

# **Sean Johnson Q5040916 Embedded Systems**

## **Software Report**

Requirement 11: Every time a pedestrian is waiting at any light in the simulation, every pedestrian waiting light is enabled. This means that when we want to find out if any pedestrians are waiting we can just check a single light to check every situation. Every time a cycle of traffic lights has completed and are all set back to red, we then check if a pedestrian is able to cross. This is handled by splitting the cycle into two separate functions, one to rotate the north/south lights and one to rotate the east/west lights. Once the north/south lights are rotated the program can check if a pedestrian wishes to cross (after EVs are checked), if none are present, the east/west lights will then rotate and so on. Since one rotation of a set of lights takes only 8.2 seconds, we have a large amount of time to allow EVs through before handling pedestrians. For indicating when a pedestrian wishes to cross so that this information is always up to speed, there is a separate loop beneath the lights functionality that handles this. This loop constantly checks if one of the pedestrian buttons is pressed (on a 0.15s loop) and resultingly enables all of the pedestrian waiting lights if one is pressed, meaning that after the current light cycle finishes they will be able to cross.

Requirement 12: The functionality of enabling the pedestrian wait lights has been separated from the main light-controlling loop meaning that it executes separately. As a result of this none of the delays occurring in the main loop will have any effect upon the pedestrians pressing the button and seeing the lights. This loop operates on a 0.15 delay so that it is under 0.2 seconds but is not always running to save CPU time.

Requirement 13: All pedestrians must wait and cross at the same time, controlled by a function that happens after the light rotation has been executed. As stated in the ICA, pedestrians only need 6 seconds to cross the road. If an EV sensor is triggered the light cycle for that loop is skipped and the EV is handled, taking about 13.5 seconds. This means that after a red light has occurred, if an EV is handled and some pedestrians need to cross there should only be about 20 ~ seconds before the next light cycle can happen (multiple EVs can come one after the other but there are 40 seconds spare to process further EVs)

Requirement 14: The processing of EVs is checked twice in the code. Once the code is first entered the presence of EVs is checked, meaning that if one is found the lights for that vehicle are instantly activated, taking about 0.2 seconds to change to green. If no EVs are found when the first access the loop, they are checked again after the light rotation, meaning that if one appears right after the traffic lights begin to change, the longest they will have to wait is 8.2 seconds from the first red-amber back to red. If an EV is located while the pedestrians are walking, it will be handled when the loop is re-entered, before changing the traffic lights, meaning they only have to wait 6 seconds for the pedestrians to cross.

