Moving Car System Design

By : Team 4

Contents

Flowchart Table

Detailed Requirements

System Requirements:

1. The car starts initially from 0 speed
2. When PB1 is pressed, the car will move forward after 1 second
3. The car will move forward to create the longest side of the rectangle for 3 seconds with 50% of its maximum speed
4. After finishing the first longest side, the car will stop for 0.5 seconds, rotate 90 degrees to the right, and stop for 0.5 second
5. The car will move to create the short side of the rectangle at 30% of its speed for 2 seconds
6. After finishing the shortest side, the car will stop for 0.5 seconds, rotate 90 degrees to the right, and stop for 0.5 second
7. Steps 3 to 6 will be repeated infinitely until you press the stop button (PB2)
8. PB2 acts as a sudden break, and it has the highest priority
9. LEDs Operations
    1) LED1: On means moving forward on the long side
    2) LED2: On means moving forward on the short side
    3) LED3: On means stop
    4) LED4: On means Rotating

Layered architecture

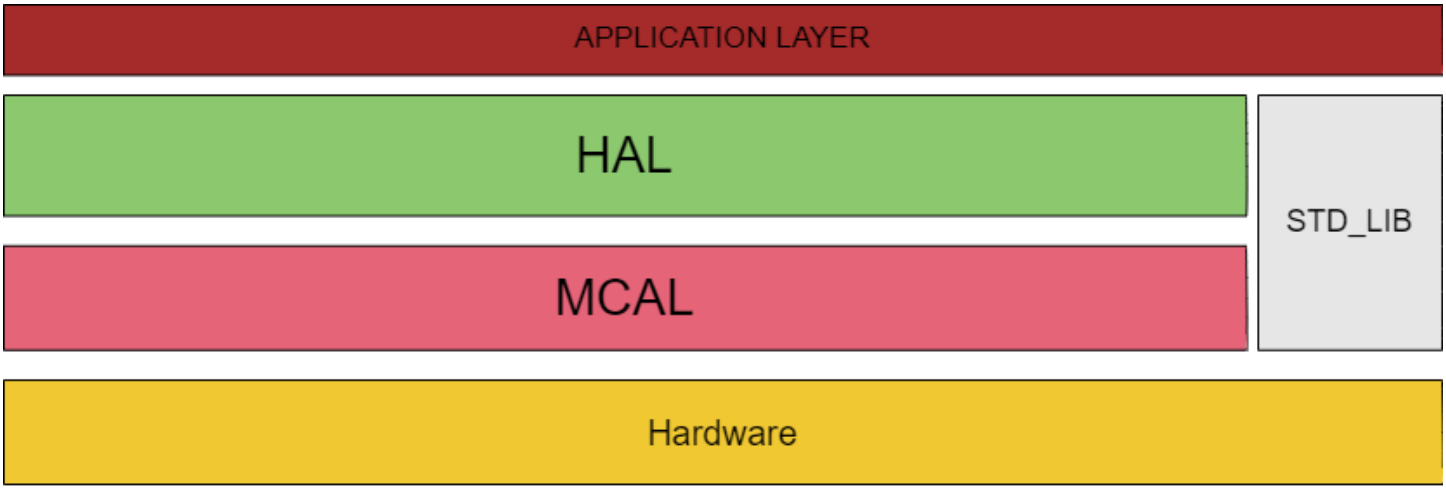


Figure 1 Desgin_arch

System modules

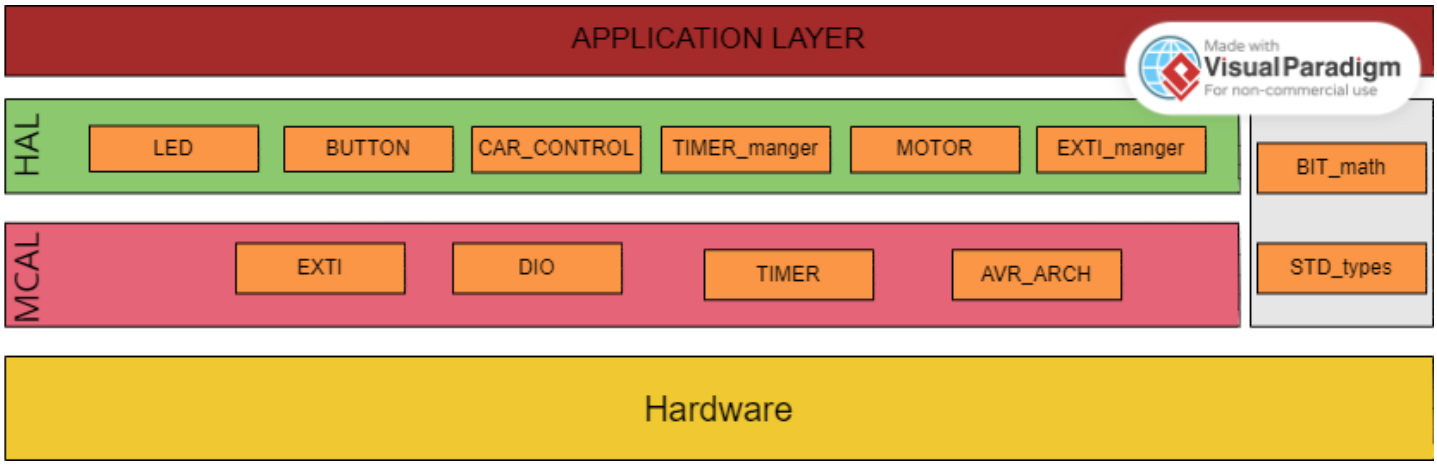
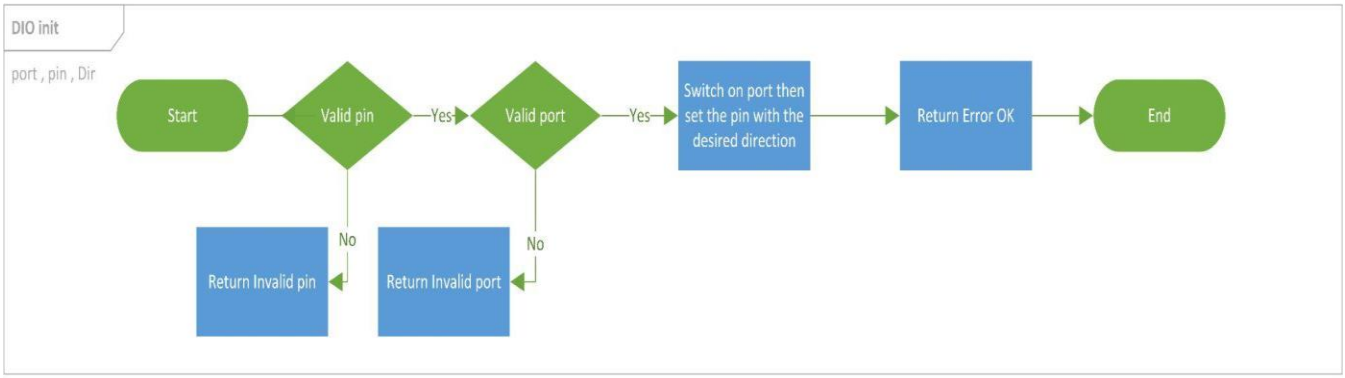


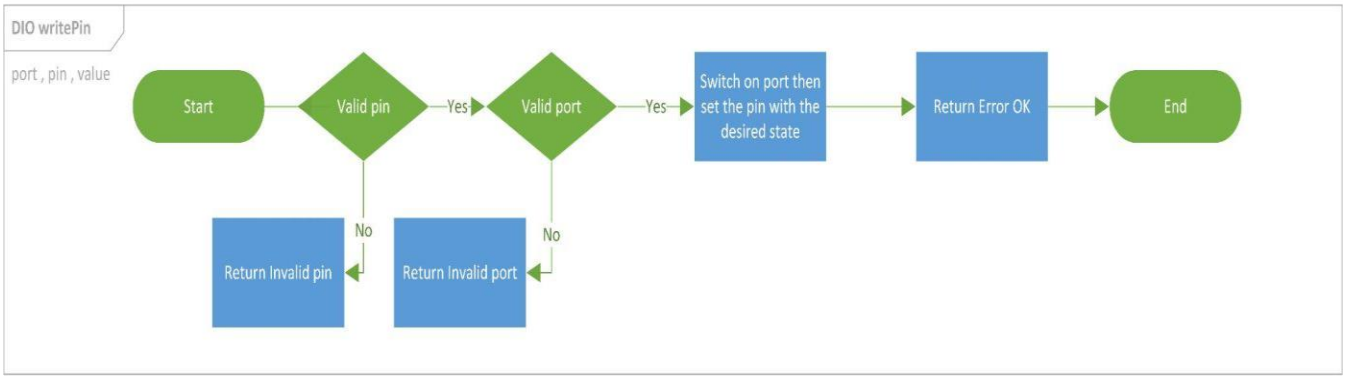
Figure 2 Moving_Car_Design_ARCH

MCAL

DIO API :

Flowcharts:





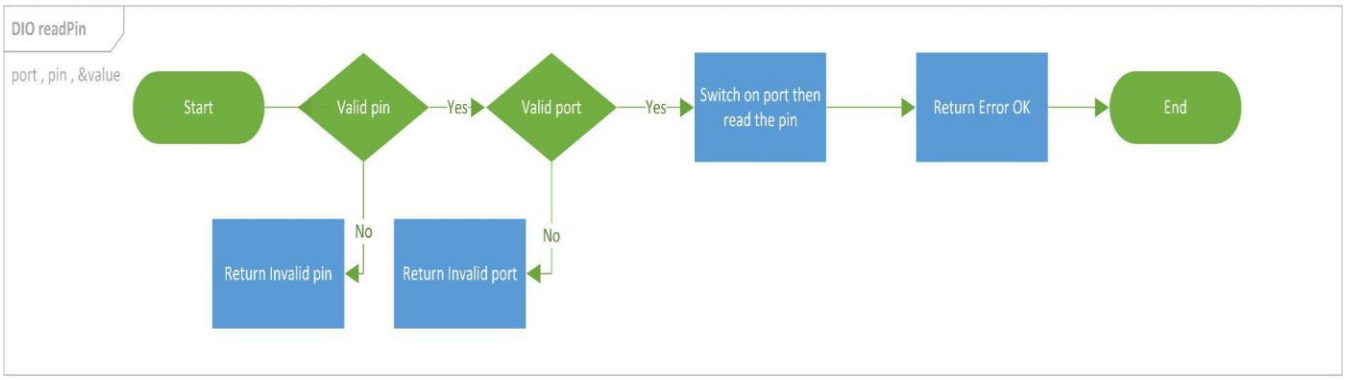


Figure 3 DIO_APIs Flowchar

External Interrupt API :

Flowcharts:

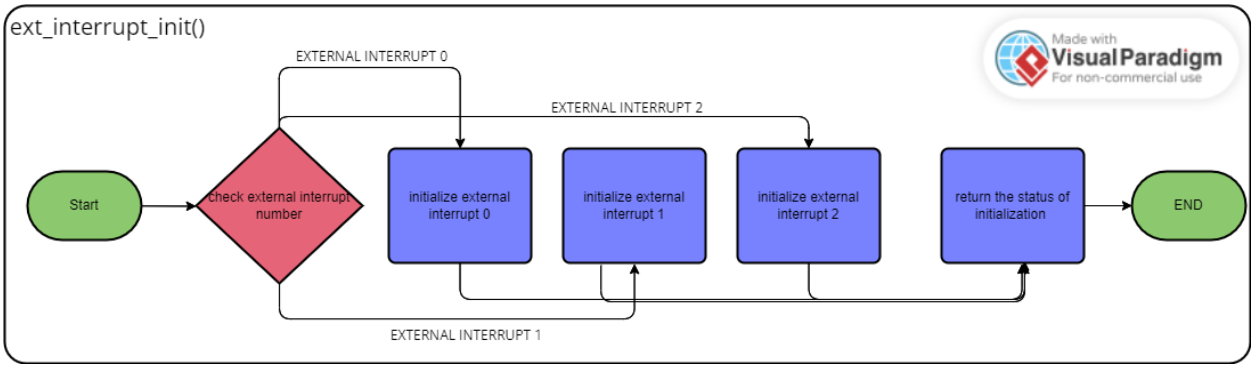


Figure 4 ext_interrupt_int()

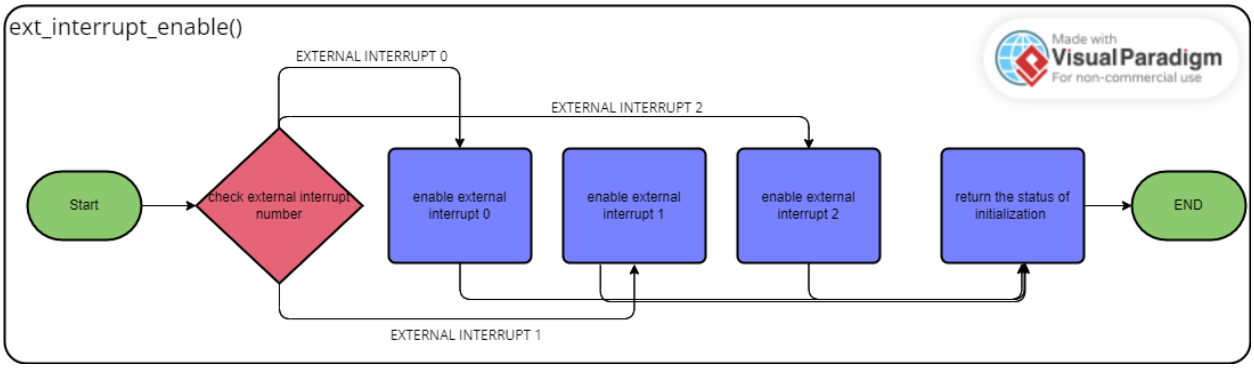


Figure 5 ext_interrupt_enable()

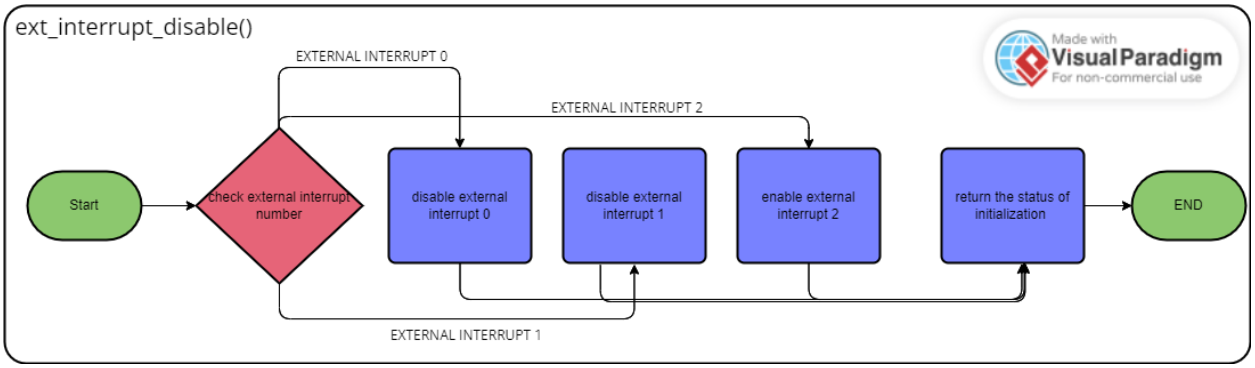


Figure 6 ext_interrupt_disable()

