

# Problem Statement

The main aim of this project is to create a communication link so that in case of emergency things could be done easily and efficiently. So, the project starts with automation of rail gates, replacing the need for manual operator. The rail gate operating sensor communicate about any fault to the rail signals and to alert train driver before -hand. Next, is driver health monitoring device. If in case driver feels unwell midway then the sensor would alert the nearby station. The last one is track continuity finder. If in case any break in track is found then the rail signals turn red and alerts the station.

# Components Used

## Hardware Components:

- WiFi module
- LDR
- Digital Gates
- AC-DC converter

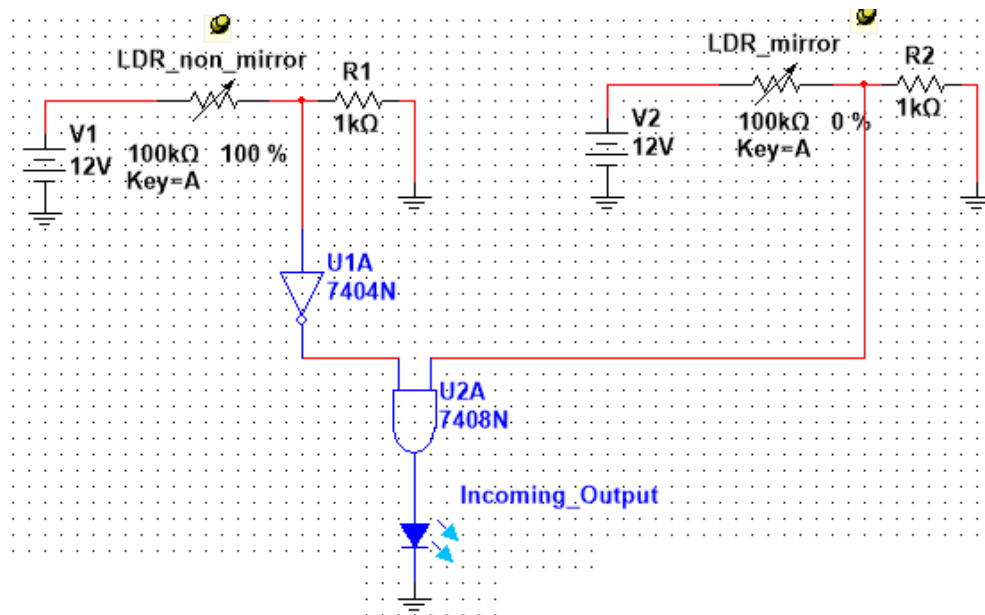
## Software Components:

- MySQL
- Python

# Automatic Rail Gate

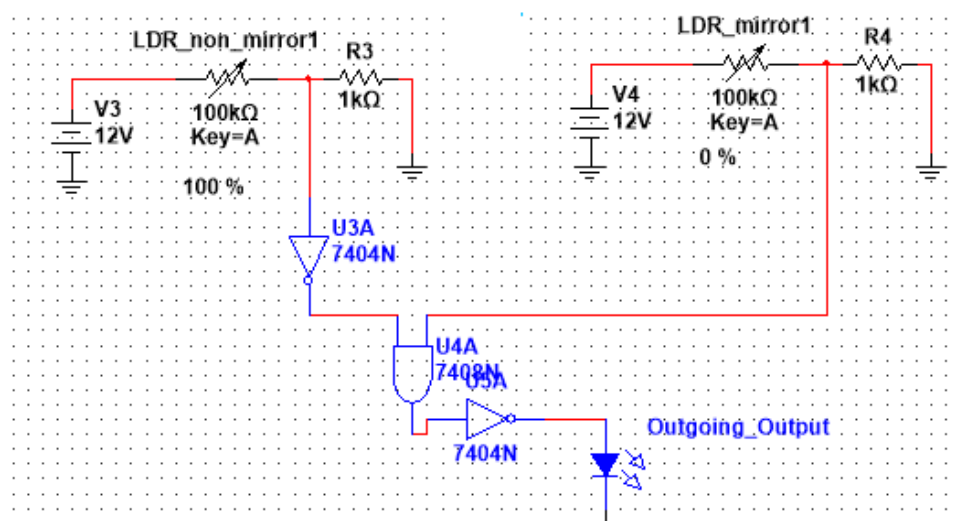
The main component equipped here is LDR. So, the main idea is that train bottom part will be having a light source attached at particular angle. So, when a train comes, the bottom light strikes the inclined mirror and then goes to LDR. After that there is darkness as train is passing through so then the next LDR senses the darkness and this is how we ensure that a train is crossing. Now based on readings by LDR's the digital logic senses and gives output. For incoming train, the digital logic gives high output if train passes. For outgoing train, the digital logic gives logic 0 in case train passes.

