

SEMI-AUTOMATED PARKING SYSTEM USING VHDL

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ABSTRACT

The Semi-automated auto/ bike parking system has been designed in such a way that it could reduce/minimize the work of a mortal being. numerous effects which a mortal being does, is now done by a machine which is semi-automated, as utmost of the burden is reduced from the people, who are being employed at the parking area. Only many effects are taken care of by the people employed at the parking area. But these records are being recorded in the GUI grounded standalone system. Thus,only many workshops are done by the person employed at the parking area. The person only collects profit which is given at the exit of the vehicle from the parking system. Their lower confusion created by this semi-automated standalone system. The data handed by the customer is kept private with the entire authentication needed. Thus, this semi-automated vehicle parking software makes effects easier for the mortal being working and a person ensconcing their vehicle in the parking system. The proposed system uses a VHDL based system in an organized manner using FSM methodology.

Keyword: - *Semi-automated, Burden, GUI, VHDL, FSM (Finite State Machine)*

1. INTRODUCTION

A partially automated parking mechanism has been developed to alleviate the burden on staff managing parking areas and optimize parking utilization to minimize the possibility of accidents when patrons park their vehicles. Employing sophisticated automated technology, vehicles can be securely and swiftly parked in the designated location without risk of collision. This ensures that each vehicle can be parked autonomously, allowing for easy access without necessitating the rearrangement of other vehicles. Using an automated parking system is a significant convenience for any parking scenario, negating the need for a valet to handle and maneuver your vehicles. Acting as a substitute for a parking attendant, our robotic parking system saves your enterprise time and money while speeding up the process of locating a parking spot for your customers. A partially automated car/motorcycle parking system allocates parking for automobiles/motorbikes in various vertical slots with intelligent use of parking areas, reducing wasted space in vast parking structures without the need for drivers.

1.1 Xilinx Vivado Software

Vivado Design Suite is a software suite produced by Xilinx for conflation and analysis of tackle description language (HDL) designs, relieving Xilinx ISE with fresh features for system on a chip development and high-position conflation. Like the after performances of ISE, Vivado includes the in- erected sense simulator. Vivado also

introduces high-position conflation, with a toolchain that converts C law into programmable sense. Vivado includes electronic system position(ESL) design tools for synthesizing and vindicating C-grounded algorithmic IP; norms-grounded packaging of both algorithmic and RTL IP for exercise; norms-grounded IP suturing and systems integration of all types of system structure blocks; and the verification of blocks and systems. A free interpretation WebPACK Edition of Vivado provides contrivers with a limited interpretation of the design terrain.

1.2 Overview

Present days operation of motor vehicles was increased day by day, it caused the pollution, business traffic and parking problems. To overcome this problem, Parking System is enforced in Finite State Machine (FSM) using VHDL Language (veritably High- Speed Integrated Circuit Hardware Description Language). The system has main important modules i.e., identification module and two detectors which are frontal, detector and back, detector. Identification module which means the security key(word) to enter into the parking niche. In this realistic world, several tasks were performed by every existent without being fugitive. So, in order to sort out all the tasks for the effective operation of time, a wise way should be taken to check the destruction of time at unproductive areas similar as at the most constantly performed action, which is the parking of vehicles. The major discussion involves the following results given below for the effective operation of time which doesn't spare important time for parking purposes and also in order to have a safe demesne without involving any kind of crashes. Methodical parking with security is the main aphorism. Security includes the operation of words at the time of demesne. This VHDL design presents an auto parking system in VHDL using Finite State Machine (FSM).

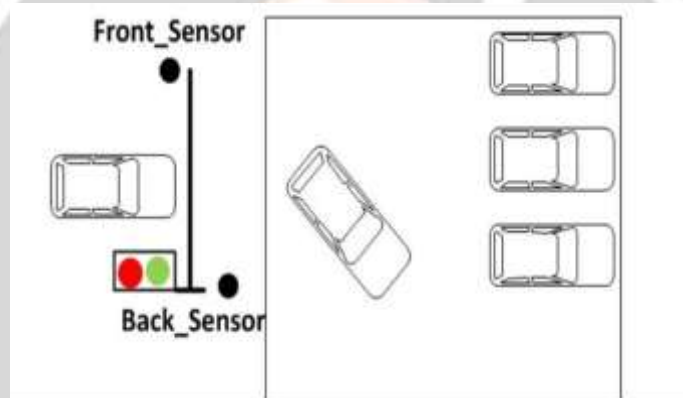


Fig-1: Parking System

2. EXISTING MANUAL PARKING SYSTEM

Man-made parking systems keep up a paper-grounded histories system since data collection and entry are manually done by parking staff. Parking lot executives must spend hours searching for columns containing the exact information in order to complete this work. These types of paper histories result in a slew of issues. Entering data takes a lot of time and trouble. Capital expenditures are added unnecessarily as a result of capitalist spent on labor that performs repetitive manual missions that can be freely and efficiently automatized. In extension, the labor cost involved in the maintenance of a man-made parking system is more since all assignments have to be done manually. Guests are constantly allowed entry into yard by guards without first verifying with the person they're visiting, which might affect in the wrong persons being granted access. As a result, a high- threat factor is usual in manual parking handling systems putting others in risk.

