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CSCD 350
Task #2

Software Requirements Specification (SRS)

ELEMENTS (E):

I.   Track Building

II.   Track Usage; e.g. switching

III.   Train Engineering: realistic motion

IV.   Train Engineering: multiple engines

V.   Track/Train Engineering: control/safety

VI.   Train Building: coupling/uncoupling

VII.   Train Usage: staging

VIII.   Train Usage; e.g. delivering passengers

USER STORIES (U):

I.   As a railway engineer, I want to be able to build tracks within a testable environment so that when the team and I move to planning to build the real track system, we will have a clear idea of what would work or not work.

II.   As a railway worker, I want to simulate switching within a railway system so that I can get a feel for how a railway system will flow in the real world.

III.   As a railway engineer, I want to be able to experience realistic motion within a testing environment so that I can design a railway system based motion that would be expected within the real thing.

IV.   As a railway engineer, I want to have the option to have multiple engines on a train because in the real world this is something that needs to happen because the loads that trains carry will be too much for one engine to handle.

V.   As a railway engineer, I want to be able to implement track and train control and safety within a testable environment because within a real railway system there are many safety requirements to consider that are legally enforced.

VI.   As a railway worker, I want to be able to couple and decouple trains because this is something that has to be done all time to have an effective railway.

VII.   As a railway worker, I want to be able to simulate staging to get an idea of how a railway system will be organized. In a real system organization is key to a successful railway.

VIII.   As a train driver, I want to be able to simulate driving the train to get a feel for how the railway runs and how everything works together as a system. Ensuring timing, safety, etc. is all running as It would in a real system.

ELICIT QUESTIONS (Q):

I.   Track Building
- Who
    1. Who decides where the tracks will lie?
- What
    2. What is the process of building the tracks?
    3. What types of tracks can the user create?

II.   Track Usage; e.g. switching
- How
    4. How can the user simulate the switching?

- What
    5. What mechanism will drive the switching?
    6. What kinds of switches will be available?

III.   Train Engineering: realistic motion
- How
    7. How will the train accelerate?
    8. How will the train stop?
    9. How much control does the user have over movement?

IV.   Train Engineering: multiple engines
- How
    10. How can the user link two engines?
- What
    11. What kinds of engines will there be?
- When
    12. When can other engines be added to one another?

V.   Track/Train Engineering: control/safety
- What
    13. What safety systems can be utilized?
- How
    14. How will the safety systems be tested?
- Who
    15. Who will be in charge of checking the accuracy of the safety/control features to ensure that they are as realistic as possible?

VI.   Train Building: coupling/decoupling
- What
    16. What types of train cars cab be coupled and decoupled?
- How
    17. How will the user couple and decouple the train cars?
- When
    18. When can coupling/decoupling be done?

VII.   Train Usage: staging
- What
    19. What types of train yards will be available to the user?
- How
    20. How will the user implement various train yards?
    21. How will staging be simulated? i.e. some timing mechanism?

VIII. Train Usage; e.g. delivering passengers
- How
    22. How realistic will driving be?
    23. How will the system react to the weight of the cargo?
- What
    24. What kinds of cargo will be available?

REQUIREMENTS(R):

[a] The user will be able to customize the track layout when designing. (1)

[b] The user will select a track type via a menu, then click within some design view where the track will lie. (2)

[c] There will be a number of different tracks, very robust for all applications within a real railway system. User can specify angles, curves, size, shape, bridges, etc. (3)

[d] The user can define a timer that causes the switch or they can manually select the switch to activate. (4)

[e] The user or a timer can drive the switching. (5)

[f] There will stub, split, undercut, fixed heel, and overriding switches. (6)

[g] The user can set a timer or manually accelerate the train while in simulation mode. (7)

[h] The user can specify when the train needs to stop, or they can activate the brakes automatically. (8)

[I] The user has all the functionality of a real train driver or they can automate everything. (9)

[j] The user can just use the couple/decouple tool to link engines together. (10)

