Intelligent Gatelines Summary

This project will develop and operationally demonstrate a gateline that is capable of automatically self-reconfiguring to maximise peak throughput and manage average throughput to prevent station overcrowding. The gateline will reconfigure the direction of individual walkways in a safe and controlled manner without manual supervision, freeing the staff at the gates to engage and support customers. This project will demonstrate to TOCs, supply chain and relevant stakeholders the commercial viability and operational benefits of this enhanced product offering.

Innovation Challenge

The solution should reduce lost customer hours through measurably reduced queueing times at gates. By freeing up gateline staff from having to focus on crowd sizes or gateline throughput maximisation the solution should improve customer service at stations by enabling gateline staff to be more customer facing, focusing less on the gateline. The solution also aims to reduce the number of station entrance closures by thinning the flow to overcrowded platforms before levels become potentially dangerous.

Installation

Overhead 3D sensors were installed to measure passenger flow across superimposed lines that allowed throughput and waiting times to be fed into the Intelligent Gatelines combined algorithms.

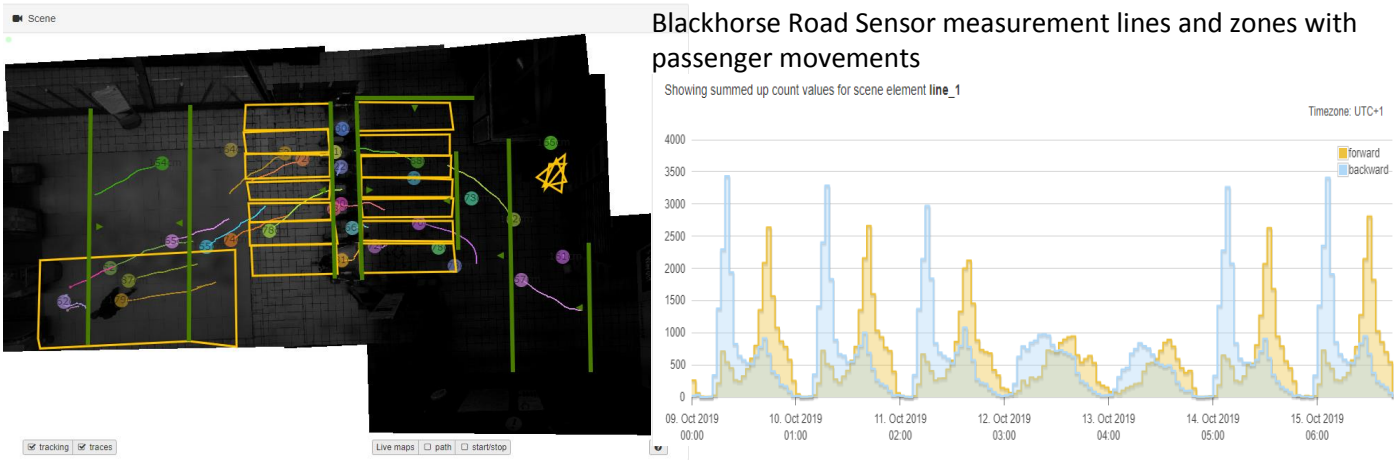

Figure1: Blackhorse Road Installation

Preliminary Results

In Blackhorse Road the throughput seems to peak in the first 4 days of the week and drop from Friday through the weekends. Although difficult to measure visually at the station, we can project –through analysing the daily throughputs over the course of the considered 2 weeks of trialling period, huge decrease in average waiting time per minute when the Intelligent Gatelines is implemented in very crowded stations. For the analysis of gate change requests, we have considered an example morning peak from October 3rd. Computations were made every minute. A total of 366 computations were logged, of which 106 required Gate changes.

Total number of Computation	366
Gates Changed	**1**
Gate Requests	**106**
Double Gate Request	**1**

Figure 2: Gate Change requests during a morning rush hour

From the above table, it can be concluded that:

> Gateline efficiency (in terms of passenger throughput) can be increased using Intelligent Gatelines by **approximately 30%** for a typical station with rush hour peaks.

We can infer from the data that a spike in passenger numbers will make Intelligent Gatelines suggest a change in gate direction (one or more walkways) which will reduce queuing and congestion.

