Title: **Real-time Garage Parking System Using Arduino with Counter and Keypad**

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Objectives

1. To be able to implement a garage parking system using photoresistor and keypad.
2. To be able to demonstrate how the measured light intensity would activate the keypad to start entering the PIN and enter the garage.
3. To be able to demonstrate how the servo motor would open the gate when entry or exit has been verified.
4. To be able to demonstrate how the seven-segment display would increment or decrement whenever an entry or exit has happened in the garage.
5. To be able to demonstrate how the LCD would be utilized as the user interface when operating the garage parking system.

Discussion

Most garage nowadays utilize PIN code to prevent strangers from entering without any consent from the owner. Similar to how parking areas have been operating in some foreign countries, they use ticket to serve as verification when entering to park their vehicles. From these ideas, the developer realized that these two can be merged with additional features to implement a real-time garage parking system with the use of keypad and counter. Initially, a photoresistor would be utilized to signal the system that an entry would begin in the garage parking. A threshold value would be set to compare it to the sensed light intensity by the photoresistor. Once the sensed light intensity reaches or exceeds the threshold value, a signal would be sent to the system to prepare it for entry which would start the keypad from accepting PIN code.

Six characters in the keypad would be used as PIN code for the garage parking system. Once six characters have been entered by the user via keypad, these will be compared to the correct PIN code in the system. If the user entered the pin incorrectly, the LCD would inform the user that the PIN code was incorrect, hence the user would be asked to enter another PIN. Once the PIN is correct, the garage parking system would treat it as a verified entry which would increment the occupants displayed in the seven-segment display by 1 and opens the gate using a servo motor. After a few seconds, it will close the gate and return to its initial state.

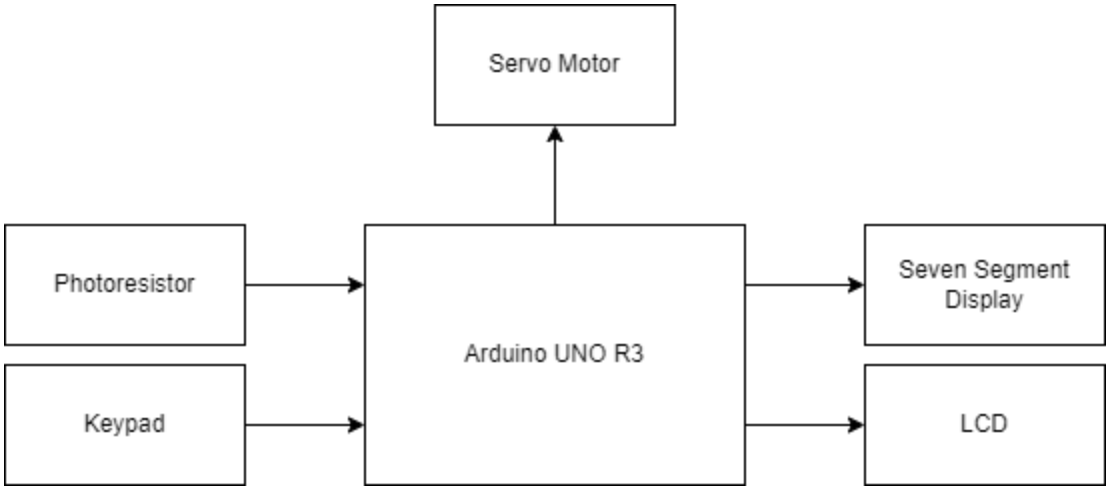
In addition, the maximum capacity of the garage parking system would be 9 vehicles. Once this is reached, the garage parking system would not accept any entry anymore. Moreover, an exit can be done by pressing a certain key in the keypad to trigger the servo motor from opening the gate. Afterward, the seven-segment display would automatically decrement by one since an exit has been verified.

As for the creation of the prototype, the developer would utilize a shoe box as the overall system casing which would serve as the garage parking area at the same time. The developer would make sure that the threshold value for the photoresistor would be based from a related article to improve functionalities. Also, it will be calibrated accordingly to prevent unnecessary input from affecting the functionalities of the system such as the light coming from the testing site. The gate would just be coming from a cut part of the shoebox and tie it to a metal coil to be able to pull by the servo motor. Hence, opening and closing the gate when signaled by the system.

