International Journal of Modern Trends in Engineering And Research
www.ijmter.com
e-ISSN No.:2349-9745, Date: 2-4 July, 2015

Problem Identification for Auto Door Lock for Lavatory in Passenger Train

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Abstract-This review paper emphasizes on automatic door locking of railway lavatories. Plenty of dirt and pollution occur due to use of lavatories at stations. So, here I have mentioned some problems and solutions to this in this paper. Door locking systems is in use with various techniques. I have proposed to use pneumatic system, which is already present in trains, for lavatory door locking. From pneumatic brakes, the pneumatic signal can be taken to door system and based on RFID system; doors can be locked or opened.

Keywords-Pneumatic door lock, railway lavatory door lock, pneumatic system of brakes used for lavatory door lock.

I. INTRODUCTION

Over the last few years, we are facing big issues related to public hygiene and health matters. Cleanliness for personal as well as social is a required measure in today's world. Different NGO's are taking step towards the awareness of personal/social cleanliness. Although some people are habitual to cleanliness, still it remains as a problem in various areas (work area or living area).The idea regarding this project came up in my mind from the same tendency, a step to add solution for this cleanliness issue. Same as our Hon. Prime Minister Mr. Narendraji Modi's mission works on "*Clean India*" (commonly known as "Swacha Bharat"), my project is an effort to bring this movement alive in most crowded zone, ever rushed zone *Indian Railways* (Railways).
This will bring a solution for problem of using toilet at stations. Though the notice has been kept by the Rail Board that one should not use the lavatory while train is on station, it is found that the notice is not followed by many. So for the solution on this, automatic door lock for lavatories when train is on station can be done.

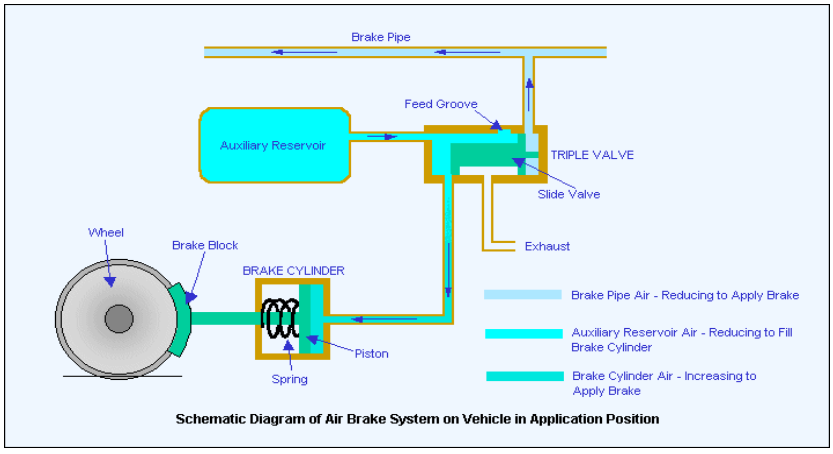

Figure 1. Pneumatic brakes for train

Automatic door locks are used in many areas nowadays but the use of such mechanism can be done in Railways too. In current working lavatories this is manual and one can enter in lavatory while the train is on station. To avoid this, the main thing to be achieved is identifying the signal about arrival of train at station and departure of train from station. In this case the signaling department of railways can help.

II. WORKING SYSTEMS

In this section, some working systems in trains are shown which leads to the ease of using lavatories. Doors in the train in current days are manual, one has to open it and close it in India. Some of train services across the world have undertaken a step to avail Automatic door locking system like British Trains, etc.

2.1 Automatic Door Locking System in some of trains

As told above, some train services do avail the automatic door services for the passenger's luxury. These doors somewhat work like elevator doors. They come up with Open, Close & Lock buttons as shown in figures herewith.

Figure 2. Automatic Door locking system in British Trains

As shown in the adjoin Figure 2, there is red LEDs are provided in those buttons to indicate that now it's the turn of that button to be pressed. To open the door for using lavatory, one should press OPEN button while for closing it CLOSE button is to be used. But LOCK button is must be used to lock the door till u use lavatory.

