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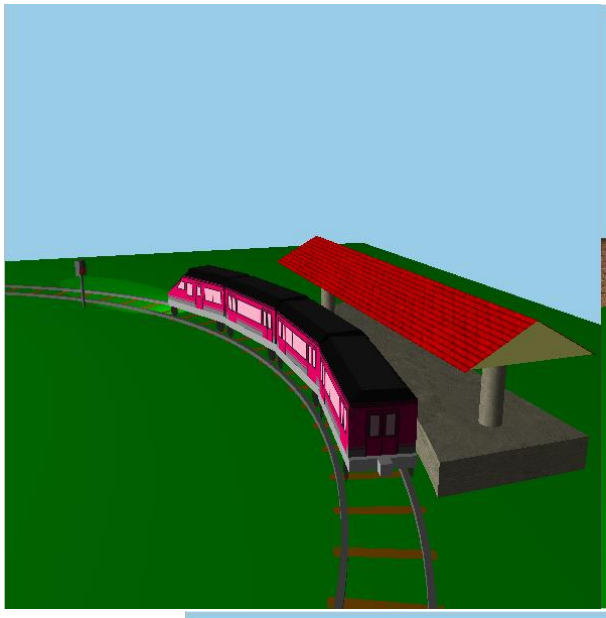
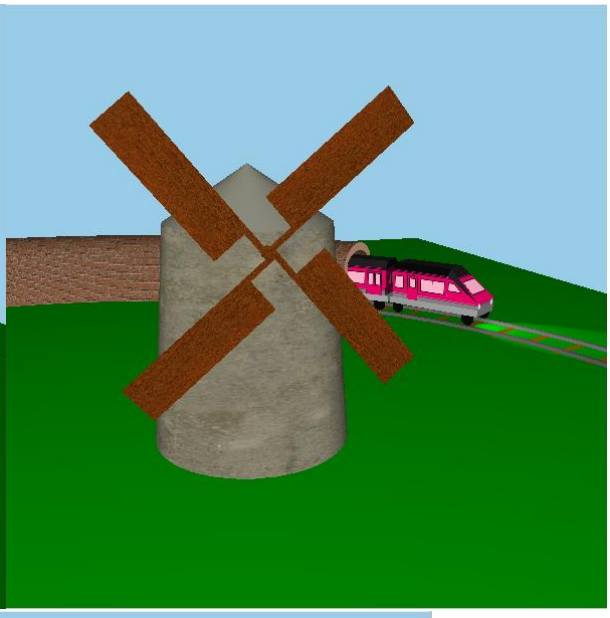
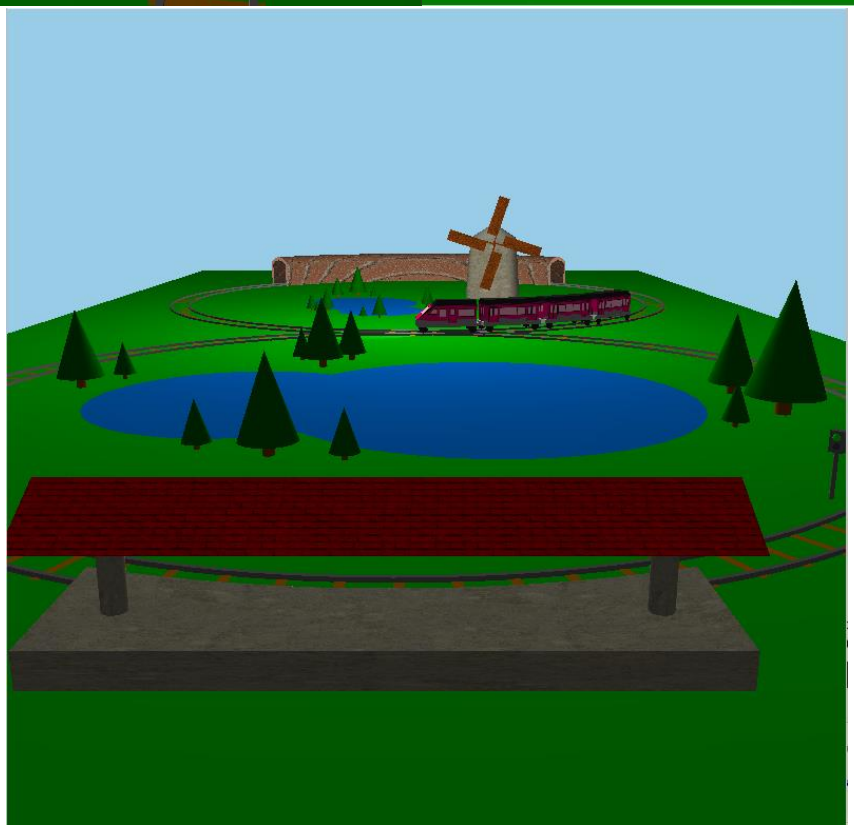
The track is in the shape of a figure-eight with grey tracks and brown sleepers. At one end of the track, is the train station made of a concrete base, two concrete pillars, and a red tile roof. At the other end of the track, is a curved brick tunnel. In the loop closest to the tunnel, is a concrete-based windmill with constantly spinning wooden blades. Near the train station is a signal light that is either red or green. The train is pink and has a front engine and three cars following. The train continuously moves along the track, only stopping for a few moments to drop off any imaginary passengers. Both loops contain a pond each, with surrounding trees. The pond with the windmill is smaller than the other.

