# **Evaluation and Engineering Decision**

## **Evaluation Table**

| **Criteria** | **Solution A (Sensor-Driven)** | **Solution B (Timer-Based)** |
| --- | --- | --- |
| **Safety** | Very high – reacts only when conditions are truly safe | Moderate – assumes vehicle clearance; risk of premature open |
| **Complexity** | Moderate – requires real-time sensor integration | Low – simpler control logic using timer |
| **Cost** | Slightly higher – due to multiple sensors | Lower – minimal sensors needed |
| **Reliability** | High – continuously adapts to input | Lower – fixed timing can fail in edge cases |
| **Flexibility** | High – adapts to any real-time scenario | Low – cannot respond to unexpected conditions |

## **Engineering Decision**

Examining the two options, a sensor-driven logic system will be the better engineering solution, namely, Solution A. Its ability to respond to real-time input conditions and adapt intelligently makes it significantly safer than Solution B, whose logic is rigid and based on assumptions. Even though Solution B seems easier and somewhat cheaper to implement, it would induce unacceptable risks of reopening the gates without the confirmation that the track is clear. In comparison, Solution A adapts to any change on-the-go and can retain control until the elimination of both danger conditions. Such accuracy and dependability are needed in regards to a public safety application such as a railroad crossing. Therefore, Solution A is selected as the final design.