 2 mainly because Mechanism 2 uses pneumatics and that is a higher degree of complexity. Mechanism 2 is also more costly when compared to Gap Closer 3000 due to its higher degree of complexity and use of pneumatics. Mechanism 2 however is more reliable and won't break as easily, it also has a higher degree of freedom.

As for my role and contribution, I focused more on finding out background information that one may need to know before continuing on to discuss our solutions. The background information that I found would be most useful for this presentation was 'What we had meant by train gap', 'Why exactly was the gap there in the first place' and 'Why had we decided to improve on it in the first place.'

Explaining briefly, the train gap is there due to the fact that trains aren't flexible as a whole which would mean that each train carriage would have to essentially turn and bend which needs space to avoid colliding with the platform. We had decided to improve on this mainly due to safety, many people get their foot stuck or lose their belongings due to the gap. Besides safety, there is also efficiency, we want to make it easier for people, regardless of their mobility, to get in and out on trains. But this would be more beneficial to disabled people as well.

Other contributions would include coming up with the pros and cons as well as filling up the template that was mentioned earlier. Prior to this, there was multiple designs that we had come up with, each of us had to design our own mechanism before voting on which one would deem more successful and more useful in stations. My design had not made it due to the fact that more space would be required to fully function the mechanism which would end up to be more costly and a larger waste of space.

Throughout the workshop, I had learned how to make and captivate the audience with a presentation as well as the basics of CAD that I am eager to implement onto and create better and new designs on new mechanisms in the future. Along with that, I also learned that communication in a presentation, both video and voice improve on a presentation by a lot. When one has good communication, the audience would be more willing or eager to listen and engage with the presenters instead of turning off video and just using voice, it is more impactful when communication is used effectively.

Overall, I had a great time and I'd like to thank the professors as well as the TAs for their hard work and dedication on an early Saturday morning.

[END of STUDENT #2's ESSAY]

Compare and evaluate the above two essays according to the rubric specified below.

#### [SCORING RUBRIC]

##### Comprehensive Evaluation of Workshop Course

##### 1. Technical Knowledge and Application (1/3)

- Understanding of Concepts: Evaluates how well the student grasps the technological and theoretical concepts relevant to the project.
- Practical Application: Assesses the effectiveness of applying technical knowledge in practical situations, specifically in project design and development.
- Innovation and Problem Solving: Measures the creativity and innovation in addressing project challenges and proposing effective solutions.

##### 2. Teamwork and Collaborative Skills (1/3)

- Individual Role and Contribution: Looks at how clearly the student defines and fulfills their role within the team, and their contribution to the project.
- Team Interaction and Communication: Evaluates the student's ability to communicate and collaborate effectively within the team.
- Peer Engagement: Considers the student's participation in peer learning, support to team members, and contribution to the team's dynamics.

##### 3. Reflective Learning and Personal Growth (1/3)

- Self-Reflection and Insights: Assesses the depth of the student's self-reflection on personal learning and development throughout the project.
- Design Thinking and Process: Measures how well the student demonstrates the application of design thinking methods and management of the project process.
- Skill and Attitude Development: Evaluates the growth in the student's professional and soft skills, like critical thinking, adaptability, and communication.

[END of SCORING RUBRIC]

Compare and evaluate two essays based on the three main criteria in the above rubric: Project Description, Role and Contribution, and Reflection and Insight. Summarize the comparison of the three main criteria and then determine which essay is better overall.

The final score should be as follows. If one is superior to the other even slightly, award +1 point to the superior essay, and -1 point to the other. If one is clearly superior to the other, award +2 points to the clearly superior essay, and -2 point to the other. If both are the same, give each a score of 0.

To evaluate the essays of Student #1 and Student #2 according to the specified rubric, we'll compare them across the three main criteria: Project Description, Role and Contribution, and Reflection and Insight.

### **Project Description**

- Student #1: Provides a detailed description of the project including its significance, challenges, and two main designs. The student also shares four additional designs created independently, demonstrating a strong understanding of the project's technical aspects.
- Student #2: Focuses on the rationale behind the project, explaining the need for the train gap filler and its significance for safety and efficiency. The description of the mechanisms is less technical compared to #1.

Evaluation: Student #1's essay is superior in terms of technical details and understanding of the project, whereas Student #2's essay, though clear, lacks the same depth in technical explanation.

Score: Student #1: +1, Student #2: -1

### **Role and Contribution**

- Student #1: Clearly outlines their role in suggesting the application of hydraulic pressure, contributing to design ideas, and summarizing the project. However, the student expresses regret over not being able to present all the work during the final presentation.
- Student #2: Describes their role in researching background information, contributing to the pros and cons analysis, and participating in the design selection process. The student reflects on their specific contributions to the team effort.

Evaluation: Both students clearly define their roles and contributions, but Student #2 appears more integrated into the team process, whereas Student #1 seems to have worked more independently.

Score: Student #1: 0, Student #2: +1

### **Reflection and Insight**

- Student #1: Reflects on personal growth in presentation skills, critical thinking, and collaboration. The student acknowledges initial discomfort but shows how they overcame it through the course.
- Student #2: Discusses learning about presentation skills, CAD, and the importance of effective communication. The reflection shows an appreciation for the overall experience and the contributions of the professors and TAs.

Evaluation: Both essays show good reflection on personal growth and learning. Student #1 focuses more on overcoming personal challenges, while Student #2 emphasizes learning new skills and appreciating the course setup.

Score: Student #1: 0, Student #2: 0

### **Overall Evaluation and Score**

- Student #1: +1 (Project Description) + 0 (Role and Contribution) + 0 (Reflection and Insight) = +1
- Student #2: -1 (Project Description) + 1 (Role and Contribution) + 0 (Reflection and Insight) = 0

**Conclusion:** Student #1's essay is slightly better overall, primarily due to a stronger and more detailed project description. Both students demonstrate good teamwork and reflective learning, but Student #1's detailed technical knowledge gives them an edge in this evaluation.