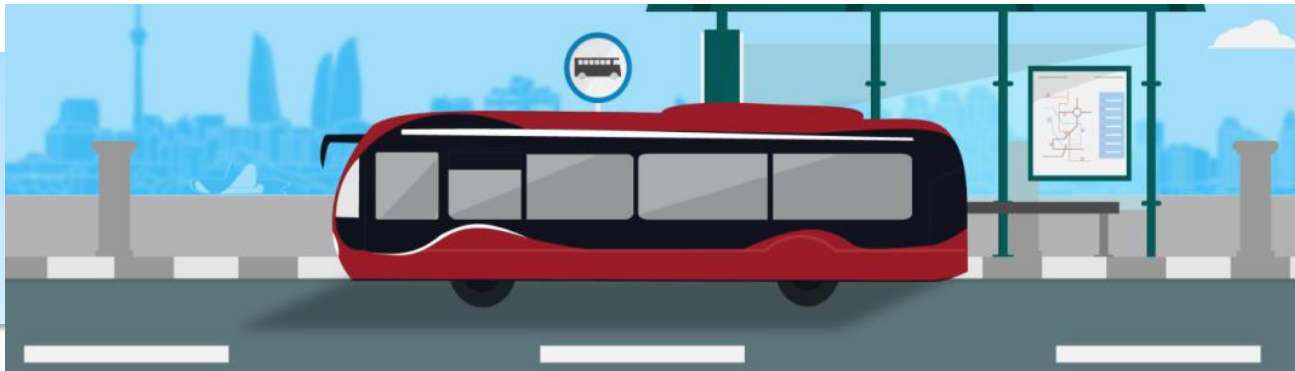




Crisis and Risks Engineering for Transport Services



CREATION OF A SIMULATION MODEL OF BUS TRAFFIC IN URBAN ROUTES



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Usage areas:

Social systems

Ecosystems

Economics

Market and competition

Project management

Human resources

Supply chains

Fleet management

Transportation

Call center

Business processes

Multi modal terminals

Warehouses

Airports

Hospitals

Rail yards

Manufacturing

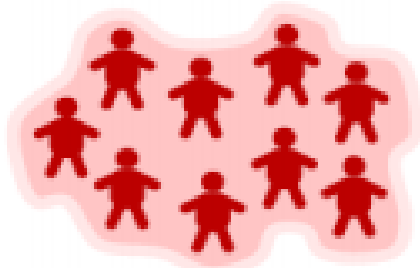
Battlefield

Traffic (Microscopic)

Pedestrian movement

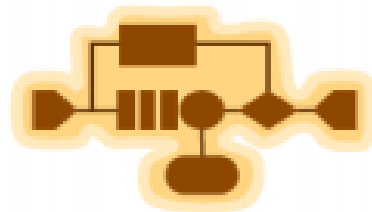
Computer hardware

Control systems

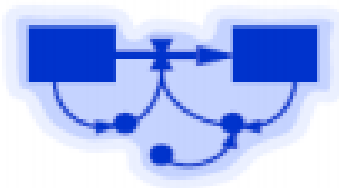


Agent based model

Simulation models



Discrete event (process) model



System dynamics model



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Basic tools for creating of model of buses route

Road
parameters
of road

CarSource
entering
vehicles

CarMoveTo
creating
movement

BusStop
accomodation of
bus stops

Delay
planning waiting
time of buses

Queue
modelling of
passenger queue

Pickup və Dropoff
modeling of embarking and disembarking
passengers, which wait at bus stop

Basic tools for creating passenger motion

Ped source

Ped wait

Ped go to

ped exit

pedEnter

pedSink



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Entering movement parameters of bus

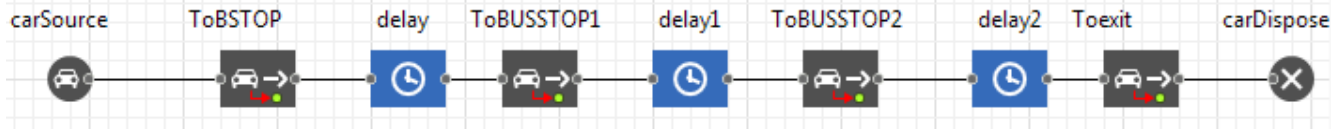
The screenshot displays a simulation environment with a map on the left and a properties panel on the right. The map shows a complex urban street network with a highlighted bus route in grey. The properties panel is titled 'carSource - CarSource' and contains the following settings:

