Lab Book

SWT-PR[1|2]-[M]
Winter Semester 2020/21

Group C

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Abstract

The current Project is the prototype of a train simulation game, throughout the project contributions have been made to the research and implementation of the various functionalities provided, familiarize with the given code and understand the extensions and updates that can be made, Realistic train engine movement was the area mainly focused on in order to change the train simulation behavior in terms of acceleration and deceleration i.e, speed profile improvement within the scope of energy conscious and adding additional parameters for the rolling stock types i.e, weight, engine power. The limitation of the directionality of the train is also considered where the reverse functionality is limited to few train types. Additional research on Automatic traffic controller is also done with a design overview. A total estimate of 100 hours is spent on the project.

1 Sprint I

Date	Project	Artifact/Component	Duration
16.11.2020	-PR	SWT bahn setup	03:00 h

Cloned the git repository master branch and simulated the existing project, installation of python3, pytq5, go language.

Date	Project	Artifact/Component	Duration
17.11.2020	SWT-PR	SWT bahn setup	02:00 h

The errors related to the import are rectified eg. No module named pyQt5 and other dependent installations i.e websocket-client using pip.

Date	Project	Artifact/Component	Duration
18.11.2020	SWT-PR	SWT bahn simulation	02:00 h

Simulating the existing train game in the editor and exploring the current editor.

Date	Project	Artifact/Component	Duration
20.11.2020	SWT-PR	SWT bahn simulation	02:00 h

Research on various aspects on the presentations provided in the last week.

Date	Project	Artifact/Component	Duration
23.11.2020	SWT-PR	SWT Bahn PO all	3:00 h

First product owner meeting for all where we have discussed regarding the overview of the work done in the past week. Group meeting with a new product owner and the division of tasks.

Date	Project	Artifact/Component	Duration
24.11.2020	SWT-PR	Research on signal libraries	1:00 h

Various references provided by the chair are studied and also german signal library provided is overviewed.

Date	Project	Artifact/Component	Duration
25.11.2020	SWT-PR	Research on signal libraries	1:00 h

Discussed about the signal libraries with the group members in a short meet.

Date	Project	Artifact/Component	Duration
30.11.2020	SWT-PR	Sprint 1 review meeting	2:30 h

Review of individual work done on research for the first task and a group meet for the schedule and division of tasks for upcoming sprint.

Lessons learned. Sprint 1 is mainly focused on the initial setup and understanding of the existing project and research on various aspects of the project. An overview of the materials provided in the vc is obtained for further updates in the project. Group formation and task allocation was done with individual cooperation as it is the first sprint.

2   Sprint II

Date	Project	Artifact/Component	Duration
1.12.2020	SWT-PR	Study on Tasks	02:00 h

Group meet with a new product owner and scheduling of the tasks, task 2 with realistic train engine movement is studied with the tasks involved in it.

Date	Project	Artifact/Component	Duration
2.12.2020	SWT-PR	Realistic Train engine movement	02:00 h

Realistic train engine movement is over viewed and explained the tasks involved in it

1) Improving the existing rushed behavior of train which is unsuitable for the energy conscious.

2) Adding of additional components to train types such as weight and engine power.

3) Limiting the directionality of the train i.e, cargo trains cannot go reverse while passenger trains can.

Date	Project	Artifact/Component	Duration
3.12.2020	-PR	Existing Code Briefing	02:00 h

Group meet with the current updates as well as the study of existing code in the example file and demo file.

Date	Project	Artifact/Component	Duration
4.12.2020	SWT-PR	Weights and Directionality	02:00 h

Weights and directionality of the train types from the task 2 is allocated and studied on the existing traintypes and their parameters in the current project.

Date	Project	Artifact/Component	Duration
6.12.2020	SWT-PR	Directionality	02:00 h

Directionality of the trains is studied i.e, how the train proceeds by going through the files in the client and server side files for the functions which effect the trains directions .

Date	Project	Artifact/Component	Duration
7.12.2020	SWT-PR	Directionality	01:00 h

Studying the server side files and modifying the existing code in the ts2server/simulation/trains.go file with the reverse functionality.

Date	Project	Artifact/Component	Duration
8.12.2020	SWT-PR	Directionality	02:00 h

Error corrections in the reverse function for traintype code matching and variable declaration errors.