In man-made parking control systems, guests must hold on in line for long ages of time to both enter and exit the parking lot due to outdated or man-made missions. Man-made parking systems extend further disadvantages than advantages. Shifting to semi-automated or automated car parking systems with the help of integrated parking guidance software would be the smart way to counter this effect. They're eco-friendly, simple to apply, and cost-efficient.

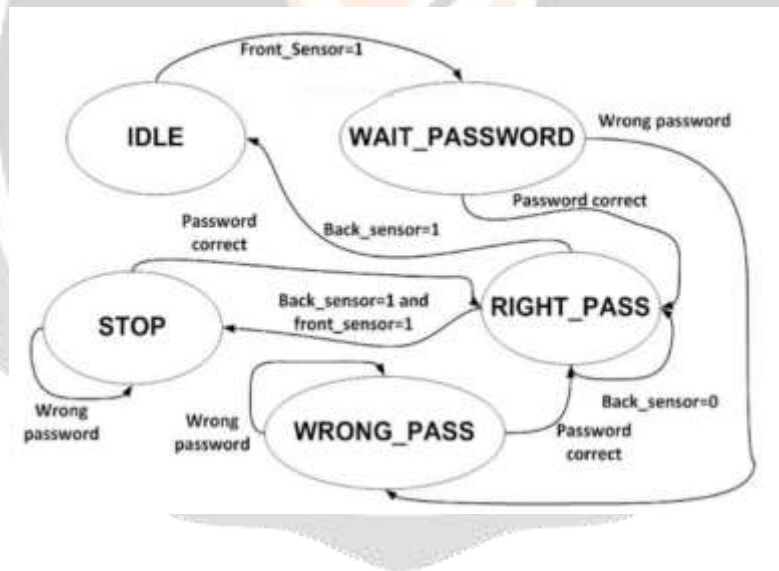
3.PROPOSED SYSTEM

A type of product or software known was developed expressly to help the parking business in managing its missions as effectively as realizable. It concentrates on helping people with their parking difficulties. Some automated gates that these systems can incorporate with and control for entry or exit can also be applied. There's also an automated marking system there. You may expect to note a respectable boost in the effectiveness of your company's parking lot with all of these factors connected with other features. A parking operation system utilizes automated gates that control entry, marking system which has autonomy, and several other features or append on. All of these features are important as they support the software to serve well and adequately.

3.1 Semi-Automated System

Semi-automated parking means each motor vehicle gets situated fully independently of every other motor vehicle, allowing access for each motor vehicle without moving all the other motor vehicles around it. Exercising this type of parking is a major convenience factor for any parking situation, not taking the use of a valet to move and rearrange your vehicles. One of the gratuities of a parking management system is that it provides security. A barrier and reservation feature controls the vehicles allowed to enter and exit a space, for case, at a business or event. This way, one doesn't have to worry about guests leaving valuables in their car, trashing, theft, or lawless dumping. It can make your car is situated with maximum security. A security camera will monitor cars and license numbers, so owners can keep track of their vehicle's whereabouts even if they've left them for someone else to watch over. Hence, having parking management systems in an automobile park is necessary.

3.2 Finite State Machine



Originally, the FSM is in INACTIVE state until the reset button is active. And also, it's in IDLE state. However, FSM is switched to WAIT_PASSWORD state and it stay for 4 cycles for a user to enter the password, If there's a vehicle coming detected by the frontal detector. The car user enters the word in this state; if the word is correct, the gate will be opened to let the auto get in the parking area and state machine turns to RIGHT_PASS state; a Green LED will be blinking to indicate that the vehicle can enter the bay.

If not, FSM turns to WRONG_PASS state; a Red LED will be blinking and the car user is needed to enter the word again until it's correct. When the current motor vehicle gets into the parking area which will detected by the rear detector and there's the following car coming, the FSM is switched to STOP state and the Red LED will be blinking so that the coming motor vehicle will be noticed to stop and enter the password. After the motor vehicle passes the entry and gets into the parking area, the FSM comes to IDLE state.

