

# DESIGN AND FABRICATION OF IMPROVISED SAFETY DOOR IN PUBLIC TRANSPORT (FOOTBOARD ACTION PREVENTED)

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**ABSTRACT:** The main objective of the improvised safety door project is to ensure the safety of passenger and to avoid the dangerous board journey of students. Safety door in public transport are merely showcase model as the meaning of that name is not implemented properly. Here the improvised safety door makes the name a real meaning full product. The doors and clutch are being synchronized to work accordingly to ensure safety. Similar ideas have already been implemented in Shinkansen trains in Japan and Boeing 747A passenger flights. This improvised safety door is more efficient when compared to the automatic foot board accident prevention mechanism which arrests the accelerator pedal. The boarding of the passengers in the transport is to be made such that passenger should not be afraid to travel in the vehicle to their favourite or desired places and also the driver should be stress less to drive the vehicle. The project presents a systematic approach to optimize the structural, heat and vibration characteristics of the clutch friction plate. Heat analysis considers the reduction of heat generated between the two friction surfaces and reducing the temperature rise during the steady state period. Mainly it is used to avoid accidents and to save many lives of the people. Door is controlled by the driver, when the door is opened by the driver, automatically the clutch plate will disengage and there is no movement of the vehicle and when the door is closed by the driver automatically the clutch will engage with engine shaft.

**KEYWORDS:** Clutch, Adriano board, IR sensor, Pneumatic cylinders, battery and door.

## 1. INTRODUCTION:

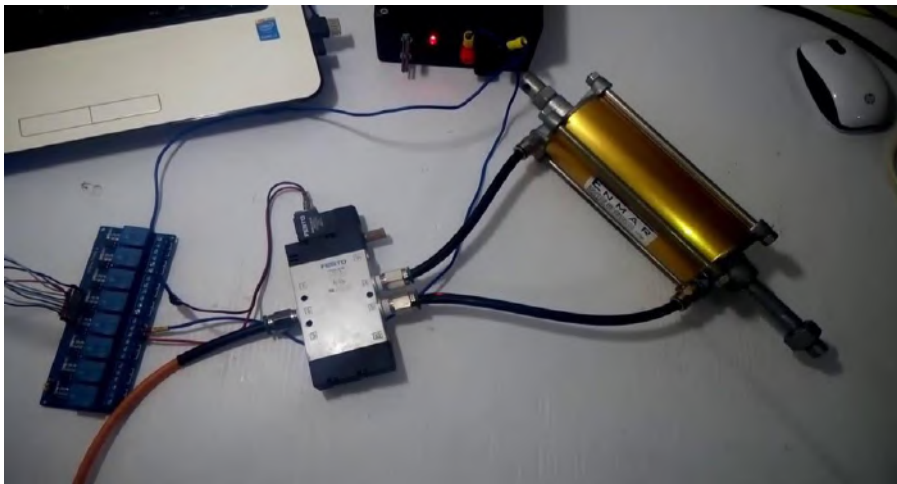
In today's world, for the connectivity and smart devices there is an urgent need to modify our existing day to day objects and make them smart. It is also the era where we cannot blindly trust the old and conventional security measures, specifically speaking about our door locks. To change and modernize any object we need to eliminate its existing drawbacks and add extra functionality. The major concepts used to design and model this access control system is advanced knowledge of micro software controllers and interfaces, as the RPI computing device is used and interfaced with different drivers along with application development to develop a desktop application. Pneumatic operated doors are primary types of doors which are used in public transports. The doors are single sliding or double sliding doors which swing to open and close with help of pneumatic cylinders operated by compressed air. The solenoid valve is placed next to driver for him to control the doors. The anti-pincher switch, pressure switch is used to avoid accidents during closing of doors and men getting struck between doors. **Anti pincher-** whenever there is an obstruction during operation of the doors, due the pressure difference created in cylinder, the mechanical signal is given to switch to retrieve back the door. As the world is progressing people are scared about the safety of their possessions, information and themselves. This model will be a major contribution to the field of passenger Safety.

## 2. MATERIALS:

| NAME OF THE MATERIAL      | TYPE OF MATERIAL | QUANTITY | COST OF MATERIAL |
|---------------------------|------------------|----------|------------------|
| 1. DOOR                   | CAST IRON        | 1        | 300/-            |
| 2. CLUTCH PLATE           | CAST IRON        | 1        | 1500/-           |
| 3. PNEUMATIC CYLINDER     | STAINLESS STEEL  | 2        | 1400/-           |
| 4. SOLENOID VALVE         | STAINLESS STEEL  | 1        | 600/-            |
| 5. PNEUMATIC MANUAL VALVE | STAINLESS STEEL  | 1        | 700/-            |
| 6. BATTERY (12V)          | LITHIUM ION      | 1        | 500/-            |