Date	Project	Artifact/Component	Duration
10.12.2020	SWT-PR	Directionality	02:00 h

Correcting the errors and succesfully able to implement the limitation of the reverse functionality to cargo type trains i.e, cargo trains cannot take reverse.

Date	Project	Artifact/Component	Duration
12.12.2020	SWT-PR	Reverse condition implementation	01:00 h

Checking out the reverse limitation to the existing demo simulation and looking into other functions in the same that is the parameters of the train types.

Date	Project	Artifact/Component	Duration
14.12.2020	SWT-PR	Sprint 2 Review meeting	03:00 h

Review meeting with existing tasks with the demo and suggestions from the current task i.e, display of error warning in the message logger for the user.

Group meet with the new product owner (myself) and studying of the tasks of all the group members.

Lessons learned.   Sprint II is mainly focused on the individual tasks and there is a brief knowledge on the existing code by the end of the sprint. Realistic train engine movement is studied thoroughly with a picture of step by step tasks to be completed. The individual teammates updates regarding the errors, progress in the group meets are taken into consideration for each teammate for the progress the task.

3   Sprint III

Date	Project	Artifact/Component	Duration
15.12.2020	SWT-PR	Weights and Task allocation	02:00 h

Group meet with the schedule for the next sprint

1) German signal libraries

2) Track Loop simulation

3) Geometrical and Spatial Attributes

4) Bahnc compiler

5) Realistic Train Engine Movement

a) Weights and Directionality

b) Energy Conscious Behavior

Studied on the weights part of the train and its implementation.

Date	Project	Artifact/Component	Duration
16.12.2020	SWT-PR	Weights	03:00 h

Writing a definition for trains with trainlength and traintypes as input and user input with wagon count.

Defining the engine weight based on various references taken into consideration.

Weight = wagon count * Wagon weight

Date	Project	Artifact/Component	Duration
17.12.2020	SWT-PR	Weights	02:00 h

Held a project meet with teammates for the individual updates and updated accordingly in the git.

Studied on weight definition and the chosen method is inappropriate for the weight implementation and thus removing the weight definition and studying the traintypes parameters and their usage in the trains file.

Date	Project	Artifact/Component	Duration
19.12.2020	SWT-PR	Weights and energy conscious	02:00 h

Modifying the existing code in the client side by adding additional parameter weight to the existing rolling stock types .

Studying about the rushed behavior i.e, acceleration and deceleration profiles of the train.

Date	Project	Artifact/Component	Duration
20.12.2020	SWT-PR	Weights and Energy Conscious	02:00 h

Group meet with the team members regarding the updates and 2 of the group members leaving the existing tasks, project leading to the reallocation of tasks and disturbance in current updates.

Acceleration profile for the Energy conscious behaviour is studied.

Date	Project	Artifact/Component	Duration
21.12.2020	SWT-PR	Sprint III PO meeting	03:00 h

PO meeting with tasks done, Demo of reverse functionality implementation and weight to be implemented, studies on acceleration and deceleration profile.

wrong assumptions made regarding the acceleration and deceleration

Emergency breaking 2*value*self.length

Normal breaking value*self.length

Acceleration value/self.length

Date	Project	Artifact/Component	Duration
22.12.2020	SWT-PR	Weights and energy conscious	02:00 h

Group meet with the issues and tasks to be shared among three teammates.

German signal library

Track loop

Realistic train engine movement

Implementation weight by adding weight to the traintypes.py with a new weight method and weight setter method, adding the weight component in traintypes.go and in the editor.py with default values.

Date	Project	Artifact/Component	Duration
24.12.2020	SWT-PR	Weights error corrections	01:30 h

Resolving the below errors

Attribute error

Key error

Method not defined properly

Undefined reference

Date	Project	Artifact/Component	Duration
26.12.2020	SWT-PR	Weights and energy conscious	01:30 h

Studying the acceleration and deceleration profile with sample references and going through various formulas and their equations in terms of different parameters and their requirements.

Date	Project	Artifact/Component	Duration
27.12.2020	SWT-PR	Weights	02:30 h

Weights error corrections , refering to stackoverflow, other internet sources for further more development. Checking out the correct declaration of weight values with proper spellings.

Return value specification error rectified, default values declaration verified, sample values in the demo file is declared.

