Advanced Digital Logic

ENGR – UH 2310

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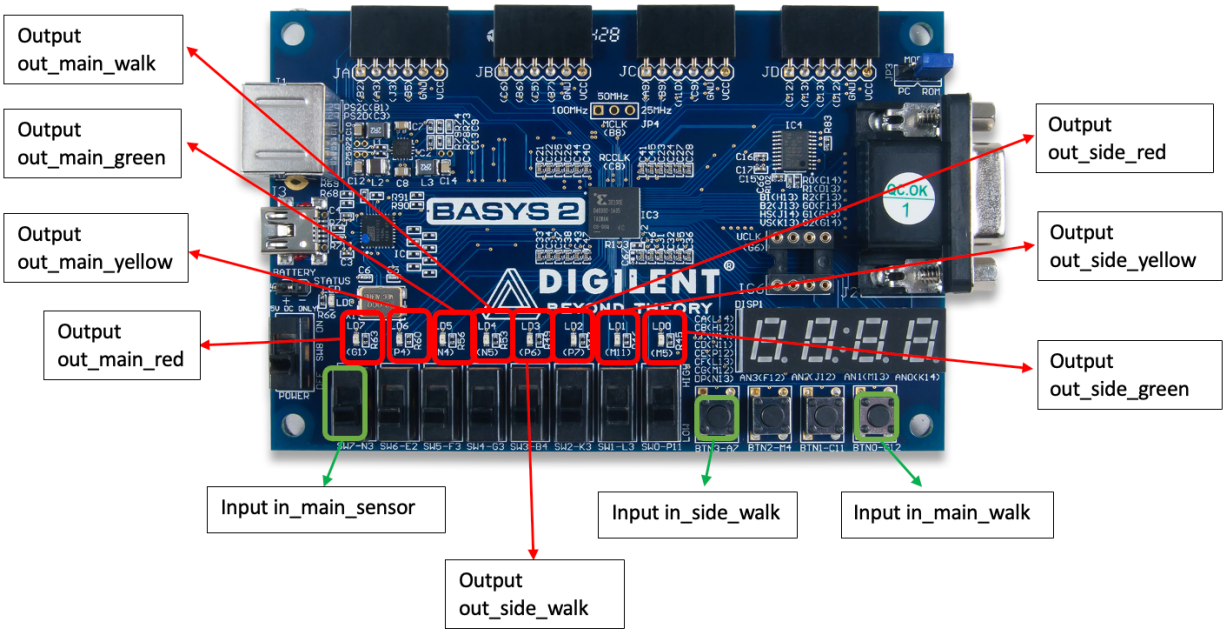
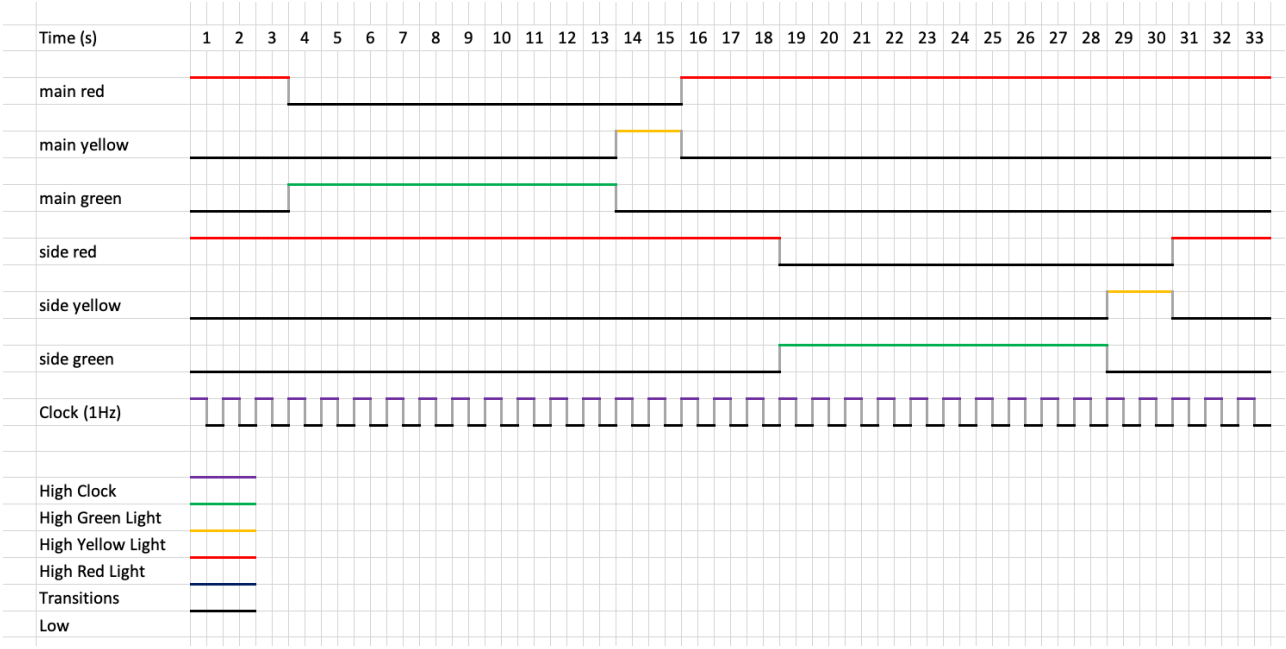
LABELLED HD PICTURE OF INPUTS AND OUTPUTS ON FPGA BOARD FOR FSM TAIL LIGHTS CONTROLLER