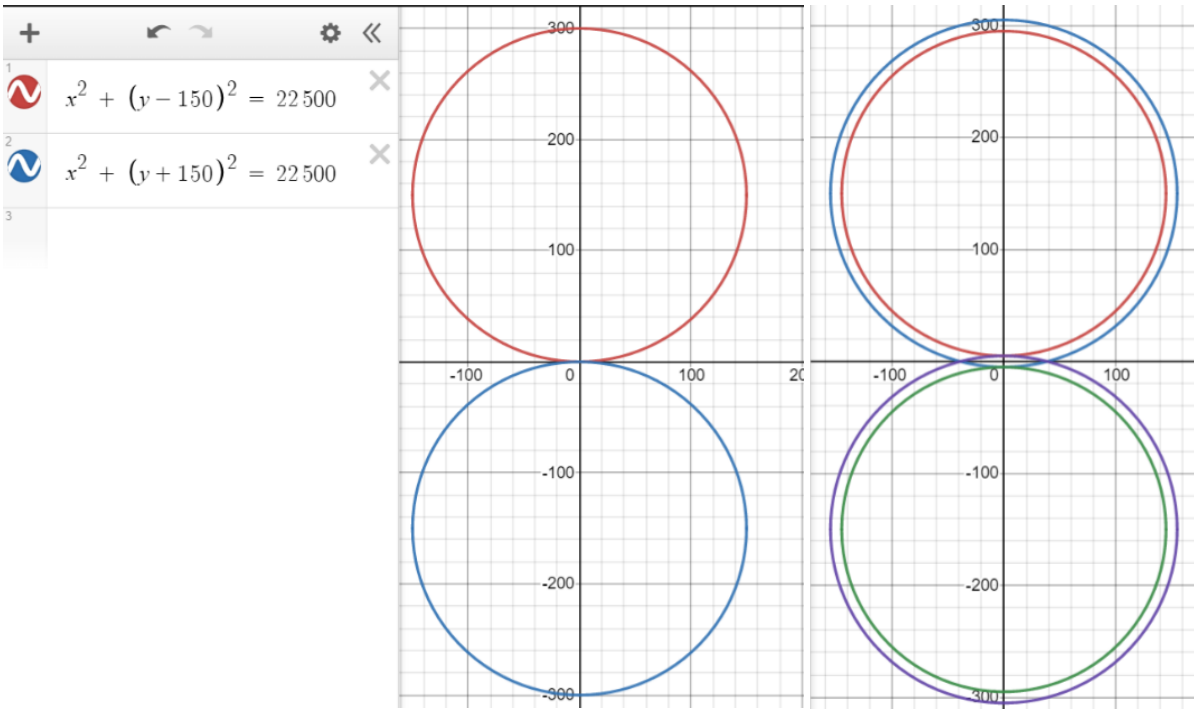






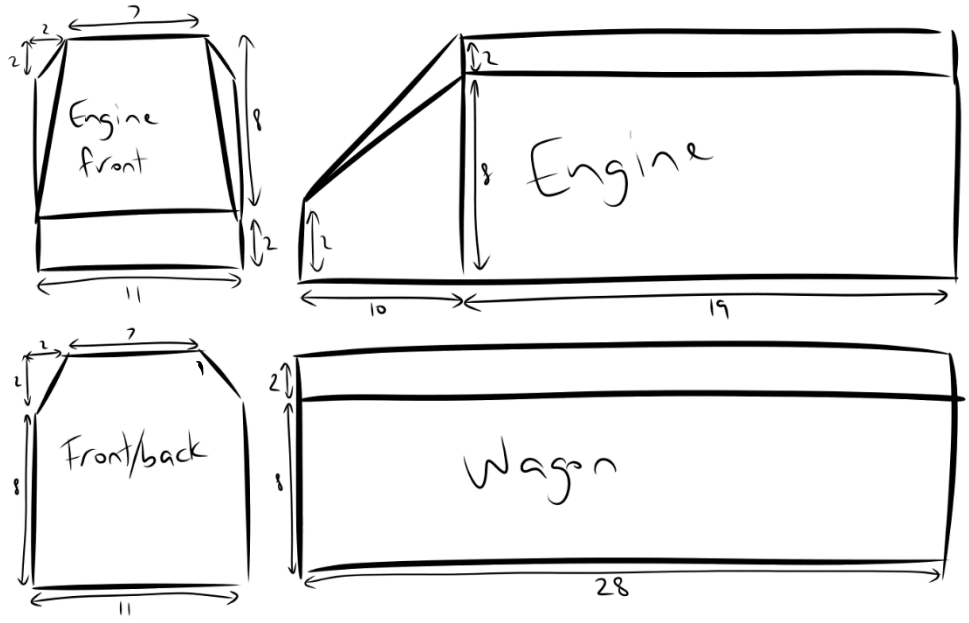
Track Enhancements

The track is a figure eight made up of 2 connecting circles. Each circle has a radius of 150 units, connected at (0, 0), as shown in the image on the left, below. The tracks are 5 units on either side of the centre line and 1 unit wide from that point on. Final result looks approximately like the image on the right. The coordinates were calculated starting at (0, 300) and taken every 2 degrees (x=150sin(angle), y=cos(angle)), resulting in 360 points. Sleepers are 2x7 units and are spaced every 2nd track point.



