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# Non-Contact Gesture Controlled Elevator

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A B S T R A C T

In this current scenario of covid, we try to avoid undesirable contact among people as much as possible. An elevator is one such place where we are avoiding such contact using this project. Using an APDS9960 sensor, we are able to detect accurate gestures and program these gestures to perform the basic operations required to operate an elevator. Thus, enabling a complete non-contact operation within the elevator.

Keywords:Gesture Controlled, Elevator, Non-contact

## 1. Introduction

By the end of 2019, the world was being introduced to a new species, the Coronavirus. With how the virus spread, we were about to experience a new way of living all together. The spread of COVID – 19 meant that everyone could have been a victim and socialization was our enemy. By closing down all common spots of meet and great like restaurants, school, mall and more, we had entered lockdown. Being bound within the home was the safest place to be, and only if it were really important to go outside. In urban places, apartments are very common. The issue faced in these multi-floored housing solutions is of the usage of elevators. These fairly modern transportations carry us from 1 floor to another with almost no effort. But in the time of this pandemic, they act as hotspots where one is likely to get infected. We can reduce the number of people entering the elevator carriage but what we cannot do is re-structure it's working. For an elevator to work, the user is required to make contact with the floor that he intends to go and with the open/close door buttons. The next person to enter the carriage might use the same buttons to go the common floor as the previous user or at least most certainly will use the open/close door button. This will happen endlessly as a common elevator must be used by all the residents and others entering the same building. In this paper, we propose to avoid this common contact spot between multiple people by making the control of the elevator completely contactless. We use a gesture sensing module and assign the gestures to operate the basic controls of the elevator.

## 2. Literature Survey

Using [1] we understand the use of non-contact elevators beingused for the same reasons, Covid – 19. We understand the usage of AI & Neural Networks for detecting gestures and hence receive high accuracy rate of 98%. It would also require one to brace the complexities associated with deploying and AI model as well.

Another unique solution was given in [2] where to maintain low costs, an IR sensor was used. Although the costs of making and implementing the project is low, but so is the accuracy. We find very low accuracies but they do give us a medium to improve upon the existing hardware.

One of the main features of an elevator is to be able to select the required floor. Using the research done in [4] we observe that the linear progression of floor is ideal for our use case over the circular progression method and stacked selection method. Hence, we will be incorporating the liner methodologies discussed.

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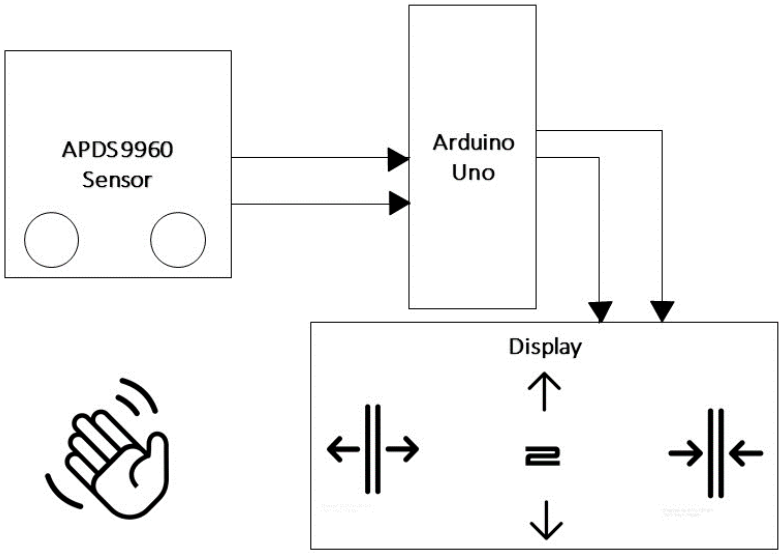
## 3. Theory and Methods

Here we shall discuss the workings of the above proposed model, the APDS9960 sensor and how using an Arduino Uno we are able to program it into operating and elevator using gesture.




***3.1 Block Diagram:***

Figure (1) : Block Diagram

The two most essential components required are the Arduino Uno and the APDS 9960 sensor module. From fig(1), we observe the block diagram which helps us picture the flow of working. When a gesture is made to the sensor, the sensor will communicate to the Arduino using the predefined codes available to us through the Arduino_APDS9960 header file. This header files contains the data required to directly communicate in terms of the type of gesture without us ever having to define the movement to its co-relating gesture. In our working of the project, we have also utilized an OLED display module to give us an output which can be presented before connecting the 'Circuit Brain' to the logic circuit of a functional elevator.