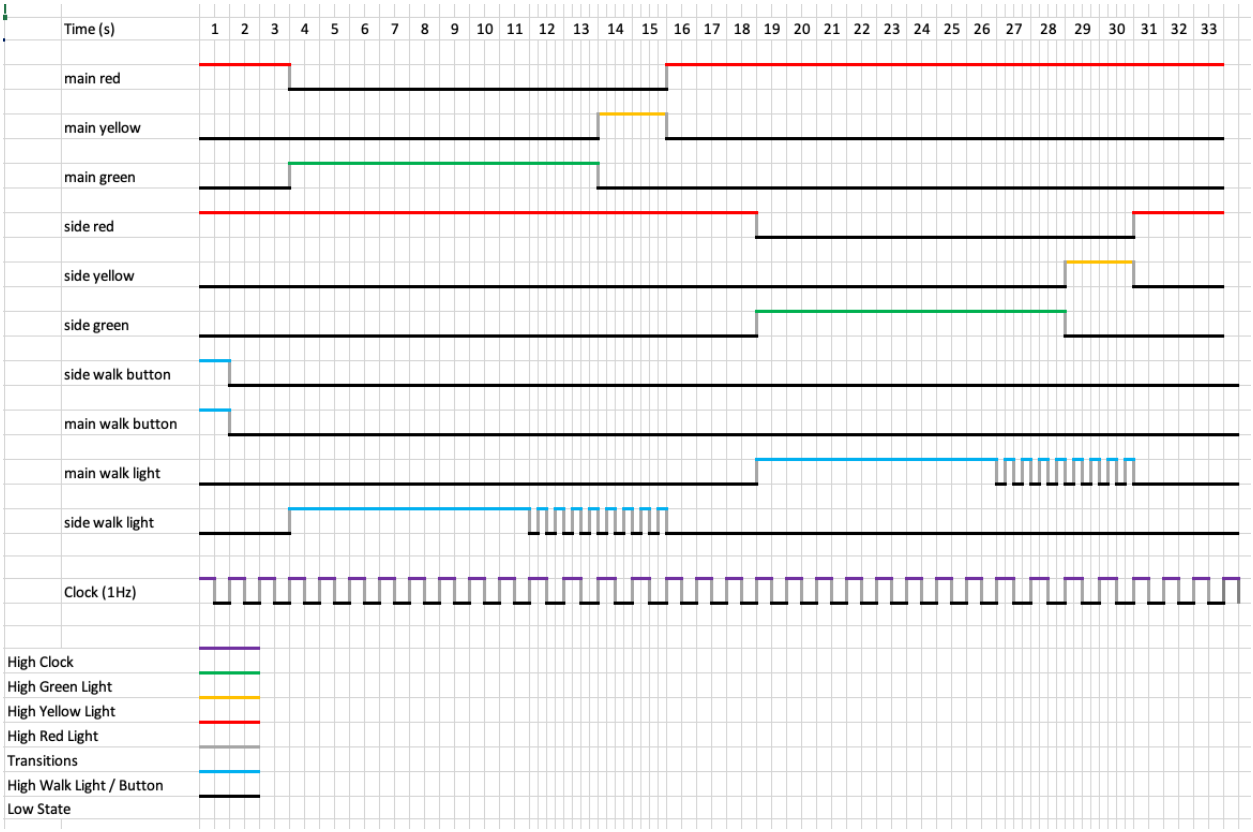


TIME LINES OF THE OPERATION SEQUENCES

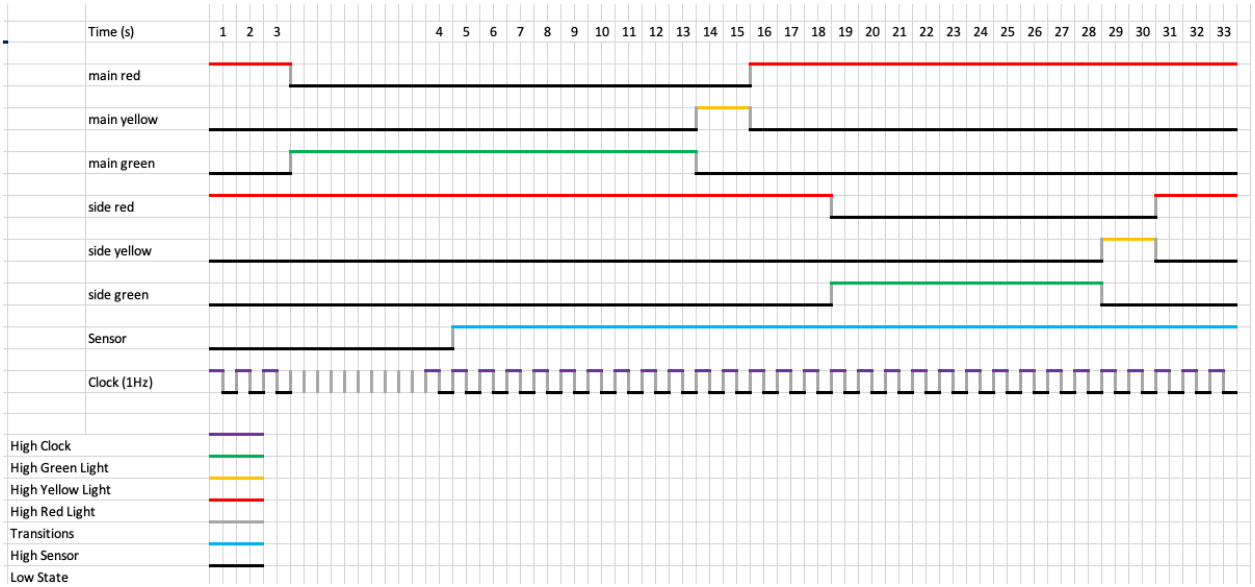
