Parking Garage counter

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Abstract

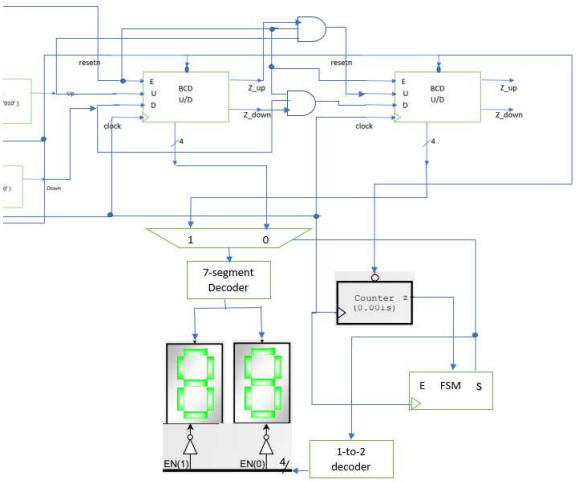
The purpose of this project is to create a VHDL code and implement it to the Atrix-A7 board to be able to detect the amount of vehicles entering and exiting the parking garage by adding 1, or subtracting 1 and displaying it to the seven segment display. This is important because it would make it easier for people to know if they should enter the garage and try to find parking.

I. Introduction

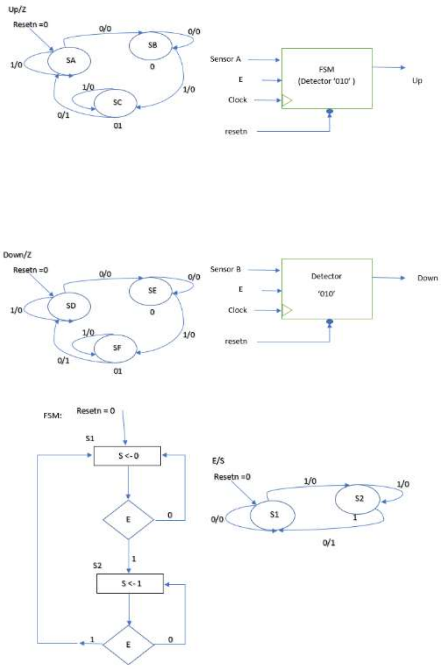
The purpose of this project is to focus on parking garages and making them faster, less crowded and easier to navigate through. During busy times like the holidays, people like to go out and have fun, and usually in busy places like downtown Detroit, there are not many parking areas except on the street and parking buildings. The parking spaces on the street are usually timed, which causes people to go into the parking buildings, and that is where people spend the most time navigating through the crowded building just to find out that it is full. with the sensors and the seven-segment display added, people would know if the garage is full, and move on to the next one. The users will use all the information learned during the lab and apply them to the project. To improve a parking garage, placing a sensor at the entrance and exit will speed up the process because it will allow the sensors to detect the vehicle before reaching a complete stop, and open the gate. It will also do the same when a vehicle is exiting. The sensors will also send a signal to the seven-segment display to show the customers if there is space available. If no space is available, the gates will remain shut.

II. Methodology

We use two sensors (sensor A (count up) and sensor B count down) connected to the Atrix-A7 board to detect cars entering or exiting the parking garage. When sensors do not detect any cars entering or exiting the parking garage, they will signal active low '0', and will signal Active high when cars enter or exit. However, when cars rarely move in or out, the sensor will go back '0'. The FSM detector "010" will be used in VHDL code to detect cars in or out, and it will output Up and output Down of the FSMS to connect BCD U/D Counter. Our system is designed to be able to count up to a maximum number of 99 vehicles. When BCD count reaches 99, we only allow cars to exit. For those reasons, the gate in will be closed although sensor A is activated, and only the gate out can be opened when sensor B is activated. From outputs of BCD U/D Counters, we will use decoders to convert 4 bits into seven segments combined with multiplexer 2 to 1 to enable display two-digit numbers on seven segment LEDs.



