East West University

Project Report

Course Code and Name: CSE360 Computer Architecture
Project Name : Microprocessor-based automatic door opener

Semester and Year: Spring-2023	**GROUP NO:** (Null)
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Objective : The device we are going to talk about is an “Automatic Door opener” also can be called a “Microprocessor based door opener”. We will need some components in order to build it. We will need a microprocessor, a servo motor, and a sensor to detect presence. Upon detecting presence within a range the door will automatically open and will close after a certain period of time. We are going to use a PIR sensor to detect motion, a servo motor to open and close the door and an ATmega328P microcontroller to work as a bridge between the devices to process the received data.

Theory : Since we are talking about a “Microprocessor based door opener”, we ought to know about its uses or the purpose of making it.
An automatic door opener can do the work of a door boy. Can increase the aesthetics of the restaurant or the shopping complex.

Since we are using a sensor, by tweaking the sensor more we can also keep track of “How many people entered the complex today” and other stuff.

Should make you curious about how it functions. When a person reaches within the range of the PIR(Passive Infra-Red) sensor, the sensor considers it to be the input and sends it to the arduino’s microcontroller which is ATmega328P. Then the microcontroller processes the data and provides the necessary output data.

The arduino has 13 digital i/o ports. We are going to use pin 12 to capture the PIR sensor's output, pin 8 will be connected to an LED and pin 10 with a servo motor.
The arduino has two Vcc, one is of 5 volts and the other is of 5.5 volts. We will use the 5 volts port and of course the Ground must be connected as well.

The PIR sensor has 3 pins, vcc, out and gnd. The data out pin sends data to the microcontroller upon sensing presence. Of course we cannot forget about ground and vcc and connect them accordingly. In the software version, there is another pin named test pin to test the circuit's functionality.

Lastly the servo motor, it has 3 pins one for vcc, one for ground and another for data input from arduino. Arduino will send data to the servo motor, upon receiving the data the motor will open the door.

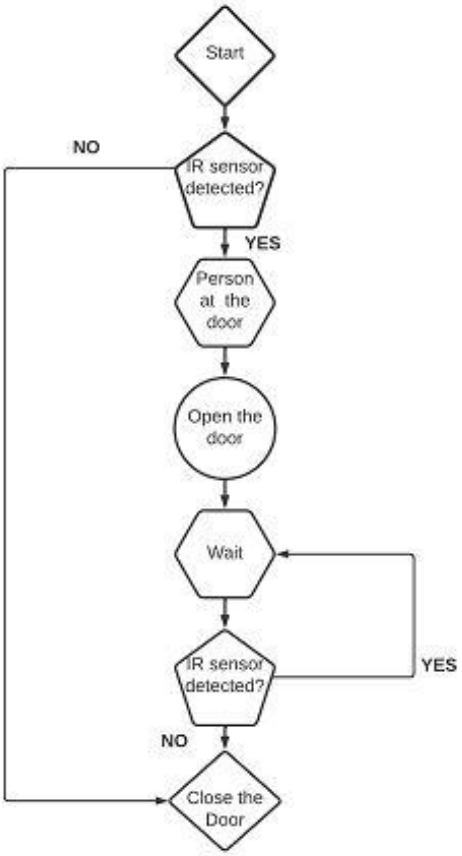
Design : The hardwares we used in the software version in order to build the device:

Hardware:

1. ATmega28
2. PIR Sensor
3. Led
4. Servo Motor
5. Logic State

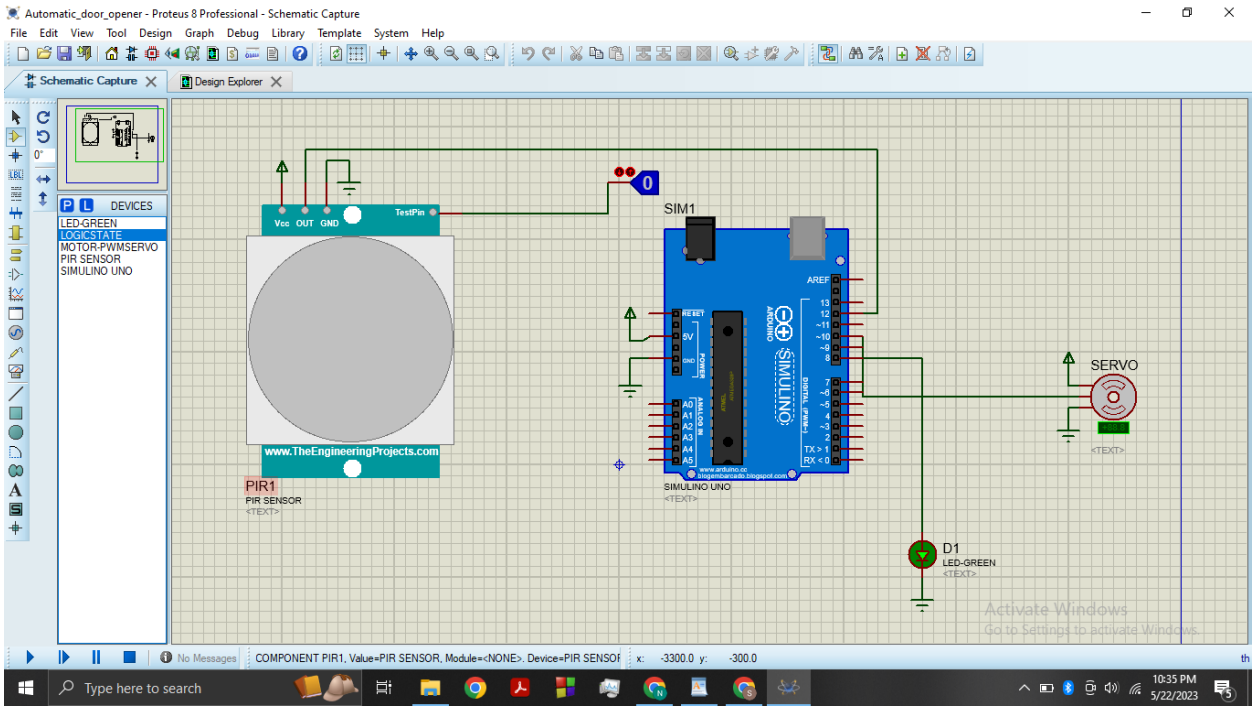
The sensor detects presence, logic state is high upon detecting and then sends it to the microcontroller and then the microcontroller processes the data and sends the data to the motor. After receiving the data, the motor opens the door. Up ahead we will see the graphical representation of the parts and their usage in a software.

Software: The device has a flow of working, more specifically a sequence of orders. We are going to use flowchart to represent the flow,



Implementation:

Hardware Implementation:



The 2nd pin of the PIR sensor is the data out pin. It sends a signal to the microcontroller upon detecting presence which is connected to port 12 of the microcontroller ATmega28P.

Software Implementation:

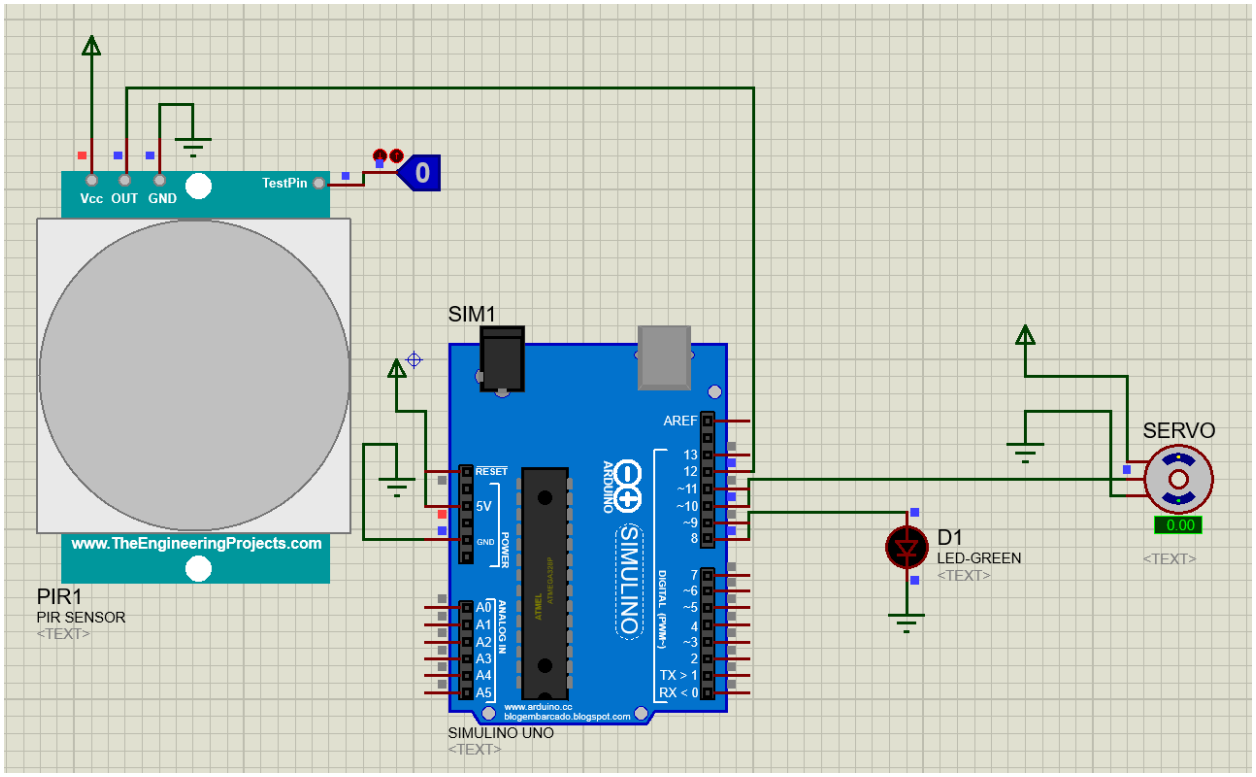
We can see 2 snaps of arduino coding.
The header file we used here is **servo.h** because we are using arduino.