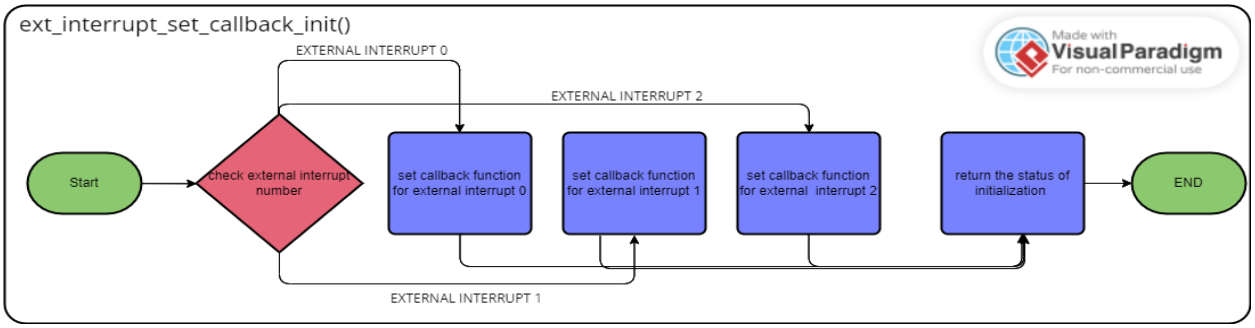


Figure 7 ext_interrupt_set_callback_init()

TIMER API :

Flowcharts:

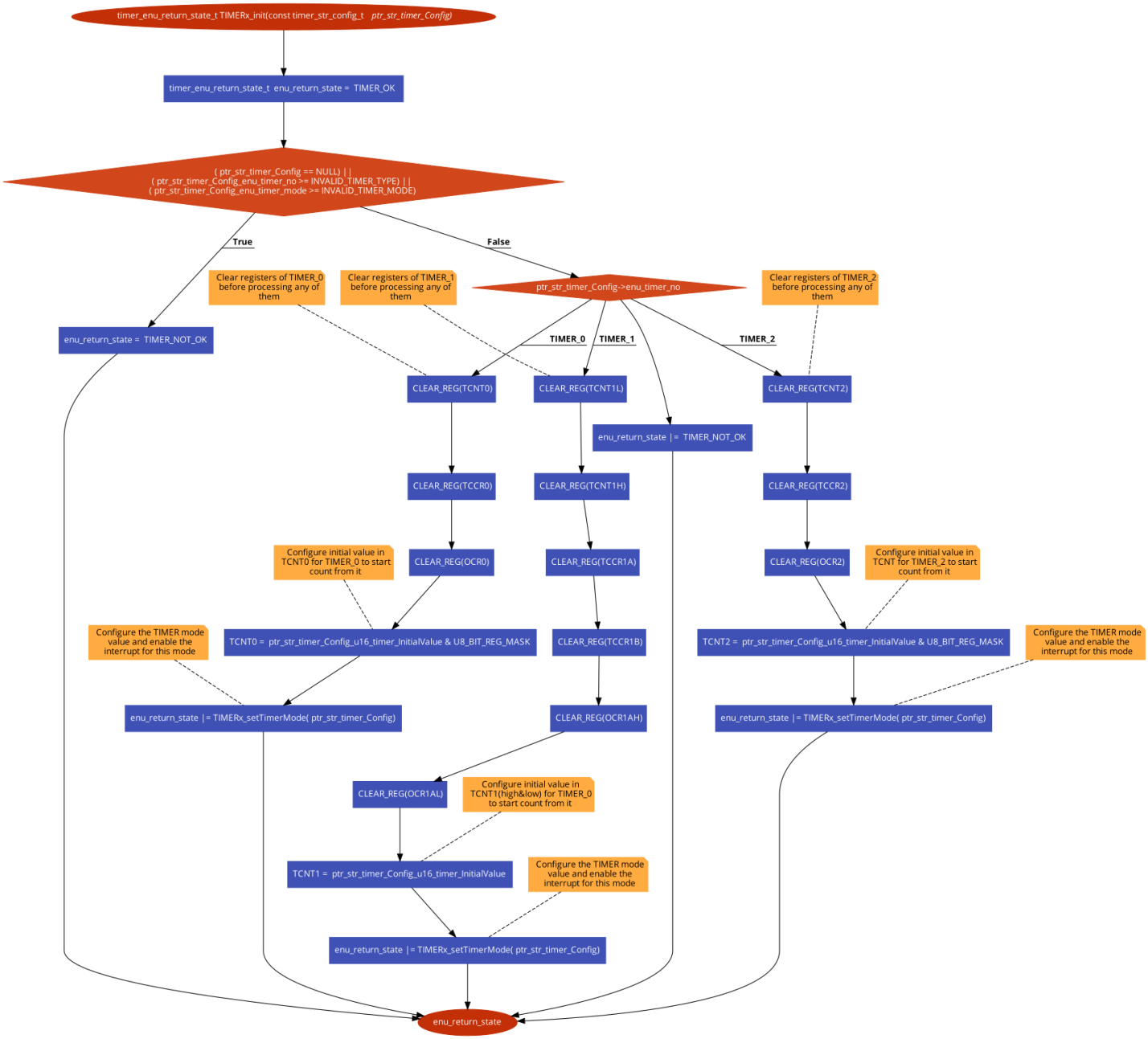


Figure 8 TIMERx_init

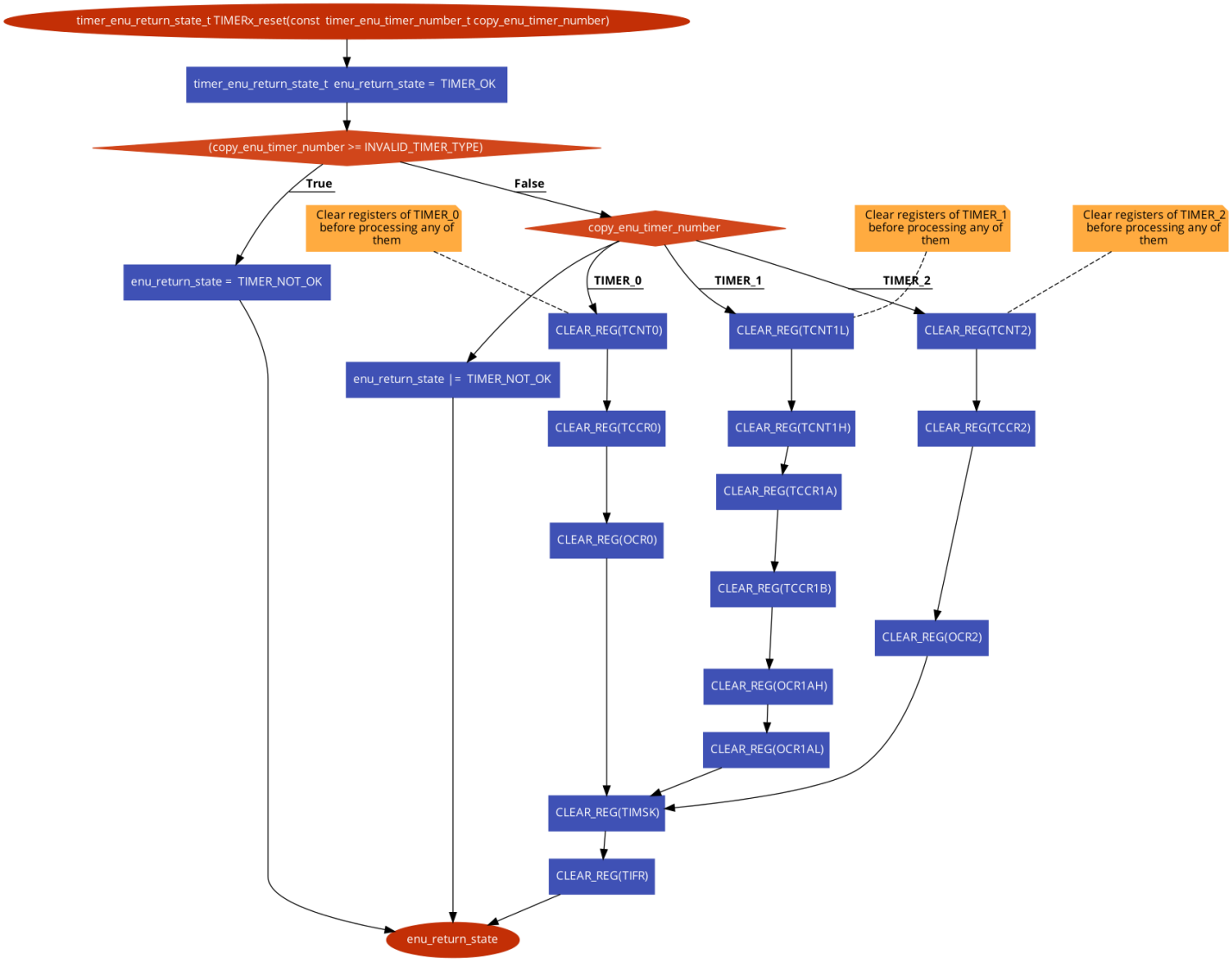


Figure 9 TIMERx_reset()

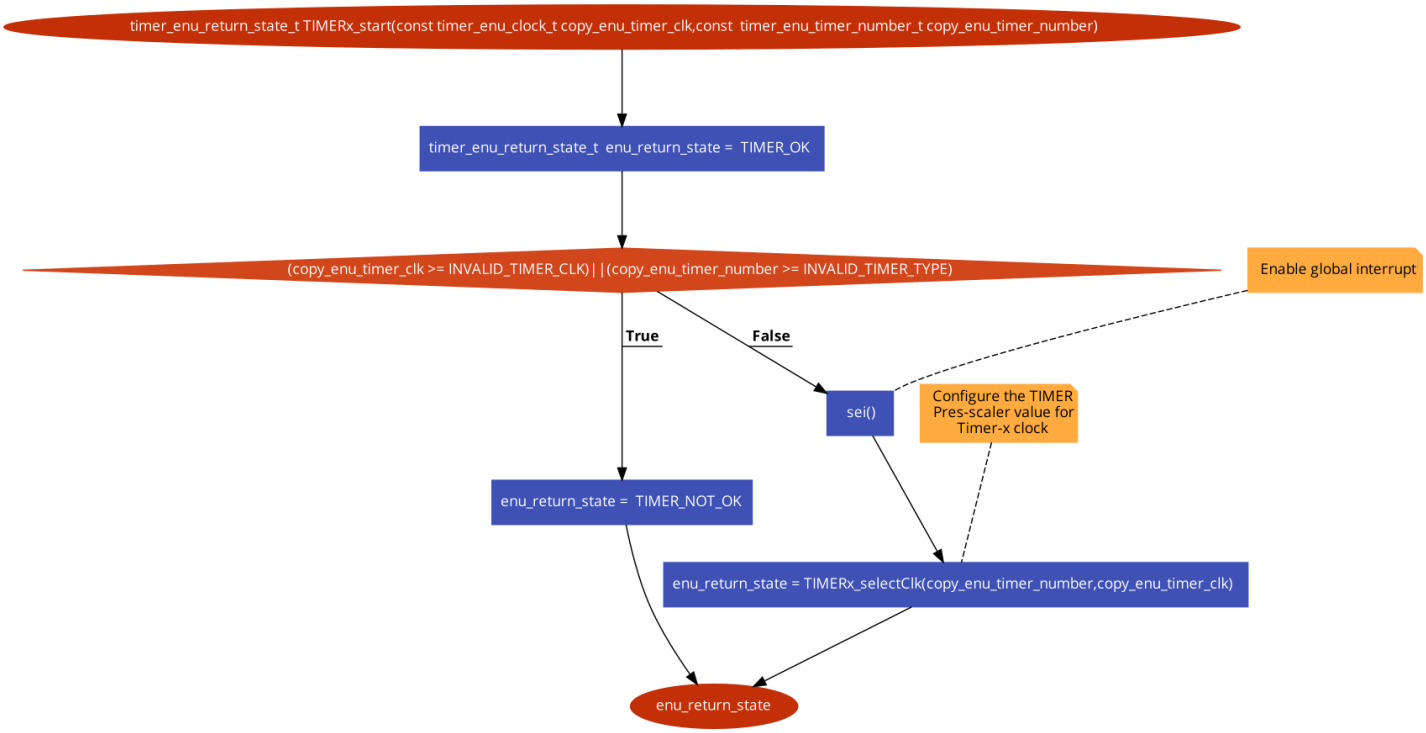


Figure 11 TIMERx_start()

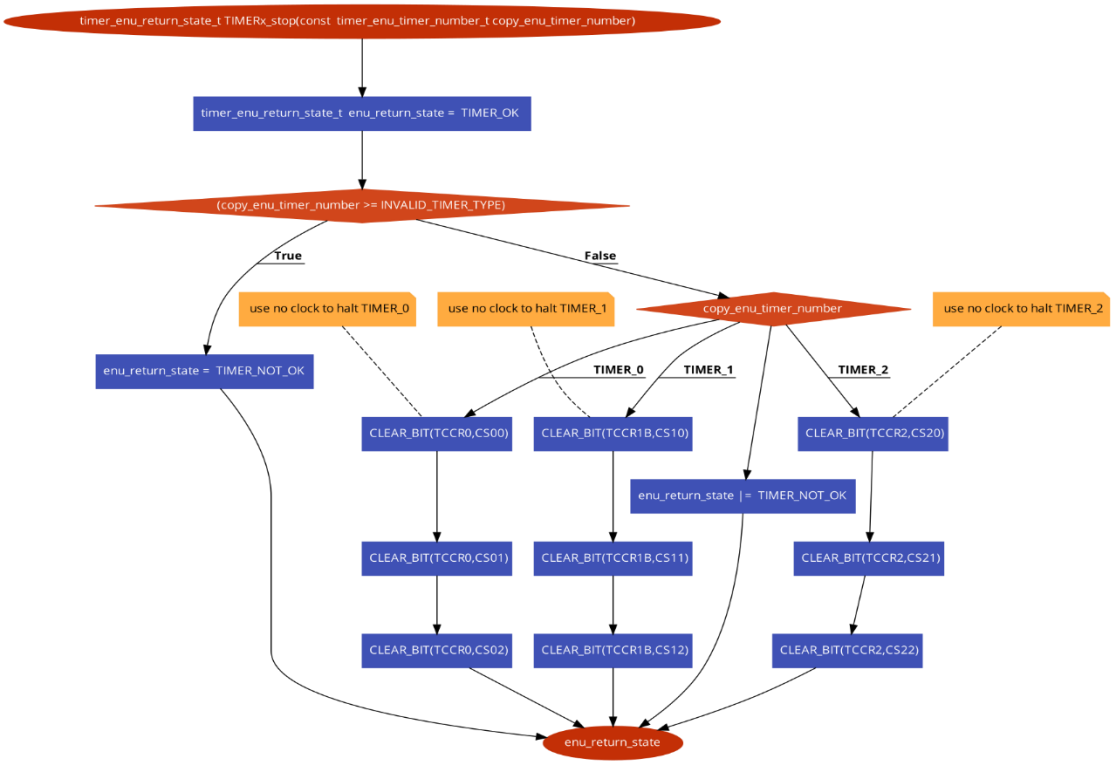


Figure 10 TIMERx_stop()