- Name: carSource
- Show name: Show name, Ignore
- Arrivals defined by: Rate
- Arrival rate: 3 per minute
- Set agent parameters from DB:
- Limited number of arrivals:
- Appears: on road, in parking lot
- Road: road
- Enters: forward lane, backward lane
- Random lane:
- Car section:
 - New car: Bus1
 - Length: 10 meters
 - Initial speed: 40 kilometers per hour
 - Preferred speed: 40 kilometers per hour
 - Max acceleration: 1.8 meters per second²
 - Max deceleration: 4.2 meters per second²
- Advanced section:
 - Add cars to: default population of root agent, custom population
- Actions section:
 - On exit: (empty field)
- Advanced section (bottom):
 - Car type: Bus1
 - Single agent, Population of agents

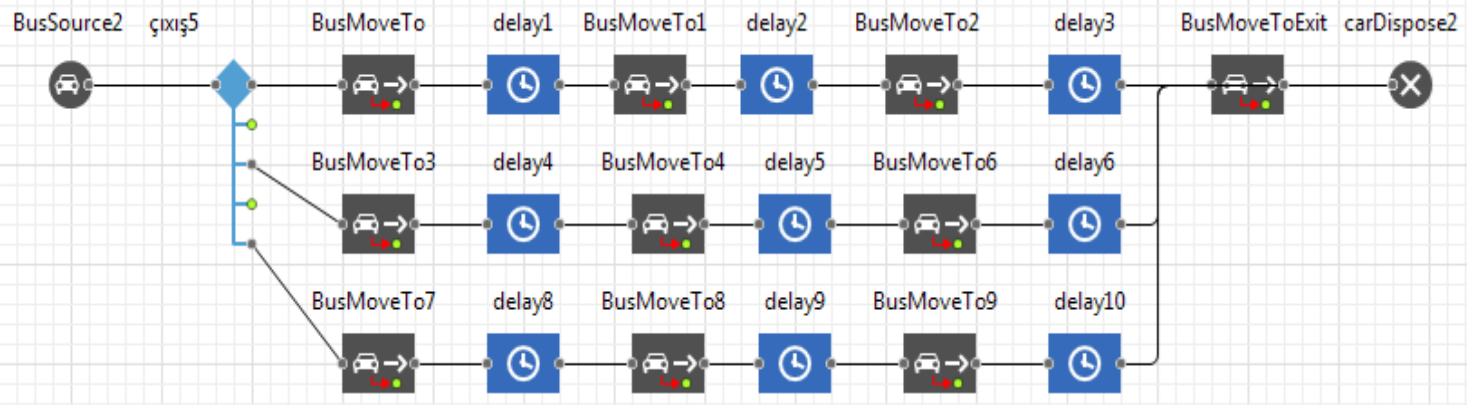
At the bottom of the map, a flow diagram shows the sequence of events for a bus: carSource → ToBSTOP → delay → ToBUSSTOP1 → delay1 → ToBUSSTOP2.



