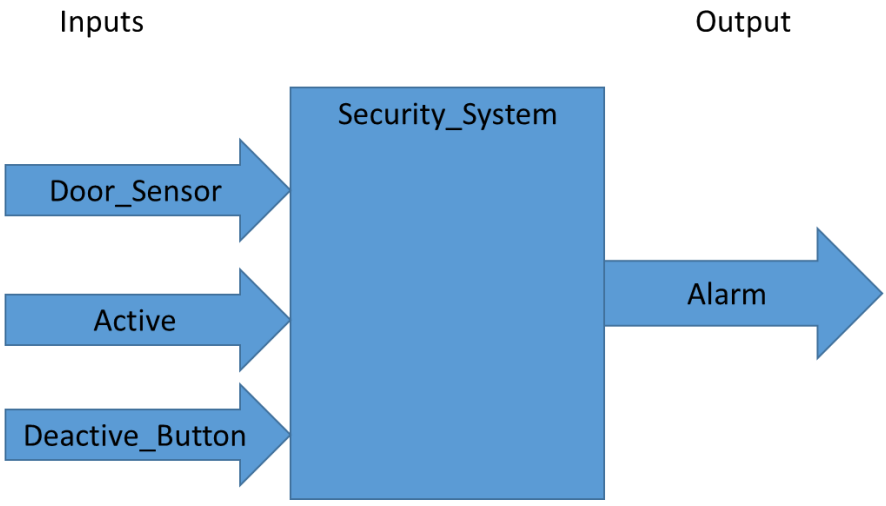
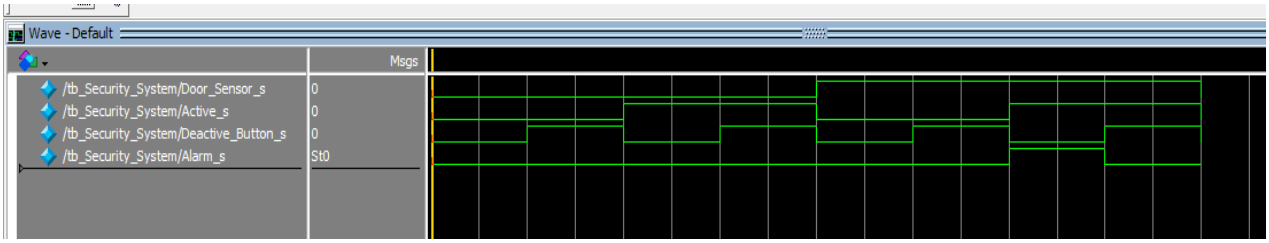
A. This project is about building a security system for my house. The system has 3 input, active state, door sensor, Secret deactivate button and one output, the loud alarm. If the system is in active state and the deactivate button have not been activated and the door sensor is activated, then it will activate the alarm.

B.



C.



D. The Code

-Main Module:

```
module Security_System(Door_Sensor, Active, Deactive_Button, Alarm);
        input Door_Sensor, Active, Deactive_Button;
        output Alarm;
        reg Alarm;

        always @(Door_Sensor, Active, Deactive_Button)
                begin
                        Alarm = Door_Sensor & Active & (~Deactive_Button);
                end
endmodule
```

-TestBench Module:

```
`timescale 1 ns/100 ps

module tb_Security_System();

        reg Door_Sensor_s, Active_s, Deactive_Button_s;
        wire Alarm_s;

        Security_System My_System(Door_Sensor_s, Active_s, Deactive_Button_s, Alarm_s);

                initial begin
                        Door_Sensor_s = 0;
                        Active_s = 0;
                        Deactive_Button_s = 0;

                        #10 Door_Sensor_s = 0; Active_s = 0; Deactive_Button_s = 1;
                        #10 Door_Sensor_s = 0; Active_s = 1; Deactive_Button_s = 0;
                        #10 Door_Sensor_s = 0; Active_s = 1; Deactive_Button_s = 1;
                        #10 Door_Sensor_s = 1; Active_s = 0; Deactive_Button_s = 0;
                        #10 Door_Sensor_s = 1; Active_s = 0; Deactive_Button_s = 1;
                        #10 Door_Sensor_s = 1; Active_s = 1; Deactive_Button_s = 0;
                        #10 Door_Sensor_s = 1; Active_s = 1; Deactive_Button_s = 1;
                        #10 Door_Sensor_s = 0; Active_s = 0; Deactive_Button_s = 0;

                end
endmodule
```