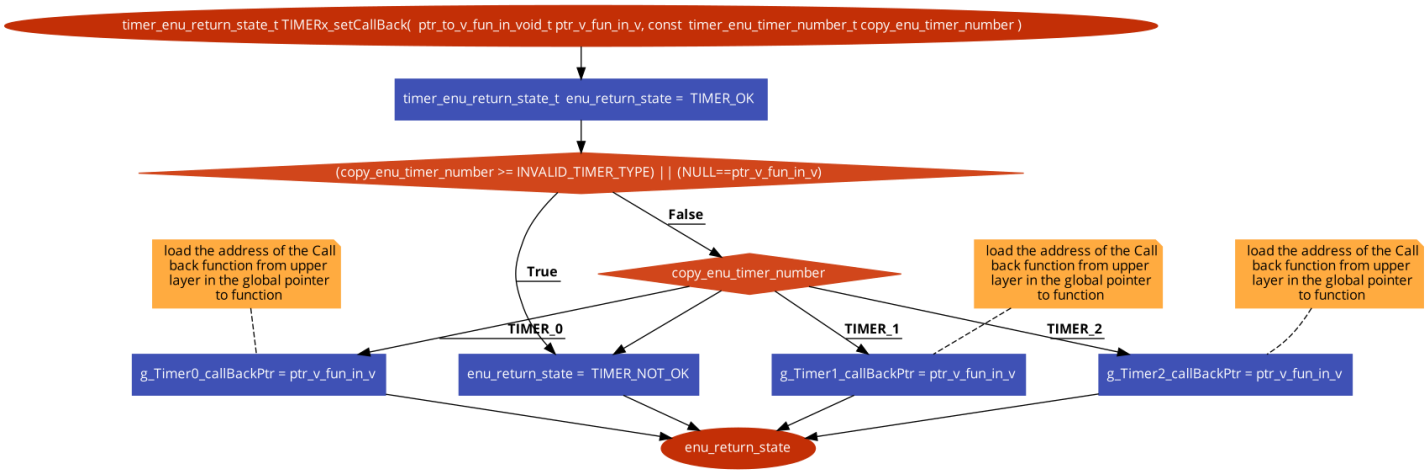


Figure 12 TIMERx_setCallBack()

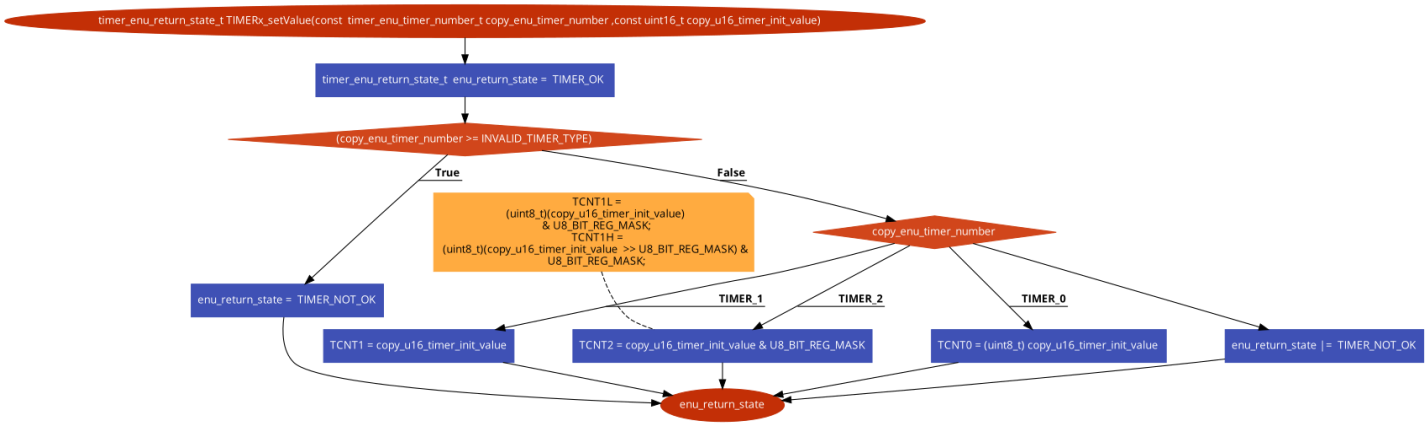


Figure 14 TIMERx_setValue

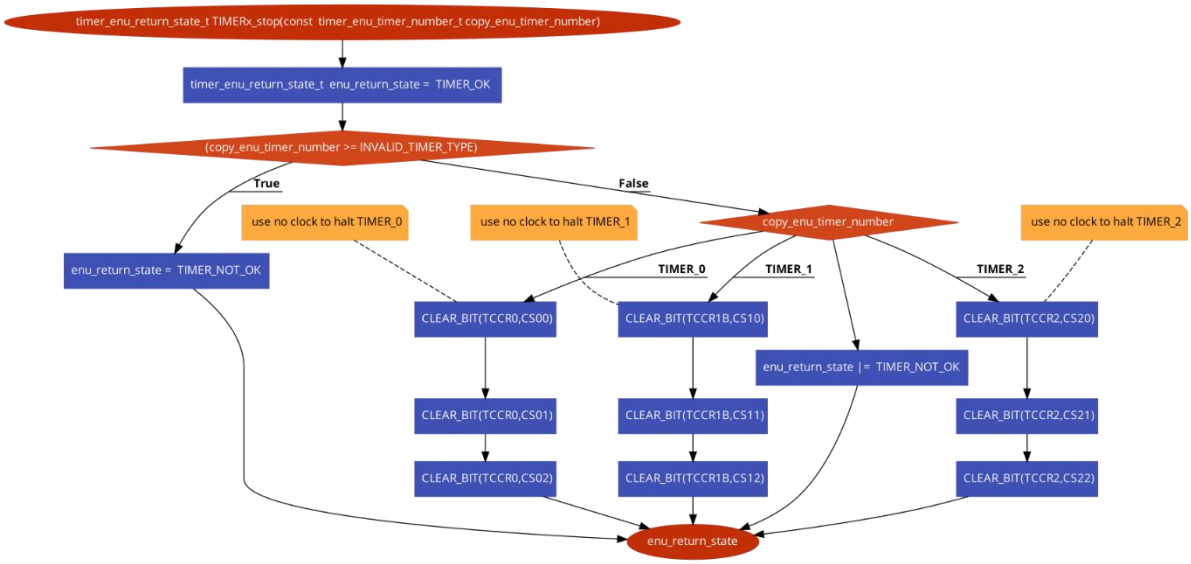


Figure 13 TIMERx_setValue()

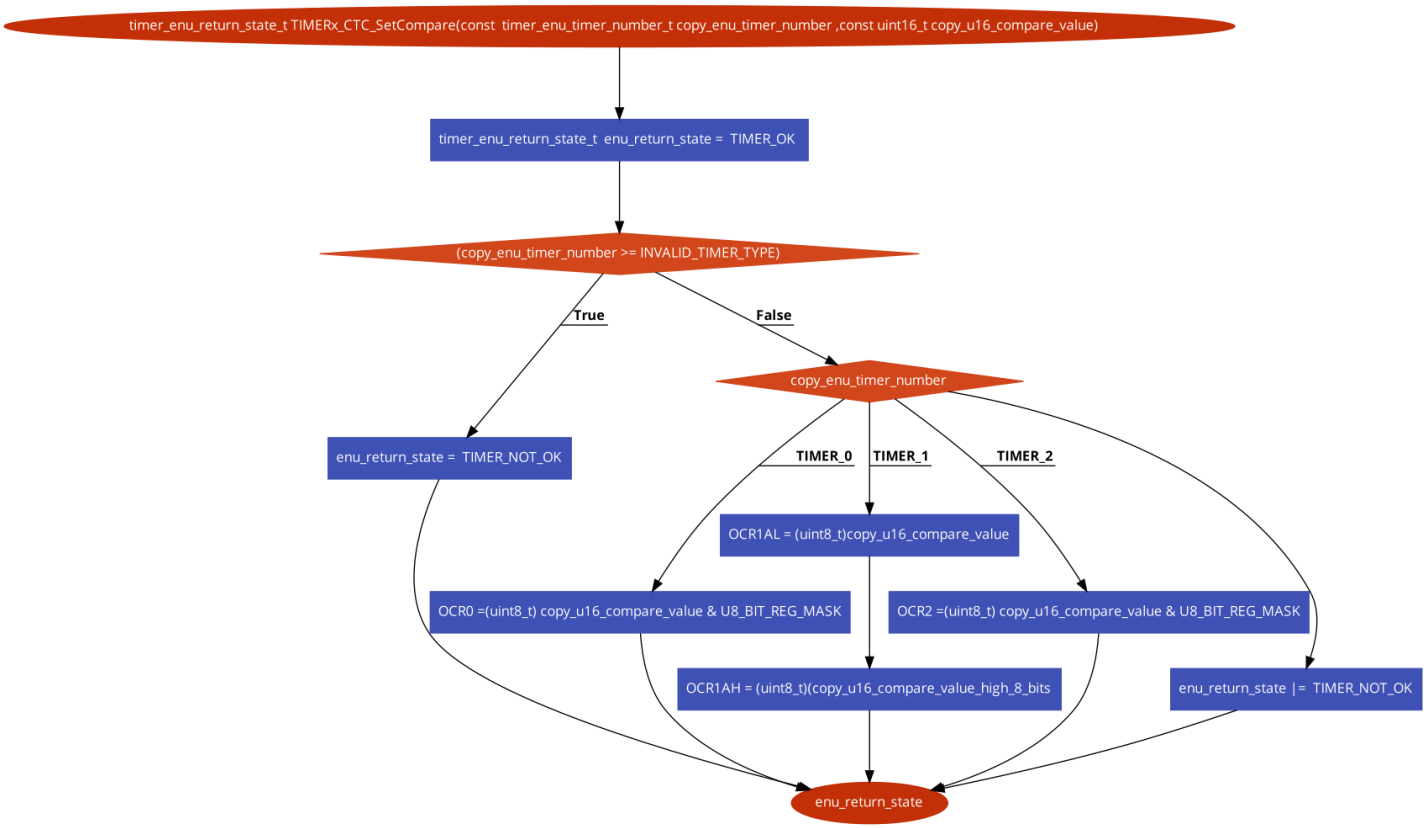


Figure 15 TIMERx_CTC_SetCompare()

HAL

LED API:

Flowcharts:

Figure 16 LED_APIs

Motor API:

Flowcharts:

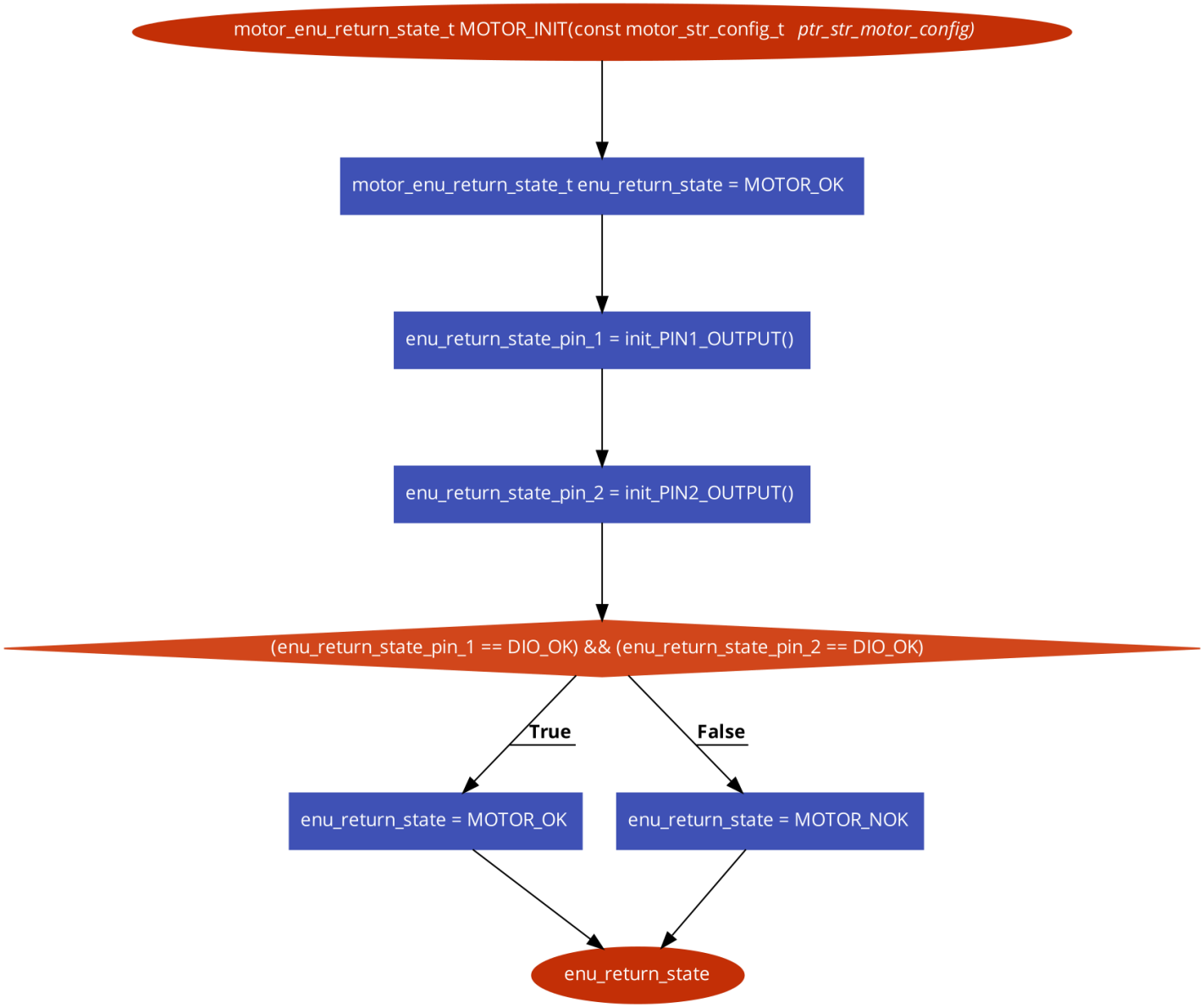


Figure 17 MOTOR_INIT ()