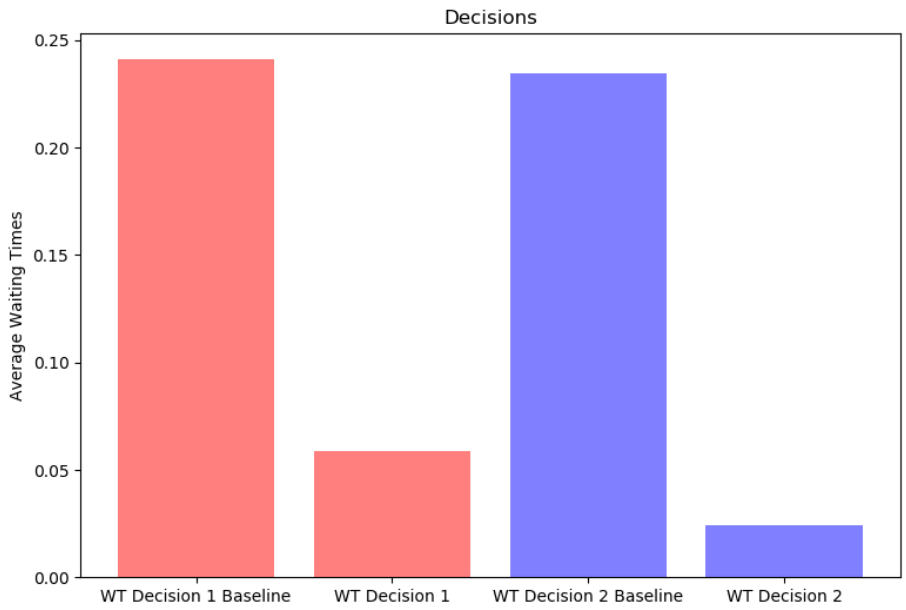

Figure 3: Showing bar charts plots of Average Waiting Times

The project has also analysed the passenger waiting times (as a proxy for queuing) from the data. The bar chart shown in Figure 3 shows:

A reduction of waiting times for decision 1 and decision 2 of 75.6 % and 89.63 % respectively at peak hours during very crowded periods.

Virtual Station Control Unit (vSCU)

Staff mobility is a key component in the Intelligent Gatelines concept, and the vSCU was developed as a conduit for IG and interface for staff to monitor and control the Gateline remotely. This allowed for a supervised mode which requires staff to accept changes requested for a gate's direction, also functionality to change open the entire gateline in case of emergencies.

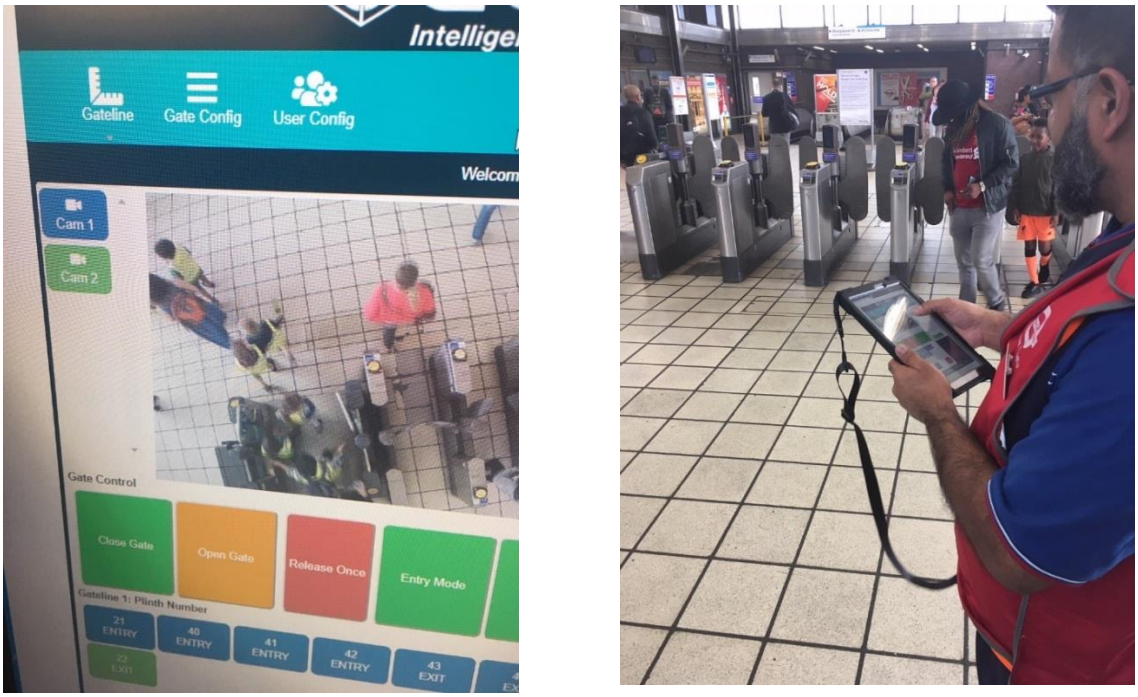

Figure 4: Virtual SCU user interface on tablet