First we set up the microcontroller, where to take input/output from and send.
Pin 12 reads the input, pin 8 sends out the output and pin 10 is connected to the servo motor.

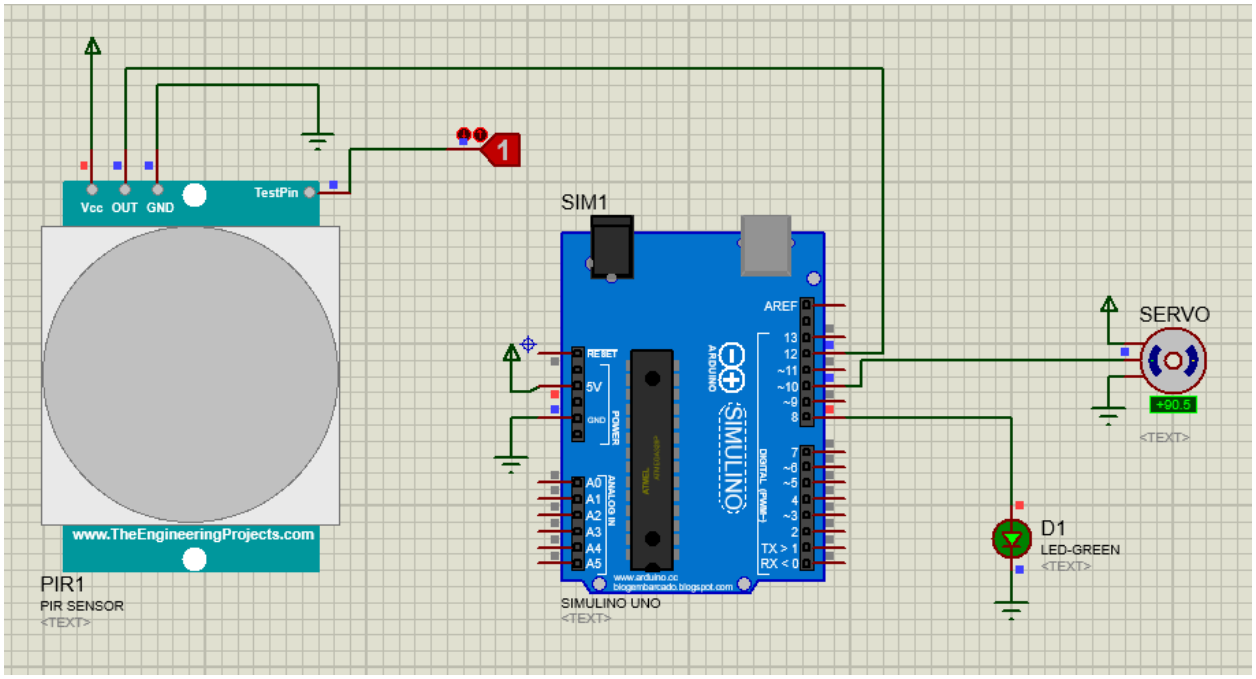
When the sensor detects presence, the logic state becomes high and the door opens. Otherwise the logic state remains low.
When the logic state becomes high, the led lights up and the servo motor rotates till 90 degrees. We have used an int variable ‘Pos’ to control the rotation of the motor.
After reaching 90 degrees, the door stays open for 3 seconds as we have added some delay before the loop resets which is basically the door closing.