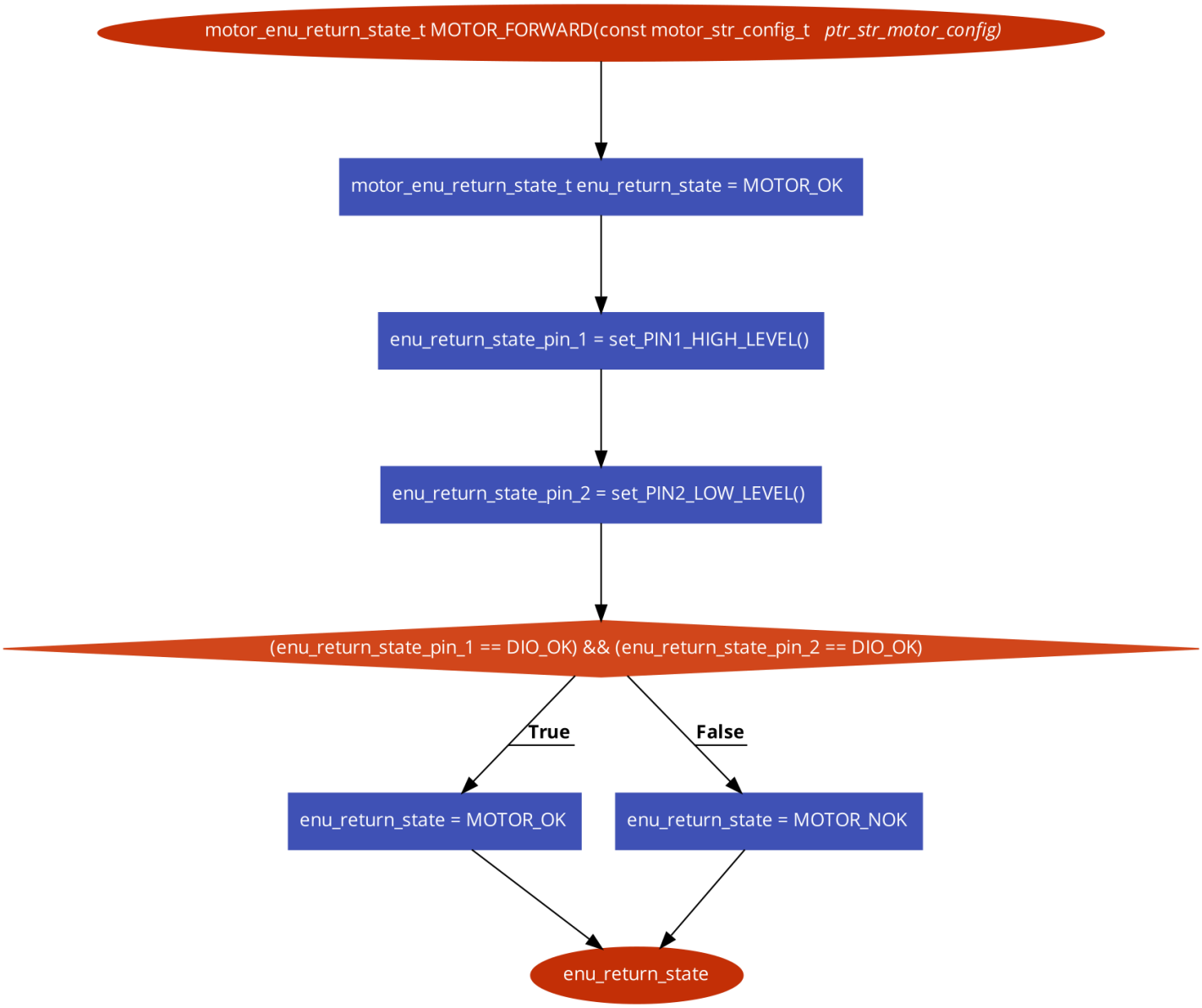


Figure 18 MOTOR_FORWARD()

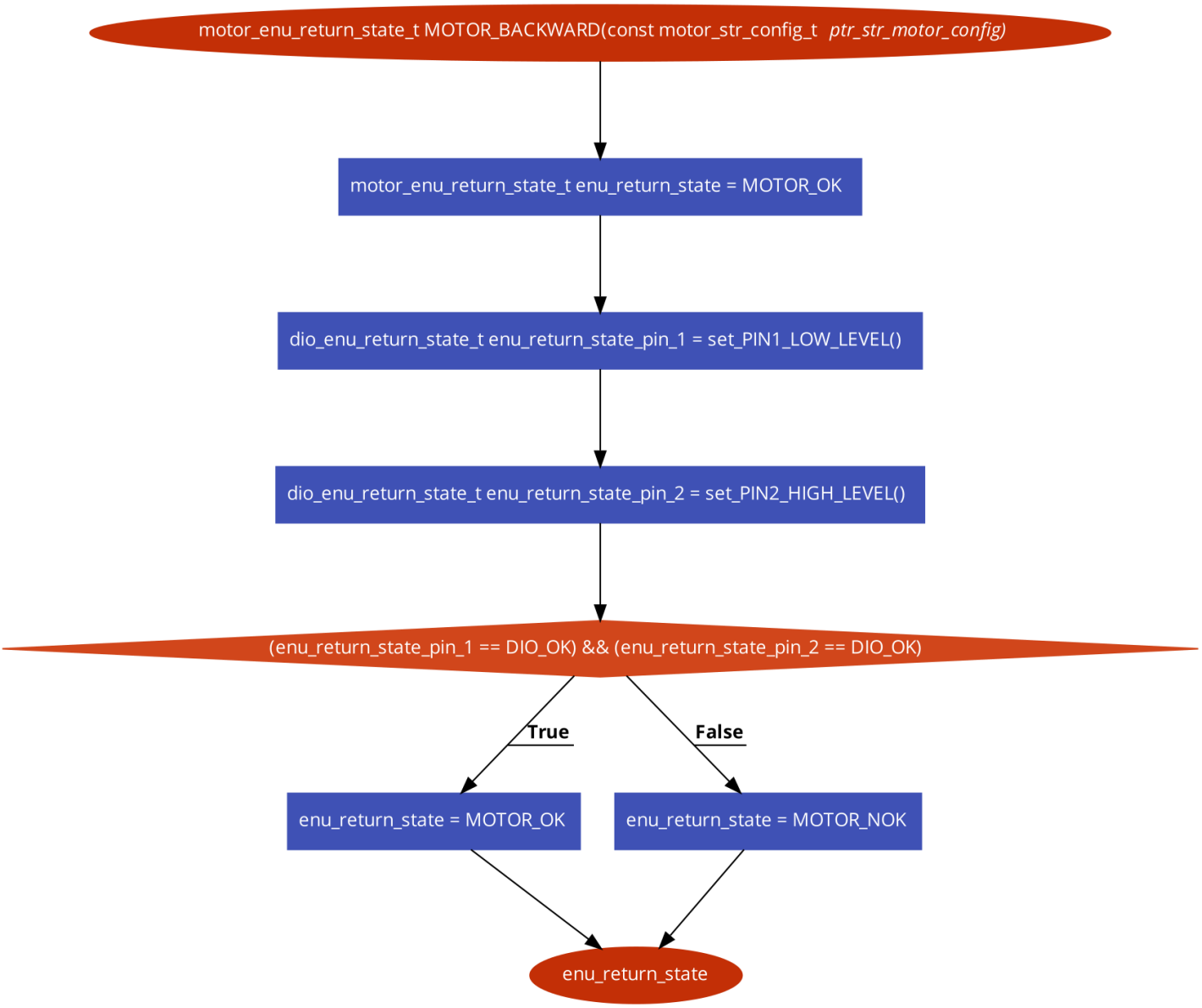


Figure 19 MOTOR_BACKWARD()

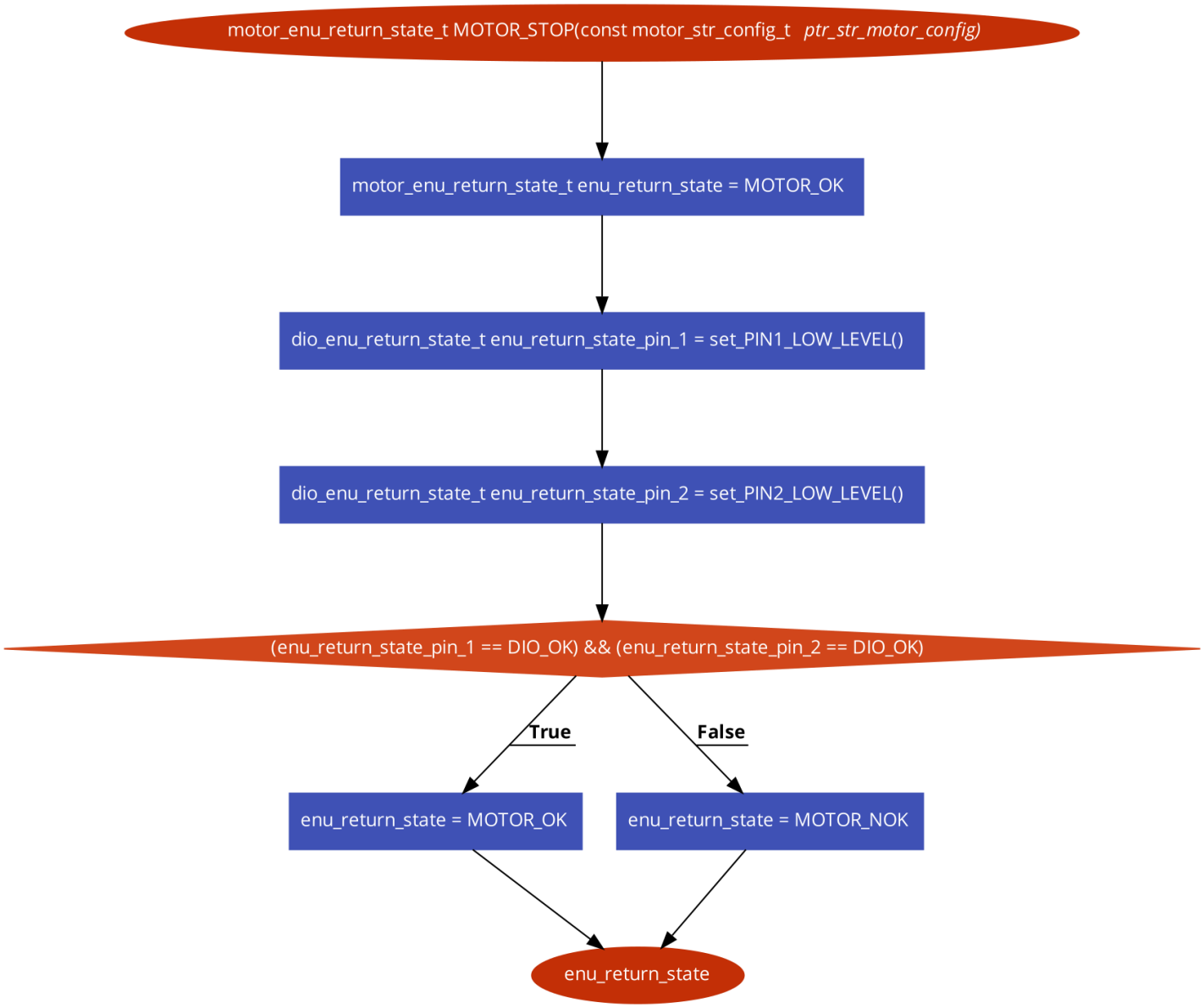


Figure 20 MOTOR_STOP()

Car Control API :

Flowcharts:

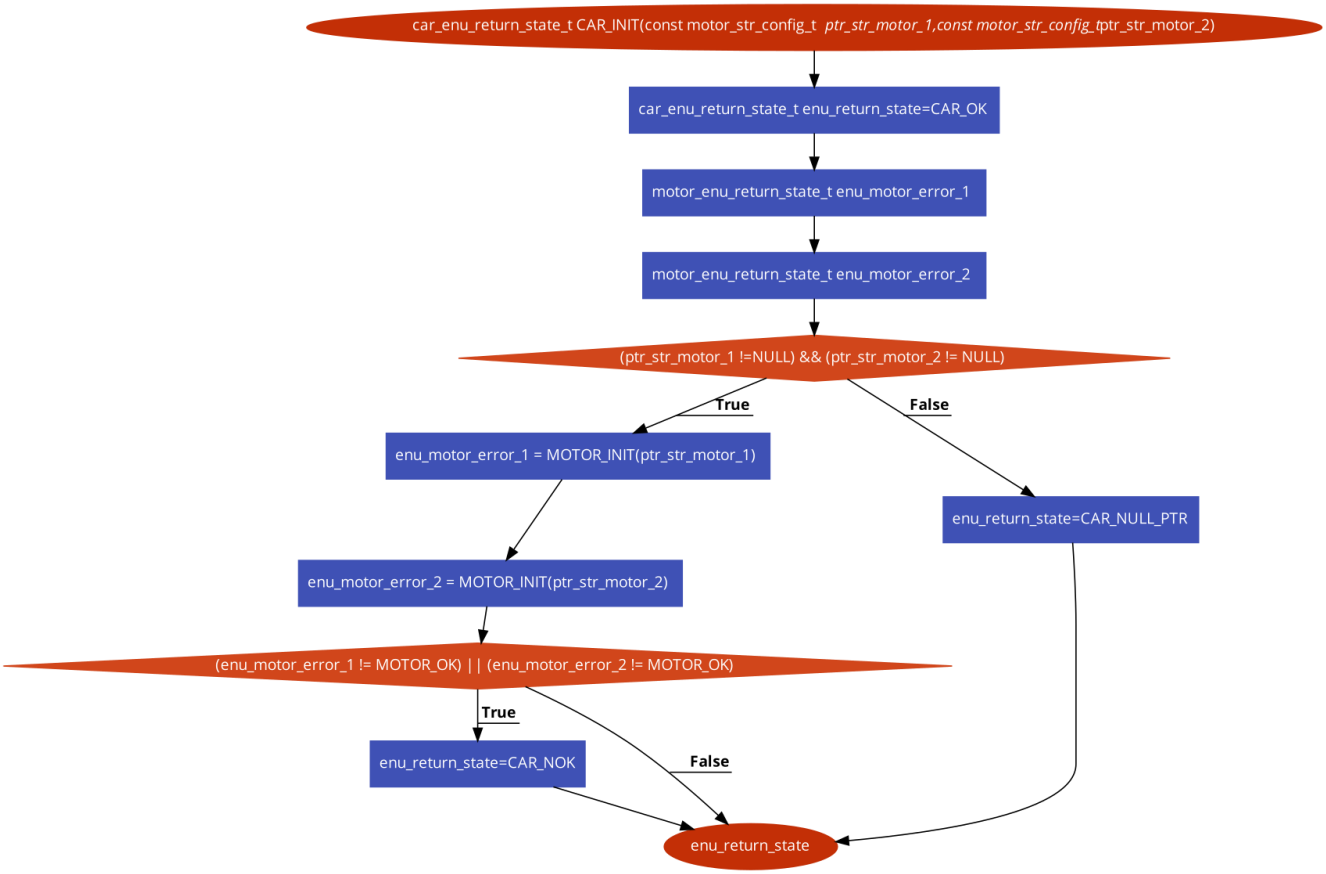


Figure 21 CAR_INIT()

