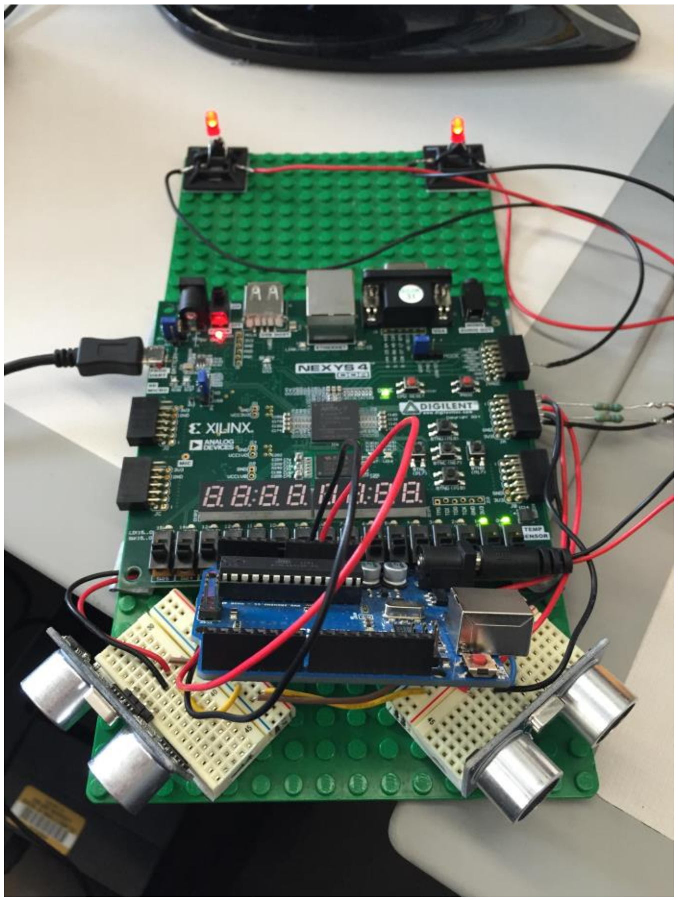
Blind Spot Monitor



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Why design a blind spot monitor?

- A Blind spot is defined as the area a driver cannot see while driving and using their mirrors.
- The National Highway Traffic Safety Administration reports 300 fatalities and 18,000 injuries occur yearly in the United States due to blind spots.[1]
- Regardless of mirror positions, blind spots still exists in the side and rear of vehicle
- Blind spot monitors exist in newer vehicles but they are costly

[1]http://www.fortheinjured.com/blind-spot-accident.html

Why design a blind spot monitor?

- Design a system that could be added to just about any car affordably
- It helps "eliminate" blind spots
- Could also be added to the front and rear of the car (parking and reversing)

Sonar Sensor

-Distance measuring sensor

-15 ft. dowel

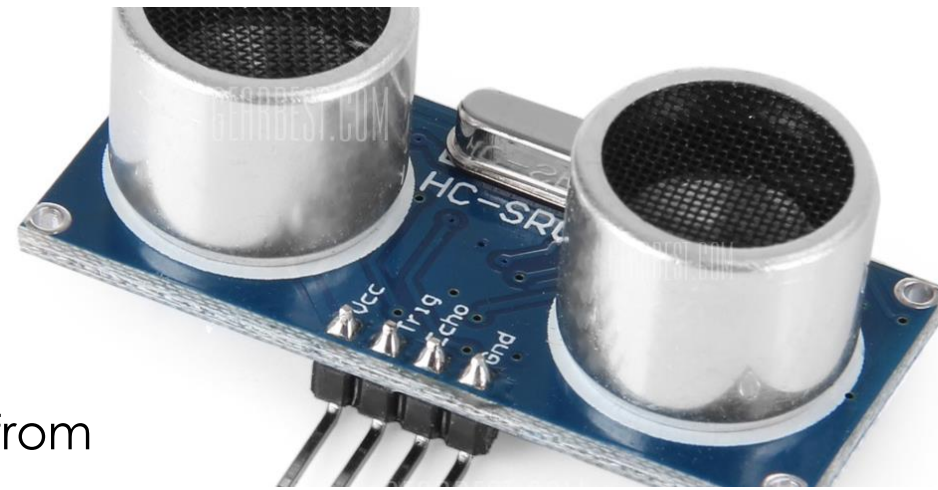
-Detects objects

-Requires 5 volts to run properly

-15 degree sensing angle

-Electric frequency output ranging from 5V (on), 0V (off).

