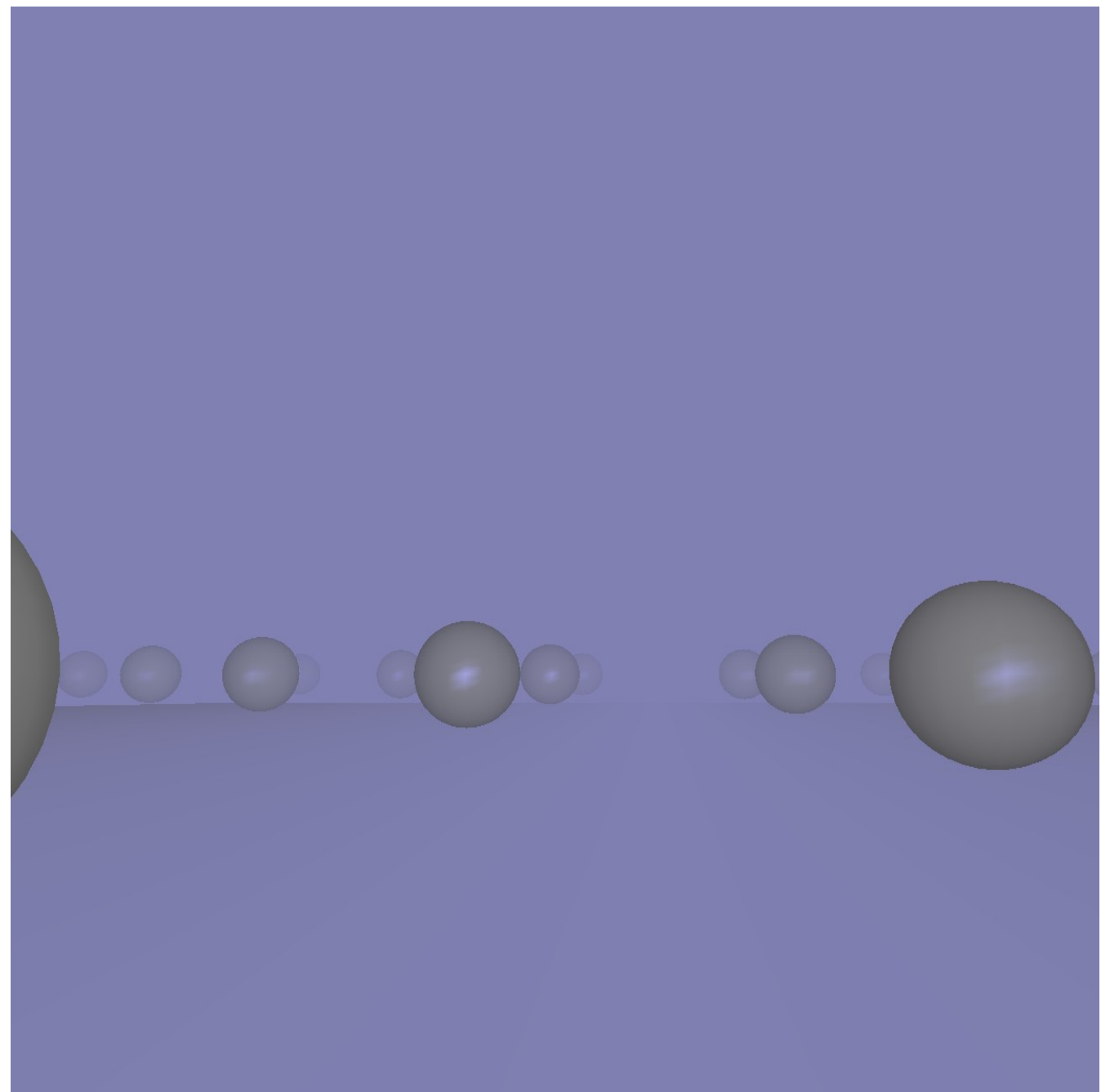


# Exploring a 3-D World

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## Abstract

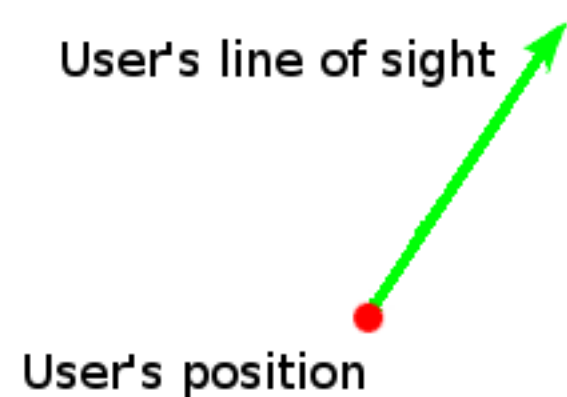
The program displays a window which allows the user to explore an infinite 3-D world using OpenGL. A grid of wire-cubes and spheres are provided as reference. Mouse input is taken to modify the direction in which the user is looking, and keyboard input is taken for



movement across a plane. Movement occurs with respect to the direction the user is looking along the xy-plane. Spherical coordinates are used to achieve this intuitively and easily.

## Perspective and Spherical Coordinates

The first real issue presented to one trying to simulate a person exploring an environment is that of perspective. OpenGL handles some of that, in that it will look from one point towards another point. Still, how do we best



represent this? We know the vector in which the player is looking, and the player's position. With the radius equal to 1, the spherical format can easily describe a point to look at. In (x,y,z) format, the point is (x\_position\_of\_player + cos(theta)\*cos(phi), y\_position\_of\_player + sin(theta)\*cos(phi), z\_position\_of\_player + sin(phi)).

Upshots of this: It translates easily to input (mouse motion in the x and y directions change theta and phi respectively), the entire line of sight vector, and motion vector, can be described with two variables, which are quickly modified and also quick to produce either vector.