1. Normal mode



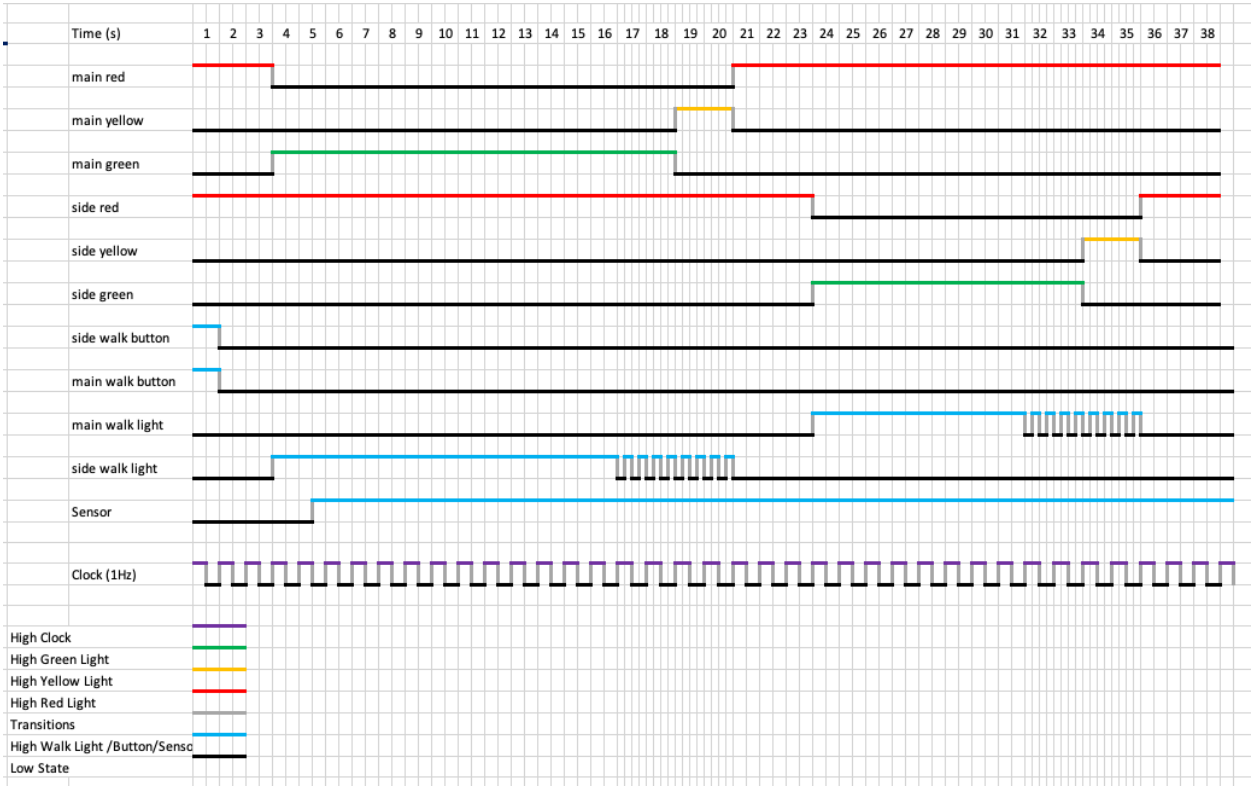
2. Normal mode with both walk lights triggered



