

Platform Screen Doors

The invention relates to a method and apparatus for opening and closing platform screen doors or gates.

The conventional railway station consisting of a raised platform adjacent to the track is essentially the same design as has been used since the beginning of the railway industry in the nineteenth century and is an effective solution to the problem of maximising passenger boarding speed.

However, the basic platform arrangement suffers from several well known problems, such as passengers falling under trains either deliberately or unintentionally and also litter from passengers falling onto the track. Although incidents of people falling under trains are not common, they result in significant disruption to the network and are traumatic incidents for everyone present. The problem of litter on the track has also increased in recent years and can represent a serious health and safety risk on underground or sub-surface systems where the litter will remain in tunnels until it is cleared up.

Platform screen systems or automated platform gates are well known in the railway industry as one approach of dealing with these problems. Due to the problem of lining up doors on the platform and the train, these systems are usually only installed on lines where the rolling stock is standardised, which in practice is on metro or underground systems, although some dedicated high speed systems are also provided with screens.

In the known platform screen door systems, the operation of the doors is controlled using the signalling system. The signalling system is quite suitable for this as modern systems have great accuracy and are designed for safety critical applications.

However, the use of the signalling system for operating the doors also suffers from a number of problems. In practice, modern signalling systems are complex and prone to faults, which leads to the doors often needing to be operated manually.

Additionally, the use of the signalling system makes it very difficult to incrementally retrofit a platform screen door system to a line to be able to operate them.

The present invention therefore seeks to provide a method and apparatus for controlling the opening and closing of the doors of a platform screen door system that does not rely on the signalling system.

According to a first aspect of the invention there is provided an apparatus for controlling the operation of a platform screen door system comprising a first transceiver adapted to be mounted on a train and a second transceiver adapted to be mounted on a platform or on the platform screen door system, the first and second transceivers, in use, being adapted to communicate with one another such that when the train is stopped within a predetermined tolerance adjacent to a door of the platform screen door system, the train can request that the platform screen doors open.

According to a second aspect of the invention there is provided a method for controlling the operation of a platform screen door comprising the steps of stopping the train within a predetermined tolerance of the door, a first transceiver on the train communicating with a second transceiver on the platform or the platform screen door, wherein the train requests that the doors open and then opens the doors of the train and when loading or unloading is complete, requests that the doors be closed, the second transceiver then transmitting a signal that the doors are closed and locked, thereby enabling the train to depart, wherein, in use, when the platform screen door is closed and locked, a corresponding signal is transmitted to the train and a flag set to enable the train to depart.

The apparatus and method of the invention provide for the train to control the operation of the doors rather than the signalling system. By dispensing with the use of the signalling system in the control of the doors, the speed of the signals is also advantageously speeded up. The system also permits the control of the screen doors by the driver without requiring any additional actions by the driver.

Preferably, a transceiver is fitted at each door position where a passenger may alight from the train. This not only provides for a degree of redundancy in the system but also ensures that the driver does not open the doors on the wrong side of the train.

An exemplary embodiment of the invention will now be described in greater detail with reference to the drawing in which.

Fig.1 shows a schematic of a train at a platform

Figure 1 shows schematically a metro train 1 adjacent to a railway platform 2 having a platform screen 3 at the edge of the platform 2 facing the train 1. A first transceiver unit 4 is fixedly mounted on the side of the train 1 and a second transceiver unit 5 is fixedly mounted on the face of the platform screen 3 facing the train 2. The platform screen extends along the length of the platform and has periodic doors at locations corresponding to the doors on the trains that will stop at the platform. Although the second transceiver unit 5 could alternatively be mounted between the rails or above the train on an enclosed or underground railway, this will tend to lead to interference and other safety issues. The transceiver units will typically be in the form of an antenna loop and operate at low frequencies ($<150\text{kHz}$) to avoid interference with other operators in particular the signalling equipment. The signal strength is also such that it ensures that the train driver has to stop within a predetermined distance from the platform screen doors. The system uses 2.5 channels to facilitate two way communication between the platform side and the train, with two channels being used for communication and the half channel being used for a carrier signal.