3.3 Methodology

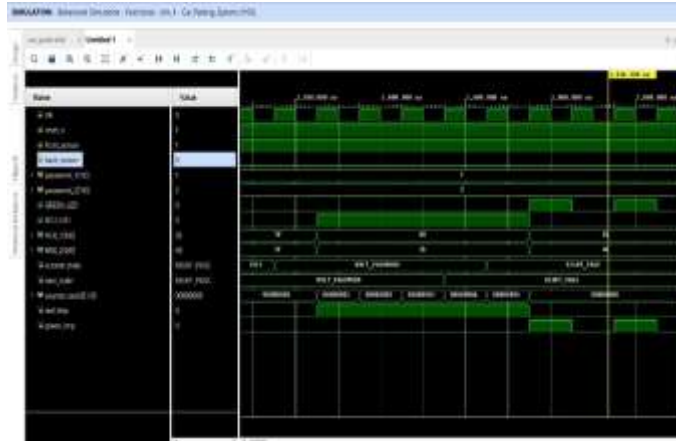
1. Create a new Vivado project: Launch Vivado and select "Create Project" from the menu. Follow the prompts to specify the project name, location, and target FPGA device. Select "RTL Project" as the project type and "VHDL" as the target language.
2. Add design sources: In the "Add Sources" dialog box, select "Add or Create Design Sources" and then click on "Create File." Name the VHDL file and specify its location. Add the VHDL code to the file and save it.
3. Add simulation sources: In the "Add Sources" dialog box, select "Add or Create Simulation Sources" and then click on "Create File." Name the simulation file and specify its location. Add VHDL code to the file that will serve as a stimulus for the design under test.
4. Simulate design: To run a simulation of your VHDL design, click "Run Simulation" in the "Flow Navigator" pane on the left side of the Vivado interface. In the "Run Simulation" dialog box, select "Simulation Settings" and choose "XSim" as the simulator. Set the simulation time and other parameters as required and click "OK."
5. View simulation results: After the simulation is complete, you can view the simulation results to verify the functionality of your design. Click "Open Waveform" in the "Flow Navigator" pane to view the simulation waveforms.

4.SIMATION RESULTS

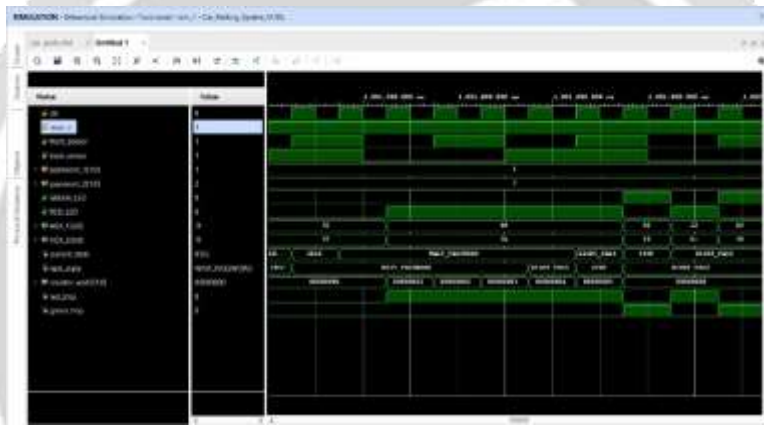
- When Reset_n is in off state; the entire system is in INACTIVE state.



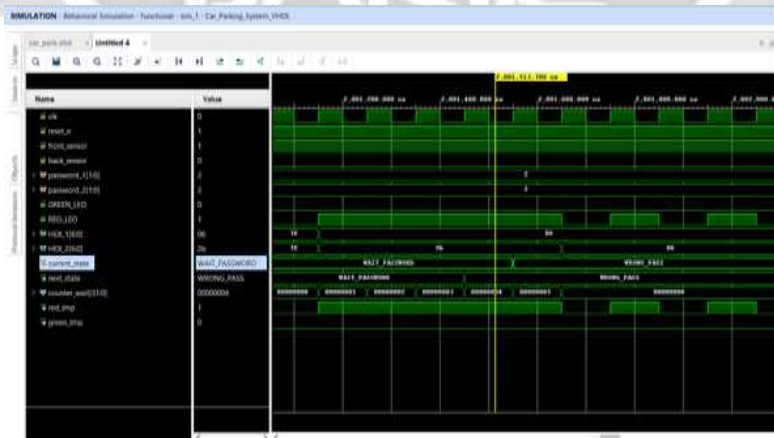
- When Reset_n is '1' and front_sensor is '1'; it changes its state from IDLE to WAIT_PASSWORD and then it checks password if it is correct, it moves to RIGHT_PASS state (green led blinks).



- If both front_sensor and back_sensor are '1' and the password is also correct; the state moves from WAIT_PASSWORD to RIGHT_PASS and immediately moves to STOP state.



- When the password is incorrect; it moves from WAIT_PASSWORD state to WRONG_PASS state (red_led blinks).



5. CONCLUSIONS

Adopting parking management system significantly reduces the amount of time consumed in seeking the parking space, renders valuable data upon the availability of the parking area, accurate mapping of the parking space, offers guidance and suggestion for proper vehicle parking. Thus a simple, least cost, most effective and secured car parking system using VHDL. Moore machine is used to design automatic secured car parking system. Xilinx Vivado 2021.2 is used to synthesize and simulate our proposed design. Different states of designed and implemented Moore FSM machine are discussed. Because proposed system was implemented on Zynq-7000 series board, it provides quick response.

6. REFERENCES

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