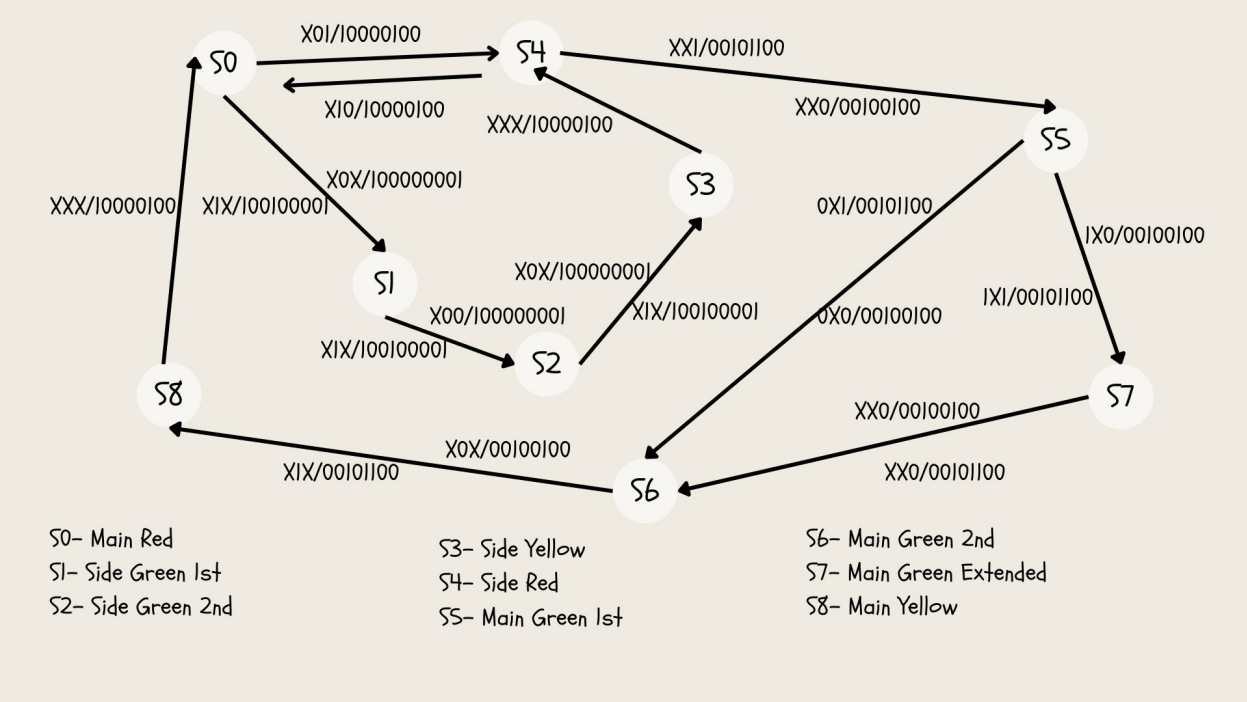
3. Mode with extended green phase for main street, without walk lights triggered.



4. mode with extended green phase for main street, along with both walk lights triggered.



STATE DIAGRAM



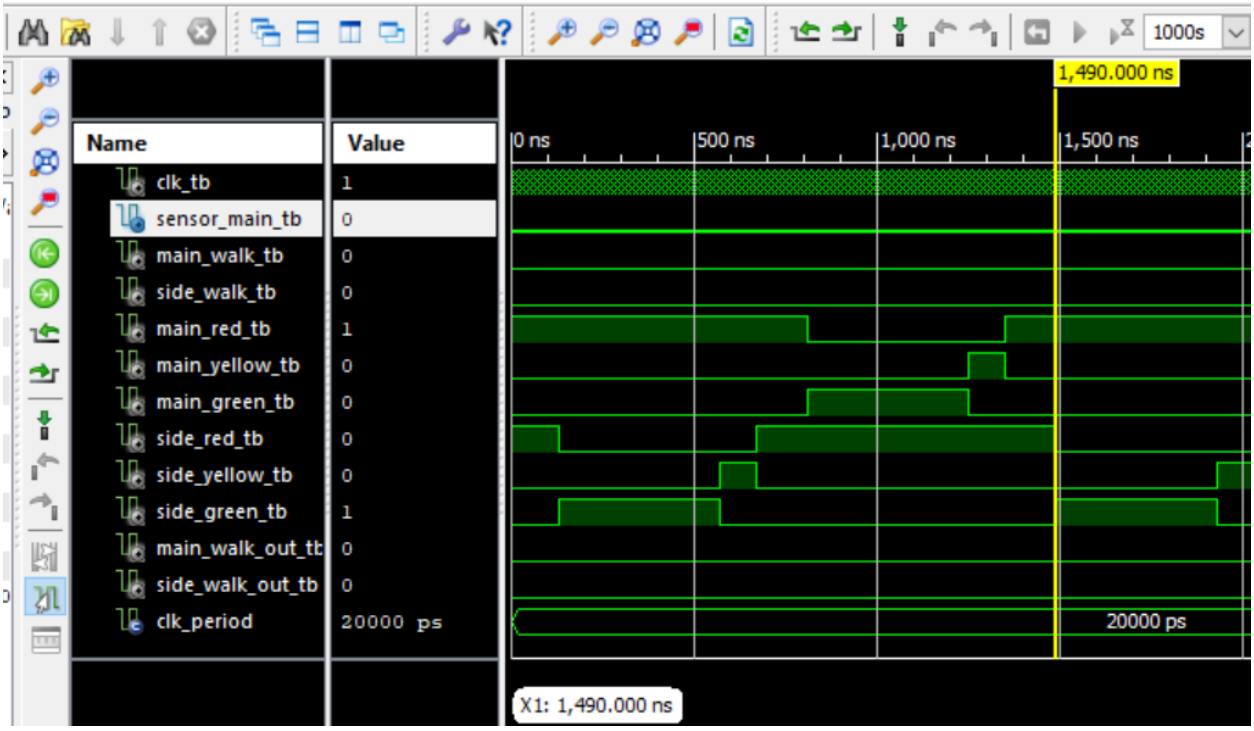
The following shows the order in which the inputs and outputs are represented in the next state transitions.

