## **TEST CASES**

These test cases are based on two **live binary inputs**:

* T = Train Detected (1 = yes, 0 = no)
* V = Vehicle Detected (1 = yes, 0 = no)

System Logic :

* If **T OR V = 1** → **Lower gates**, **Turn ON** lights & sound
* If **T = 0 AND V = 0** → **Raise gates**, **Turn OFF** lights & sound

## **TABLE**

| **Test Case** | **Train Detected (T)** | **Vehicle Detected (V)** | **Expected Output** | **Actual Output** | **Pass/Fail** |
| --- | --- | --- | --- | --- | --- |
| **TC1** | 0 | 0 | Raise gates, lights and sound OFF | Raise gates, lights and sound OFF | Pass |
| **TC2** | 1 | 0 | Lower gates, lights and sound ON | Lower gates, lights and sound ON | Pass |
| **TC3** | 0 | 1 | Lower gates, lights and sound ON | Lower gates, lights and sound ON | Pass |
| **TC4** | 1 | 1 | Lower gates, lights and sound ON | Lower gates, lights and sound ON | Pass |
| **TC5** | 1 → 0 | 1 → 0 | Remains closed until both 0 | System reopens gates correctly | Pass |

## **REFINEMENTS**

Even though the logic in use gives a perfect response to live signals and reduces risks to a minimum, numerous improvements can be made to increase safety and reliability.

1. **Sensor Fault Tolerance**

In the event of a sensor failure or discrepancy in readings, the system must automatically switch to a safe default state — such as keeping the gates closed — and remain in that state until functionality is fully verified according to standard operating procedures.

1. **Manual Override(but with safeguards)**Provide manual control to maintenance personnel that are included with lock out measures to avoid misuse.
2. **Signal Logging**Keep logs of the input and the output timestamped to analyse and diagnose.
3. **Redundant Input Confirming**Has two separate sensors per direction of a track input to provide fail-safety.
4. **Diagnostic Mode**Add a test mode; to test gates, lights, and sound separate, during maintenance.

Such optimizations will make the mechanism flexible, auditable and resistant to real-world deployment.