Exploring Alternatives

Alternative Options

Here are 2 alternative and improved solutions to the proposed plan.

First, a different digital gate design could work like this. Instead of the gate lowering once a vehicle is sensed on the tracks, the gate will be open until the vehicle is cleared off the track, if a train is approaching, the gate will be closed, not allowing any more vehicles onto the track. This eliminates the risk of a vehicle being stuck on the tracks whilst a train is approaching.

Furthermore, we could implement a solution that relies on traffic pre signals. The lights will flash prior to the train arriving at the crossing. The pre-signals will ensure that vehicles do not queue onto the tracks, and vehicles already on the tracks will be allowed to exit via a timed exit until clear phase. This phase will keep an exit path open for vehicles to clear before that train crosses.

Real World Solutions

In a study, a group of engineers aimed to create a system that curbed many of the problems plaguing physical railway systems at the time, heavy weather conditions, servicing requirements, human error and limited visibility being the main culprits outlined by the article. The solution used IR sensors to detect the radiation and heat given off by passing objects to reliably detect oncoming trains. This IR sensor would send signals back to a programmed arduino which would analyse the data and control the gate appropriately. By using heat and radiation sensors, the designers managed to implement a system that wasn't triggered by foreign objects unnecessarily whilst also being reliable in situations where other methods weren't. (Golder et al., 2023)

Golder, A., Gupta, D., Roy, S., Ahasan, A. and Haque, M.A. (2023). Automated Railway Crossing System: A Secure and Resilient Approach. *2022 IEEE 13th Annual Ubiquitous Computing, Electronics & Mobile Communication Conference (UEMCON)*, pp.0247–0253. doi:https://doi.org/10.1109/uemcon59035.2023.10315973.