Inputs: Sensor, Main Walk Signal, Side Walk Signal
Outputs: Main Red, Main Yellow, Main Green, Main Walk Lights, Side Walk Lights, Side Red, Side Yellow, Side Green

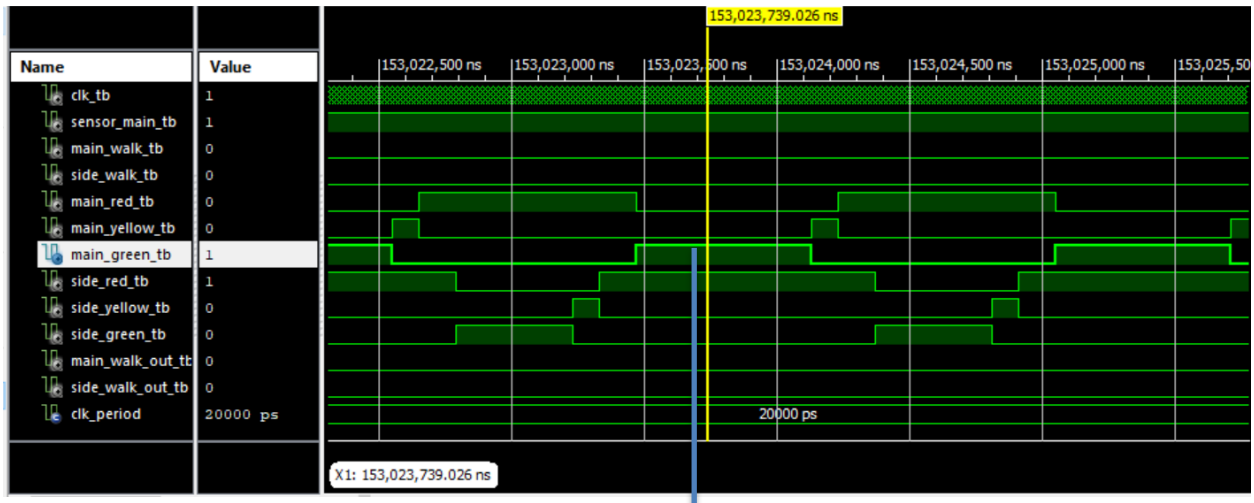
SIMULATION WAVEFORMS

TEST CASES:

