

Step1. Exploring the Problem

Restate the problem:

This task involves designing a safety system to ensure that gates are lowered when a train is approaching or a vehicle remains on the track and only raised once it is entirely safe. As an engineering team, my task is to create simple, intuitive logic, which is Boolean logic and digital logic gates.

Identifying and describing all inputs and outputs of the systems:

Inputs:

- Train approaching (yes/no)
- Vehicle on the track (yes/no)
- Safety system control (on/off)

Outputs:

- Gate Raised/Gate Lowered (yes/no)

Context, Constraints, and Stakeholders

- Context:
 - The railway crossing is in a busy area that has a lot of traffic. The system must ensure that the gates are functioning when a train is approaching or a vehicle is on the track. The gates can only be raised when it is entirely safe.
- Constraints :
 - Technical: The system must detect the presence of trains and vehicles accurately.
 - Economics: The system needs to be cost-effective enough to be implemented at multiple crossings.
 - Social: The system needs to be easy to understand and interact with all the users. There is no need for complex system management.
 - Environmental: System must be operated in all temperature extremes.
 - Legal: The system must fulfil railway safety standards to be authorised for operation.
- Stakeholders :
 - Local government
 - Railway operators
 - Pedestrian and vehicle drivers
 - Maintenance teams