Debugging-Test-run:

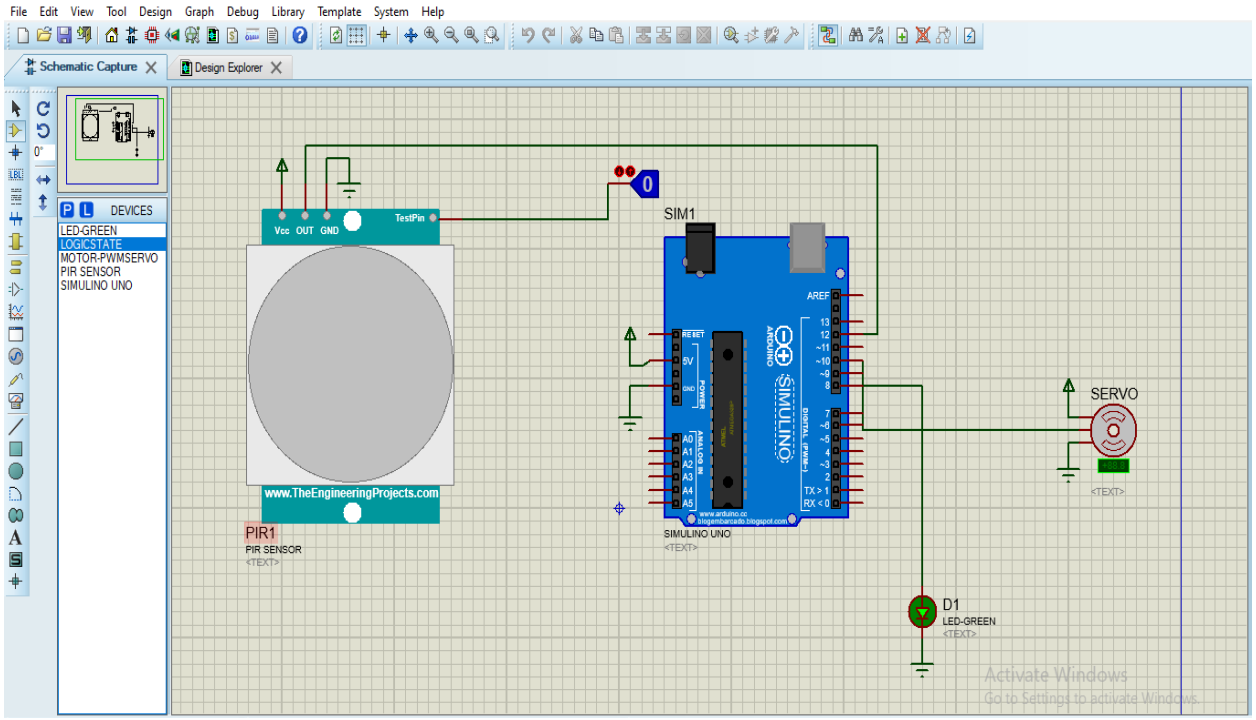
We can see here the LED is black which means it is not receiving any power also the logic state is zero meaning no presence has been detected. The motor is at zero degree state.



Here we can see the logic state is high/1. Logic state becomes high when the sensor detects presence. LED lights up and the motor's voltage will also become high via the microcontroller and it will start its rotation.



Here the motor is rotating back to its initial state when the logic state becomes low/0. The led stays green until the motor stops at 0 degree.



Conclusion : Automatic door opener can be a very useful device. As we said before, it can be used in restaurants and shopping complexes. It can also be used in places where air conditioning is used.

Our project is not perfect, it has its own limitations such as the door will open for beings aside from humans since it is an IR based sensor.

We can add a lock system, other new features for ensuring security purposes and we can use more powerful sensors to detect even more efficiently.

The automatic gate provides convenient access. Overall, it is a good system to make our daily life a bit easier. But we can update the system in the future. Along with this system, we can use Face-detection through Camera for Automated Attendance System. We can also upgrade the system using higher bit microprocessors for speed optimization.