1. All inputs are off; the controller cycles through the normal operation mode.

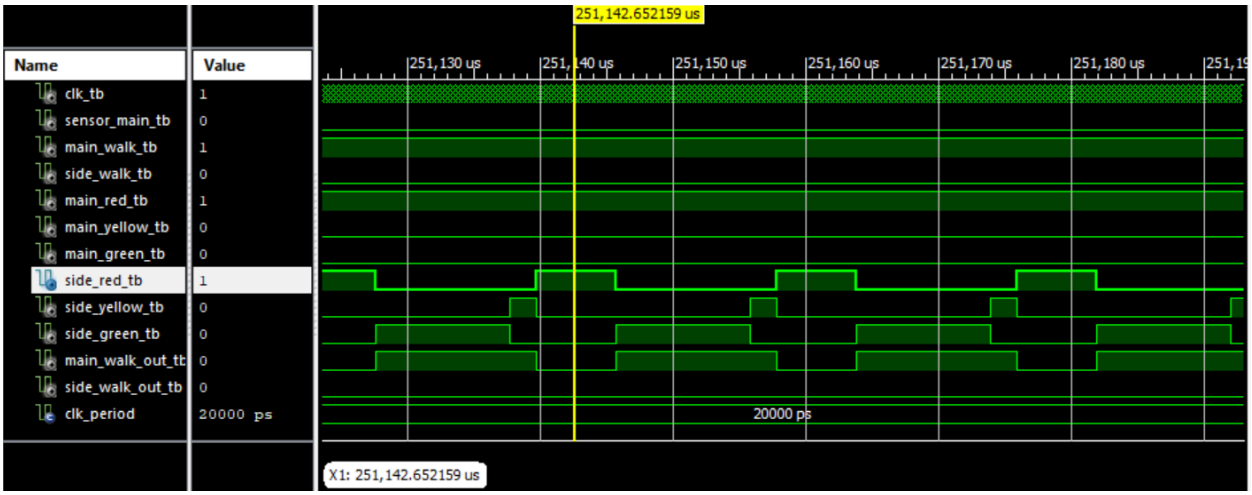


2. The main street sensor is on; the controller allows for the main street to have a longer green phase.

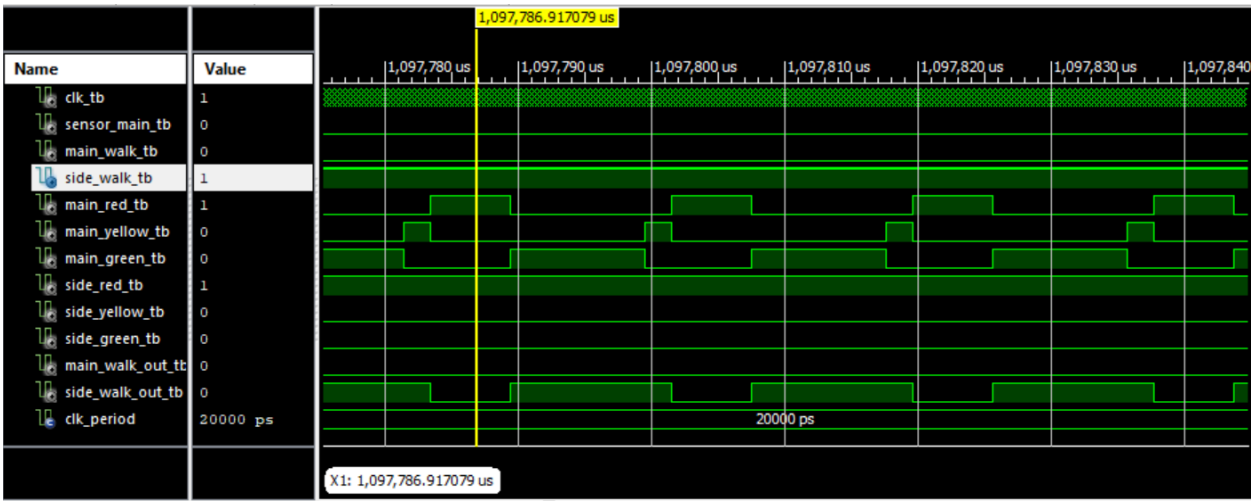


The green light is extended for 5 seconds

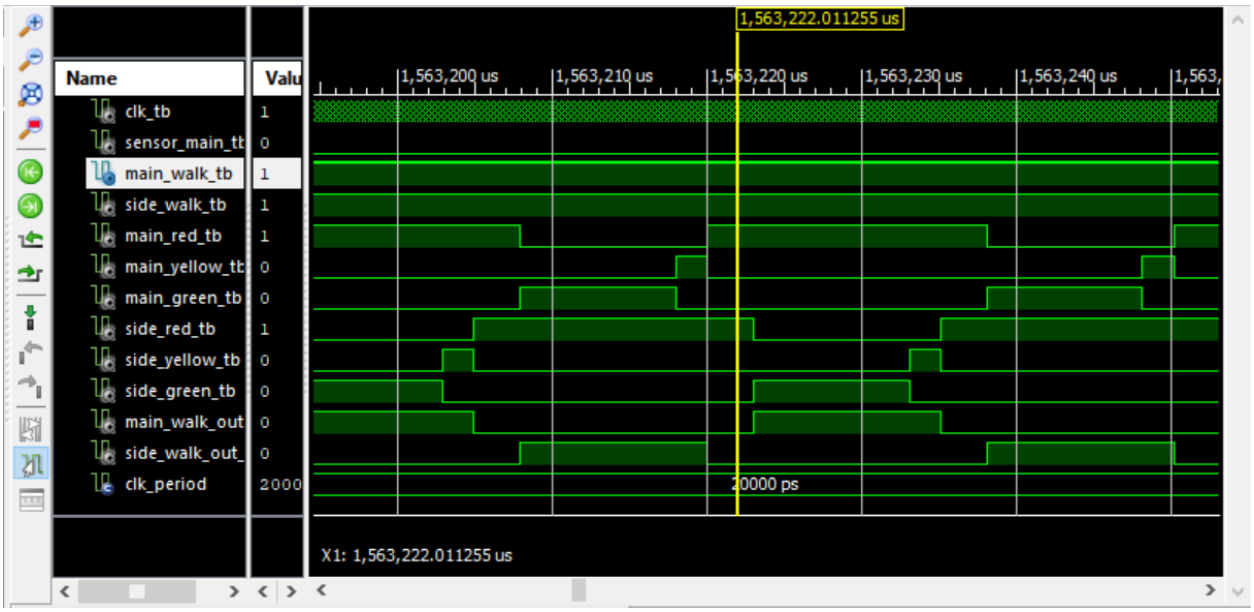
3. Both walk buttons are briefly pushed at some (random) point in time; the controller cycles through the operation mode and also serves the walk lights.



Only Main walk is on. The blinking of the walk light is not visible due to frequency.

