

Report

Firstly, we are trying to implement a smart car which is controlled mainly by using 2 sensors which are the IR sensors and the land detector sensor (LN).

We implemented the code as follows to cover all cases for of both sensors.
which are:

1- Both sensors read an input so the motor is stopped and the word ALERT gets displayed on the 7-Segment display.

2-the IR sensor reads an input so the motor is stopped and nothing is displayed on the 7-Segment display.

3- the LN sensor reads an input so the word ALERT gets displayed on the 7-Segment display and the motor will still operate .

4-if both sensors does not read any input the motor will still operate and nothing is displayed on the 7-Segment display.

Not: Both sensors are triggered by the negative edge so we they are 0 that means that they read an input.

Here is the VHDL code:

```
library IEEE;
use IEEE.STD_LOGIC_1164.ALL;

-- Declare the input and output signals
entity car is
    Port (
        --clock : in STD_LOGIC;
        lane_sensor : in STD_LOGIC;
        infrared_sensor : in STD_LOGIC;
        motor_control : out STD_LOGIC;
        seg1,seg2,seg3,seg4,seg5: out std_logic_vector(0 to 6));
end Car;

-- Define the behavior of the car control logic
architecture Behavioral of car is
begin
    -- Determine the appropriate control signal for the motor based on the sensor inputs
    process (lane_sensor,infrared_sensor)
    begin
        -- If the car is within its lane and there is no obstacle, allow the car to move
        if (lane_sensor = '0' and infrared_sensor = '0') then
            motor_control <= '0';
            seg1<="0001000";
            seg2<="1110001";
            seg3<="0110000";
            seg4<="1111010";
            seg5<="1110000";

            -- If the car is outside its lane, display a warning and stop the car
        elsif (lane_sensor = '0') then
            motor_control <= '1';
            seg1<="0001000";
            seg2<="1110001";
            seg3<="0110000";
            seg4<="1111010";
            seg5<="1110000";

            -- motor_control <= '0';
            -- Display warning message on 7 segment display
            -- If there is an obstacle in front of the car, stop the car
        elsif (infrared_sensor = '0') then
            motor_control <= '0';
            seg1<="1111111";
            seg2<="1111111";
            seg3<="1111111";
            seg4<="1111111";
            seg5<="1111111";
        else
            motor_control <= '1';
            seg1<="1111111";
            seg2<="1111111";
            seg3<="1111111";
            seg4<="1111111";
            seg5<="1111111";
        end if;
    end process;
end Behavioral;
```

Here id the Pin assignment for the FBGA:

[illegible]