[k] There will be steam, diesel, gasoline, electric, hybrid locomotive, steam-diesel hybrid locomotive, gas turbine-electric, fuel cell-electric, and atomic-electric. (11)

[l] Engines can be added during the design phase, also during simulation. Also, user can automate when a new engine (or any car) will be added during the simulation. (12)

[m] Various signaling systems, brake failsafe's, track failsafe's, various monitoring systems, control system automation, various other systems as well will all be integrated. (13)

[n] Safety systems will be a part of the simulation which can all be automated or controlled by user. Entire simulations can be customized, also individual safety systems can be simulated outside the overall railway simulation. (14)

[o] Each safety system will be pre-certified via the "Train Safety Certification Board", to ensure accurate testing within the program. (15)

[p] The developers on the program will have a dedicated team to create all the safety components and test them thoroughly before implementing them to the overall program. They will make sure to makes everything perfect to receive a certification as stated above. (16)

[q] During the design faze or the live simulation, there will be a tool to click each of the train cars or engines to couple them. (17)

[r] Coupling/decoupling can be done during simulation or design. (18)

[s] There will switching, arrival, receiving, sorting, coach, transfer, repair and maintenance, departure yards. Also, there will be engine houses. All of these will be integrated and the user will be able to set these up during the design phase. (19)

[t] The user will select the yard they want and put it within their system during designing of the railway. (20)

[u] There will be automated staging that can be set up. This system will be super robust so that the simulation can capture an extremely busy rail way system or a not so busy one. The user can also manually stage trains and act as a manger in a sense, and have all the control. (21)

[v] Driving will include every control that an actual train driver has. Driving the train can be automated via an automation tool. The user can simulate driving the train in a first person or overhead view. Driving can be set to simple – ultra realistic modes via some settings. User has all the control on how real the driving simulation feels. Will support a variety of hardware (mouse and keyboard control, gaming pad, steering wheel, etc.). (22)

[w] Weights will be real-world accurate. If cargo is heavy user may find they have to add engines to make the train work. Tracks will be less accurate as far as supporting weight goes. Each cargo piece will mirror real-world weight. (23)

[x] There will be passengers, freight, coal, gases, livestock, motor vehicles, about anything a train would likely haul in real systems. (24)

SPECIFICATIONS (S)

[A] Tracks will be certified as they would in the real world, TSB (Track Safety Board) V1.03 S.4. [a]

[B] System will have robust GUI for user to interact with to design system. [b]

[C] User will not be able to construct unrealistic designs. System is flexible but not fantasy. Errors will enforce this. [c]

[D] Switches' timing will be real time. [d]

[E] Selecting switches and clicking activate. [e]

[F] All switches certified under TSB 23.2 S. 2.00 V2. [f]

[G] Acceleration is in real time using real engine capabilities. [g]

[H] Brakes will be certified by BSB (Brake Safety Board) v323.9 Sd5. [h]

[I] All models will 99% accurate to their real-world counterpart. [in]

[J] Coupling mechanisms will mirror real ones that are certified under TCSB (Train Component Safety Board) vfd4 S4.9 V22 [j]

[K] All engines will behave to their real counterparts. Not all components will be present within the engines. This is not a train mechanic simulator, rather we just want to capture the behavior as accurately as possible. [k]

[L] Tools displayed via GUI. [l]

[M] All systems certified via TSB 123.123 V34 S33 CH.8. [m]

[N] Real-world timing and manual activation via drop down menu. [n]

[O] Systems will be treated like real ones, again certified under TSB 123.123 V34 S33 Ch.8. [o]

[P] Team will be paired with an actual system certification team from the TSB. [p]

[Q] Coupling options via drop down menu. [q]

[R] Drop down menu. [r]

[S] All yards will be modeled from real ones. Function will be tested by industry professionals during development to ensure accurate behavior. [s]

[T] Selected with design GUI tools. [t]

[U] Staging will be real time, tested by train industry professionals. [u]

[V] Tested by real train drivers to get accurate control schemes, views, behavior, etc. [v]

[X] Cargo will mirror real cargo; real cargo will have weighed. [x]