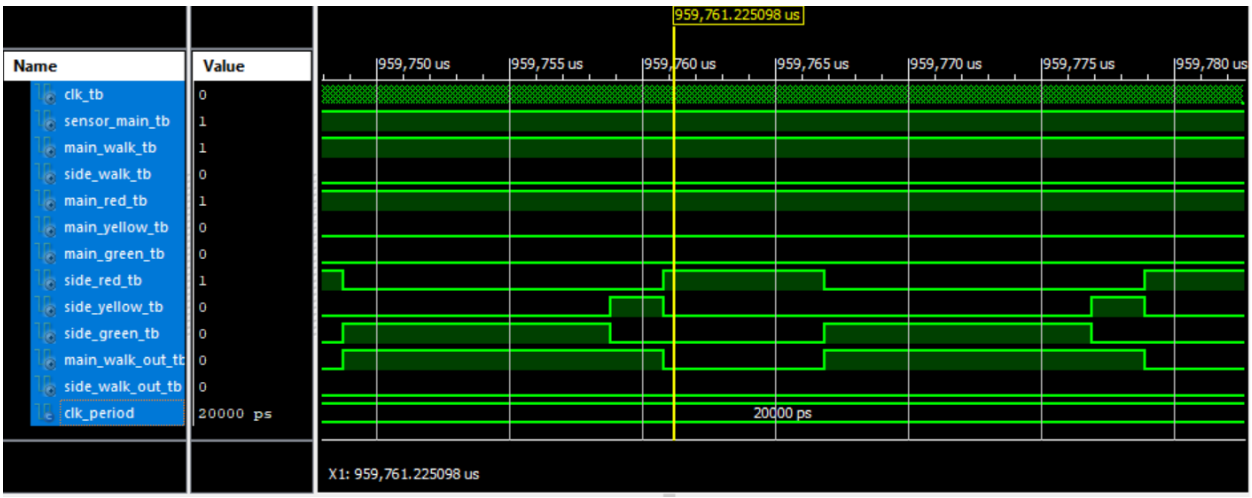


Only Side walk is on. The blinking of the walk light is not visible due to frequency.

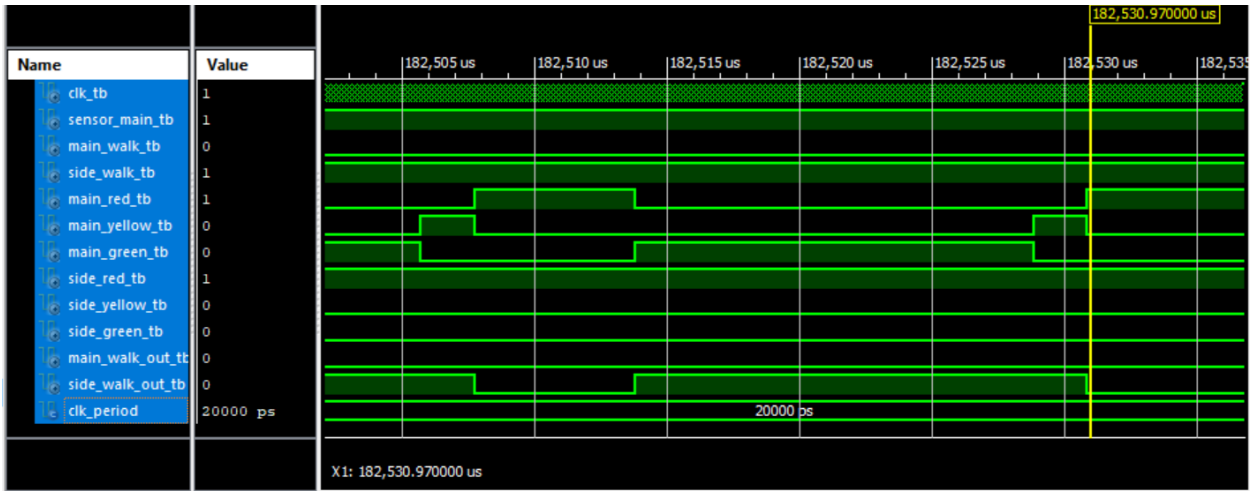


Both Main and side walk are on. They are saved in the register then executed one after the other. The blinking of the walk light is not visible due to frequency.

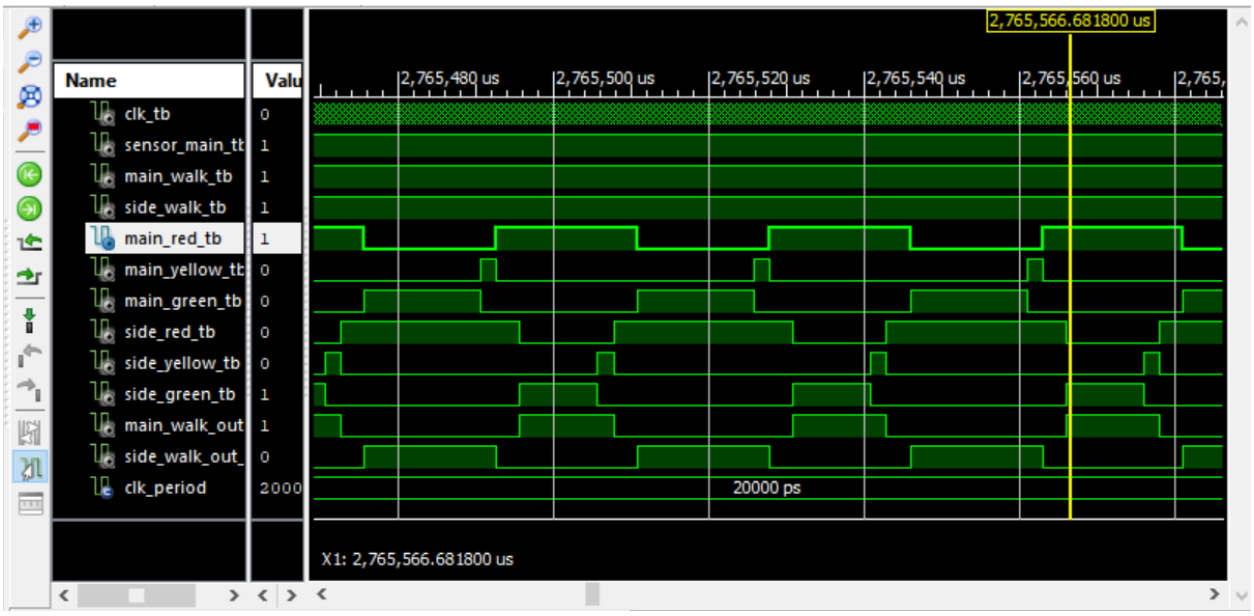
4. Both walk buttons are pushed at some point, and also the sensor is on; the controller cycles through the mode with the main street having a longer green phase, and also serves the walk lights.



