**DEVS Assignment**

20.12.2018

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The goal of this assignment is to find optimization length of the railway segments. The railway is made of some segments that they have the same length and get one train. For each segments there is a traffic light, if there is a train on the segment, the light will be red and invers.

As we know, the model (TrainNetwork) is made up of connecting three Atomic DEVS model which are Generator, RailwaySegment and Collector. So, first we made these models that we explain all of them in the following.

Train

We have a class for train which includes id that is unique for each train, a\_max that is the maximum number of acceleration and dep\_time which is the time that train leaves the generator. Also, we have another attributes like v (speed of the train) and x\_remaining that is for the remaining distance of railway segment.

Generator

As we know AtomicDevs class has 5 function, initializing, internal transaction, external transaction, time advance and output function. In initializing function, the generator, generates trains randomly. Also for the IAT (inter arrival time) we used random module. We calculated the departure time in this part, which is the sum of departure time of the train and IAT for each train. There are some query messages that can be sent to the next railway segment. So the QueryAck has information about the state of the traffic lights and is part of the initialization of the generator AtomicDEVS. After that, we implemented the internal transition of the generator, first we should calculate the time advance and then if it is in “wait” state (initial state) the train can go to state “send” with output port of train\_out. After that with output port of “query is goes to state RequestAccess. Then according to External transition, if the received\_ack be “Green” it is allowed to go to the railway segment. So if it be in “allowed” state, again train should wait.

RailwaySegment

In this class, in the init function, the initial state is “Idle”. Also, we have the length of the railway segment. So if there is a train n the segment, the light will be red and if there is no train, the light will be green. Another attributes that we have is v\_max which is the current velocity. Here, after initial state (Idle) it will go to “allow” state and then if the light is Green, train can go to the segment (trainIn).

Collector

Collector always allow to train to enter with QueryAck. Also it should calculate transit time. Here, we have a “Idle” state, as an initial state. Because it always receive train, so it goes to “TrainIn” state and the ourput function, just return “Green”.