In use, when the train 1 is correctly aligned within the stopping zone in the station, which will typically be within about 0.5m of the ideal position, the first and second transceivers line up and are able to communicate with one another. Once communication between the transceivers is established, the train-side transceiver 4 transmits a door open signal to the platform screen side transceiver 5 and then transmits a door open signal down the train, so that the train doors open slightly after but at substantially the same time as the platform doors.

Once passenger embarkation and disembarkation is completed, a door close signal is transmitted from the train-side transceiver to the platform screen side receiver 5 and then also down the train, so that the respective doors can be closed. Once the platform doors are closed and locked a corresponding signal is transmitted to the train

so that it may depart the station. This will typically be signalled to the driver by way of an in cab lamp. The lamp will be driven by the closed and locked signal.

In many existing railway systems an additional problem arises. Due to cost considerations and the impossibility of long term line closures, it is unlikely that an entire line will be fitted with the system at a single time and so it is envisaged that the system will be retrofitted incrementally. In this case, the train cannot receive the closed and locked signal in the same manner as described above as the equipment is not present and it is undesirable to provide the driver with a manual override as this will compromise safety. As the closed and locked signal flag is cancelled by the return message from the platform that the platform doors are open. If there are no platform doors on the platform, the closed and locked signal is not cancelled. By effectively latching in the closed and locked signal, in the absence of a signal from the platform transceiver, the closed and locked signal stays and the train can depart.

The use of the train and platform side transceivers in this embodiment is particularly advantageous as it permits further information such as train operating data, loading and positioning to be exchanged at the platform, where it can be passed on to the network operators own computer network. Similarly, information from other parts of the network can also be passed on to the train and train driver. The train in this case acts a token and the railway as a token ring network. This embodiment also has the effect of reducing the load on the signalling equipment, which in turn should prove to be more reliable and faster than in known systems.

In the event that each door on the platform screen door system is equipped with a transceiver, it is possible to implement selective door opening on the train. This is sometimes necessary on some older railway systems, in which the train may be longer than some of the platforms at which it must stop. In a hybrid system, it would also be possible for the transceivers to communicate with the signalling system, thereby avoiding resignalling the line and also avoiding the need to install monitoring equipment on every platform.

The system and method of the invention provide a low cost solution to the problem of operating platform screen doors that is suitable for incremental retrofitting to existing railway networks.

Claims

1. An apparatus for controlling the operation of a platform screen door system comprising a first transceiver (4) adapted to be mounted on a train (1) and a second transceiver (5) adapted to be mounted on a platform (2) or on the platform screen door system (3), the first and second transceivers (4,5), in use, being adapted to communicate with one another such that when the train (1) is stopped within a predetermined tolerance adjacent to a door of the platform screen door system (3), the train (1) can request that the platform screen doors open, wherein, in use, when the platform screen door (3) is closed and locked, a corresponding signal is transmitted to the train and a flag set to enable the train to depart.
2. Apparatus according to Claim 1, wherein the transceivers (4,5) comprise coil antennae.
3. Apparatus according to Claim 1 or Claim 2, wherein the transceivers (4,5) communicate with one another at a frequency of less than 150kHz using 2 ½ channels.
4. Apparatus according to any one of Claims 1 to 3, wherein, in use, when a door open is successfully transmitted to the platform screen door transceiver, a return message cancels the closed and locked signal flag.
5. A method for controlling the operation of a platform screen door comprising the steps of stopping the train within a predetermined tolerance of the door, a first transceiver on the train communicating with a second transceiver on the platform or the platform screen door, wherein the train requests that the doors open and then opens the doors of the train and when loading or unloading is complete, requests that the doors be closed, the second transceiver then transmitting a signal that the doors are closed and locked, thereby enabling the train to depart.