III. Experimental Setup



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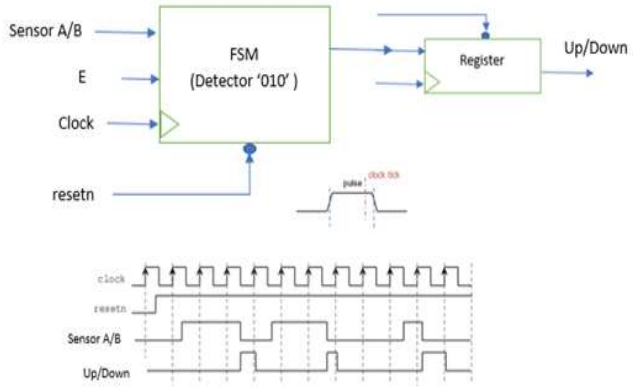

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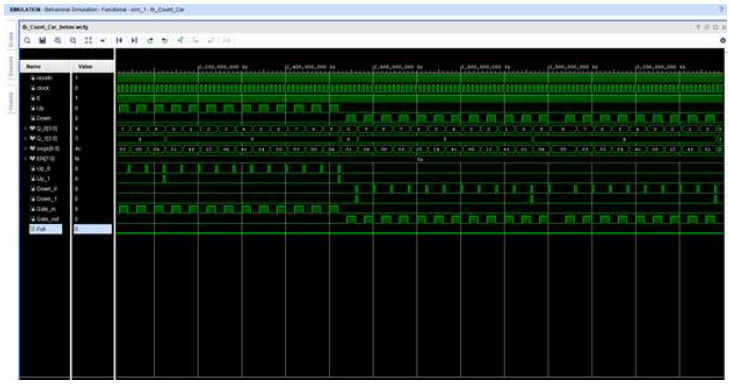
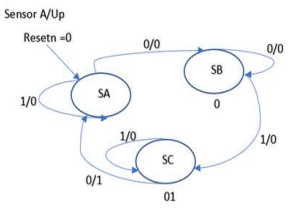
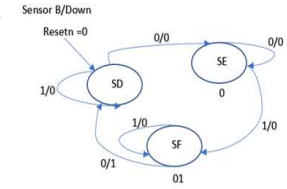
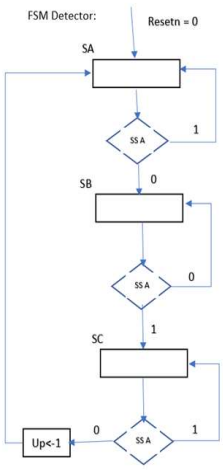
IV. Results

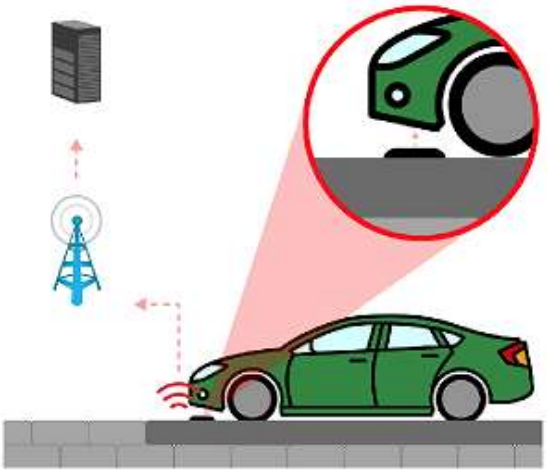
After finishing the VHDL code and running the simulation, we have the time diagram look like the picture below. Overall, the simulation looks good and counts exactly.

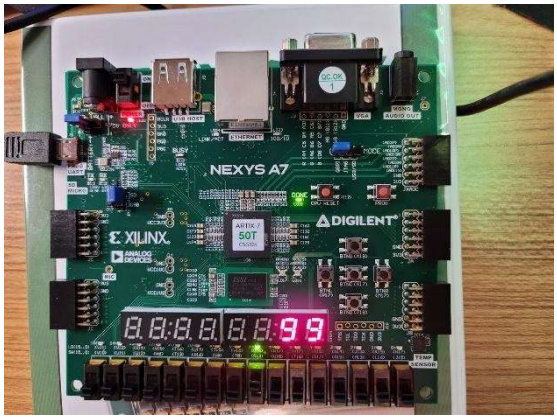












When the number of cars is 99, the LED middle will light and we know that the parking lots are full. We cannot allow cars to be able to get

Conclusions

Today, energy and money is being wasted when people are trying to find a parking spot inside garages. Our project could reduce that if the driver is provided with vacancy information of a parking garage by detecting and counting the number of cars in the garage, by implementing this idea to all parking garages, people can save much time by knowing to enter the garage or move on to the next one.

References

Digiital Logic Design VHDL Coding for FPGAs Unit 6- Daniel Llamocca.

Digiital Logic Design VHDL Coding for FPGAs Unit 7- Daniel Llamocca.