Contents

CONTEXT CruiseCtx
CONSTANTS

  CRUISE_MAX_SPEED

  BUTTON_STATE

  CAR_MAX_SPEED

  CHANGE_STATE

  PEDAL_COMMAND

AXIOMS

  axm1: $CRUISE\_MAX\_SPEED \in \mathbb{N}$

  axm2: $BUTTON\_STATE = \{TRUE, FALSE\}$

  axm3: $CRUISE\_MAX\_SPEED \geq 1000$

  axm4: $CAR\_MAX\_SPEED \in \mathbb{N}$

  axm5: $CAR\_MAX\_SPEED > 1000$

  axm6: $CHANGE\_STATE \in \{TRUE, FALSE\} \twoheadrightarrow \{TRUE, FALSE\}$

  axm7: $CHANGE\_STATE = \{TRUE \mapsto FALSE, FALSE \mapsto TRUE\}$

  axm8: $CRUISE\_MAX\_SPEED \leq CAR\_MAX\_SPEED$

  axm9: $PEDAL\_COMMAND \subset \mathbb{N}$

  axm10: $PEDAL\_COMMAND = 0 \mathinner{.\,.} 3$

END

MACHINE CruiseMachine
SEES CruiseCtx
VARIABLES

cruise_system_state

cruise_speed_up

cruise_speed_down

brake_pedal_perc

acc_pedal_perc

cruise_start_stop

current_speed

acc_pedal_command

brake_pedal_command

cruise_speed

INVARIANTS

inv1: $cruise\_system\_state \in BUTTON\_STATE$

inv2: $cruise\_speed\_up \in BUTTON\_STATE$

inv3: $cruise\_speed\_down \in BUTTON\_STATE$

inv4: $brake\_pedal\_perc \in \mathbb{N}$

inv5: $brake\_pedal\_perc \geq 0$

inv6: $brake\_pedal\_perc \leq 100$

inv7: $acc\_pedal\_perc \in \mathbb{N}$

inv8: $acc\_pedal\_perc \geq 0$

inv9: $acc\_pedal\_perc \leq 100$

inv10: $cruise\_start\_stop \in BUTTON\_STATE$

inv11: $cruise\_speed \in \mathbb{N}$

inv13: $cruise\_speed \geq 1000$

inv14: $cruise\_speed \in \mathbb{N}$

inv15: $current\_speed \geq 0$

inv16: $current\_speed \leq CAR\_MAX\_SPEED$

inv17: $acc\_pedal\_command \in PEDAL\_COMMAND$

inv18: $brake\_pedal\_command \in PEDAL\_COMMAND$

EVENTS
Initialisation

begin

act1: $cruise\_system\_state := FALSE$

act2: $cruise\_speed\_up := FALSE$

act3: $cruise\_speed\_down := FALSE$

act4: $cruise\_start\_stop := FALSE$

act5: $cruise\_speed := 50000$

act6: $acc\_pedal\_perc := 0$

act7: $brake\_pedal\_perc := 0$

act8: $acc\_pedal\_command := 0$

act9: $brake\_pedal\_command := 0$

act10: $current\_speed := 0$

end

Event cruise_increase_speed ⟨ordinary⟩ $\widehat{=}$

when

grd1: $cruise\_system\_state = FALSE$

grd2: $cruise\_speed\_up = TRUE$

grd3: $cruise\_speed\_down = FALSE$

grd4: $cruise\_speed \leq CRUISE\_MAX\_SPEED - 2500$

then

act1: $cruise\_speed := cruise\_speed + 2500$

end

Event cruise_decrease_speed ⟨ordinary⟩ ≙
    when
        grd1: $cruise\_system\_state = FALSE$
        grd2: $cruise\_speed\_down = TRUE$
        grd3: $cruise\_speed\_up = FALSE$
        grd4: $cruise\_speed \geq 3500$
    then
        act1: $cruise\_speed := cruise\_speed - 2500$
    end

Event cruise_start_stop ⟨ordinary⟩ ≙
    when
        grd1: $cruise\_start\_stop = TRUE$
    then
        act1: $cruise\_system\_state := CHANGE\_STATE(cruise\_system\_state)$
    end

Event accelerate_vehicle ⟨ordinary⟩ ≙
    when
        grd1: $current\_speed < cruise\_speed$
        grd2: $cruise\_system\_state = TRUE$
        grd3: $brake\_pedal\_perc = 0$
        grd4: $brake\_pedal\_command = 0$
    then
        act1: $acc\_pedal\_command := 1$
    end

Event decelerate_vehicle ⟨ordinary⟩ ≙
    when
        grd1: $current\_speed > cruise\_speed$
        grd2: $cruise\_system\_state = TRUE$
        grd3: $brake\_pedal\_perc = 0$
        grd4: $acc\_pedal\_perc > 0$
    then
        act1: $acc\_pedal\_command := 2$
    end

Event increase_acc_pedal ⟨ordinary⟩ ≙
    when
        grd1: $acc\_pedal\_command = 1$
        grd2: $acc\_pedal\_perc \leq 98$
        grd3: $cruise\_system\_state = TRUE$
    then
        act1: $acc\_pedal\_command := 0$
        act2: $acc\_pedal\_perc := acc\_pedal\_perc + 2$
    end

Event decrease_acc_pedal ⟨ordinary⟩ ≙
    when
        grd1: $acc\_pedal\_command = 2$
        grd2: $acc\_pedal\_perc \geq 2$
        grd3: $cruise\_system\_state = TRUE$
    then
        act1: $acc\_pedal\_command := 0$
        act2: $acc\_pedal\_perc := acc\_pedal\_perc - 2$
    end

Event increase_brake_pedal ⟨ordinary⟩ ≙
    when
        grd1: $brake\_pedal\_command = 1$
        grd2: $brake\_pedal\_perc \leq 98$
        grd3: $cruise\_system\_state = TRUE$
    then
        act1: $brake\_pedal\_command := 0$

$\qquad\qquad$ act2: $brake\_pedal\_perc := brake\_pedal\_perc + 2$

$\quad$ **end**

Event decrease_brake_pedal ⟨ordinary⟩ $\;\widehat{=}$

$\quad$ **when**

$\qquad\qquad$ grd1: $\;brake\_pedal\_command = 2$

$\qquad\qquad$ grd2: $\;brake\_pedal\_perc \geq 2$

$\qquad\qquad$ grd3: $\;cruise\_system\_state = TRUE$

$\quad$ **then**

$\qquad\qquad$ act1: $brake\_pedal\_command := 0$

$\qquad\qquad$ act2: $brake\_pedal\_perc := brake\_pedal\_perc - 2$

$\quad$ **end**

END