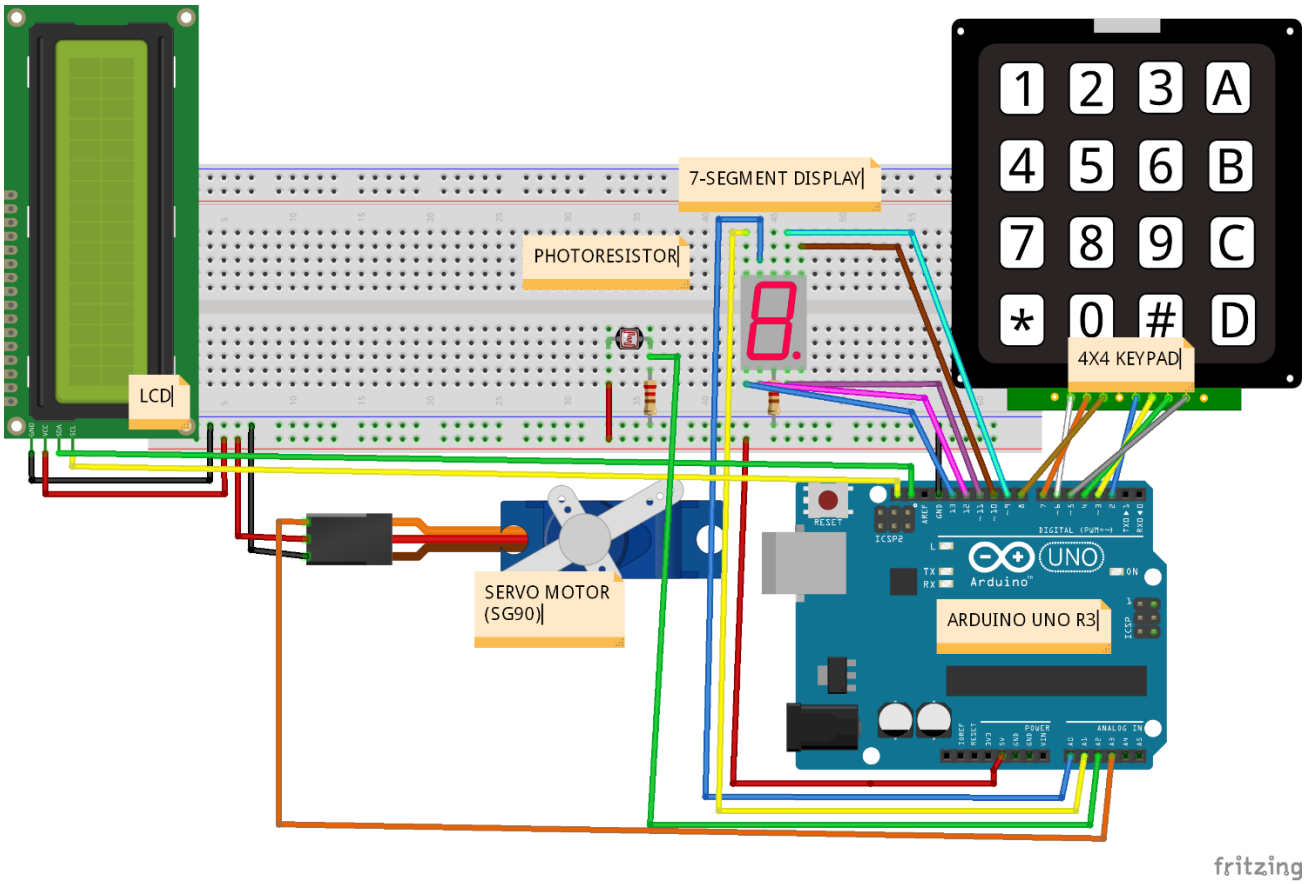
List of materials:

- 1 pc Arduino UNO R3 Microcontroller
- 2 pcs Breadboard
- 1 pc LCD
- 1 pc Seven-Segment Display (single digit)
- 1 pc Servo Motor (SG90)
- 1 pc Keypad
- 1 pc Photoresistor
- Jumper Wires