Date	Project	Artifact/Component	Duration
28.12.2020	SWT-PR	Weights and energy conscious	02:00 h

Acceleration, braking values, braking force etc., are studied with their impact on the energy consumption of the train. Regenerative braking is known to regenerate energy with 75 percent efficiency while braking at sudden speed. Various speed dependent acceleration formulas are studied.

Date	Project	Artifact/Component	Duration
30.12.2020	SWT-PR	Weights and energy conscious	02:00 h

All the dependent files with weight are updated accordingly and tried modifying demo file for the error rectification of weight parameter.

As slow as possible acceleration values and as quick as possible deceleration values are considered into implementation and so further train files at client side is studied for the possible speed variation.

Date	Project	Artifact/Component	Duration
02.01.2021	SWT-PR	energy conscious	02:00 h

Braking information, braking distance calculation, speed information, energy consumption are displayed in the message logger.

Date	Project	Artifact/Component	Duration
03.01.2021	SWT-PR	energy conscious	01:30 h

Adding of new context menu widget of energy consumption to the current menu and attempt of adding acceleration parameter to the trains file.

Date	Project	Artifact/Component	Duration
04.01.2021	SWT-PR	energy conscious	02:00 h

Having a quick group meet with teammates regarding the updates and further progress to be done.

Going through the energy consumption materials for the energy saving behavior of vehicles.

Date	Project	Artifact/Component	Duration
06.01.2021	SWT-PR	Acceleration and debugging	02:00 h

Considering the power to weight ratio for acceleration and so adding an additional parameter enginepower to the rolling stock types.

Acceleration = power/(speed * Weight)

Debugging of errors of weight parameter by adding print statements over the train.py file at the ts2 client side.

Date	Project	Artifact/Component	Duration
08.01.2021	SWT-PR	Braking	01:00 h

Studying of equations for energy consumption of trains, braking details, regenerative braking, braking distance implementation at the server side.

Date	Project	Artifact/Component	Duration
10.01.2021	SWT-PR	energy conscious	02:00 h

Research on speed profiles of different vehicles and their behaviour at different contexts, Studying of impact of weight and engine power of the movement of vehicle.

Train movement based articles and interdependent features of trains for energy saving behavior. eg. engine power and weight for speed.

Date	Project	Artifact/Component	Duration
12.01.2021	SWT-PR	Weights	01:00 h

Weights parameter error debugging.

Quick group meet on updates

Date	Project	Artifact/Component	Duration
14.01.2021	SWT-PR	Sprint III Review Meeting	03:00 h

Sprint 3 review on the tasks completed with a quick demo, presenting the tasks accomplished and overview of further proceeding with energy conscious behavior.

Group meet with new Product owner and explanation of task accomplishments, errors, progress with teammates.

Lessons learned.   Sprint 3 mainly focused on debugging of errors and research on various related studies and their methods of implementations to the existing project. Wrong assumptions made are corrected to proceed in a right path i.e, what ways it is possible for the current code not to be integrated.

4   Sprint IV

Date	Project	Artifact/Component	Duration
15.01.2021	SWT-PR	weights Debugging	03:00 h

Held a meeting with Eugene (Supervisor) about 1:20 min for debugging of the current code. Tried various print statements, demo file modifications, for the error rectification.

Pushing of the current debugging code to git repository.

Eugene Rectified the error and suggested a hint for error rectification, data structure declaration error in go file with capitalization of initial letter.

Date	Project	Artifact/Component	Duration
15.01.2021	SWT-PR	weights and engine power	01:30 h

Successfully able to add the weight and engine power parameters to the current rolling stock types.

Date	Project	Artifact/Component	Duration
17.01.2021	SWT-PR	Speed Profile	02:00 h

Importing of weight and engine power to train.py from traintype.py for writing a new method for speed.

tried different menthods for import

import os

importlib

from x import etc., and from editor.py other sample import statements.

Date	Project	Artifact/Component	Duration
18.01.2021	SWT-PR	Speed Profile	01:00 h

Fixing of import error by adding ts2.traintype and using weight and engine power for derivation of speed, checking for the speed value calculation.

Date	Project	Artifact/Component	Duration
19.01.2021	SWT-PR	Speed Profile	02:00 h

Wrong assumptions of importing weight and enginepower to train.py instead ts2-server/plugins/trains.go file where the actual speed value calculation for the simulated train is defined.