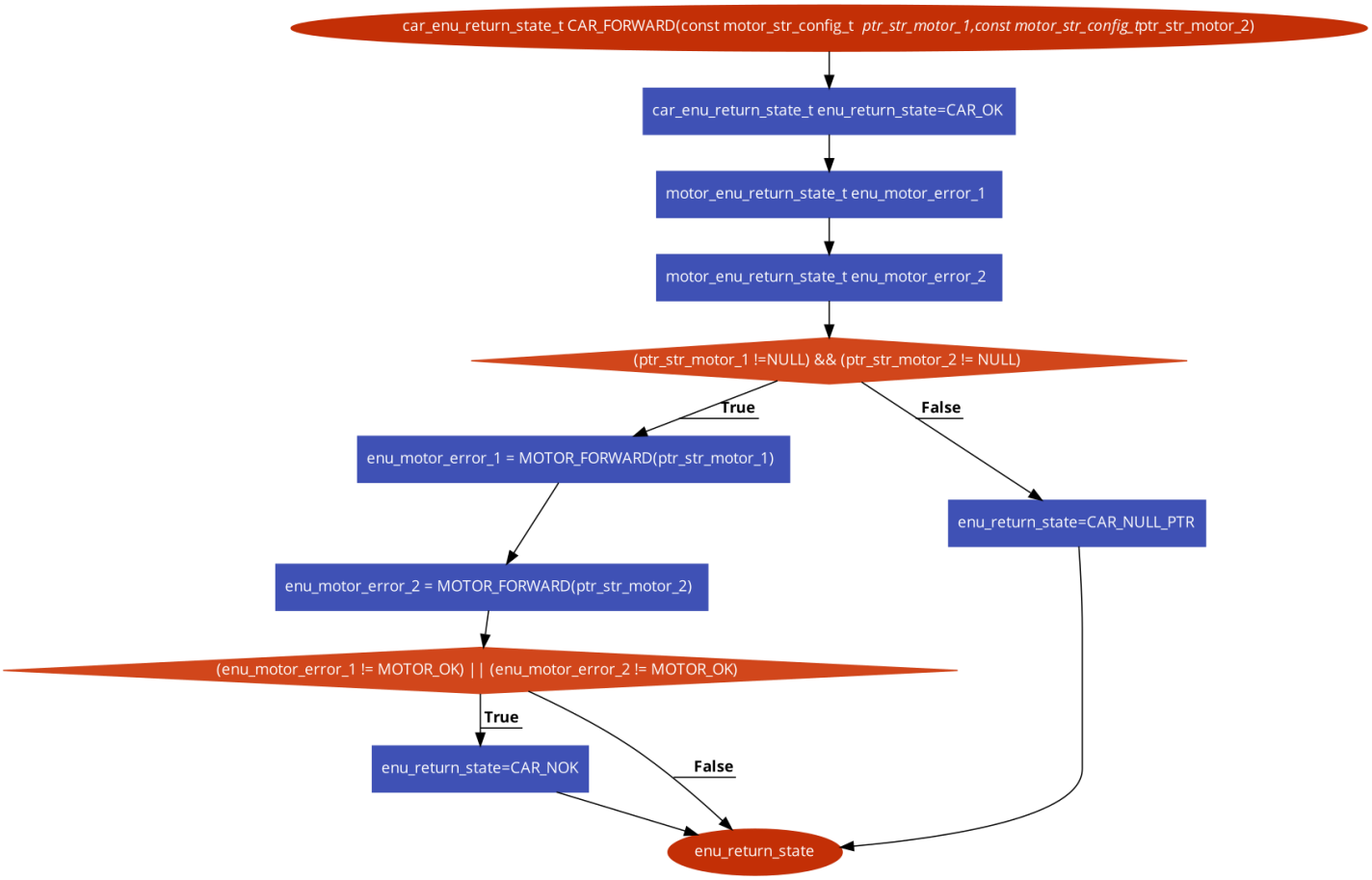


Figure 22 CAR_FORWARD()

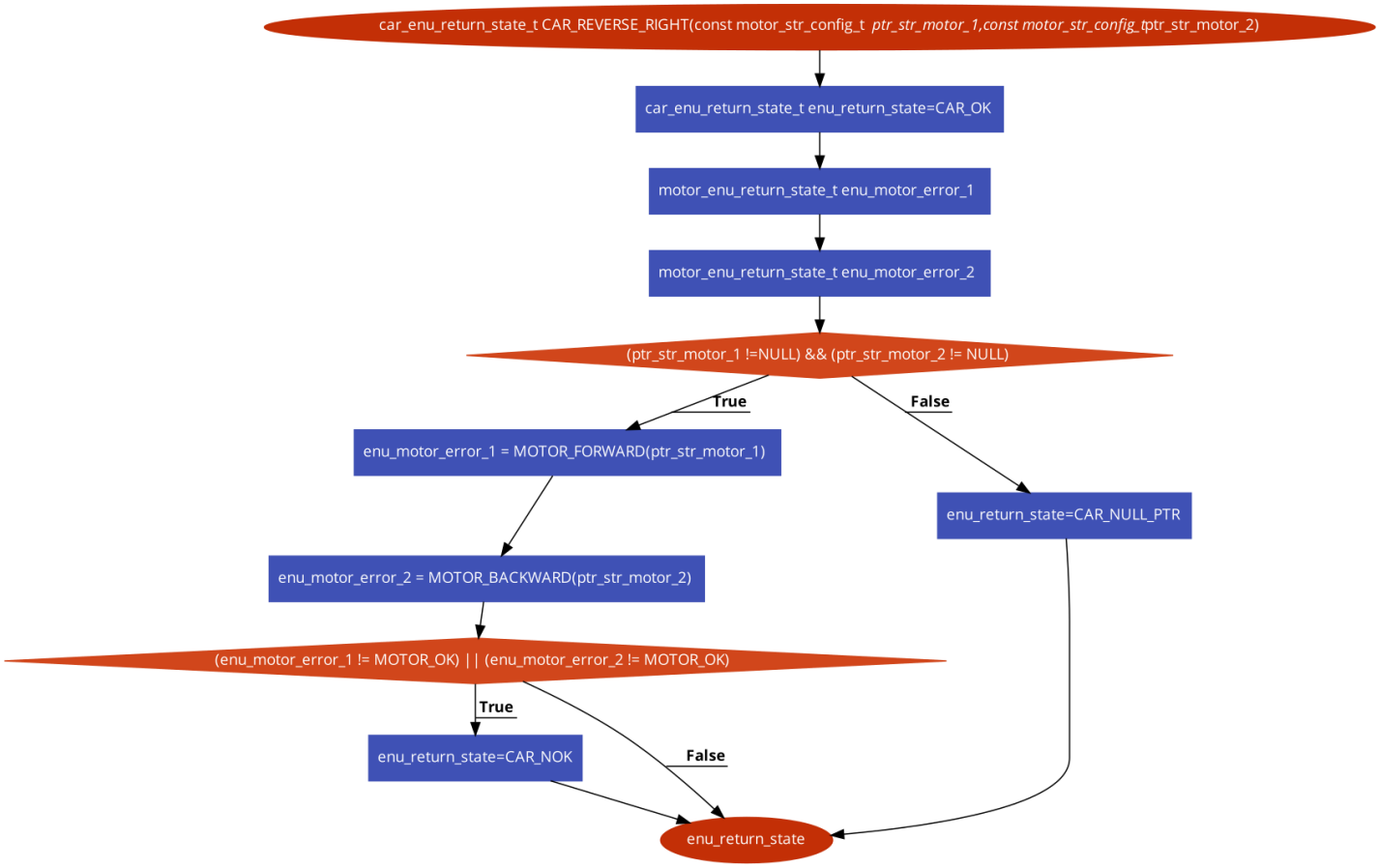


Figure 23 CAR_REVERSE_RIGHT()

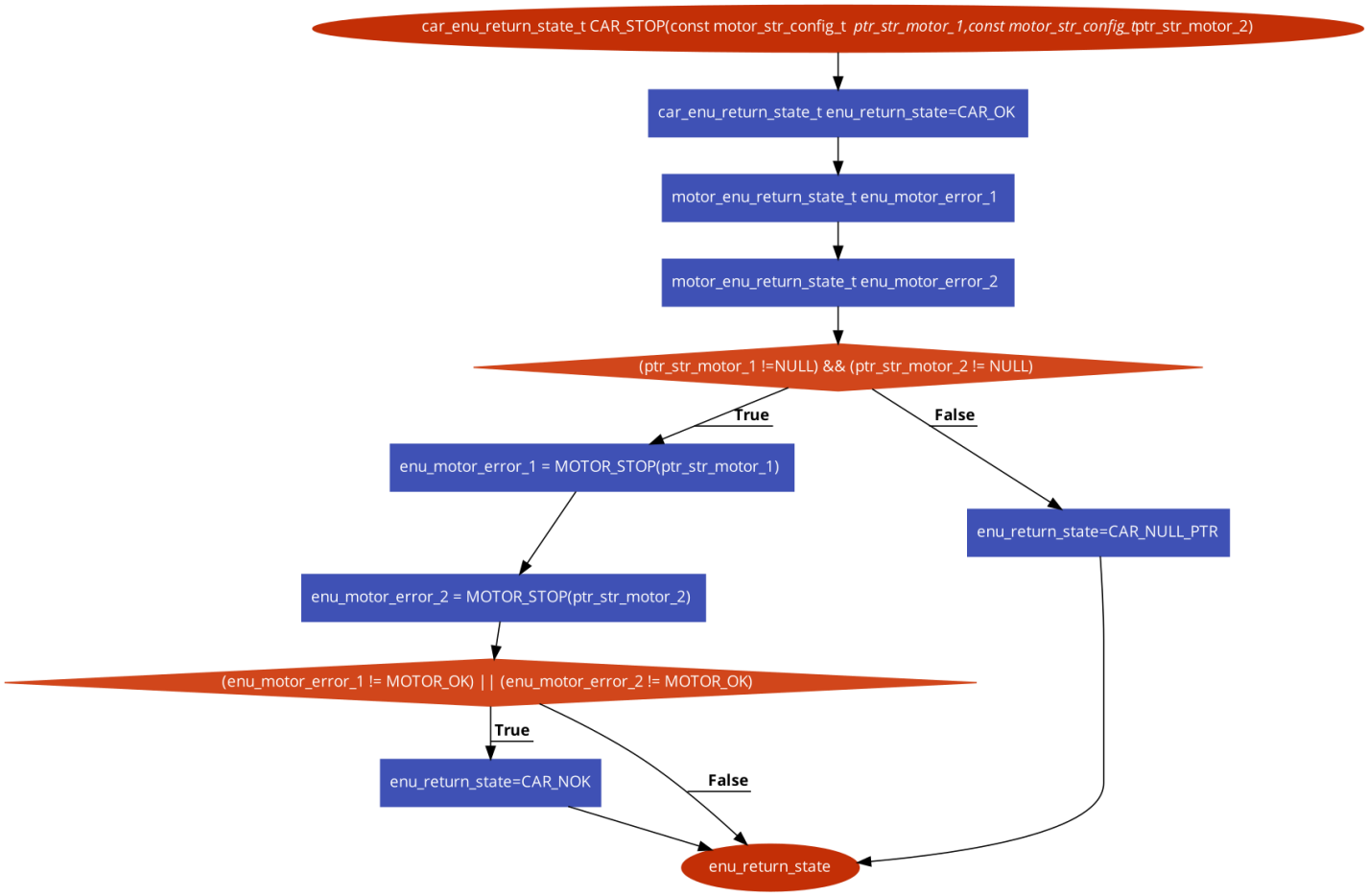


Figure 24 CAR_STOP

Timer Manager API :

Flowcharts:

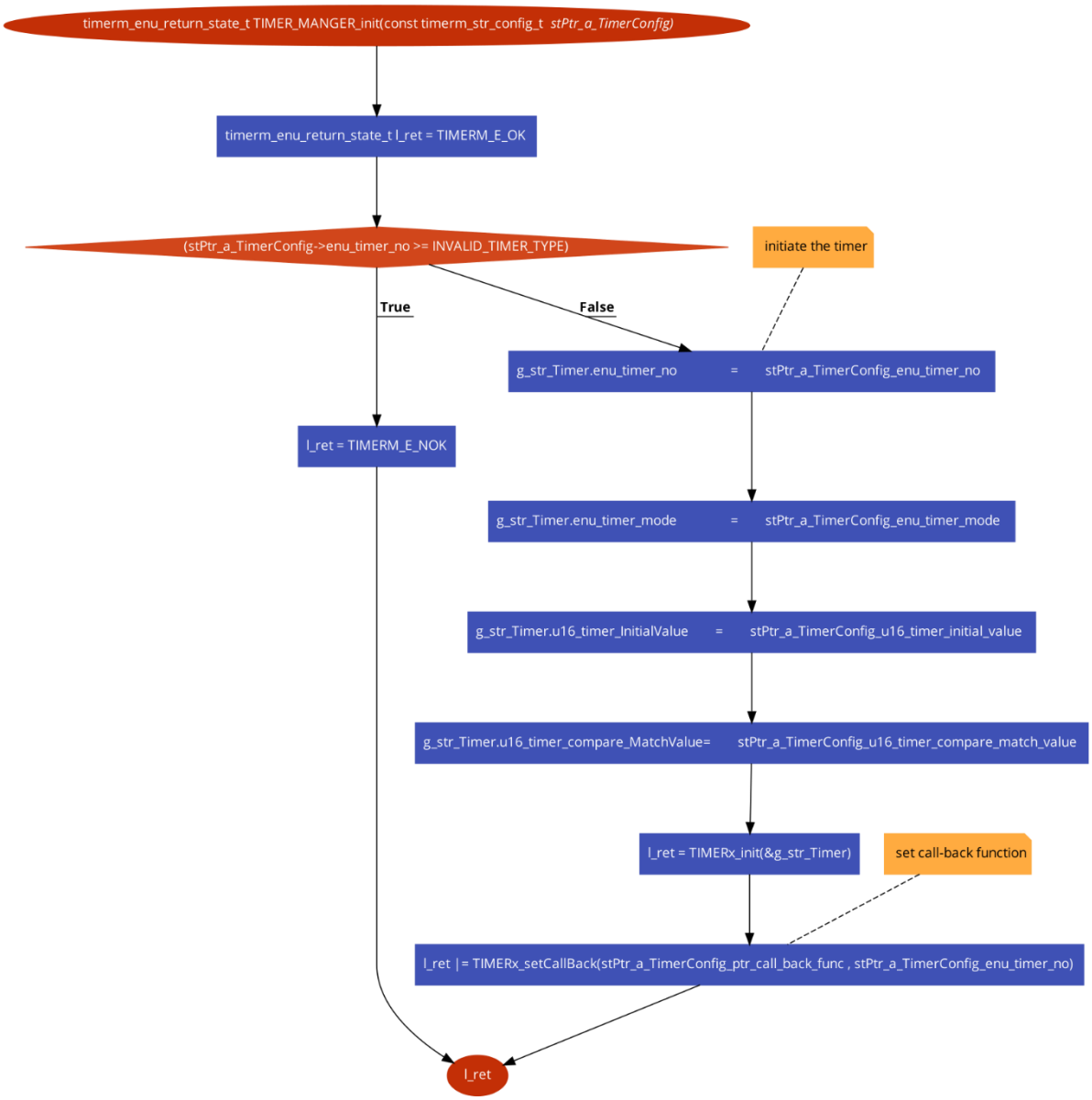


Figure 25 TIMER_MANGER_init()

