Arab Academy for Science and Technology and maritime transport

College of Computing and Information Technology

Lecturer: Dr. Khaled Maher

Course: CS305-Modeling and Simulation
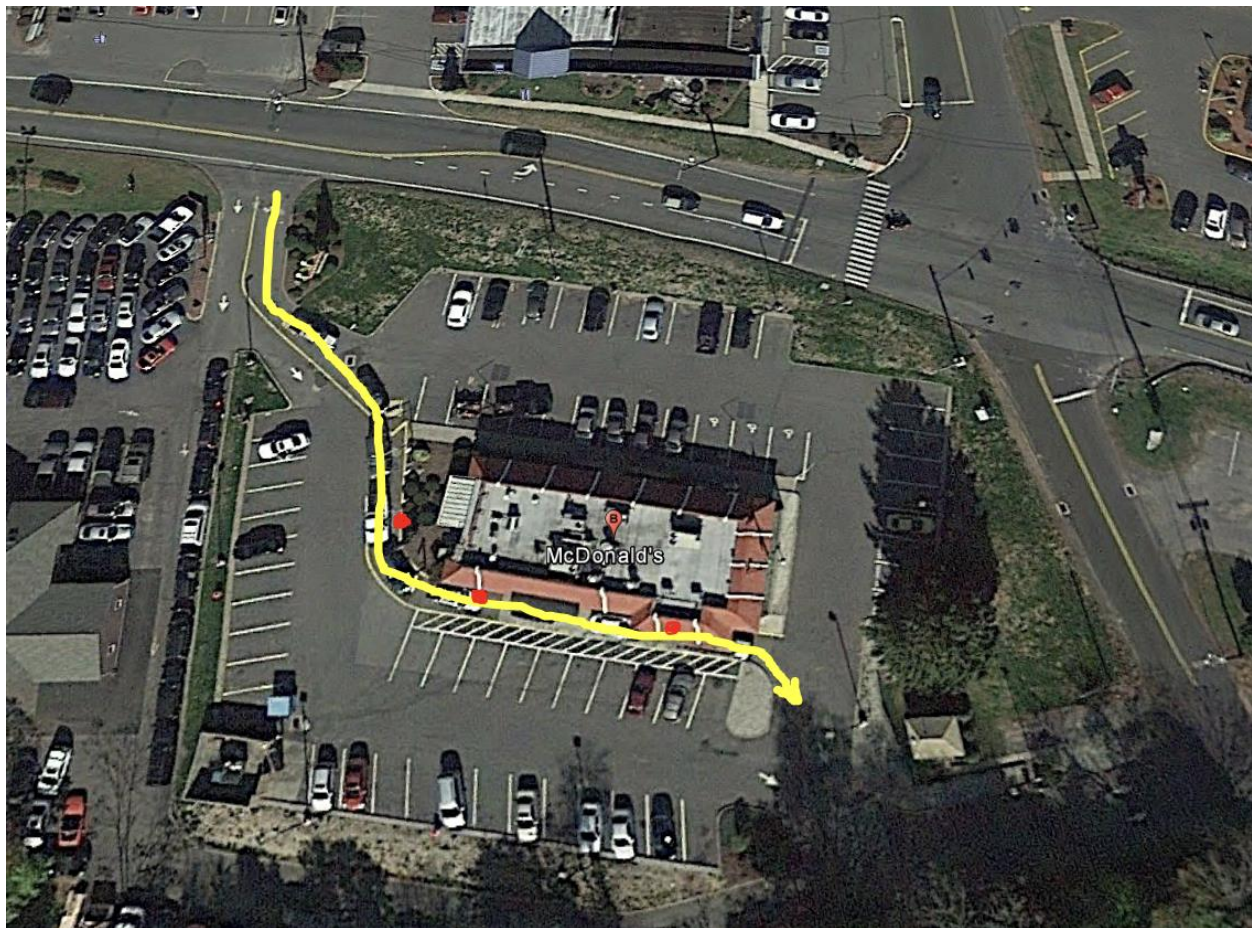
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12ᵗʰ Project

Drive through Lane

To use the drive through system a customer will enter a specified lane that guides each customer to each station in the system

1. Order Station

The order station has a menu display and an intercom system for the customer and an employee inside the restaurant to communicate. When a customer reaches the order station a McDonalds' employee will greet them via the intercom system. The customer will place an order through the Intercom.

The queue at the order station is 6 cars to fill the drive through lane to the street.

2. Payment Window

Once the order is placed the order taker will provide the customer with the total order cost and ask them to proceed to the payment window. When the customer reaches the payment window, they will pay the cashier at the window. When the payment is complete the customer will proceed to the pickup window.

- The queue at the payment window is two cars

3. Pickup Window

At the pickup window a McDonalds' employee or several employees will fill the order and bag it to hand to the customer.

The queue for the order window is one car. There is also a three parking spaces designated for drive through pickup for cars in the system that may have a longer than normal for an order. When this happens, the cars are directed to the order pick up parking spaces and when the order is ready an employee will deliver it to the car.

Given that

1) Customer Inter-arrival Times

Customers arrived at an exponential rate of 3 to 307 seconds with a mean time of 40 seconds. This can also be converted to 90 customers per hour for the measured hour.

2) Ordering Station Service Time

The time was observed as each customer arrived at the ordering station and left the ordering station. With these two-time recordings the service time was calculation.

The service time is a normal distribution with a minimum of 3 seconds, a maximum of 34 seconds with a mean of 16.9 seconds. The standard deviation is 7.09 seconds.

3) Payment Window Service Time

The same process used to measure the order window service time was used for the payment window station.

The payment window data is a triangular distribution with a minimum of 7 seconds, a maximum of 35 seconds with a mean of 17.7 seconds. The standard deviation is 6.95 seconds.

4) Pickup Window Service Time

Again, the same process used to measure the order window and payment window service times was used for the pickup window station.

The pickup window data is a lognormal distribution with a minimum of 1 second, a maximum of 63 seconds with a mean of 17.5 seconds. The standard deviation is 17.9 seconds.

Based on the given data we wanted to perform the simulation of the drive through system to determine if any or how many customers may be affected by the seemingly limited drive through queue space using python/simpy

Assignment submission
  – create a python/simpy for the system.
  – The project is individual not groups.
  – Deadline is end of week 11 (16 Dec)
  – Discussion will be on the 12th week