Automatic door opening system

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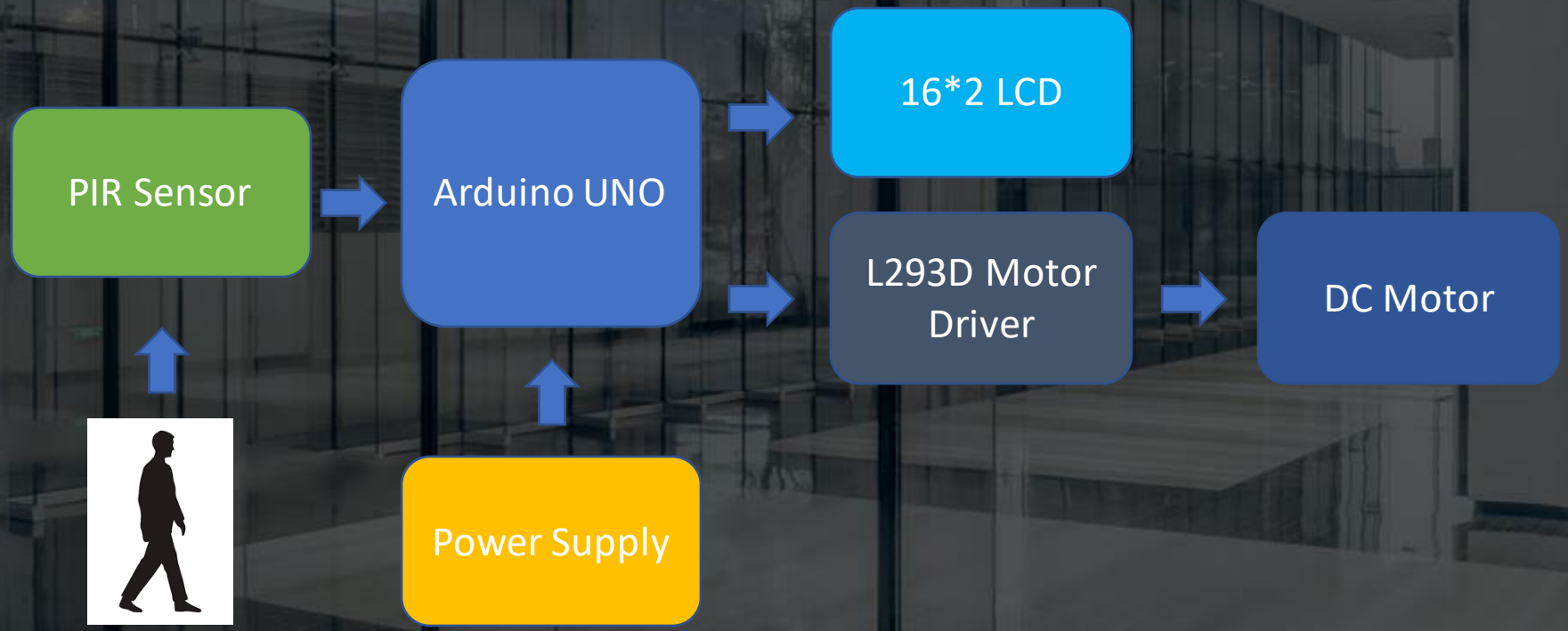
INTRODUCTION

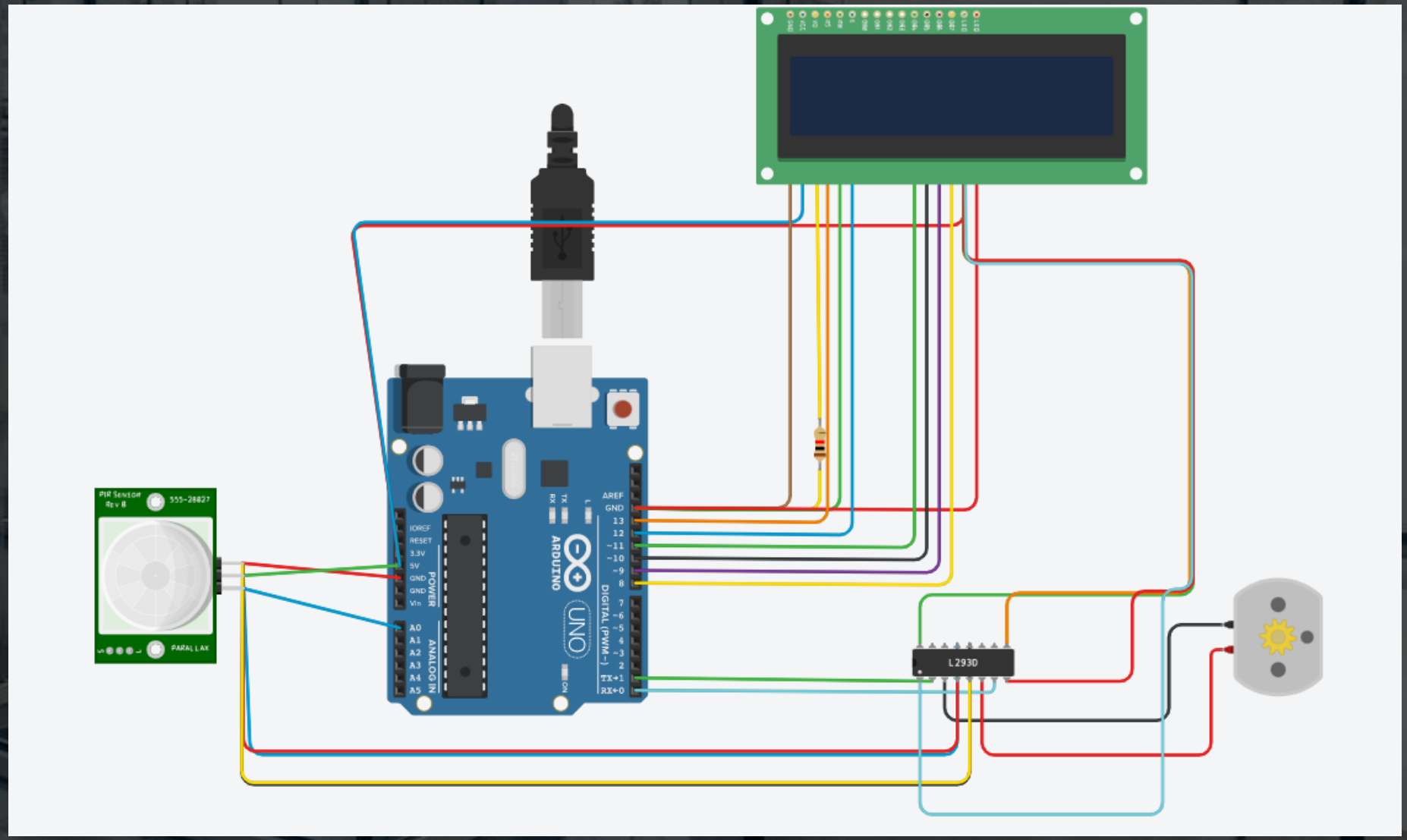
- In this modern-day, everything around us becoming automated which makes our life more easy and more advanced. One of the most common systems is the automatic sliding door opening and closing system.
- They are used at highly visited places where a person is always required to open and close the door for visitors. To reduce human effort most commercial buildings use automatic sliding doors.
- The main parts of this project are Arduino, PIR Sensor, motor driver IC, and a DC motor.