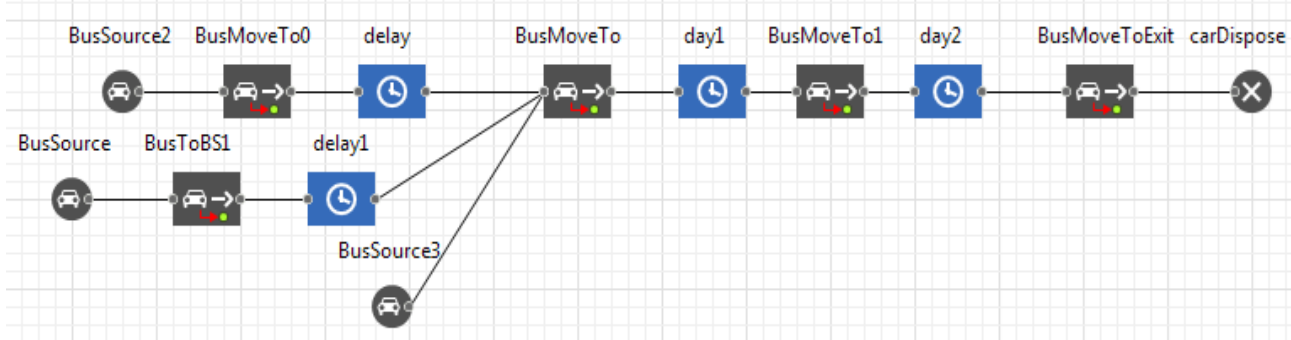
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The logical algorithm of bus routes



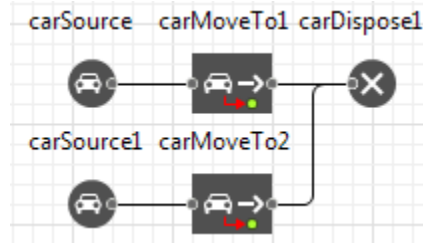
algorithm for simulating motion of buses beginning from the same initial stop



simulation algorithm for routes with coincident stops



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simple algorithm for entering parameters of traffic flow

Properties

busStop - Bus Stop

Name: Ignore Visible on upper agent

Lock

Visible: yes

Length:

Position and size

Offset from road start:

Advanced

Show in: 2D and 3D 2D only 3D only

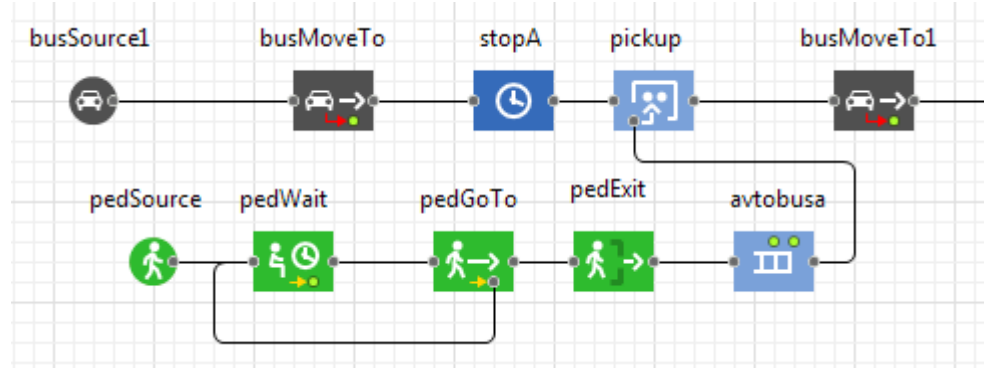
Show name

Description

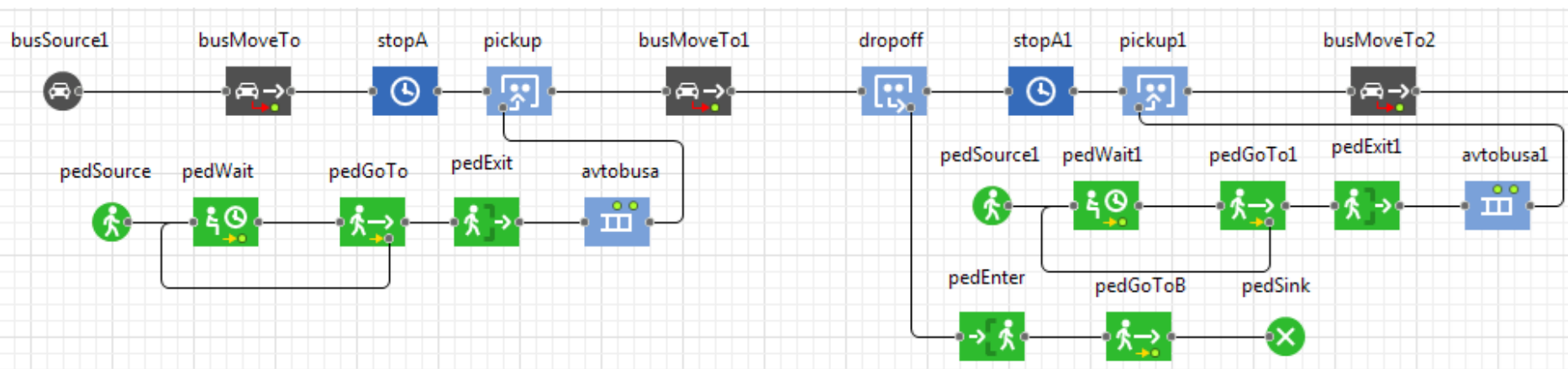
parameters of bus stops



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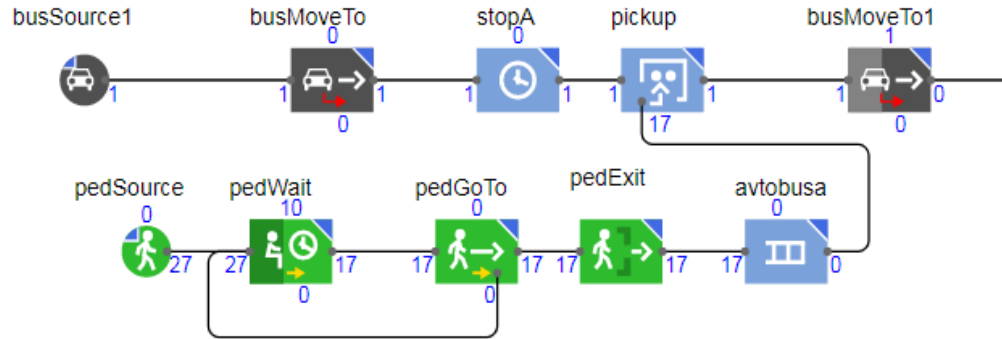
logical model of passengers boarding the bus (only one bus stop)



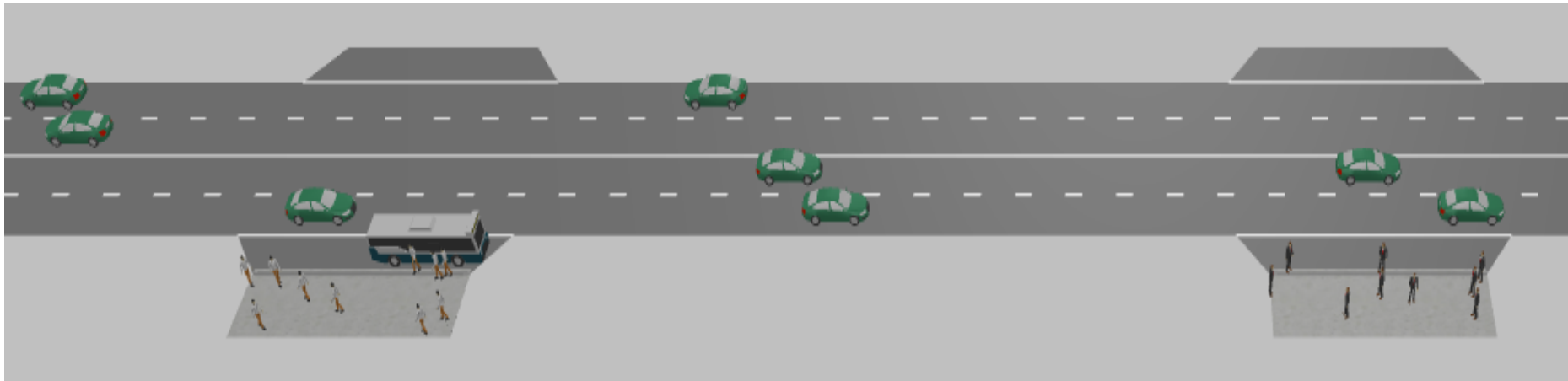
logical model of passengers boarding the bus (two consistent bus stops)



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3D view of bus route model





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Thank you for attention