

SUMO:
an introduction from a beginner

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About SUMO

- Simulation of Urban Mobility
 - An open-source traffic simulator
 - Supports traffic flow and individual vehicles
- Example
 - https://www.youtube.com/watch?v=D_2tQ7wTocU
- Code available:
 - <https://github.com/wingsweihua/hellosumo>

SUMO can do the following

- Simulate traffic flow and vehicle movement
 - Support different kinds of vehicles and lanes
 - Support signal control and priority
 - Graphic interface
 - Multi-level output (network, lane, vehicle, detector)
- Import road network
 - Manually design
 - Import from OpenStreetMap
- Routing

Install SUMO

- Windows (✓)
- Linux (✓)
- MacOS (Recommend Macport)
- Document: <http://sumo.dlr.de/wiki/Installing>

An example: Hello SUMO

1. Road network definition and generation
2. Vehicle/flow definition
3. SUMO configuration

An example: Hello SUMO

1. Road network

- Node (Junctions and intersections) <.nod.xml>
- Edge (road segment) <.edge.xml>
- Compile <.net.xml>

```
<nodes>
  <node id="1" x="-250.0" y="0.0" />
  <node id="2" x="+250.0" y="0.0" />
  <node id="3" x="+251.0" y="0.0" />
</nodes>
```

```
<edges>
  <edge from="1" id="1to2" to="2" />
  <edge from="2" id="out" to="3" />
</edges>
```

```
netconvert --node-files=hello.nod.xml --edge-files=hello.edg.xml --output-file=hello.net.xml
```

An example: Hello SUMO

2. Vehicle/Flow <.rou.xml>

- Vehicle
- Flow

```
<routes>
  <vType accel="1.0" decel="5.0" id="Car" length="2.0" maxSpeed="100.0" sigma="0.0" />
  <route id="route0" edges="1to2 out"/>
  <vehicle depart="1" id="veh0" route="route0" type="Car" />
</routes>
```

An example: Hello SUMO

3. SUMO configuration

```
sumo-gui -c hello.sumocfg
```

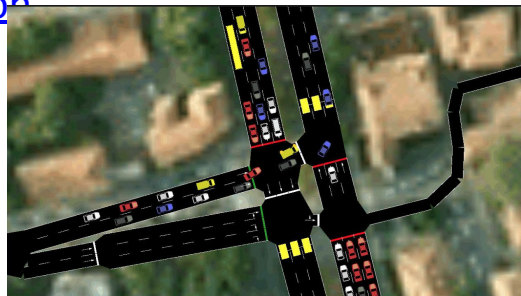
hello.sumocfg

```
<configuration>
  <input>
    <net-file value="hello.net.xml"/>
    <route-files value="hello.rou.xml"/>
  </input>
  <time>
    <begin value="0"/>
    <end value="10000"/>
  </time>
</configuration>
```

http://sumo.dlr.de/wiki/Tutorials/Hello_Sumo

Advanced SUMO

1. Personalize the visualization of vehicles http://sumo.dlr.de/wiki/Definition_of_Vehicles,_Vehicle_Types,_and_Routes#Visualization
2. Import real-world road network
 - <http://sumo.dlr.de/wiki/Tutorials/OSMWebWizard>
 - http://sumo.dlr.de/wiki/Tutorials/Import_from_OpenStreetMap
3. Interact with SUMO using TraCI
 - http://sumo.dlr.de/wiki/TraCI/Interfacing_TraCI_from_Python
 - Get traffic signal and vehicles' status
 - Set traffic signal and vehicles' status



Programming with SUMO

- TraCI Document

- http://sumo.dlr.de/wiki/TraCI#TraCI_Commands

- Using TraCI

- Specify the location of TraCI module, it should be under the “tools” folder if you clone from the github codes

- (<https://github.com/eclipse/sumo>)

- http://sumo.dlr.de/wiki/TraCI/Interfacing_TraCI_from_Python

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```
os.environ['SUMO_HOME'] = "SUMO_SOURCE_LOCATION/tools".format(os.getlogin())
sys.path.append(os.environ['SUMO_HOME'])
```

Thanks