# Bridge Strike Warning System

Ammeon Ltd
geoff.newson@ammeon.com

## Background

Every year there are multiple incidents of vehicles striking rail bridges. In most cases these do not result in fatalities but there is the potential for catastrophic accidents that could easily result in multiple fatalities, as has arisen in the past (Byrne, 2009).

Bridge strikes can arise for several reasons:

- Drivers unaware of their vehicle height
- Drivers unaware of published height restrictions that lie ahead on a planned route
- Driver may be oblivious to the risk posed by their actions to the railway above or below

To quote an information campaign from NetworkRail UK: "*Our research shows 43 per cent of lorry drivers admit to not measuring their vehicle before heading out on the road, and 52 per cent admit to not taking low bridges into account.*" (NetworkRailUK, 2018)

Network Rail estimate that there were on average 5 strikes per day in the UK in 2019, with an average cost of > £700,000 and a cost to the economy of £23,000,000

The current method for reporting bridge strikes is by phone, an information sign complete with contact details is fixed to each bridge and the reporting of the strike incident is the responsibility of the driver of the vehicle in question or a witness to the incident.

When a railway bridge strike is reported all train movements over that bridge are stopped until an engineer travels to site and carries out an inspection, following that a decision is made to re-open the bridge for train travel or not. In either case this leads to inevitable delays to passenger train services, public road closures as often vehicles get wedged underneath bridges, inconvenience to both rail and road travellers and increased maintenance/repair costs.

Bridges are vulnerable for many reasons, however the most notable reason is the direct interface that railway bridges have with the public road infrastructure. Road users and hauliers are often unaware of their vehicle height and the published height restrictions that may lay ahead on a planned route. When a bridge strike occurs the driver of the vehicle may be oblivious to the risks posed by their actions to the railway above.

With this in mind, solutions to reduce the amount and risk that bridge strikes by vehicles pose to passengers and infrastructure are of interest. It is currently envisaged that these issues and incidents could be reduced, and managed more effectively by the development of technical solutions for a range of bridge strike warning, prevention, pre-emptive and remote communication & alert systems/technologies.

**3. Problem Statement:**

Create an anti-bridge strike system that signals if the vehicle height exceeds the space

available and sends an emergency signal to the driver to stop. The device should also notify the authorities to record strikes, partial strikes, near misses and the volume of HGV traffic on that risky road.

Systems should take account of the fact that rail network and bridge locations are nationwide and in many circumstances located in remote locations therefore systems and technologies proposed should consider effective solutions for power requirements, operation, communication and equipment maintenance regime.

### 3.3 Solution

There are two part to the solution

- appropriate sensors to detect a bridge strike and communicate that to an application running on OpenShift which should log it and alert a control centre to the event - potentially also the software to receive these strike notifications
- Provide an early warning system to drivers of tall vehicles based on sensors before the bridge which communicate the height of the bridge to sensors on the vehicle via bluetooth. This warning could take the form of a noise or light in the vehicle (potentially Raspberry Pi in the vehicle controlling sensors and warning device) and/or signage on the lead up to the bridge. This signage could be dynamic and controlled by an app on OpenShift.

## References

https://www.networkrail.co.uk/communities/safety-in-the-community/railway-safety-campaigns/wise-up-size-up/

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https://www.networkrail.co.uk/wp-content/uploads/2020/11/Bridge-Strikes-Risks-Consequences-and-Costs-2020-accessible.pdf