Due to issues getting a microphone working I was unable to create a voiceover for my video explaining my graphics program. I do have a script so I decided to type it up instead of not showing anything

My program shown running here is a real-time ray tracer. Every frame it simulates light rays in reverse from the camera and uses the phong lighting model to calculate the colour of each pixel. My program also has functions to draw 2D shapes and perform matrix transformation. In the scene shown here 3 spheres are being rotated around a stationary sphere in 3D space. To do this each of the spheres are translated by the negative vector from the stationary sphere’s centre to the origin, rotated about the origin then translated back which makes them appear to be orbiting the stationary sphere. The ray tracer functions by generating a ray in NDC space and transforming it into world space with a projection and view matrix. Then the ray is checked for intersection with anything in the scene and the index of the closest object intersected is returned. Then the lighting equation is called which uses the phong lighting model to calculate the colour of the collision point and after the vector from the point to the light source is checked for collision. If there is a collision the colour returned is halved to simulate shadow. Then that colour is used to draw the pixel to the screen. Given more time I could implement multiple light sources, which would be done using a vector of light sources and calculating the colour from each of them, then summing all of their colours for the pixel, and reflection by recursively calling the ray tracing function with the reflection vector as the new ray until the ray depth reaches the specified limit or there isn’t any new collision. I could also optimize the program by reducing the processing during each frame, making the program run on the GPU and using multithreading to make parts of the program run in parallel as each pixel can be calculated independently from one another. All of these could improve the low framerate of the current program but would take some time to implement.

The program will run as is fine but to test other functions I haven’t used but left in you’d need to create an instance and call the function.