- This system works like that when someone comes in front of the door (PIR Sensor), the PIR sensor detects a motion and produces high output.
- Arduino reads that output and send commands to the L293D motor driver IC to open the door by controlling the DC motor.
- When nobody is present in front of the door, the PIR sensor doesn’t detect any motion and produces low output.
- Again, the Arduino reads that output and sends commands to the L293D motor driver IC to close the door by controlling the DC motor.

BLOCK DIAGRAM



CIRCUIT DIAGRAM



WORKING

- In this automatic sliding door opening and closing system, the PIR sensor is placed at the top of the entrance.
- When a person comes in the range of PIR Sensor, then the PIR sensor detects the motion of that person and its Signal Pin will become High (+5).
- Then the Analog in pin A0 of Arduino read this HIGH output and it understands that there is a person approaching the door.
- Then the digital pin 1 and pin 0 of Arduino become High (+5) and Low (0) respectively that immediately activates the L293D Motor Driver module to start rotating the DC motor at one direction and the door opens.
- After some time, if movement is not detected, the digital pin 1 and pin 0 of Arduino become Low (0) and High (+5) respectively, which will once again activate the L293D Motor Driver module to start rotating the DC motor in another direction. Now the door will close automatically.

ALGORITHM

- Start.
- Initialize LCD.
- Print “Automatic door opener” on the LCD.
- Clear LCD.
- Print “CIRCUIT READY”.
- If movement is seen in the PIR sensor, open the door in the first iteration and print “Movement Seen Door Opened”.
- For further iterations of PIR signal being high, keep the door opened.
- If the PIR signal is low, for the first iteration close the door and print “Gate Closing” and “Gate Closed.”
- For further iterations, keep the door closed and print “No Movement Gate Closed.”

ADVANTAGES

- Automatic doors don’t necessitate any human effort or force to perform their operation. It helps do away from the struggle and aggravations when it comes to opening a relatively heavier manual door. It is useful in places where the door needs to be opened frequently.
- Automatic doors effectively contribute to energy saving and reduce annual heating and cooling costs by preventing air-conditioning from escaping and outside air and dust from entering.
- Automatic door with air-tight function can also prevent the entry of dust and dirt by increasing the air pressure of the room, which is suitable for operating rooms and other controlled environments.

DISADVANTAGES

- The installation process of automatic doors mandates the need of a professional technician in order for it to be accurate and efficient. They also require regular maintenance and check-ups to guarantee proper functioning which also can be expensive.
- Sometimes owing to power failures, electrical gates cease to work causing inconvenience which might require you to physically set the gate to open and close or call in a technician to look at it.
- Automatic doors are definitely pricier as compared to their manual counterparts. Due to the presence of many automatic features, automatic doors can be expensive to procure and mandates a high budget.
- Automatic doors are more difficult to clean as you need to polish and oil internal parts like springs and bolts to avoid it from rusting.

CONCLUSION AND FUTURE WORK

- Automatic door opening systems are extensively used in shopping malls and hotels and in places where doors are needed to be opened repeatedly. These systems reduce human effort and increase the hygiene of a place.
- This system can also be implemented in a number of other ways. For example, instead of a PIR sensor, we can use a numpad to make a password protected door lock system.
- Different kinds of sensors can be used for different purposes. For places with greater security like locks and houses, password protected doors and doors with biometric scan security are used and for places which require easy access like malls and hotels, PIR sensors are used.
- In the future, these systems can be implemented with a technology to store information regarding the entry and exit of customers. The uses of automatic door opening systems are extensive and their application is only going to increase in the future.


Thank You