TABLE 1.1

### 3. METHOD:



**FIGURE 1.1**

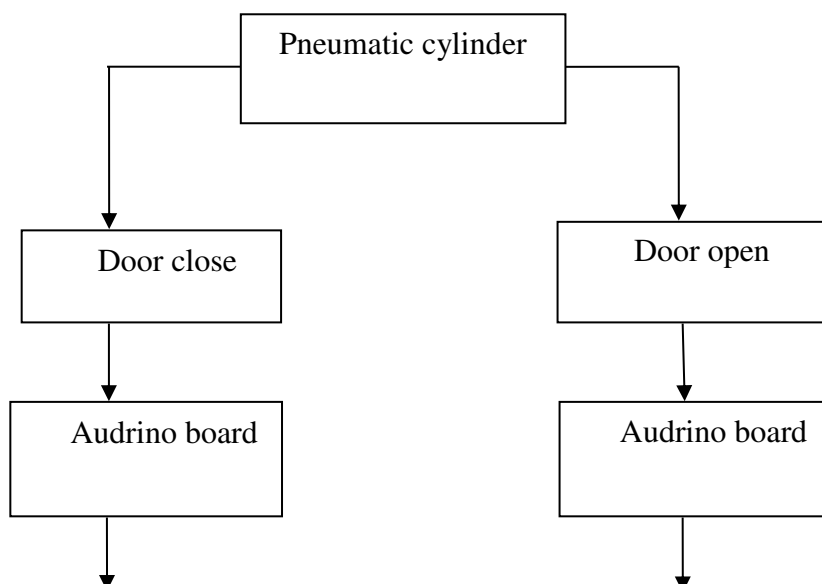
The **FIGURE 1.1** shown the arduino board connect with pneumatic cylinder.

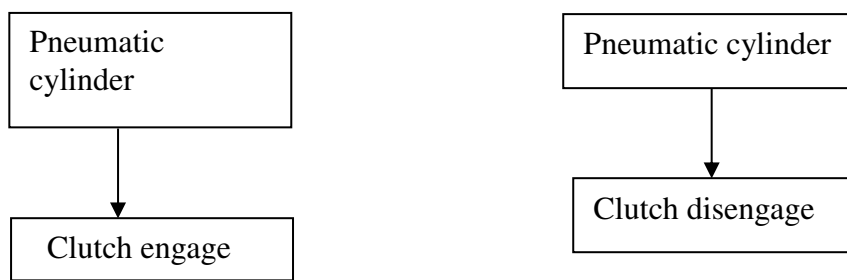


**FIGURE 1.2**

The **FIGURE 1.2** has shown the experimented door setup

- The experimental layout of the Arduino board controlling the pneumatic cylinder which engages the piston movement, while the clutch plate annex with the piston then the disengaging and engaging happens. This experimental layout is shown below,





### Block diagram of working model

- The exhaust gas of the bus and the air is compressed to use in the pneumatic cylinder to operate the door. The door is open by the driver the IR sensor will sense the door is opened the signals is transmitted to arduino board and the board is control the pneumatic cylinder to piston is connect with the clutch plate. Whenever the door is opened the sensor is sense and to board is control the pneumatic cylinder the piston will reciprocate to engage and disengage the clutch to the engine shaft.

### 4. DISCUSSION:

- Out of total fleet strength of , only 1,874 have automatic doors. And in many of those, the doors do not function properly. A rough survey on Tuesday evening and Wednesday morning showed buses on routes 21G, A51, 23C, 27H and 47D plying with doors open.

T.K. Pandian, a quality assurance expert in logistics, said two automatic doors are mandatory for deluxe buses. “If the doors are maintained properly, the number of footboard-related accidents can be reduced by half,” he said.

The maintenance of MTC buses is carried out on contract basis, an official said. “But it is not done properly and often, spare parts for broken doors are not available,” he said.

### 5. ANALYSIS:

The analysis for the identification of cylinder to be selected depends on this following condition. As for the pneumatic, it is better than hydraulic by giving the better results. Pneumatic offer a very clean system suitable for food manufacturing processes and other processes which require no risk of contamination. It is concluded that the pneumatic is better than the hydraulic.

Here, a 12V battery is used to control the solenoid valve and Arduino board. When the vehicle is in motion the power is automatically generated to recharge the battery thus producing the self sustaining power source.

### 6. FINDINGS:

The new way to find out the solution for the difficulties of the travelling passengers to have a safe journey by using the pneumatic cylinder to pull and push the clutch that means disengagements and engagement from the engine shaft. The door is controlled by the driver. The sensor is used to sense whether the door is open or closed, when it is opened the signal is transmitted to arduino board, the board control the pneumatic cylinder to pull the clutch this makes the vehicle to stop at instant. When the door is closed by the driver, the piston pushes the clutch to engine shaft and the vehicles starts to move. Due to this process the passengers will not able to travel on steps or footboard of the vehicle thus avoiding the rush travelling.

### 7. RESULT:

The result shows that the clutch engagement and disengagement with the engine shaft by the aid of pneumatic operation is working smoothly but when it comes to pressure control, only the limited required pressure is used to operate the pneumatic, If high pressure is used for pneumatic then the piston will reciprocate very fastly and this makes clutch plate to be damaged during engagement process. So if the pressure is controlled this model will be working successfully.

### 8. RECOMMENDATIONS:

The project proposed here is fabricated on the idea of preventing the foot boarding activities and thereby reducing the fatality rate, accident, mishaps etc. The project thus gives the government a viable way to prevent foot boarding activities of the rogues. This also makes way to reduce the carelessness of the drivers of the vehicle. Thus the proposed project is believed to be an efficient safety system in the automotive fields.

## **9. CONCLUSION:**

This project main aim is to provide safer journey in public transportation and to avoid footboard journey of the students in the peak hours. It achieved by using simple devices.

## **REFERENCES:**

### **Journal / Conference Papers:**

1.Edward Steinfeld and G. Scott Danford, “Automated Doors: Towards Universal”, The Center for Inclusive Design and Environmental Access, School of Architecture and Planning SUNY/Buffalo, USA, October 25,1993.

### **Reference / Hand Books:**

- Joji P., “Pneumatic Controls”, Wiley India Pvt Ltd, 1stEdition, ISBN: 8126565422
- Peter Croser & Frank Ebel, “Pneumatics- Basic Level”, FESTO Handbook, 2002 Edition, MIT Library-078190