Main walk and sensor are on. Main walk is not extended as it is not affected by the sensor as shown above. The blinking of the walk light is not visible due to frequency.

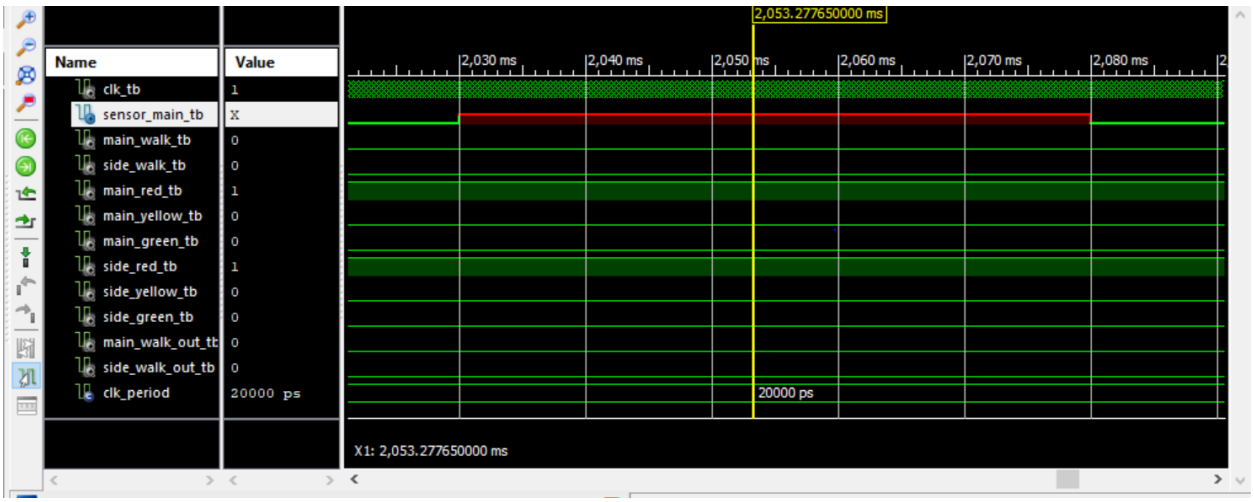


Side walk and sensor are on. Side walk is extended by the sensor as shown above. The blinking of the walk light is not visible due to frequency.



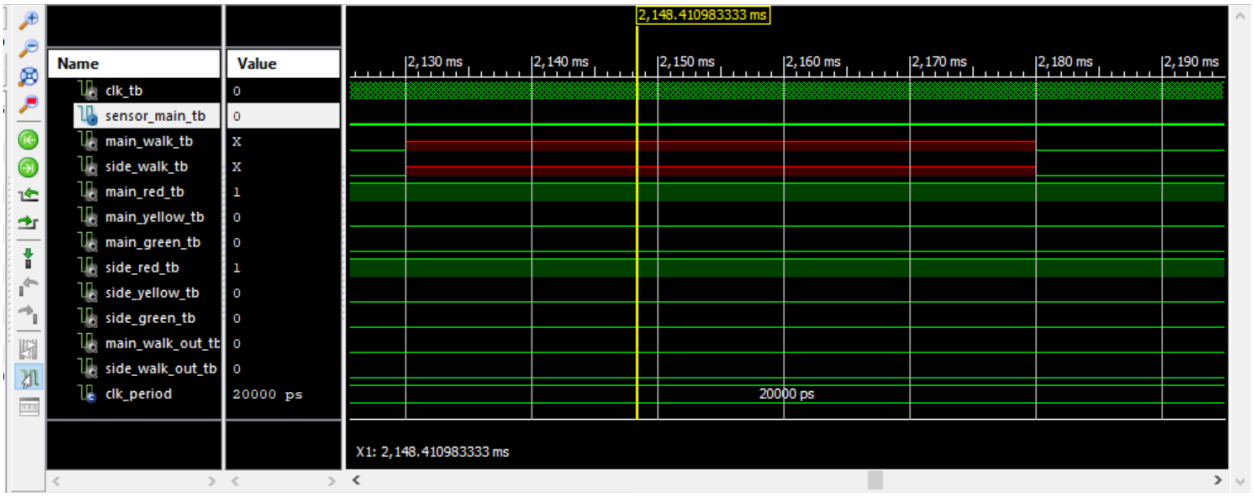
Main walk, side walk and sensor are on. Main walk is not extended as it is not affected by the sensor as shown above. Side walk and the main green light are extended. The blinking of the walk light is not visible due to frequency.

5. An “X” error is assigned for the sensor.



Sensor has ‘X’ error input. According to our design when sensor input is in error, the both red light remains red and operation pauses until error is resolved.

6. An “X” error is assigned for both walk buttons.



Both side and main walk have ‘X’ error input. According to our design when sensor input is in error, the both red light remains red and operation pauses until error is resolved.