-Simulation of car mirrors, two sensors to detect blind spot on each side of vehicle



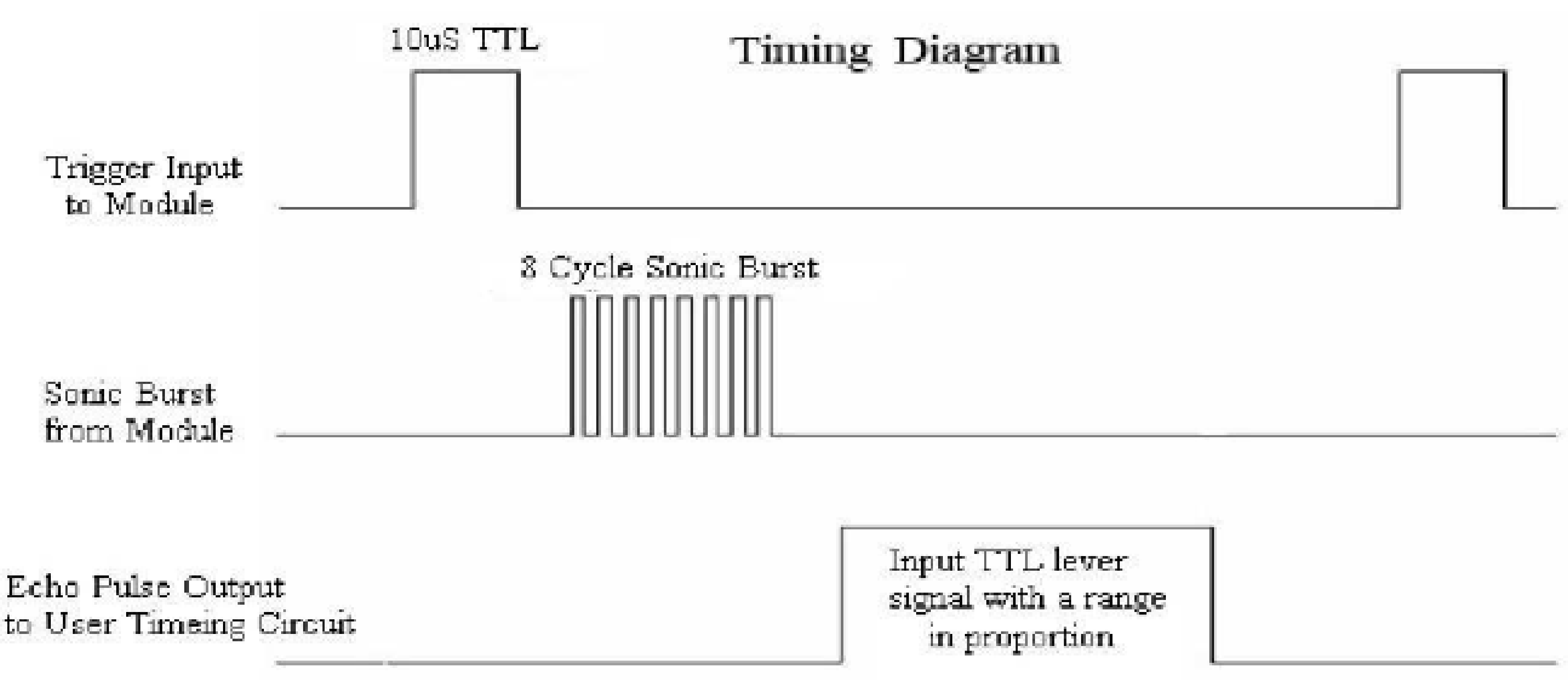
Sonar Sensor

Formula used in calculating the distance from the sensor:

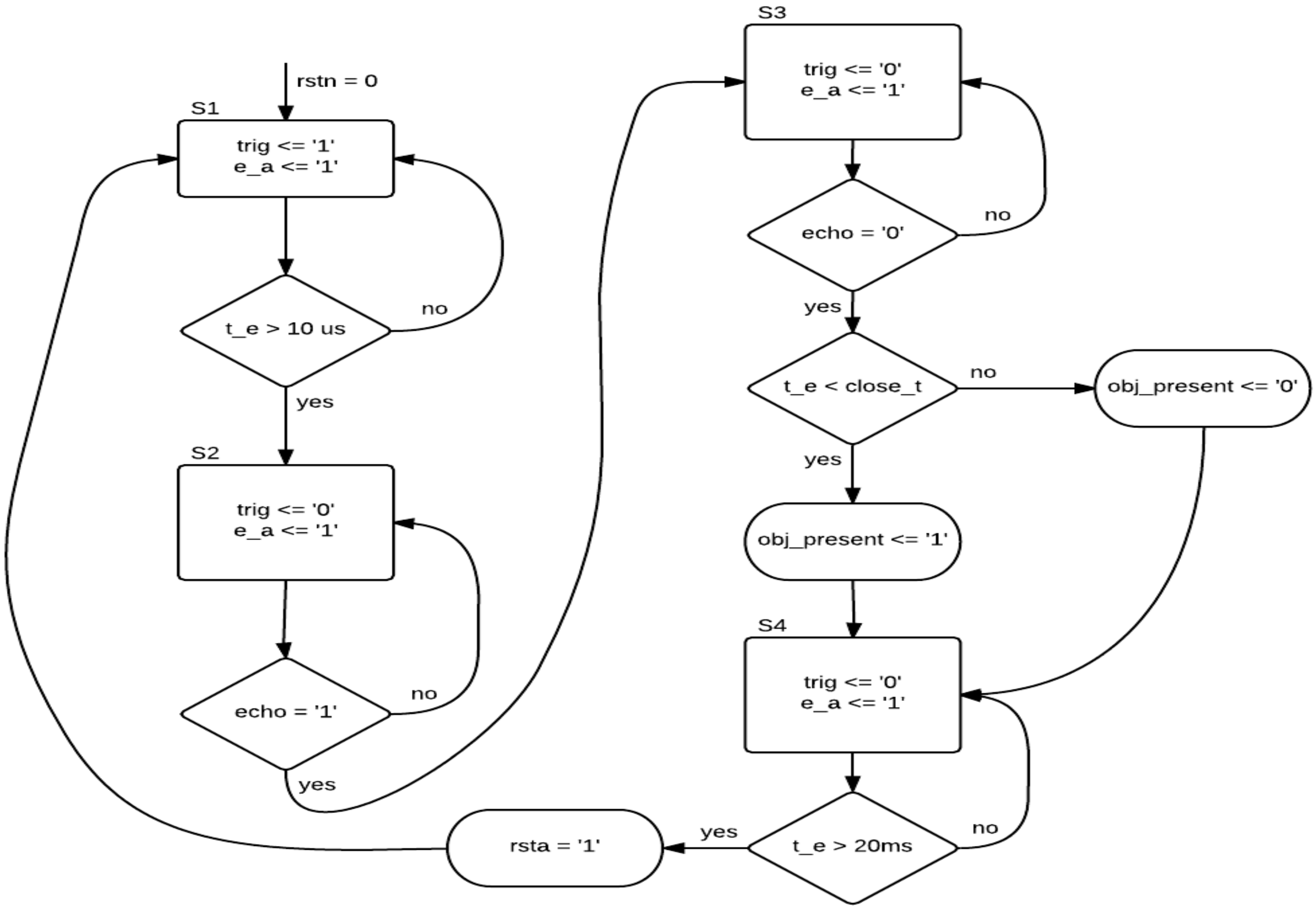
uS / 58 = centimeters
uS / 148 = inch

Calculating the range:
range = high level time * velocity (340M/S) / 2

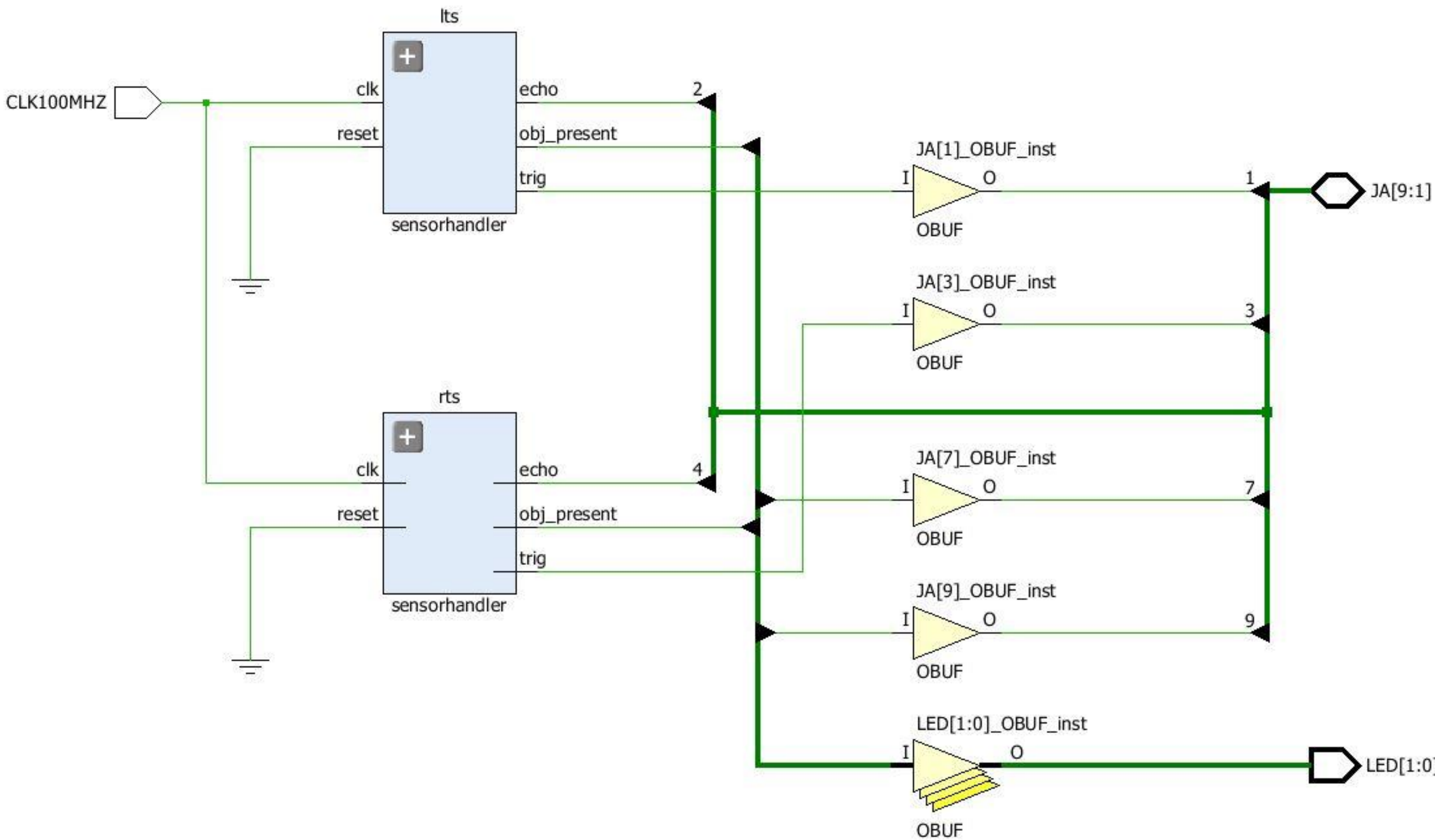
Sonar Sensor



Control & Datapath

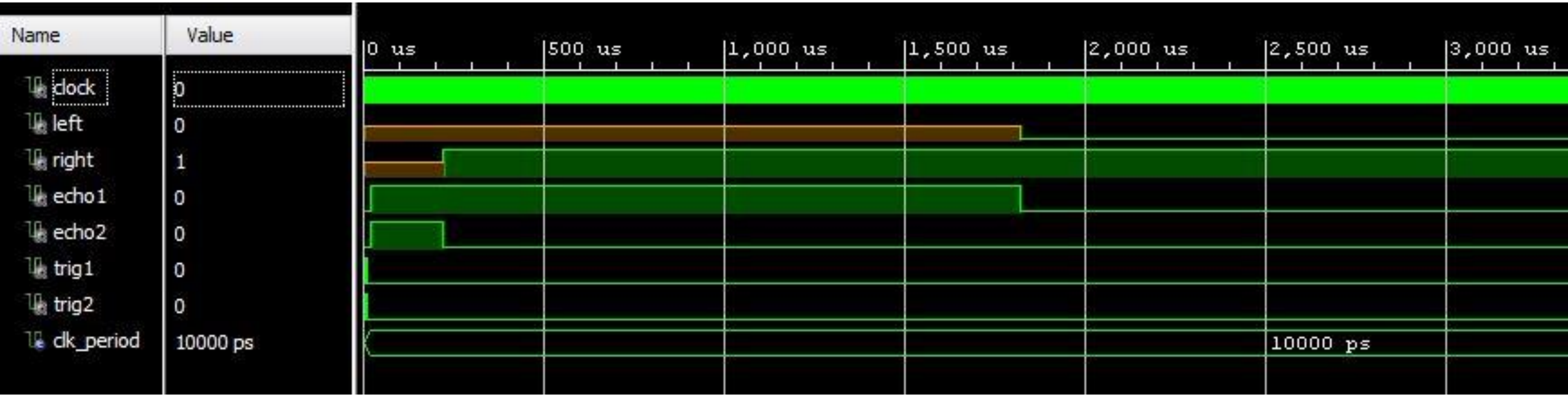


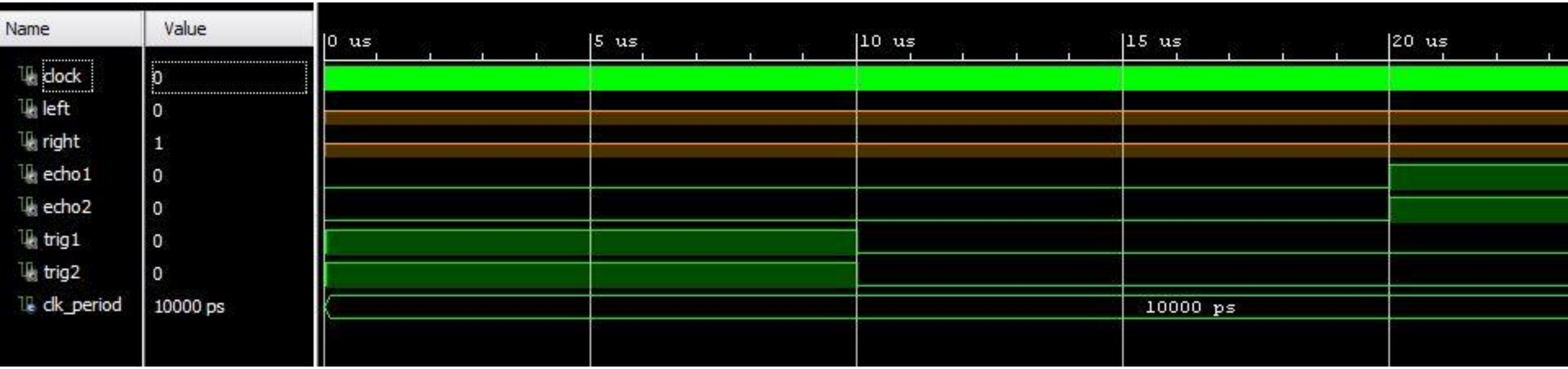
Top Level



lts
CLK100MHZ
clk
reset
echo
obj_present
trig
sensorhandler
2
JA[1]_OBUF_inst
I
O
OBUF
1
JA[9:1]
JA[3]_OBUF_inst
3
rts
4
JA[7]_OBUF_inst
7
JA[9]_OBUF_inst
9
LED[1:0]_OBUF_inst
LED[1:0]

Waveform


Name
Value
clock
left
right
echo1
echo2
trig1
trig2
clk_period
0
0
1
0
0
0
0
10000 ps
0 us
500 us
1,000 us
1,500 us
2,000 us
2,500 us
3,000 us
10000 ps


Name
Value
clock
left
right
echo1
echo2
trig1
trig2
clk_period
0
0
1
0
0
0
0
10000 ps
0 us
5 us
10 us
15 us
20 us
10000 ps

Initial Ideas

- Using different sensors.
- Lidar, infrared
- Different project, such as line following robot
- Scaled the project from car size to smaller scale.

Problems Faced

- Using 3.3V caused issues with the sonar sensor.
- 5V fixed the issue.
- Having multiple parts for testing purposes
- Obtaining parts on time

Improvements

- Display distance to object
- Output audio feedback for the driver
- Add another sensor in the front and rear of vehicle
- Make it life scale (to fit in car)
- More accurate sensors
- 3.3V sensor to work on the same supply