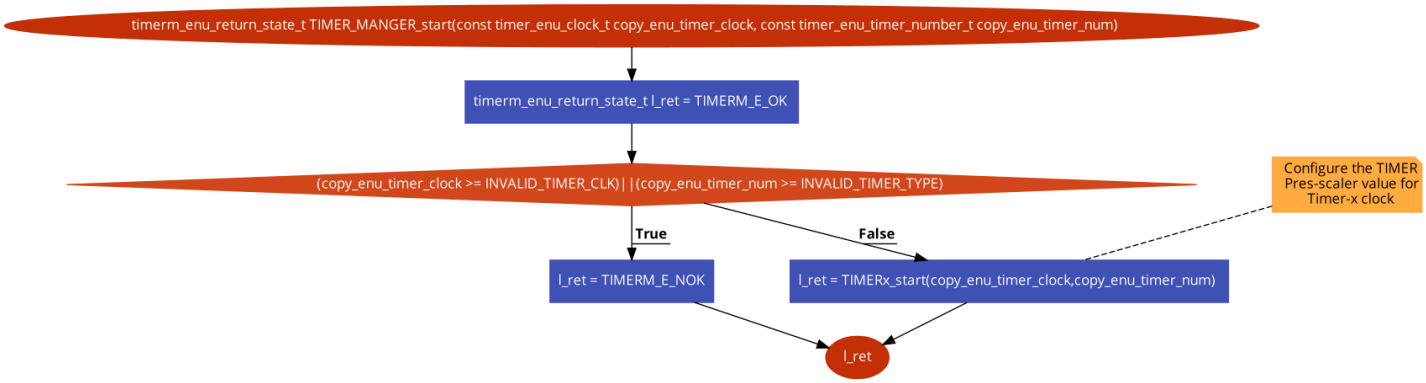


Figure 26 TIMER_MANGER_start()

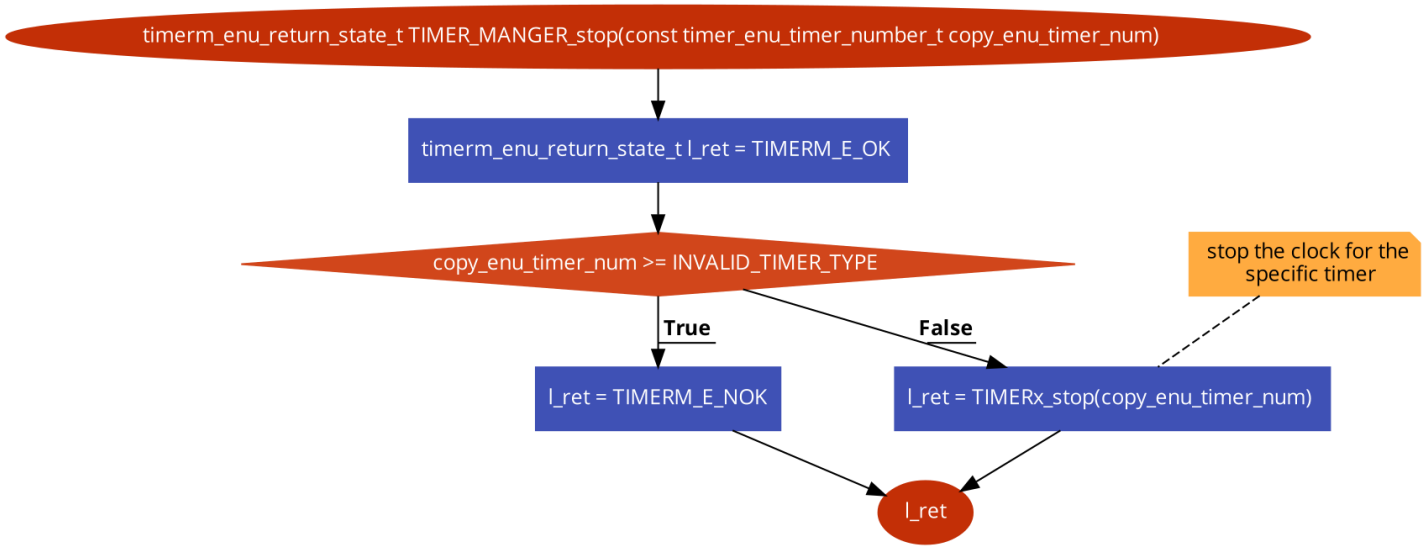


Figure 28 TIMER_MANGER_stop()

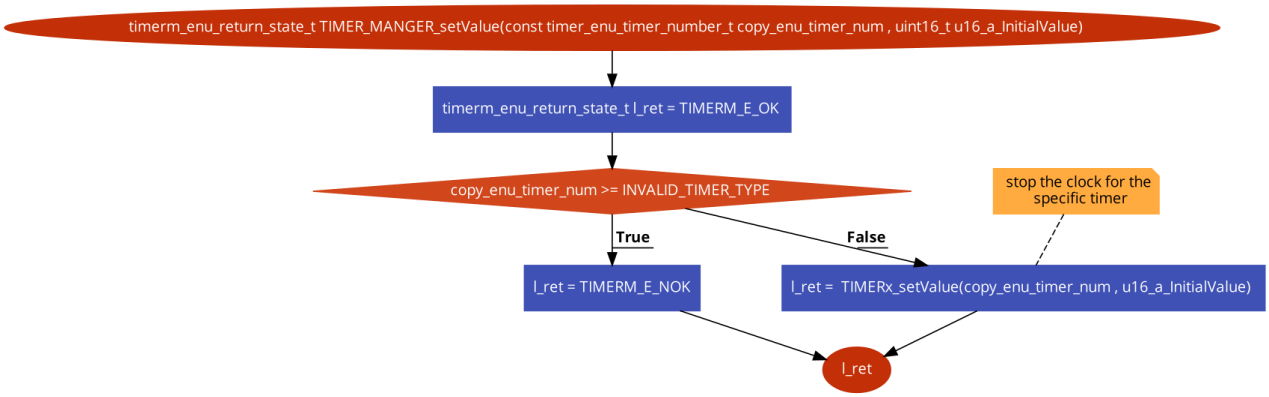


Figure 27 TIMER_MANGER_setValue()

Interrupt Manager API :

Flowcharts:

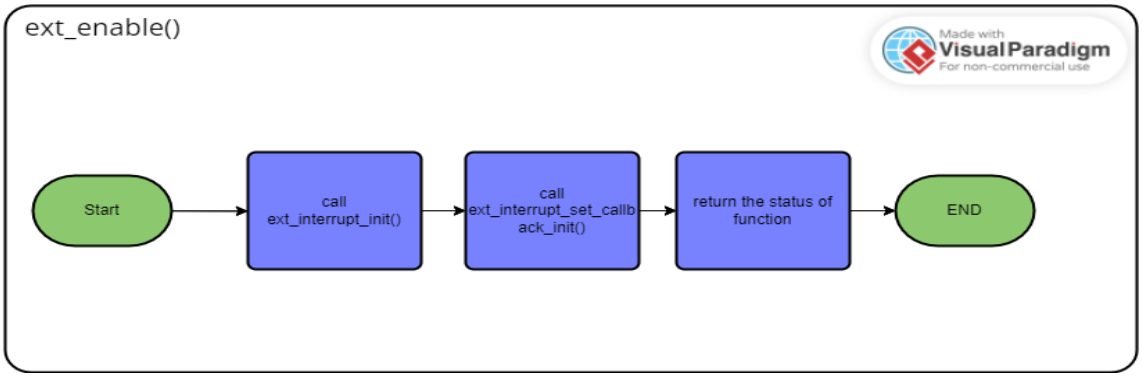


Figure 29 extm_init()

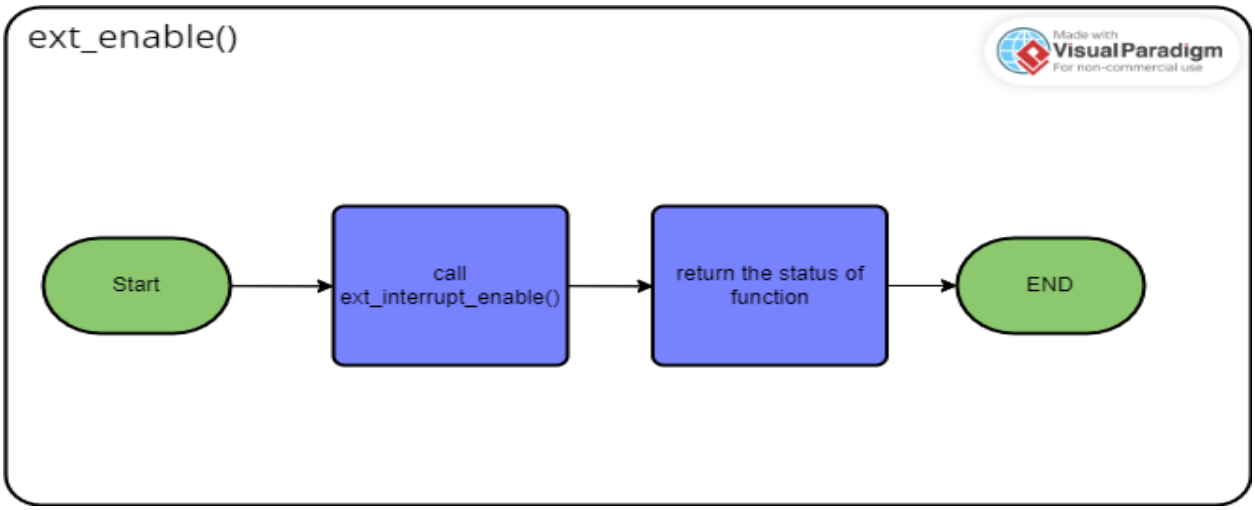


Figure 30 extim_enable()

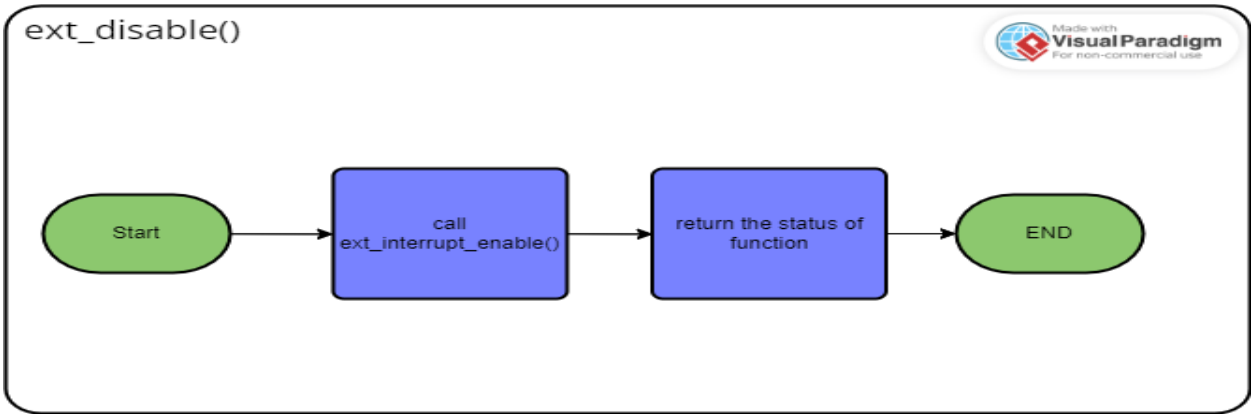


Figure 31 extim_disable()

Button API:

Flowcharts:

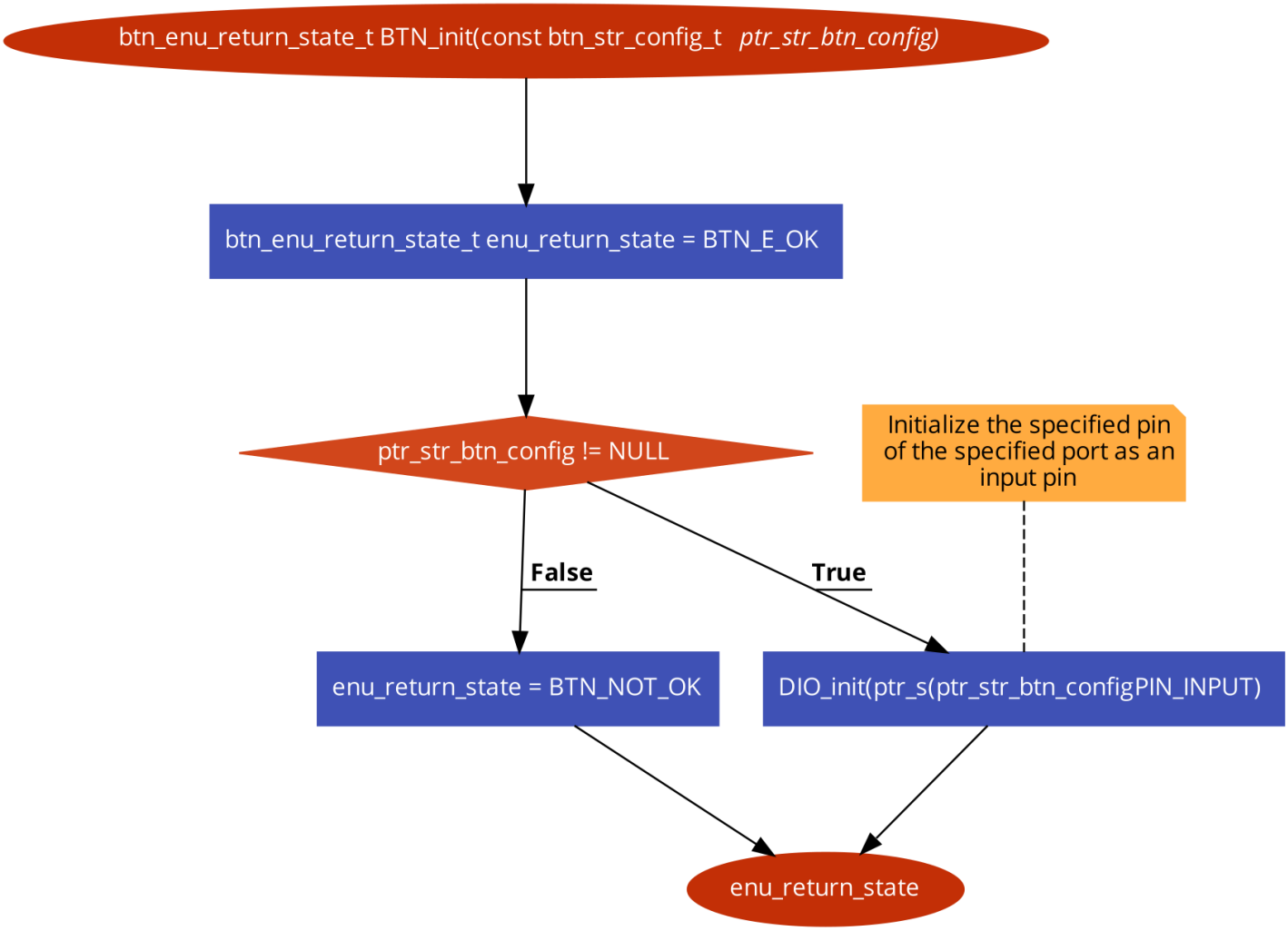


Figure 32 BTN_init()t

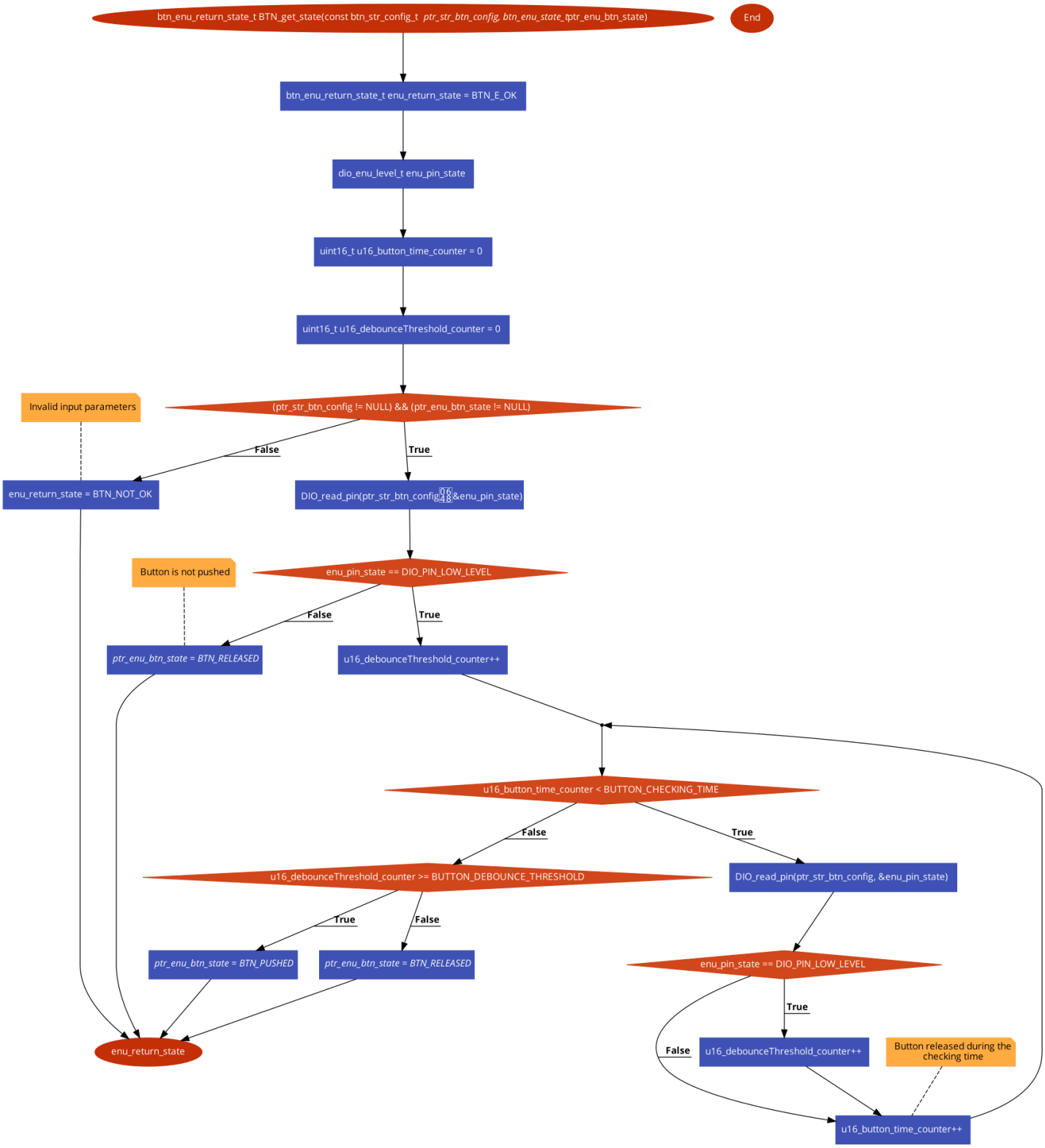


Figure 33 BTN_get_state()

App

App API:

Flowcharts:

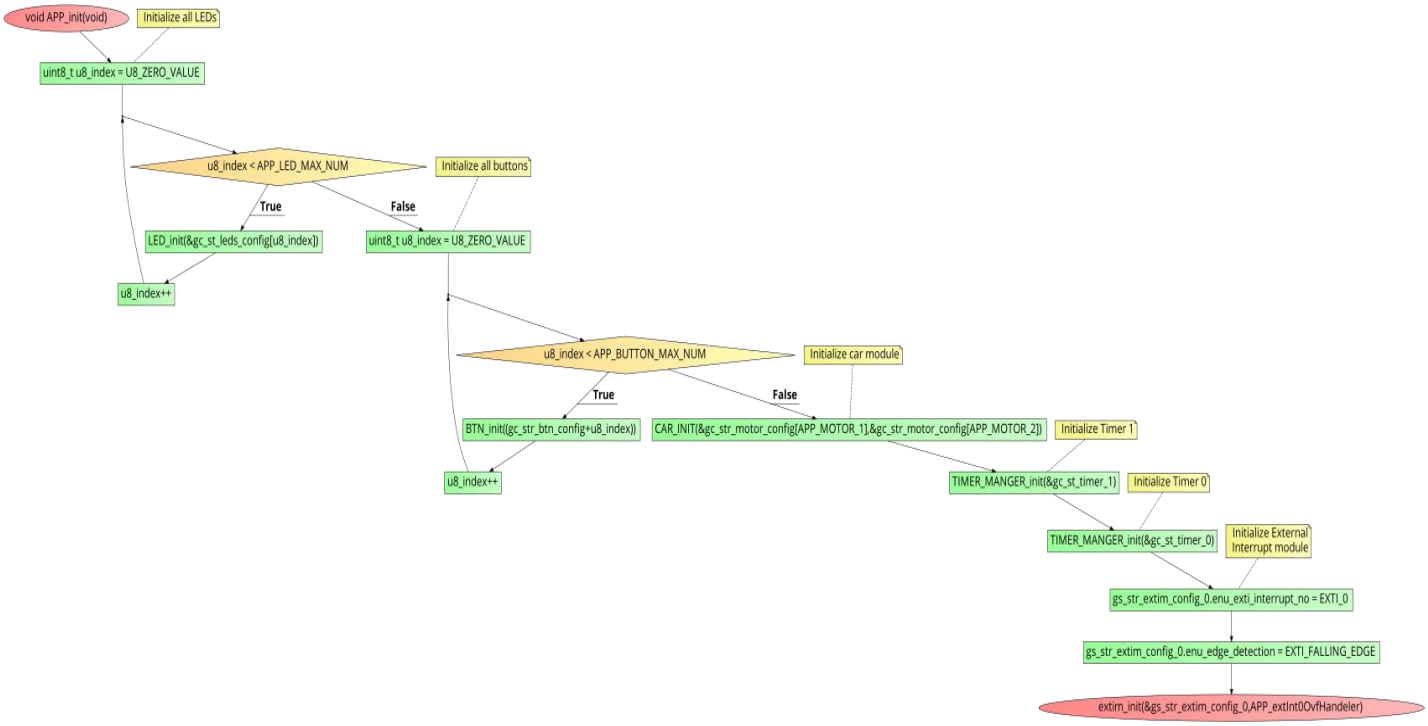


Figure 34 APP_init()

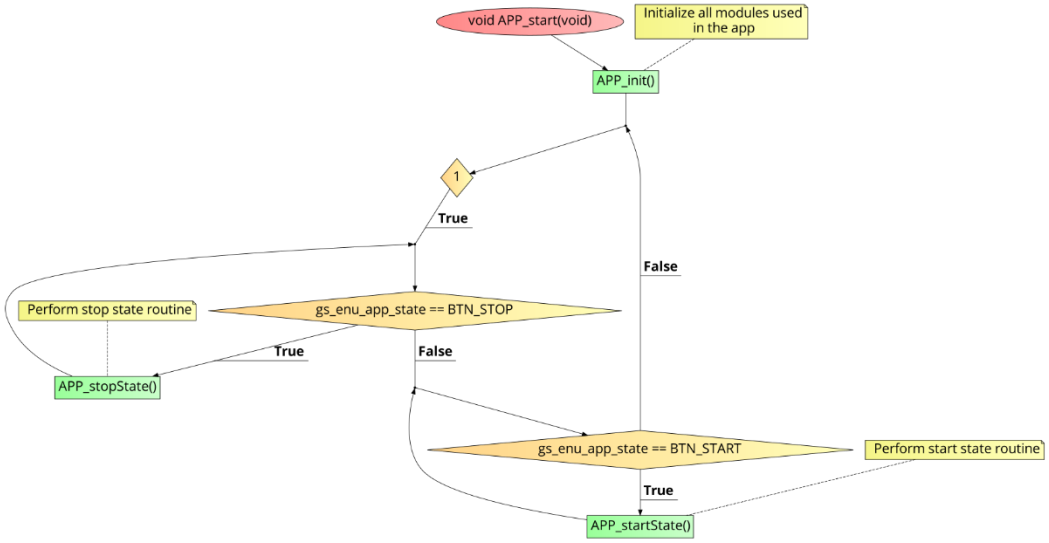


Figure 35 APP_start()

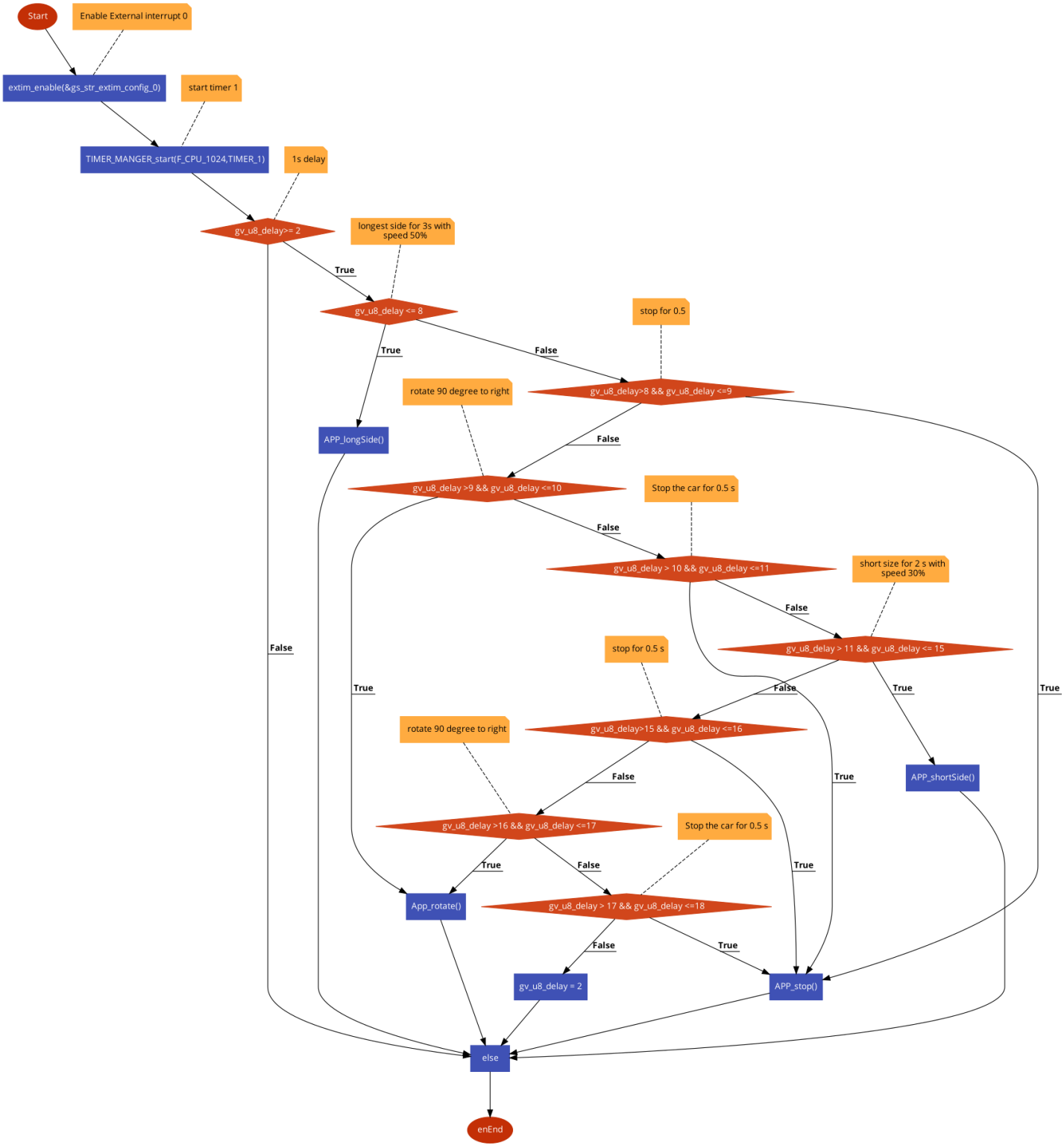


Figure 36 APP_startState()

