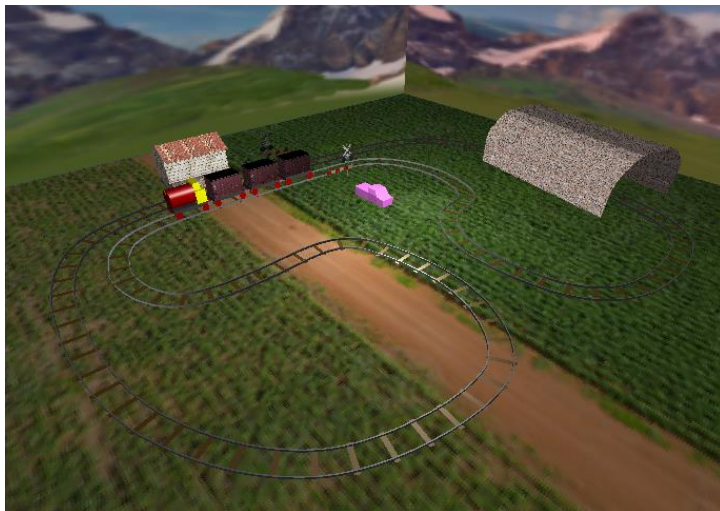


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## Scene Description

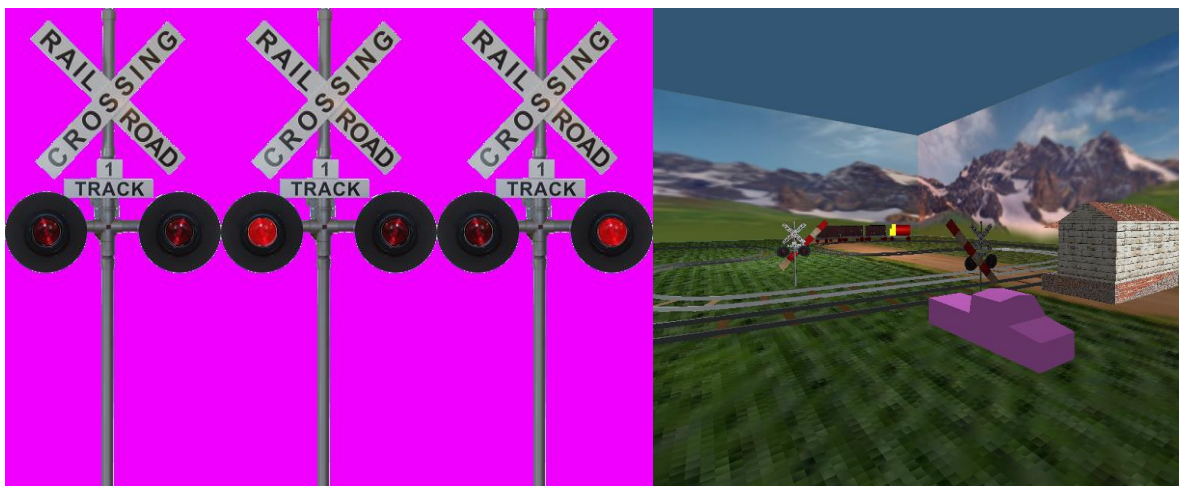
The scene consists of a train that is hauling three coal carts. On its journey it passes through a tunnel and stops at a station. There is also a train crossing where a car will cross when safe. The scene has a textured floor made up of many quads. I also has a sky box.



## Train Crossing

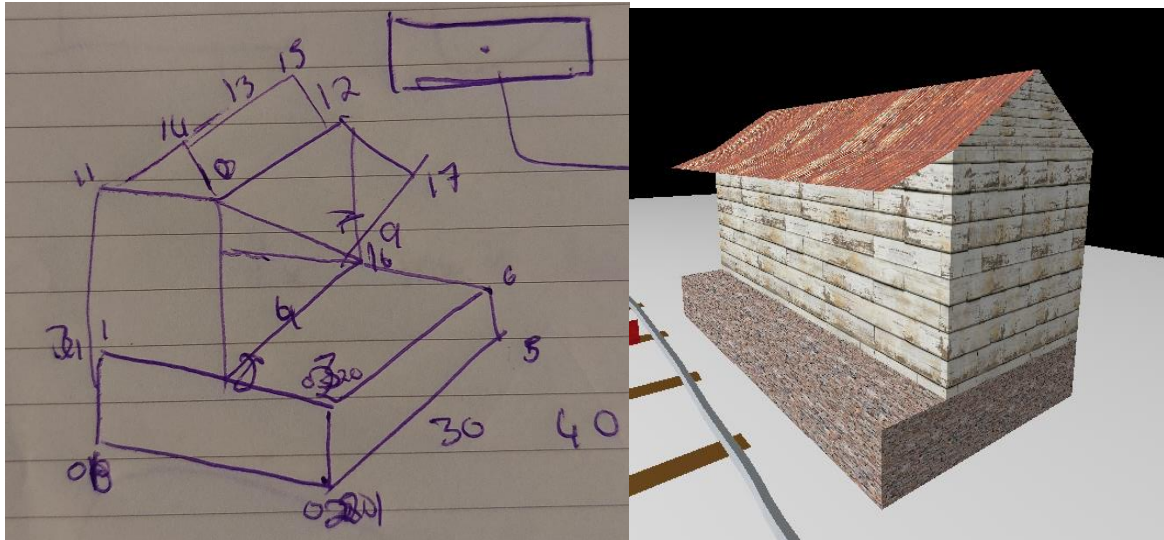
In the scene an animation takes place for train crossing. There is a set of crossing lights and a boom arm. The lights are usual off until the train gets close then the lights start flashing and the arm drops down. Once the train has passed, the arm will move out the way the lights will turn off and the car may move across the tracks.

