

Tiva TM4C1294NCPT Traffic Light Controller Architecture and Design Document

This document describes all the components of the software and how they relate to one another.

Components

The components consist of Functions and Global variables, which the functions will use

Functions

Main Function Used for configuration, and overall program flow handling

Used: None

Uses: 1. Led Configurator 2. Timer Configurator 3. Button Handler 4. Standard and Rush mode handler 5. Night mode handler 6. Traffic mode 7. Ticks 8. Next Ticks

Led Configurator Sets up the pins to output, makes button pins interrupt-aware

Used: Main Function

Uses: None

Timer Configurator Sets up timer to tick every 0.25 of a second, repeatedly

Used: Main Function

Uses: None

Button Handler Handles button presses

Used: Main Function

Uses: 1. Main Pedestrian Flag 2. Side Pedestrian Flag 3. Car Sensor Flag 4. Traffic Mode 5. Light State 6. Ticks 7. Next Tick

Standard and Rush mode handler Checks the flags, which are raised by button presses. Instructs lights handler to change lights for standard and rush modes.

Used: Main Function

Uses: 1. Main Lights handler 2. Side Lights handler 3. Main Pedestrian Flag 4. Side Pedestrian Flag 5. Car Sensor flag 6. Motion flag 7. Light State 8. Next Tick

Night mode handler Checks the flags, which are raised by button presses. Instructs lights handler to change lights for night mode.

Used: Main Function

Uses: 1. Night Mode Handler 2. Main Pedestrian Flag 3. Side Pedestrian Flag 4. Light State 5. Next Tick

Main Lights handler Changes Lights for the main car and pedestrian road.

Used: Standard and Rush mode handler

Uses: Light State

Side Lights handler Changes Lights for the side car and pedestrian road.

Used: Standard and Rush mode handler

Uses: Light State

Night Lights handler Changes all Lights, for night mode only.

Used: Night Mode Handler

Uses: Light State

Global variables

Global variables cannot use other components ##### Main Pedestrian Flag Raised by main road pedestrian button press.

Used: 1. Button Handler 2. Standard and Rush Mode Handler 3. Night Mode Handler

Side Pedestrian Flag Raised by side road pedestrian button press.

Used: 1. Button Handler 2. Standard and Rush Mode Handler 3. Night Mode Handler

Car Sensor Flag Raised by car sensor being active.

Used: 1. Button Handler 2. Standard and Rush Mode Handler

Motion Flag Used as a “wait” for Pedestrian button presses, so pedestrians could not repeatedly press and abuse the buttons.

Used: 1. Button Handler 2. Standard and Rush Mode Handler

Traffic Mode Indicates which traffic mode it is: * -1 - Stopped mode * 0 - Standard mode * 1 - Rush mode * 2 - Night mode

Used: 1. Main Function 2. Button Handler

Light State Indicates which light state it is, as described in Requirements RE5

Used: 1. Button Handler 2. Standard and Rush Mode Handler 3. Night Mode Handler 4. Main Lights Handler 5. Side Lights Handler 6. Night Lights Handler

Ticks Used to count current time (in 0.25 of second).

Used: 1. Main Function 2. Button Handler

Next Tick Used to indicate when the next action (light change) should happen (in 0.25 of second).

Used: 1. Main Function 2. Button Handler 3. Standard and Rush Mode Handler 4. Night Mode Handler