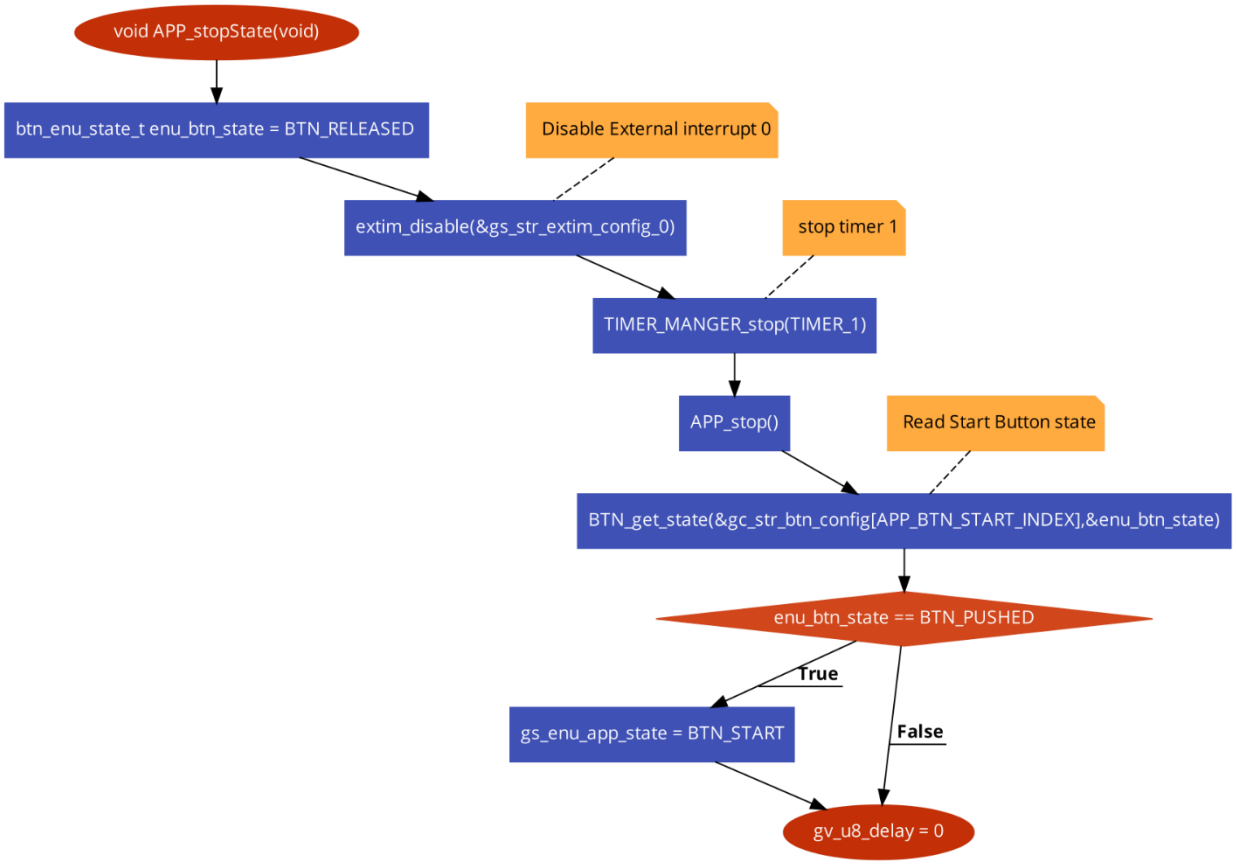


Figure 37 APP_stopState

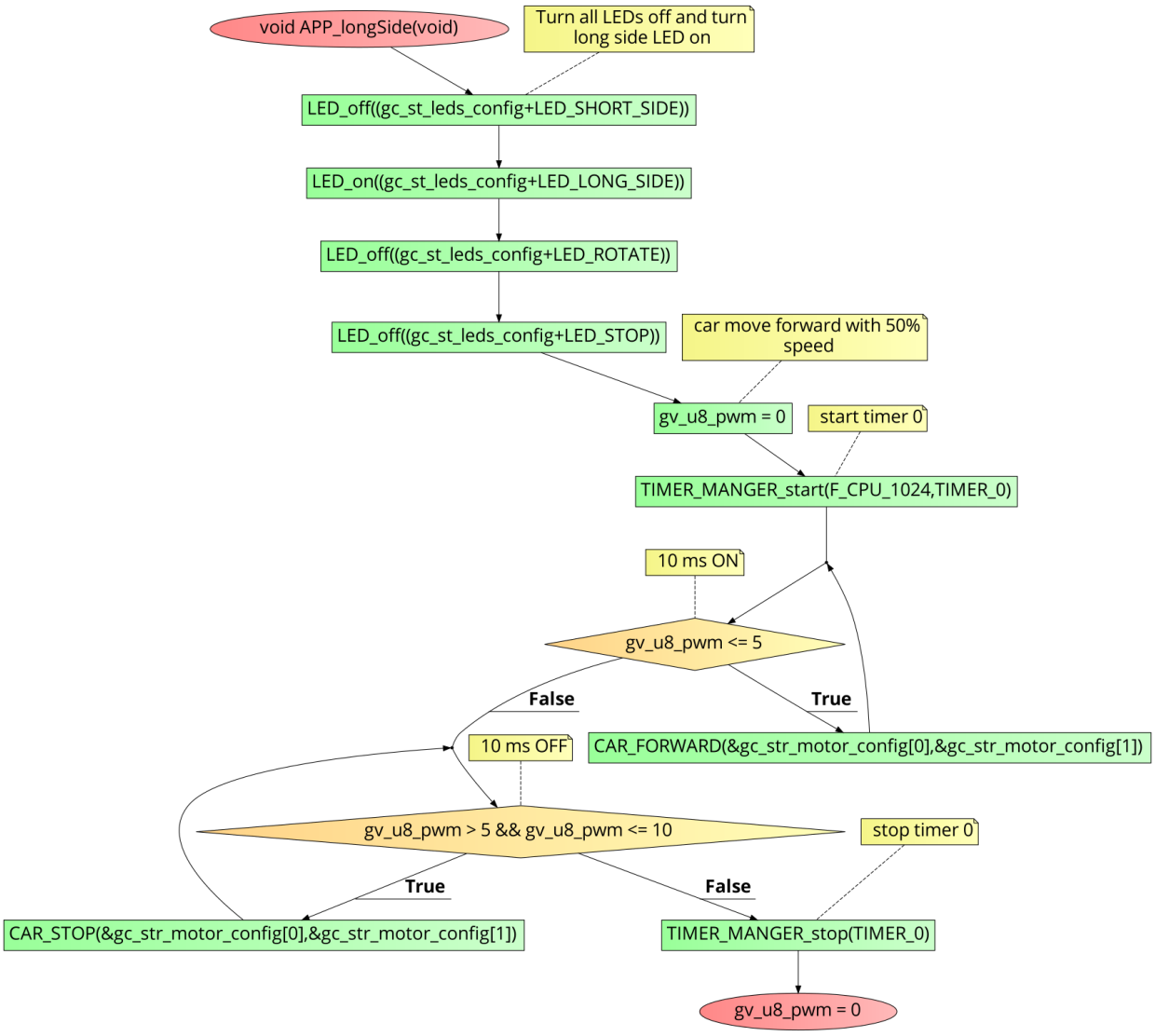


Figure 38 APP_longSide

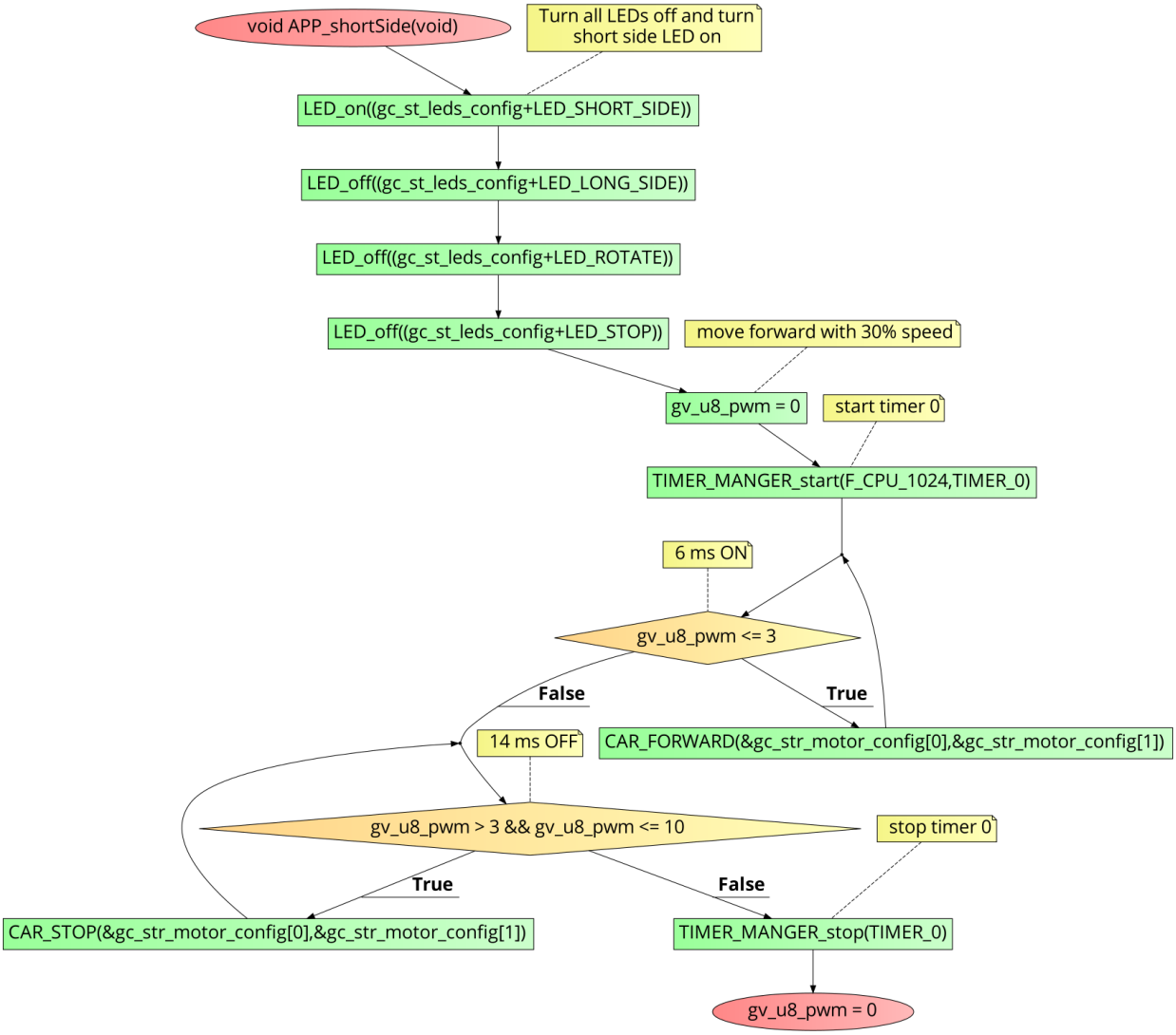


Figure 39 APP_shortState

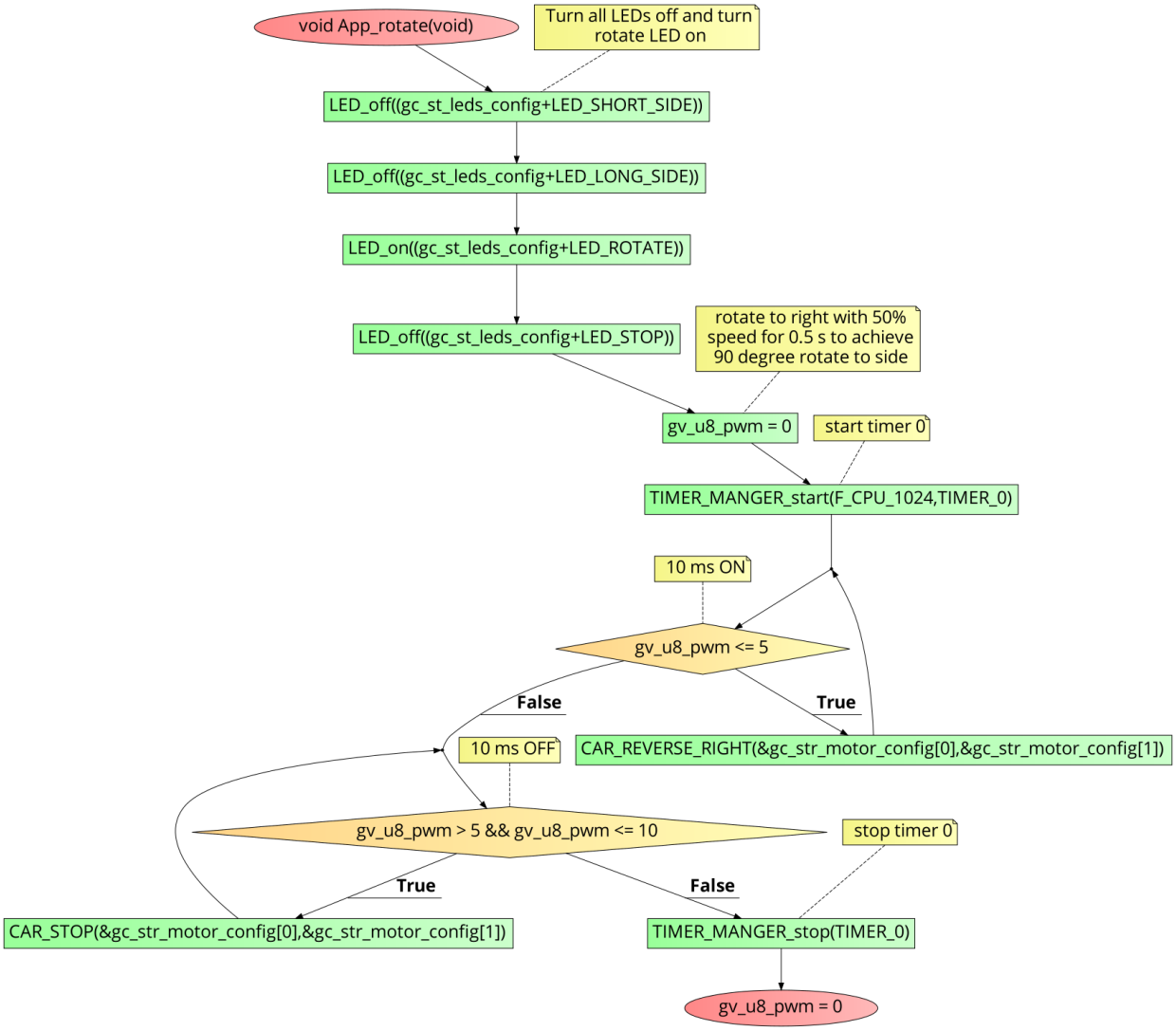


Figure 40 APP_rotate()

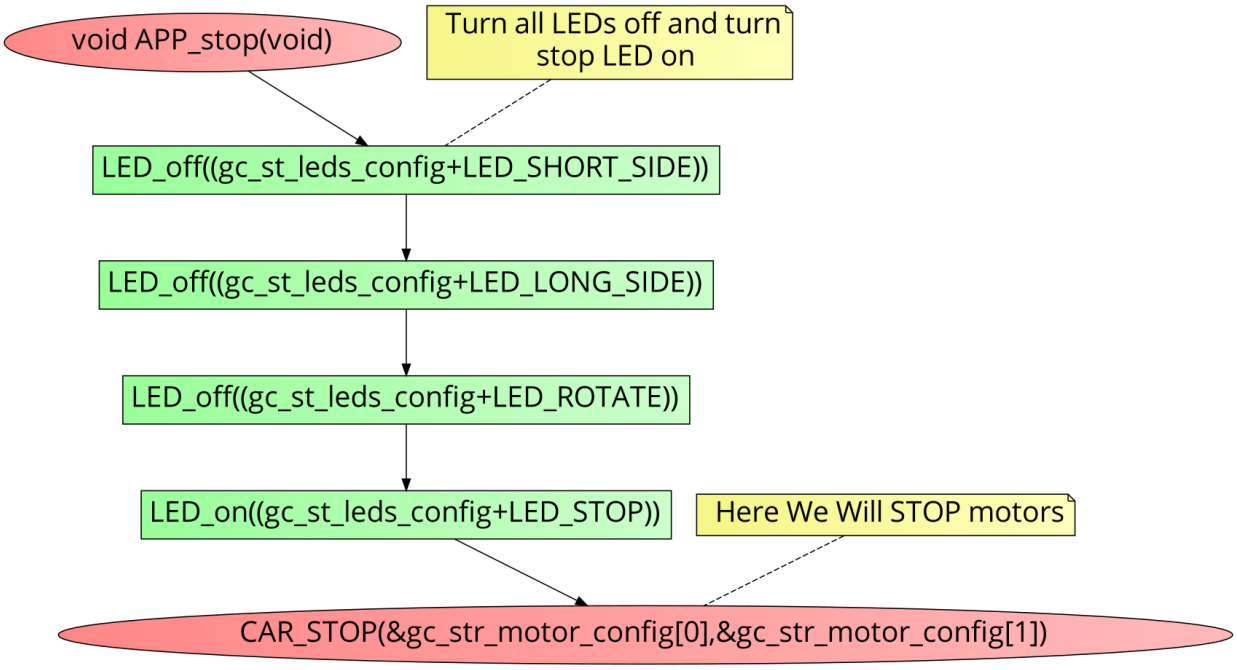


Figure 41 APP_stop()