**MoSIS Assignment 5 - Statecharts**

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**Introduction**

In this assignment, we were given a GUI that represents the dashboard of a train and we were asked to implement a statechart that controls the behaviour of a train. In this statechart we implemented acceleration of a train, train entering a station and emergency break. While implementing these states, we had to consider the limitations such as maximum speed limit and traffic lights on the railway. Train is limited to go at 100 km/h maximum so the train cannot accelerate further. Another limitations is that, whenever passing a yellow light ocures, the speed should be less than or equal to 50 km/h otherwise train would go to the emergency break state. When entering a station, we had to limit the speed to 20 km/h, otherwise again it would go to the emergency break state. If train passes a red light, then it directly goes to emergency break and stops. At the emergency break, the dashboard of the train is non-responsive to any of the inputs coming from the driver. After 5 seconds of cooldown, dashboard becomes responsive again. Also, there is a dead man’s button that prompts the driver to press “Poll” button every 30 seconds after it starts moving. If the driver fails to press it within 5 seconds of prompt, then the train goes to emergency break.

In the next section we would like to discuss and analyse the statechart we implemented.

**Statechart**

We started implementing the statechart with the part that is responsible for the acceleration and checking the maximum speed of the train. The section that handles this can be seen in the figure below.

**[INSERT FIGURE HERE]**

After handling the acceleration and checking the speed of the light, we moved on to the part which is responsible for controlling the behaviour with respect to changes in the traffic lights. The requirements are:

1. If the train passes red light, it has to go to emergency break.
2. If train is passing a yellow light and its speed is greater than 50 km/h, it must go to emergency break.
3. If the train is cruising at a speed which is less than or equal to 50 km/h while passing a yellow light, then the speed must be limited to 50 km/h. Train should not be able surpass 50 km/h until it sees green light.

The part that handles the controls can be seen below.

**[INSERT FIGURE HERE]**

Whenever train arrives at the station, it doors can be open, and after 5 seconds, the doors should be close with pressing the “close” button. Then, it will leaves the station. But, if the speed of the train be more than 20 km/h, it will go to emergency break. As you can see below.

Also, there is a Pause state. When we press the “pause” button, it will pause the simulation. And after pressing the “continue” button, it will continue with the same speed as it had before. For having the same situation in emergency situation, we added the EmergencyPause for that part too. When we press “pause” button in the emergency situation, it will stop and after pressing the “continue” button, it will come back to the emergency situation.

You can see these 2 parts in below.

**[INSERT FIGURE HERE]**

There is another part that is called “Dead Man’s Button”. The driver should press this button every 30 seconds, if it doesn’t happen within 5 seconds, it will go to the emergency break. But, after pressing that button it will have no effect, however, the warning will be clear.

You can see this state in the below.