UML Class Diagram

GUI

startButton.listener
pauseButton.listener
stopButton.listener

run()

TrafficLight

TrafficLightColor
boolean stop
Boolean changed
Boolean pause
AtomicBoolean suspend

run()
changeColor()
waitForChange()
getColor()
getStatus1()
stop()
pause()
resume()
interrupt()
start()

Car

Int xPos
Int yPos
AtomicBoolean running
Boolean atLight
Boolean Paused
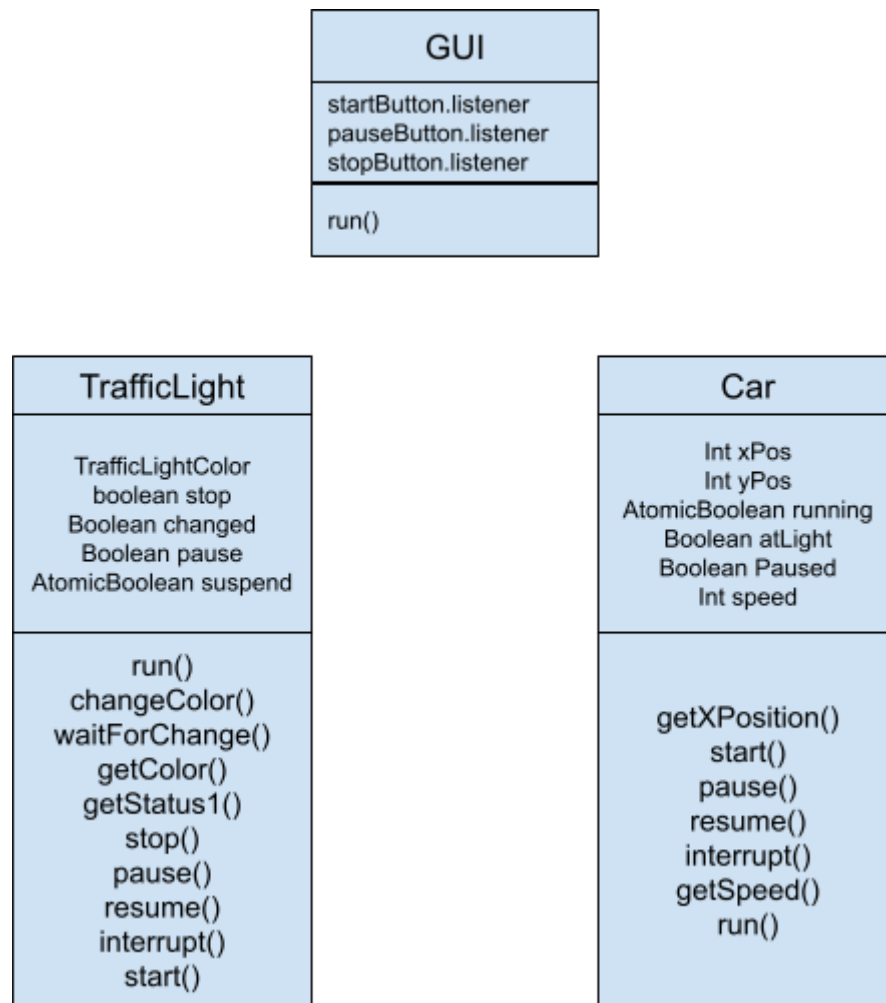Int speed

getXPosition()
start()
pause()
resume()
interrupt()
getSpeed()
run()

To run the program
Run the MainGUI program. This will open up a GUI where the user must enter the number of cars and number of intersections desired. Up to 3 each. Then, the start button can be pressed. The lights will go through its sequence and the x position of the cars will increase and stop when the light turns red. When the car hits 3000 m, the position will reset to 0. If a value greater than 3 is entered, the max amount of cars and intersections will be displayed. The time will continue to run whether the simulation has started or not.

Lessoned learned:
I learned how to implement threads into a Java program. This includes implementing Runnable. Defining the Run() method. Each of the functions of the program is on its

own thread. The clock is on its own thread running even if the simulation hasn't been started. Each car is on its own thread and so are each of the intersections. I learned to use Thread.interrupt and Thread.sleep(). Each thread is started off with .start(). Lastly I learned to update the GUI when the output changes.