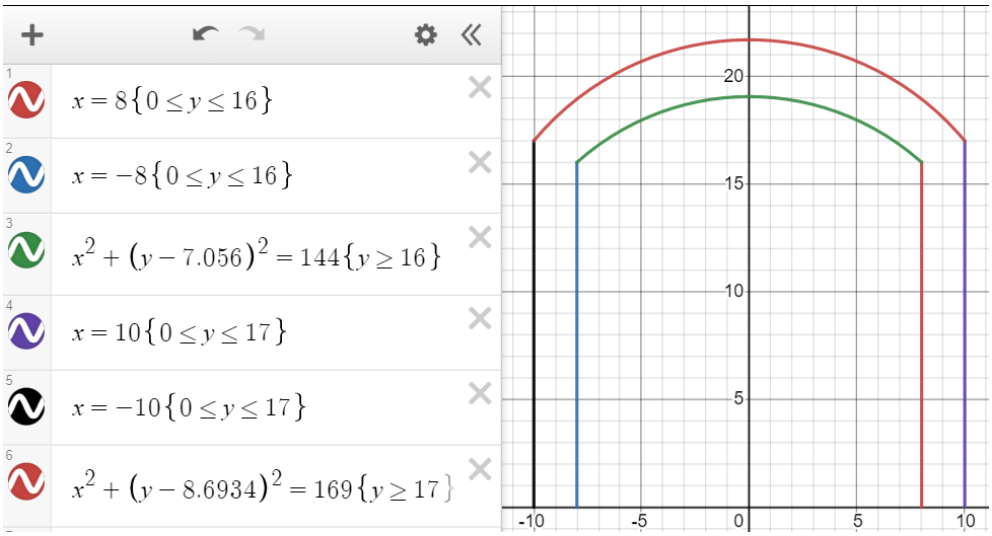
Model Enhancements

The base for each segment of the train is 30 units long and 11 units wide. The design and dimensions for the engine and wagons are shown in the images below. The textures for these models were self-made.



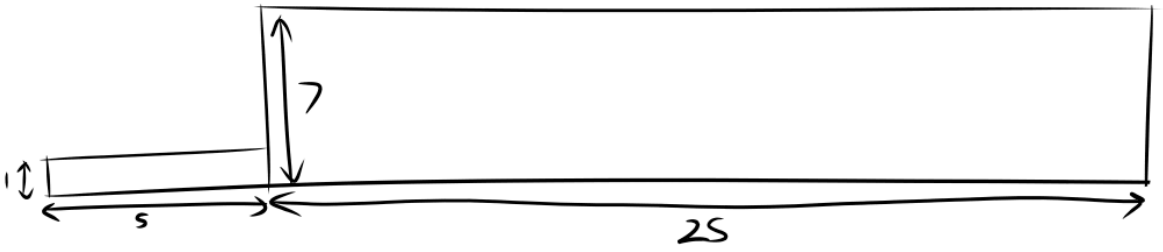
The station base has the dimensions and coordinates as shown in the image below. The individual coordinates for the curve were taken at 2-degree intervals on either side of (0, 0). The roof follows the straight sections of the base and cuts through the curved area at -5y and is made of two pieces that angle from 20 units high to 27. The 2 pillars are placed centred of the base, 40 units away from the centre length wise.

The tunnel contains an inner segment and an outer segment with the ends capped. A brick texture is mapped to the inner and outer sections. The image below shows the first slice of the tunnel. The coordinates of the curved section were taken at 7-degree intervals on either side of 0x. The tunnel curves along 90-degrees of the track circle it's on. The angle was calculated by 90-degrees divided by the number of slices. The distance to move the next slice along was the circumference (300*pi) divided by 4 (as 90-degrees is ¼ of 360) and divided by the number of slices.



<u>Scene Enhancements</u>

The windmill is 40 units high with a base radius of 18 units and a radius of 15 units at the top of the cylinder. This cylinder has a concrete texture. A cone sits on top of the cylinder. The image below shows the design and dimensions for the blade. Four blades are a part of the windmill, rotated 90 degrees each. The blades are 37 units high, attached to the main structure with a tiny cylinder.



The station signal light is placed so it is visible in the train view when the train stops at the station. When the train nears the station, the bottom sphere of the structure will turn red with the sphere for the green light will turn grey. Just before the train leaves, the top sphere turns green and the bottom one goes grey.

Camera Enhancements

There are 3 different camera modes.

1. Free movement camera
2. Stationary view from the train station
3. View from the front of the train

Controls

Up arrow: Move camera forward in the current direction.
Down arrow: Move camera backward in the current direction.
Left arrow: Change the current direction towards left by a certain angle.
Right arrow: Change the current direction towards right by a certain angle.
Page-up: Increase camera height.
Page-down: Decrease camera height.
'c': To toggle camera modes.

Instructions

1. Download and unzip folder
2. Open CMakeLists.txt in Qt Creator and configure project.
3. Make sure that the working directory is the folder with everything in it, i.e., the textures.
4. Press the green triangle at the bottom left corner of your screen.
5. Enjoy!
6. Move around the scene using the controls specified above and watch from multiple different points of view.

References

texturelib.com for the concrete, wood, roof, and brick textures.
Special thanks to desmos.com for helping me plan out my structures.