Incoming Device:



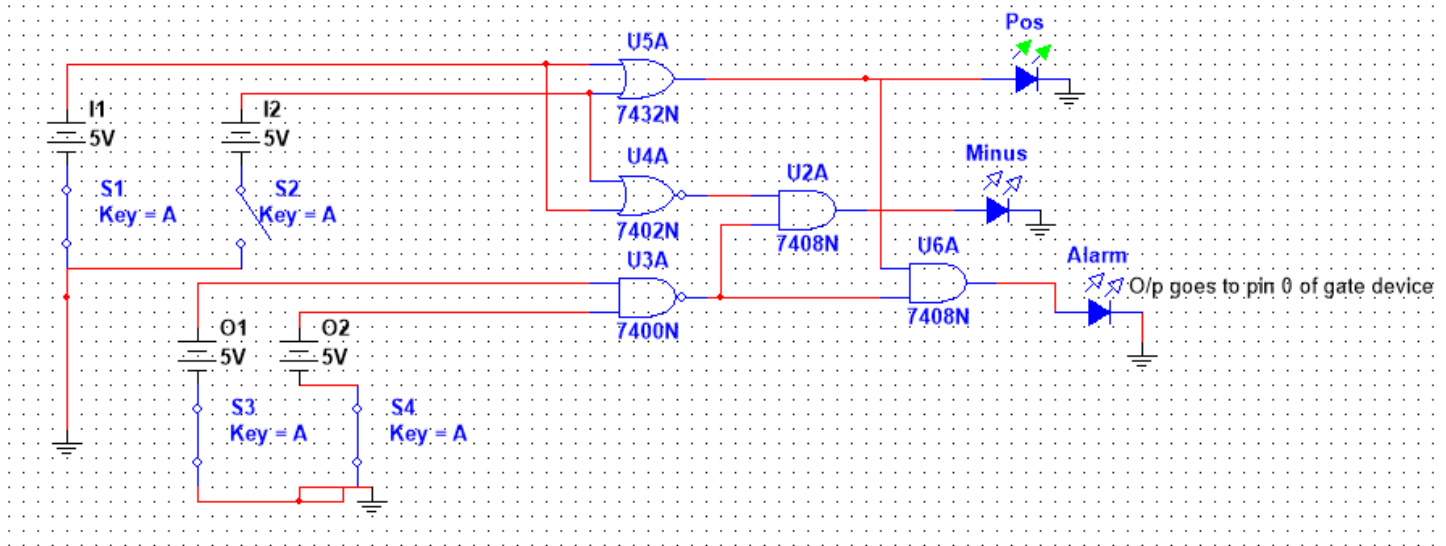
The non-mirror LDR will see darkness hence resistance is high. For mirror LDR it sees brightness hence the resistance is less.

Outgoing Device:



# Automatic Rail Gate

The motor in the gate is operated as per the signals received by the incoming and outgoing devices. Based on this it senses whether train has crossed or yet to cross. Here, the case of two lines is considered. The train moves opposite in both the lines. As per that the incoming and outgoing devices are fixed. Based on the signal value received the digital logic sends the signal. “Pos” means the gate is closing, “Minus” means gate is opening, “Alarm” means a fault.