The image bellow of the crossing lights are contained in one TGA file the pink being transparent. The images are mapped to a quad. The light flashing is achieved by changing the texture on the quad from the middle one the far right one. The animation is starts when the train gets to a specific point in its journey and when it gets to another point the arm will drop down.

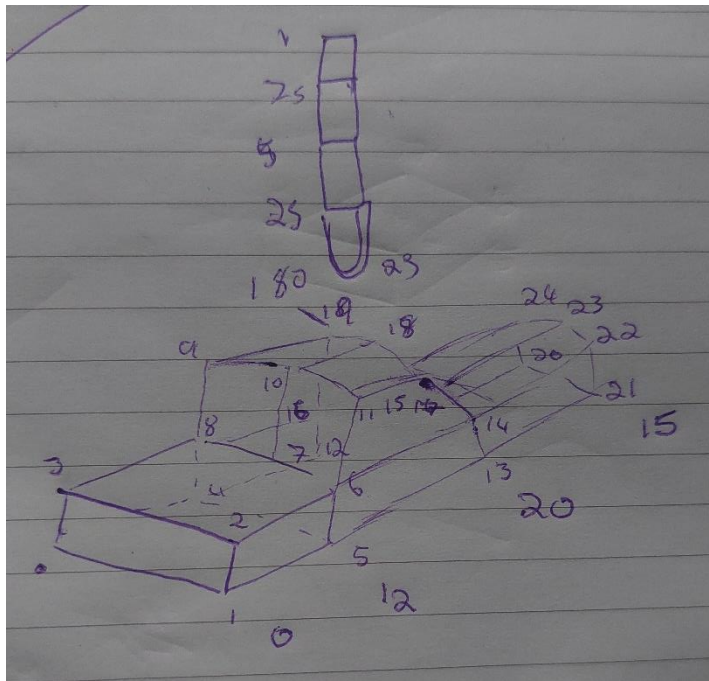


## Station

I created the station model by drawing up a 3d view on paper and naming all the vertexes using this rudimentary drawing I created the sets of vertex and polygons in an OFF file. The station model is loaded in using the modal loader from the first lab. To texture this I have gone with a simple approach of using a switch statement that changes the texture to be used on the quad or triangle depending on what the id of the polygon being drawn is. A better way would be to add another section to the OFF file that would give the texture mapping data in relation to the polygon it would be mapped to. This would then be loaded in with the model data and used for when texture mapping is required.

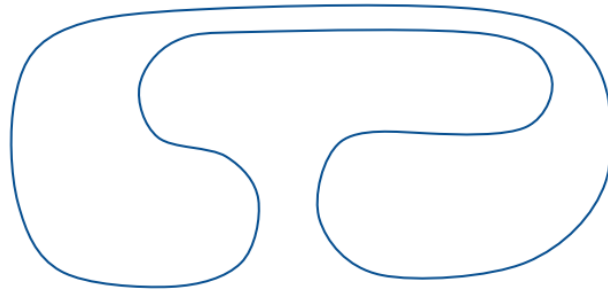


The car model is also an off file. I have altered the model loading so that the models are treated similar to texture in that they are contained in a array this allows multiple models to be loaded in.



## Track

### Folded Dog Bone



#### Formula

$$P_{prev} + \frac{d_{AV} - d_1}{d_2 - d_1} \times (P_2 - P_1)$$

#### Method for equidistance

The first 100 points that form the track are used to calculate the average distance between each point this average distance is then used by the equidistance calculations to evenly space the points.

Equidistance points are achieved by creating a new set of points where each point is the same distance from one another. As the number of points in the new set are unknown and making a variable length array with the heap is completed an array for the x and z components is initialised to be very big. A loop increments each time the distance from the current point to the next point is less than the average distance. Every time that the distance is greater new points are constructed between the points until the distance between the new point and the old next point are less than the average distance.

I also made my own track but liked the one in the lecture better



## Controls

UP Arrow: Forward

Back Arrow: Backward

LEFT Arrow: Turn Left

RIGHT Arrow: Turn Right

PAGE UP Arrow: Move Up

PAGE DOWN Arrow: Move Down

C: change camera to station again to get a view from the train again to go back to normal

## Run Program

To run the program you can import it in to QT creator with the use of the make file. Open QT creator go to file go open projects and files navigate to the make file in my document once it has imported it in click the green play button to run.

## References

Textures

Crossing:

<https://makezine.com/projects/operating-railroad-grade-crossing-signal/>

Building:

<https://www.sketchuptextureclub.com/textures/materials/metals/corrugated/iron-corrugated-dirt-rusty-metal-texture-seamless-09985>

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Wagon:

<https://www.fs2000.org/2015/03/20/fsx-train-passenger-freight-and-fuel-tank/>

SkyBox

[https://developer.valvesoftware.com/wiki/File:MMoDM\\_sky\\_flashback\\_a.png](https://developer.valvesoftware.com/wiki/File:MMoDM_sky_flashback_a.png)

Floor

<https://www.vecteezy.com/photo/1978862-aerial-view-of-a-path-through-a-corn-field>