Test Case	Input	Output	Expected	Pass?
1	3 cars, 3 intersections, start, stop	3 cars, 3 intersection, lights function, and car x pos increases and stops when red light, lights stop changing, and car stop increasing	3 cars, 3 intersection, lights function, and car x pos increases and stops when red light, lights stop changing, and car stop increasing	Yes
2	2 cars, 2 intersections, start, stop	2 cars, 2 intersection, lights function, and car x pos increases and stops when red light, lights stop changing, and car stop increasing	2 cars, 2 intersection, lights function, and car x pos increases and stops when red light, lights stop changing, and car stop increasing	Yes
3	1 car, 1 intersection, start, stop	1 car, 1 intersection, lights function, and car x pos increases and stops when red light, lights stop changing, and car stop increasing	1 car, 1 intersection, lights function, and car x pos increases and stops when red light, lights stop changing, and car stop increasing	yes
4	1 car, 3 intersection, start, stop	1 car, 3 intersection, lights function, and car x pos	1 car, 3 intersection, lights function, and car x pos	yes

		increases and stops when red light, lights stop changing, and car stop increasing	increases and stops when red light, lights stop changing, and car stop increasing	
5	Start program	Clock runs	Clock runs	yes
6	1 car, 1 intersection, start, pause, continue, stop	1 car, 1 intersection, lights function, and car x pos increases and stops when red light, light and xPos pause and continues where it left off, lights stop changing, and car stop increasing	1 car, 1 intersection, lights function, and car x pos increases and stops when red light, light and xPos pause and continues where it left off, lights stop changing, and car stop increasing	yes

Test Case 1

Traffic Simulation

Traffic Simulation Program

Start	Pause	Stop

Status

Sun Dec 11 14:38:38 EST 2022

RED	RED	RED
1357	2081	600

Car 1 x PositionCar 2 x PositionCar 3 x Position

0	0	0
Car 1 Speed	Car 2 Speed	Car 3 Speed

How many cars?

How many Intersections?