2.2 Automatic Door System for Person with disability Lavatory

Automatic door system is also proving useful for person with disability. They can use lavatory on their own by this service. Because the system provides Open and Close button while the Occupied and Vacant Signs too. The regarding these are shown herewith in Fig. 3. As shown in Fig. 3, Vacant light glows when nobody is inside & one can press PUSH TO OPEN button to use the lavatory. Inside the Lavatory, PUSH TO LOCK & PUSH TO UNLOCK button is provided. This button can be used when is person wants to come out from the lavatory.

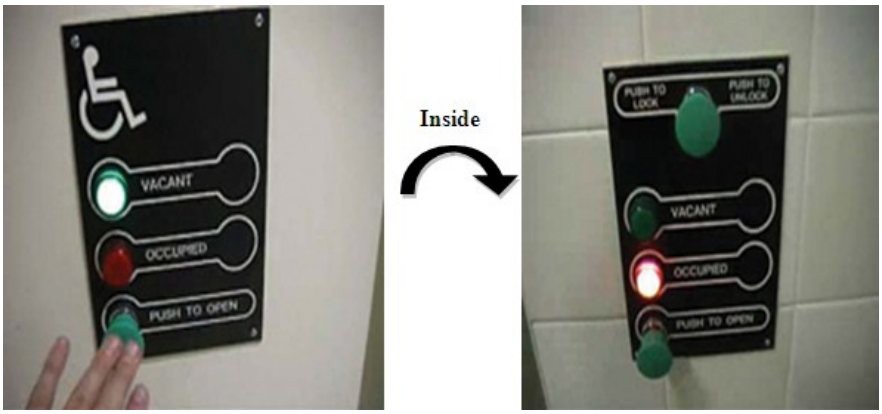

Figure 3. Automatic door lock of lavatory for person with disability

The area for lavatory is as shown below in Fig 4

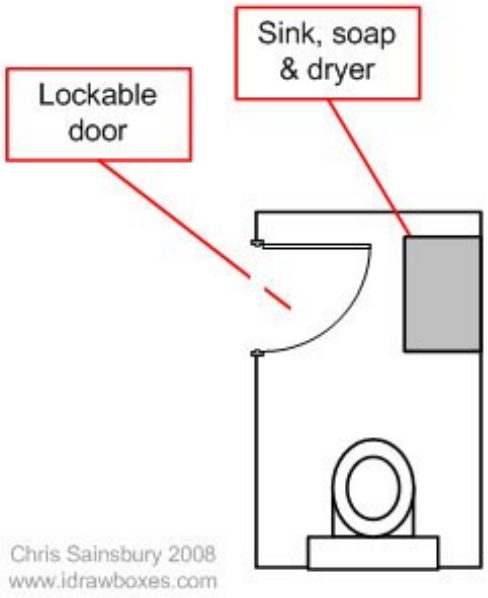

Figure 4. Lavatory locking arrangement

III. PROBLEM IDENTIFICATION

While working on this idea, from current scenario following problems are identified.

3.1 Lock button needs to be pressed

As there are three buttons given OPEN, CLOSE & LOCK, and these buttons give indication of lights which are meant to be "PRESS ME" purpose.

Figure shows the arrangement for these buttons. So sequence follows like this:

- Press OPEN button (Close LED glows)
- Press CLOSE button (Lock LED glows)
- Then one should press LOCK button to firmly lock door this and then Flashing LED stops and firmly LED will glow now.

So, accordingly many times the problem occur that, person used to press open & close button properly, but forget to press lock button as he/she suppose the LOCK led is flashing because the door is locked. Due to which many times the embarrassing situations occurred. It is also shared by some passengers in certain blogs.

Figure 5. Automatic Lavatory door

3.2 Use of lavatory while train is on station

Nowadays many people still use lavatory while train is on station, though the notice is given on the door of lavatory. This causes the serious health problem for passengers as well as the shopkeepers at the train station. This will also make station as well as tracks there dirty which leads to many problems. So to avoid this I came up with this idea that to shut doors of lavatory automatically while train is on station and open the door when train leaves the station.

Figure 6. Notice on train lavatory

3.3 Human waste management while train passing by River Bridge

When train is passing by the river bridge and if the lavatory is still in use, then the river water may get contaminated.

Figure 7. Train is on River Bridge

This happens, because the human waste gets directly deposited on the track and their by in river. So, to avoid this, flap can be provided below the outlet of lavatory. For this, a solution can be developed and the systems for the same will more effectively made by using pneumatic pressure, which is already present in train.

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