Going through the code for the speed value calculation by print statements at various positions.

Date	Project	Artifact/Component	Duration
21.01.2021	SWT-PR	Speed Profile	03:00 h

Getting familiar with the current speed calculation with all the methods and implementing the acceleration formula (power to weight ratio) in the acceleration and observing the changes, changing various min max patterns with trial and error base for speed variation.

Date	Project	Artifact/Component	Duration
22.01.2021	SWT-PR	Acceleration	02:00 h

Acceleration calculation with a final formula of

acceleration := math.Max(-t.TrainType().EmergBraking, math.Min(1/secs*(targetSpeed-t.Speed), math.Max(t.TrainType().StdAccel,t.TrainType().Enginepower/(t.Speed*t.TrainType().Weight))))

Date	Project	Artifact/Component	Duration
23.01.2021	SWT-PR	Deceleration	02:00 h

Changing of various values and functions for speed variations i.e, calculatespeed(), getmaxspeed(), targetspeed() etc.. for observing speed variations.

Date	Project	Artifact/Component	Duration
25.01.2021	SWT-PR	Energy Conscious	01:00 h

Mapping of research work with the current speed calculation for energy conscious behavior.

Date	Project	Artifact/Component	Duration
26.01.2021	SWT-PR	Controlling Rushed Behaviour	02:00 h

Observing of accelerated values at dtnsignal distance for standard braking deceleration, change of accelerated values as low as possible i.e, difference between speeds at regular elapsed time frames is to be as minimum as possible.

Pushing of existing code to git repository.

implementation of emergency contextmenu.

Date	Project	Artifact/Component	Duration
28.01.2021	SWT-PR	Sprint IV Review Meeting	02:30 h

Demo of tasks accomplished and to be accomplished tasks explained.

Study on implementation of emergency brake contextmenu.

Lessons learned. Sprint 4 has accomplished tasks of weight, reverse and improved debugging strategies as well as other ways of getting solved the problems based on trial and error methods. Coordinating with supervisors for any sort of help in the tasks.

5 Sprint V

Date	Project	Artifact/Component	Duration
29.01.2021	SWT-PR	Energy Conscious	02:00 h

Quick group meet with the new product owner with an additional task

1) Design of Automated Traffic Controller

and finishing the tasks to be completed. Study on display of energy consumption details for the user.

Wrong assumption : E:= power*time ,K.E= 0.5*weight*speed*speed

neglecting the speed profile.

Date	Project	Artifact/Component	Duration
30.01.2021	SWT-PR	Energy Conscious	01:00 h

Getting the deceleration formula

stddec = math.Abs((t.Speed*t.Speed)/2*(targetDistance - t.Speed*t0))

Substituting with min and max values of current and previous deceleration values for a change in deceleration.

Date	Project	Artifact/Component	Duration
01.02.2021	SWT-PR	Energy Conscious	01:00 h

Braking distance calculation from braking force for the display to the user towards energy saving driving behavior.

Brakingforce := t.TrainType().Weight*t.TrainType().StdBraking

Braking distance := (0.5*t.TrainType().Weight*t.Speed*t.Speed)/brakingforce

Displayed in the message logger for the user.

Date	Project	Artifact/Component	Duration
02.02.2021	SWT-PR	Energy Conscious	02:00 h

Design of Automated traffic controller, came up with a rough flowchart , small functions .

Date	Project	Artifact/Component	Duration
03.02.2021	SWT-PR	Energy Conscious	02:00 h

Validating the change in acceleration values manually through equation substitutions.

Manual calculations cross checked with simulated values.

Date	Project	Artifact/Component	Duration
05.02.2021	SWT-PR	Energy Conscious	02:00 h

Writing of testcases for the change in values. Evaluating the speed profiles of the original and change in acceleration.

Date	Project	Artifact/Component	Duration
07.02.2021	SWT-PR	Energy Conscious	02:00 h

Pushing of the current changes to the git repository fixing of pipeline errors.

Reviewed the merge request from the other teammate.

Date	Project	Artifact/Component	Duration
08.02.2021	SWT-PR	Sprint V Review Meeting	03:00 h

All the accomplished tasks are displayed and further suggestions, feedbacks are taken for the further progress.

Lessons learned. By the end of Sprint 5 Git pipeline errors fixing are able to be improved and evaluating the current values with estimated values is achieved.