

Sean O'Brien – 213735741
EECS 4312 – Lab 7 Report – Car Interlock Requirements
Thursday November 8th, 2018

System Boundaries

The system is two pairs of sensors and actuators. The environment is a one-way bridge that cars coming from both directions may wish to cross. To regulate this, the sensors detect when a car is present and waiting to cross, and the actuators give the green light to cars when it is their turn to cross. Priority is given to cars moving one direction (off of 'island').

Monitored Variables

The monitored variables are the two sensors, they represent whether or not there is a car in the waiting position on each side of the bridge. Their type is a function of dtime (discrete time) to sensor (which is effectively a boolean).

Controlled Variables

The controlled variables are the two actuators, they tell cars when it is safe to cross. They do this in response to the state of the monitored variables. Their type is a function of dtime (discrete time) to actuator (which is effectively a boolean).

i=0	X	X	y1(0)=stop	y2(0)=stop
i>0	x1(i)=off	x2(i)=off	y1(i)=stop	y2(i)=stop
	x1(i)=on	x2(i)=off	y1(i)=go	y2(i)=stop
	x1(i)=off	x2(i)=on	y1(i)=stop	y2(i)=go
	x1(i)=on	x2(i)=on	y1(i)=go	y2(i)=stop

PVS Function Table

```
control_ft(i): bool =
  COND
  i = 0 -> y1(0) = stop AND y2(0) = stop,
  i > 0 ->
    COND
    x1(i) = off AND x2(i) = off -> y1(i) = stop AND y2(i) = stop,
    x1(i) = on AND x2(i) = off -> y1(i) = go AND y2(i) = stop,
    x1(i) = off AND x2(i) = on -> y1(i) = stop AND y2(i) = go,
    x1(i) = on AND x2(i) = on -> y1(i) = go AND y2(i) = stop
    ENDCOND
  ENDCOND
```

E-Descriptions

1. Cars will not take longer than 10 seconds to cross the shared area.
2. Cars will wait until a green light to cross the shared area.

R-Descriptions

1. The lights will not both be green at the same light.
2. In the event there are cars waiting on both sides, priority will be give to cars exiting the plant.
3. Only one car may cross the shared area at the same time.