Traffic Simulation

Traffic Simulation Program

Start	Pause	Stop

Program started

Sun Dec 11 14:38:08 EST 2022

GREEN	GREEN	GREEN
2728	2243	932

Car 1 x PositionCar 2 x PositionCar 3 x Position

36	36	36
Car 1 Speed	Car 2 Speed	Car 3 Speed

3

3

Traffic Simulation

Traffic Simulation Program

| Start | Pause | Stop |

Program is stopped

Sun Dec 11 14:38:24 EST 2022

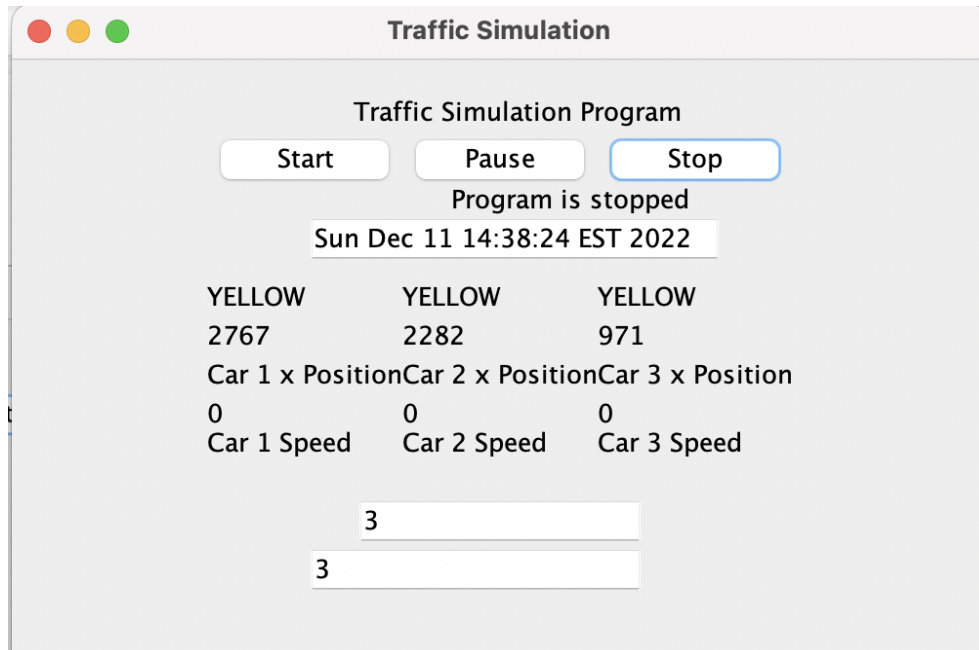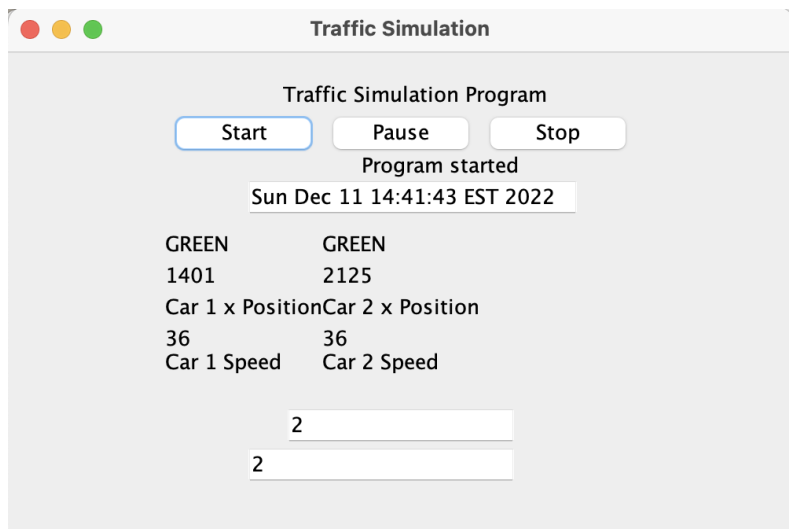| YELLOW	YELLOW	YELLOW
2767	2282	971
Car 1 x Position	Car 2 x Position	Car 3 x Position
0	0	0
Car 1 Speed	Car 2 Speed	Car 3 Speed

3

3

Test Case 2

Traffic Simulation

Traffic Simulation Program

| Start | Pause | Stop |

Program started

Sun Dec 11 14:41:43 EST 2022

GREEN	GREEN
1401	2125
Car 1 x Position	Car 2 x Position
36	36
Car 1 Speed	Car 2 Speed

2

2

Test Case 3

Traffic Simulation

Traffic Simulation Program

| Start | Pause | Stop |

Program started

Sun Dec 11 14:42:05 EST 2022

GREEN

701

Car 1 x Position

36

Car 1 Speed

1

1

Test Case 4

Traffic Simulation

Traffic Simulation Program

| Start | Pause | Stop |

Program started

Sun Dec 11 14:44:23 EST 2022

YELLOW   YELLOW   GREEN

1261

Car 1 x Position

36

Car 1 Speed

1

3

Test Case 5

Traffic Simulation

Traffic Simulation Program

Start	Pause	Stop

Status

Sun Dec 11 14:45:00 EST 2022

RED	RED	RED
2738	1388	2838
Car 1 x Position	Car 2 x Position	Car 3 x Position
0	0	0
Car 1 Speed	Car 2 Speed	Car 3 Speed

How many cars?

How many Intersections?

Test Case 6

Traffic Simulation

Traffic Simulation Program

Start	Continue	Stop

Program is paused

Sun Dec 11 14:46:01 EST 2022

GREEN

748

Car 1 x Position

36

Car 1 Speed

1

1

Traffic Simulation

Traffic Simulation Program

Start   Pause   Stop

Program is continued

Sun Dec 11 14:46:11 EST 2022

GREEN

773

Car 1 x Position

36

Car 1 Speed

1

1

Traffic Simulation

Traffic Simulation Program

Start   Continue   Stop

Program is stopped

Sun Dec 11 14:46:23 EST 2022

YELLOW

781

Car 1 x Position

0

Car 1 Speed

1

1