“The DSD Team” Report

Team Name: The DSD Team

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Brief description

Idea and approach

It is a smart parking system, that has more than one functionality.

- It counts the number of free slots available, which prevents any additional cars from entering if there are no free parking slots, using an ultrasonic sensor
- It has an ultrasonic sensor at the entrance gate that decrements the number of available slots as a car enters the parking
- It has an ultrasonic sensor at the exit gate that increments the number of available slots as a car leaves the parking
- There are four parking slots, each with 3 different LEDs indicating different status
    (1) Green LED: indicates that this is a free slot
    (2) Red LED: indicates that this slot is occupied
    (3) Yellow LED: indicates that this slot is reserved
- It has a reservation system, a person can reserve a parking slot if there are available slots and a password is displayed on the FPGA screen for the user to memorize and then removed. Whenever a car wants to enter the reserved spot, the user has to enter the password using FPGA switches, If the entered password is correct, the reserved slot (indicated by a yellow LED) becomes free and the user is free to enter this slot.

Components used

1. 6 ultrasonic sensors: detection of movement
2. 4 green LEDs: free slot indication
3. 4 red LEDs: occupied slot indication
4. 4 Yellow LEDs: reserved slot indication
5. 2 breadboards: connections between the components
6. A lot of jumpers/wires (AND WE MEAN A LOT!!!)
7. 4 cars for real life simulation

Input handling

Sensors

Two sensor are used, one for detecting entering cars and the other one for detecting leaving cars.

Four sensors are used to detect the state of the parking slots, one for each slot.

Switches

One switch is used for reservations. Any change in the state of the switch signals a reservation request.

Four switches are used to write the password of the reservation. The password consists of zeros and ones and every switch's state should match its corresponding value in the password.

Button

A button is used to enter the password after it is written using the switches.

Output handling

FPGA 7-BIT segments

One 7-BIT segment for showing the count of the free spots in the parking.

Four 7-BIT segments for displaying a reservation password.

LEDs

To indicate the state of each parking slot.

Limitations

- How the sensor is triggered and passed as input.

Dividing the work

The whole team worked on both the coding and the connections/design, however the project was divided mainly into two teams:

Coding team:

Abdulrahman Muhammad

Youssef Mohamed Ahmed

Youssef Ayman Abuelleil

FPGA, connections and design team:

Abdelrahman Hassan Abdou

Mark Micheal Lamie Abdelaziz

Ahmed Hashem Abdulrhman