

Problem Identification for Auto Door Lock for Lavatory in Passenger Train

Sushant S. Samleti

*Department of Electronics & Instrumentation Engineering
ITM, Gwalior, MP*

Prof. Pramod Kumar Pandey

*Department of Electronics & Instrumentation Engineering
ITM, Gwalior, MP*

Abstract- This topic 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. Narendraj 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 project 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.



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

2.1 Automatic Door Locking System in some of trains

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. 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.



Fig. 2 Automatic door locking system in British trains

- Problem with these doors:

As there are three buttons given OPEN, CLOSE & LOCK, and these buttons give indication of lights which are meant to be “PRESS ME” purpose. 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’s also shared by some passengers in certain blogs.

2.2 Automatic door systems for person with disability lavatory

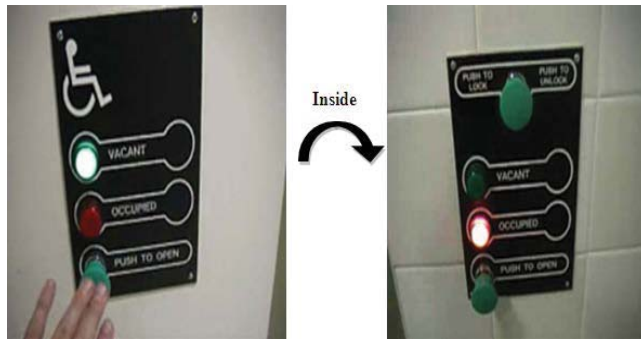


Fig. 3 Auto door lock of lavatory for person with disability

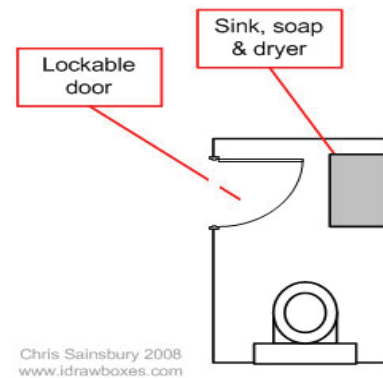


Fig. 4. Lavatory locking arrangement (Chris Sainsbury 2008, www.idrawboxes.com)

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 (in fig no. 5), 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.



Fig. 5 Automatic Lavatory door



Fig. 6 Notice on train lavatory

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.

3.2 Use of lavatory while train is on station

Nowadays many people still use lavatory while train is on station, though the notice (shown in fig.6) 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.

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.



Fig. 7 Train is on River Bridge

This happened because the human waste gets directly deposited on the track. So to avoid this flap can be provided below the outlet of lavatory which can work on pneumatic pressure principle which is already used for braking system.

3.4 If any human being or animal comes in front of train

During the rain is running on track if any animal or human being comes in front of the train, this will cause

fatal risk to the life of than animal or human being.



Fig. 8 Persons jumping in front of train

For this, a solution can be developed that will take a thermal imaging of human being or animal and then generate a high decibel sound that will indicate those animal or human being to leave the track. As shown in figures given above, the problem can be explained more elaborately.

REFERENCES

- [1] Peshkin Evrard S, Algoet Y, Conan N, De Paoli D, Efthymiopoulos I, Fumey S, Gaillard H, Grenard J-L, Grenier D, Pardons A, Paulat E, Seraphin Y, Tavlet M, Theis C, Vincke H (2011), "SPS WANF Dismantling: A Large Scale-Decommissioning Project" at CERN. Proceedings of IPAC11, San Sebastian, Spain. pp 1668 – 1670.
- [2] Kershaw K, Bertone C, Bestmann P, Feniet T, Forkel-Wirth D, Grenard J-L, Rousset N (2009) "Remotely Operated Train for Inspection and Measurement in CERN's LHC Tunnel". Proceedings of PAC09, Vancouver, BC, Canada. pp 2902 – 2904
- [3] Home R.A (1988) Teleoperator evolution at CERN. International Symposium on Teleoperation and Control, Bristol, UK. CERN SPS/88-32 (AMR). 8p
- [4] <http://www.sdcsecurity.com/communicating-bathroom-systems.htm>
- [5] <http://www.sdcsecurity.com/communicating-bathroom-systems.htm#sthash.mxCxIVF.dpuf>
- [6] <http://www.autodoors.com.au/disabled-toilet-doors.html>
- [7] <http://www.google.com/patents/US4994722>
- [8] US Patent: *Automated door locking system for aircraft lavatory* US 4994722 As
- [9] <http://www.idrawboxes.com/2008/07/user-experience-toilet-south-west-trains/>
- [10] <http://infovore.org/archives/2006/12/23/train-toilets-not-such-a-design-nightmare-any-more/>
- [11] <http://lukehaliwell.wordpress.com/2010/08/08/horrible-doors-on-british-trains/>
- [12] http://commons.wikimedia.org/wiki/File:The_Toilet_idicator_switch_cum_door_lock-AC_coach-Indian_Railways-India443.JPG
- [13] <http://i2.wp.com/www.materialworldblog.com/wp-content/uploads/2012/05/toilet204.jpg?resize=308%2C410>
- [14] https://www.kurashiki-tabi.jp/for/en/barrierfree/barrierfree_kankokyukei.jpg
- [15] <http://toilet-guru.com/train.php>
- [16] <http://cdn.intechopen.com/pdfs-wm/45831.pdf>
- [17] Remote inspection, measurement and handling for maintenance and operation at CERN
- [18] CERN (2006) Safety Code F, Radiation Protection.14p