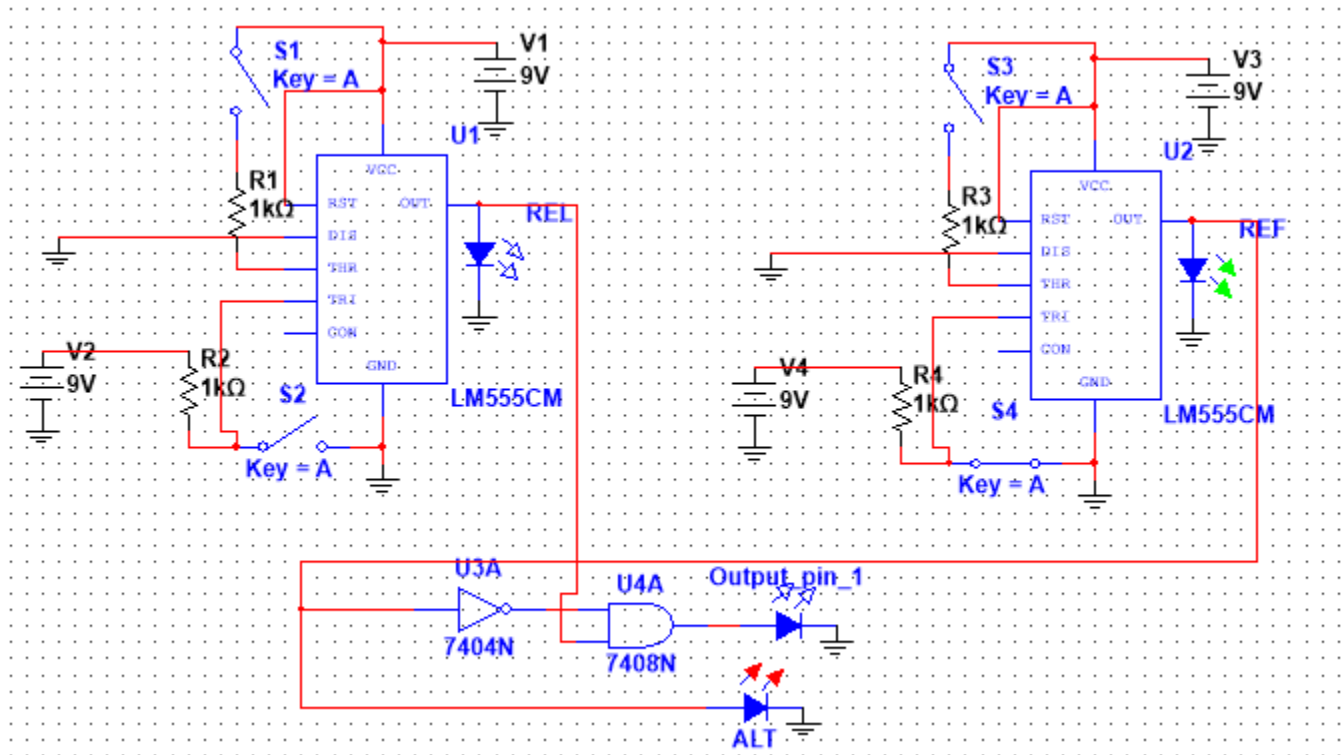


While the lines are high motor moves, if no line is high motor stops. By default, in case of any fault the motor closes the gate, the “Alarm” signal goes to Wi-Fi module at rail gate.

The Gate\_Warner software code checks pin 0(“Alarm”) signal waits for five minutes, if found high again raises the pin 1 of rail signals after and before the rail gate. The rail signals turn red.