***3.2 Flow of command:***

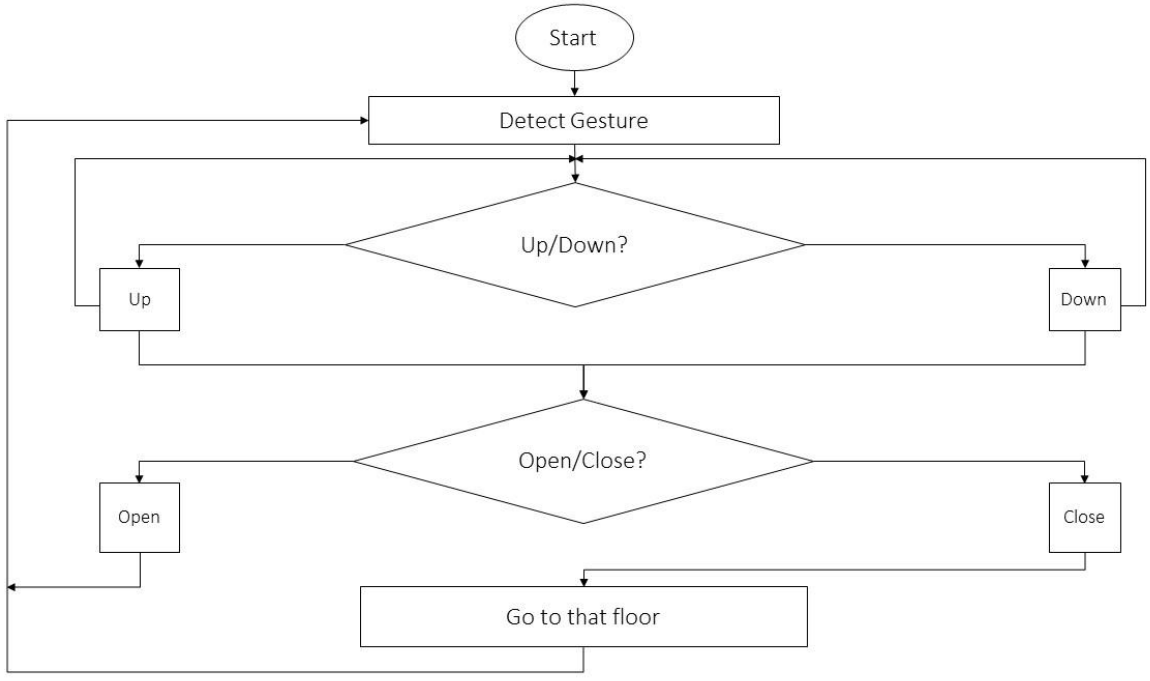
We will here discuss and understand the operational proceeding that are undertaken as the project is initialized. We initialize the code to start at level 0 (ground floor), and thereby the elevator as well. Once the user enters the carriage of the elevator, a small section of the carriage will be dedicated for the controls of the elevator found like in any other system. But to avoid the touch buttons, we will prompt the user to feed gestures into a small section within in control panel. This small section will contain our APDS9960 sensor which will interpret the users hand/finger movements. These are the recorded and are decoded within the module before sending the command as one of the four gestures programmed into the Arduino for the appropriate action to be performed. From the fig(2), we observe that there are 4 distinct commands to be presented to the elevator, and each command with a distinct gesture associated.

- The level control is done using 'Floor UP' and 'Floor DOWN' functions. The Floor UP is associated with the hand/finger movement in the upwards direction from the allotted and preplanned sensor location on the control panel. This upwards movement is detected and decoded in the sensor module and transmitted as the function 'UP' to the Arduino. In the Arduino, the program has the associated 'UP' function assigned to increment the floor level by 1. This process is repeated to go to a higher floor.

- The Floor DOWN is associated with the hand/finger movement in the downwards direction from the allotted and preplanned sensor location on the control panel. This downward movement is detected and decoded in the sensor module and transmitted as the function 'DOWN' to the Arduino. In the Arduino, the program has the associated 'DOWN' function assigned to decrement the floor level by 1. This process is repeated to go to a lower floor.

- Another important control found in an elevator carriage is of its doors. We incorporate the Left and Right gestures and assign them for the control and operation of the doors of the elevator carriage. The 'Open Door' function is associated with the hand/finger movement in the leftwards direction from the allotted and preplanned sensor location on the control panel. This leftwards movement is detected and decoded in the sensor module and transmitted as the function 'LEFT' to the Arduino. In the Arduino, the program has the associated 'LEFT' function assigned to the opening of the door. This process is only required while the elevator waits for more passengers as this function is disabled during the movement of the carriage itself.

- The 'Close Door' function is associated with the hand/finger movement in the rightwards direction from the allotted and preplanned sensor location on the control panel. This rightwards movement is detected and decoded in the sensor module and transmitted as the function 'RIGHT' to the Arduino. In the Arduino, the program has the associated 'RIGHT' function assigned to the closing of the door. This process is essential as the 'Close Door' function also plays the role of initiating the movement of the carriage. Therefore the 'Close Door' function must be input only after the correct floor has been selected.




Figure(2): Flow Chart

## 4. Conclusions

With the safe intentions of avoiding contact as much as possible especially in dense urban areas like apartment complex, malls and other multi-storied complexes, we are aiding to diminish the spread of Covid -19. With installing these modules to pre-existing elevators but just changing the controller setting, we are able to create an elevator which requires no contact to operate. With the very low error rates and accurate recognition of the gesture, we are able to create not only a safer and healthier approach to elevator travel but also a more advanced and intuitive ride for the passenger.

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