SYSC 3303 - Final Project – Data Analysis

Data selection process:

For the calculations of travel time from floor to floor, a couple of assumptions were made about the elevator's behaviour:

      I) The acceleration of the elevator would be $0.50 m/s^2$

      II) The elevator would reach maximum velocity within the one floors travel length (4 meters)

- Using these assumptions and the data provided, the maximum velocity was calculated to be 2.0m/s, this meant that the time it would take for the elevator to move from floor to floor would be **2.0s** at maximum velocity.
- It was also necessary to calculate the time it would take for the elevator to reach maximum velocity (which is also the time it would take to slow down to a stop). This value was calculated at **4.0s**.
- Comparing these times to the calculated times with times with the average times found from the data presented shows an > 80% resemblance which will be accounted for using a confidence interval.
- Calculated velocities with an assumption of acceleration = $1.5 m/s^2$ or $1.0 m/s^2$ proved to be too fast in comparison to the data and were therefore ruled out as possibilities.

Along with full distance travel, the data also gave floor to floor travel but included the time for doors opening and closing on each floor. The average speed here would be far slower than the continuous travel option as every floor involved acceleration on launch and slowed down to a stop on each floor.

Identifying the amount of time it took on each floor for a door to open and close gave much more data about loading/offloading times.

- The mean of the onloading/offloading time and a 95% confidence interval were used to find a range of **9.53s ± 1.61s** used in the getElevatorLoadingTime() function.
  - In contrast to the travel times, these times will likely not have to be revised as there is no need to account for acceleration or any other factors.
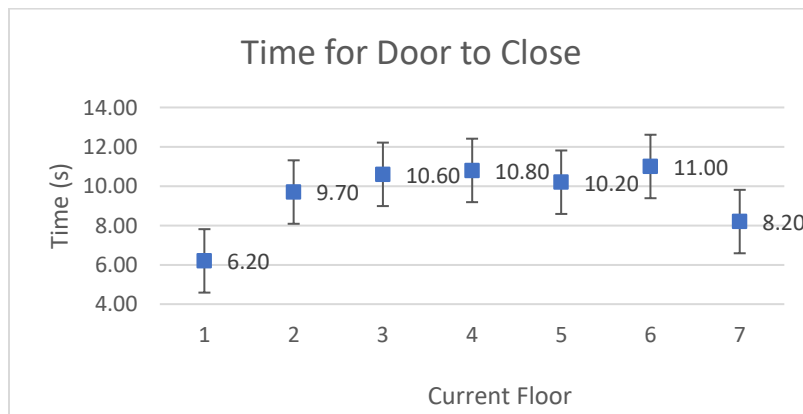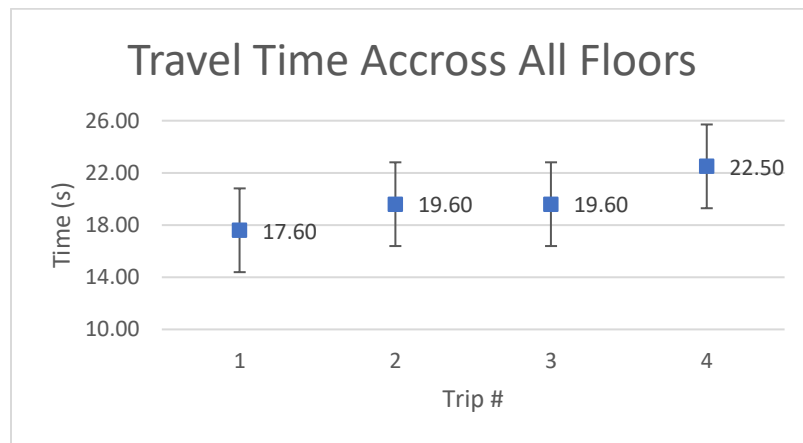
Velocity/time model graphs of how movement would look when accounting for acceleration, deceleration and max velocity:
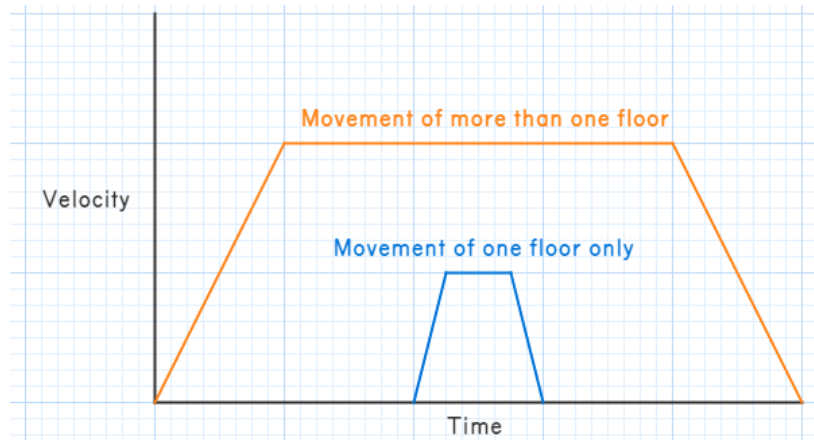
This graph models what the elevators movement will generally look like, it will accelerate initially and plateau at a maximum velocity until it is 1 floor before its final destination where it will decelerate to a stop.

- Since moving only one floor will not cause the elevator to reach peak velocity, it will plateau at a lower velocity for a much shorter time.