# Driver Health Monitor

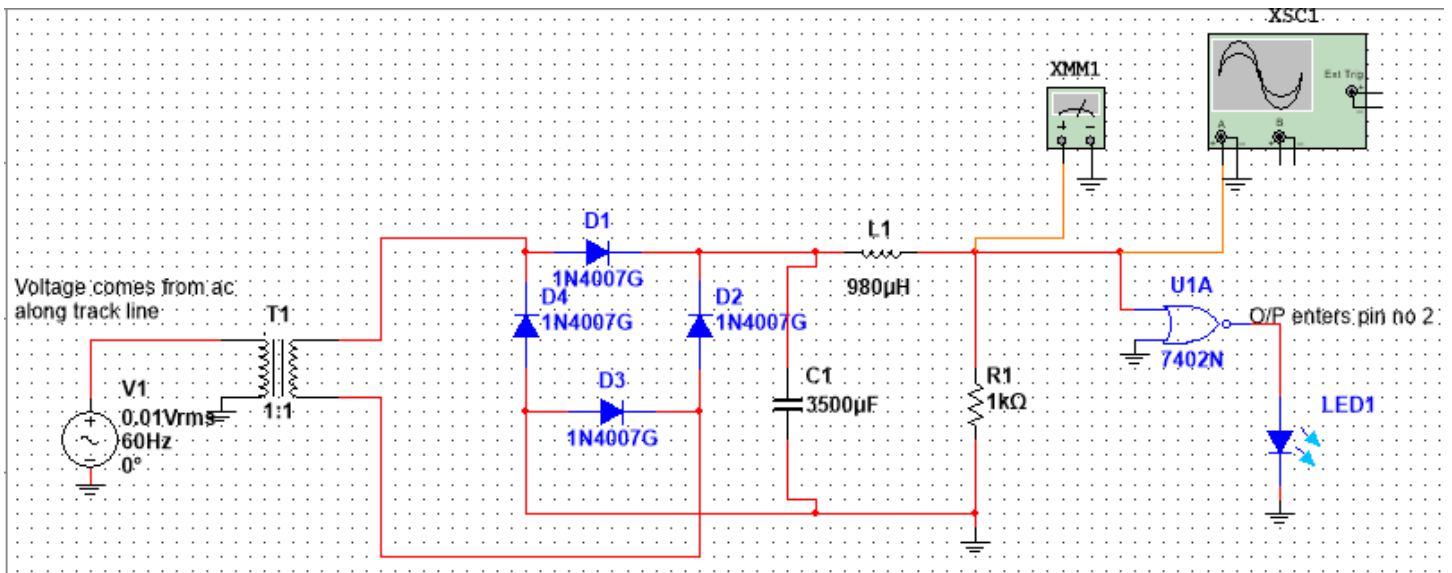
For this there is a simple device which consists of a pendulum and that will tilt only when head remains down at greater tilt angle, indicating something wrong with driver health. Now the buzzer will sound, so in order to switch it off the driver has to put head up and also touch driver touch plate, then the buzzer will switch off. But in case train is passing through high slope then it might be that the pendulum touch before only, so we have reference device which also turns on indicating that the device has failed. So, then ALT signal turns on. This would also turn off the sensors.



There is also emergency switch which when pressed will go in pin 2 of Wi-Fi module. Now, the train maintains a database of all non-stopping stations, every station will generate a light in the track when train will pass, then a LDR in train bottom will get information which station it had passed and put it in "dynamic" database. So now when train gets a fault like driver health fault, it waits for 15 minutes and gives warning signal to station it just crossed.

# Track Continuity Finder

The design is very simple. The idea is to have an electric signal going in line with rail track, so if a cut occurs then the circuit in rail signal would make rail signal Wi-Fi device pin 2 high



# Station WiFi Module

So, this is the software code running in railway station. If the fault is received from train then it waits for 5 minutes to see if fault resolves, if it does not resolve then it turns all signal in its radius red. It checks for the other pins in the Wi-Fi device of the rail signals in its radius. If particular pin is found high then it prints data about fault, whether it is track continuity or rail gate problem.