TU Delft

IN4387 Project

Railway Crossing System Validation

Project Plan

TODO:Template Report

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Introduction TODO

2 | Requirements

2.1 System Components

- 2 train tracks
- 2 crossing roads
- 2 Barriers
- 2 Pairs of flashing Lights
- 2 Bells
- 6 Train Sensors

2.2 System Configuration

TODO: insert schematic image

2.3 Sequence

2.3.1 Barriers closing

1. Lights start blinking
2. wait a few blinks, so noone is scared by an instant bell.
3. Bells start ringing
4. Wait for all the cars to drive off of the intersection and give them time to brake/react.
5. Barriers close

2.3.2 Barriers opening

1. Barriers open

2. Bells stops ringing
3. Lights stop blinking

2.4 System Requirements

The most obious requirement is of course that the system has to prevent cars from driving on the crossing when there is a train comming.

This means that the barriers have to be closed before a train enters the crossing and that they have to stay closed untill the crossing is clear of trains.

Besides this trivial requirement, there are a couple less trivial ones.

1. A train can arrive on both tracks from both directions.
    1. When a train left the crossing and the barriers are opening again, a new train can retrigger the closing sequence again, which has priority over the opening sequence.
    2. Theoratically, it would be possible for two trains to arrive from the same direction where one of the trains is significantly shorter than the other one.
2. The beams, lights and bells on both sides of the track operate synchronously.

2.4.1 Challenging Cases

1. Theoratically, it would be possible for two trains to arrive from the same direction where one of the trains is significantly shorter than the other one.

2.5 Possible extensions

1. Detect if Barriers are really closed (test feedback within the system)
2. Car detector to detect if all cars left the crossing
3. Add Signal Lights for trains to notify them the crossing is not clear
4. Adding an train sensor closer to the crossing so the system sooner knows that the tracks are clear.
5.

1.

3 | Conclusion

conclusion TODO