C Coursework – Robot Animation

Program Description

The program displays an animation of a robot moving around in a grid. The grid contains obstacles, which the robot must avoid, and the goal of the robot is to find the marker in the grid. To navigate the grid, the robot moves forward until it detects that an edge of the grid or an obstacle is in front of it, at which point it turns either right or left. This process of moving forward and turning persists while the robot is not at the marker.

In order to configure the robot animation, the program reads data from a text file. This makes the animation completely customizable without having to edit and recompile the source code of the program. The program expects the text file to specify certain attributes along with its associated **data** as follows:

- Grid **size windowSideLength backgroundColor lineColor**
- Robot **xCoord yCoord orientation turnDirection color sleepTime**
- MarkerColor **color**
- Marker **xCoord yCoord**
- ObstacleColor **color**
- Obstacle **xCoord yCoord**

Note that the obstacle attribute can be specified multiple times. See datafile1.txt, datafile2.txt, datafile3.txt, and datafile4.txt for examples of valid text files that the program can interpret.

Compilation Command

The command below compiles the program (assuming the current directory contains the source files).

```
gcc -o ccoursework main.c graphics.c grid.c robot.c
```

Program Execution

To demonstrate the extent to which the animation is customizable using a text file, four different configurations were created. Each table below contains the command to execute the configuration along with a brief description of the animation that will be displayed.

Configuration #1	
Command	`./ccoursework datafile1.txt | java -jar drawapp-2.0.jar`
Animation Description	The red robot turns right when it cannot move forward and follows a spiral path, eventually reaching the dark gray marker located in the center of the 15x15 grid.

Configuration #2	
Command	`./ccoursework datafile2.txt | java -jar drawapp-2.0.jar`
Animation Description	The orange robot turns left when it cannot move forward and follows a zigzag path, eventually reaching the white marker in the 12x12 grid.

Configuration #3	
Command	`./ccoursework datafile3.txt | java -jar drawapp-2.0.jar`
Animation Description	The gray robot turns randomly and is confined to a box-shaped path, however, no matter the direction it turns when it cannot move forward, it always finds the red marker in the 9x9 grid.

Configuration #4	
Command	`./ccoursework datafile4.txt | java -jar drawapp-2.0.jar`
Animation Description	The cyan robot turns randomly, and regardless of the direction it turns when it cannot move forward, it will never find the green marker in the 7x7 grid.