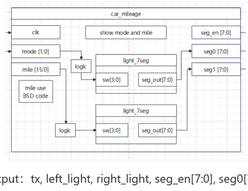
未命名文件

- Engine.v 顶层模块
  - input：clk, rx, power(button), model_select[1:0], man_throttle, man_clutch, man_brake, man_reverse, right(button), left(button), up(button), down(button)
  - clock_diviser.v 将时钟频率分频至 500Hz
    - input: clk
    - output: clk_out
  - start.v 小车开关和模式切换模块
    - input: clk, power(button), model_select[1:0], break
      - clk关联clock_diviser.v中的clk_out
      - power关联Engine.v中的power
      - model_select关联Engine.v中的model_select
      - break关联man.v中的break
    - output: mode[1:0]
      - mode 未启动状态（00），手动状态（01），半自动状态（11），全自动状态（10）
  - mode_selection.v (2-to-4 mux decorder)
    - input: mode[1:0]
      - mode[1:0]关联start.v中的mode[1:0] 表示现在的模式选择
    - output: out [0], out[1], out[2], out[3]
      - out[0] 车未启动
      - out[1] 车处于手动状态
      - out[2] 车处于自动状态
      - out[3] 车处于半自动状态
  - man.v (initial state is in not-starting state)
    - input: enable, clk, reverse, brake, clutch, throttle, left, right
      - enable关联mode_selection.v中的out[1] //若当前为手动模式则为1，否则为0
      - clk关联clock_diviser.v中的clk_out //clk帮助left和right自动方向校正
      - reverse(手刹)关联Engine.v中的man_reverse
      - brake(刹车)关联Engine.v中的man_brake
      - clutch(离合)关联Engine.v中的man_clutch
      - throttle(油门)关联Engine.v中的up
      - left关联Engine.v中的left
      - right关联Engine.v中的right
    - output: break, move_forward, move_backward, turn_left, turn_right
      - break表示熄火信号
      - move_forward为向前信号
      - move_backward为向后信号
      - turn_left为向左信号
      - turn_right为向右信号
  - semi_auto.v (initial state is in moving state)
    - input: enable, clk, is_turning, move_left, move_right, move_backward, detector[3:0]
      - enable关联mode_selection.v中的out[3]
      - clk关联clock_diviser.v中的clk_out
      - is_turning关联auto_turning.v中的is_turning
      - move_left关联Engine.v中的left
      - move_right关联Engine.v中的right
      - move_backward关联Engine.v中的down
      - detector[3:0]关联SimulateDevice.v中的front_detector,back_detector, left_detector, right_detector
    - output: out_move_forward, trigger_turn_left, trigger_turn_right, trigger_turn_back
      - out_move_forward为向前信号
      - 三个trigger为转弯或掉头信号
  - auto.v
    - input: enable, clk, moving, is_turning, detector[3:0]
      - enable关联mode_selection.v中的out[2]
      - clk关联clk_out
      - moving关联Engine.v中的man_clutch
      - is_turning关联auto_turning.v中的is_turning
      - detector[3:0]关联SimulateDevice.v中的front_detector,back_detector, left_detector, right_detector
    - 自动机与semi_auto，根据move_forward, moving经过logic分析形成小车运动信号
    - output: move_forward, trigger_turn_left, trigger_turn_right, trigger_turn_back, place_barrier, destory_barrier
  - auto_turning.v
    - input: clk, enable, trigger_turn_left, trigger_turn_right, trigger_turn_back
      - clk->clk_out
      - enable-> out[1] | out[3] //手动模式的自动校正，半自动模式的自动转弯
      - trigger: 将semi_auto.v和auto.v中的trigger_turn_* 对应取或
    - output: turn_left, turn_right, is_turning
      - is_turning标记转弯状态
  - SimulateDevice.v 小车运动状态输出模块(to UART)
    - input: sys_clk, rx, turn_left, turn_right, move_forward, move_backward, place_barrier, destory_barrier
      - sys_clk关联Engine.v中的clk
      - rx关联Engine.v中的rx
      - turn_*: 将man.v和auto_turning.v中对应的turn_*两两取或
      - move_forward: man.v和semi_auto.v和auto.v中的move_forward取或
      - move_backward：直接关联man.v的move_backward
      - place or destroy barrier直接关联auto.v中place_barrier, destory_barrier
    - output: tx, front_detector, back_detector, left_detector, right_detector
  - car_LED.v 小车LED灯显示模块
    - input: clk, mode[1:0], turn_left, turn_right
      - clk->clk_out
      - mode关联start.v中的mode
      - turn_*和SimulateDevice.v一样
    - output: left_light, right_light
  - car_mileage.v 小车里程计数模块(to 7 seg) 数码管输出mode和mile
    - input: clk, mode[1:0]
      - clk->clk_out
      - mode[1:0]关联start.v的mode
    - output: seg_en[7:0], seg0 [7:0], seg1 [7:0]
    - 

    - output：tx, left_light, right_light, seg_en[7:0], seg0[7:0], seg1[7:0]