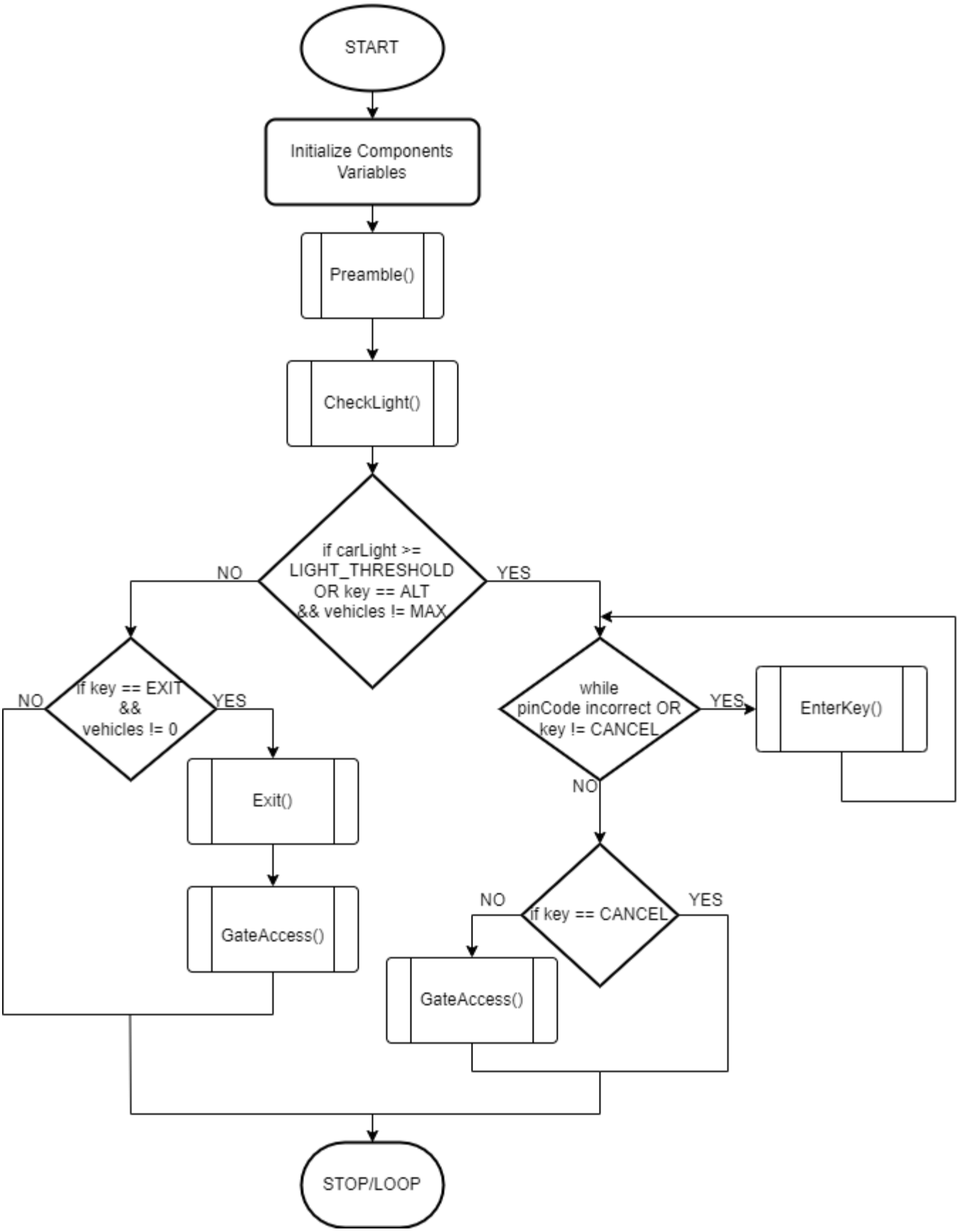
Block Diagram:



Circuit Diagram:



Flowchart (process/how the system will work):



Prototype Setup: