
PSE

Verkehrssimulation

Modeling of Intersections

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Current State

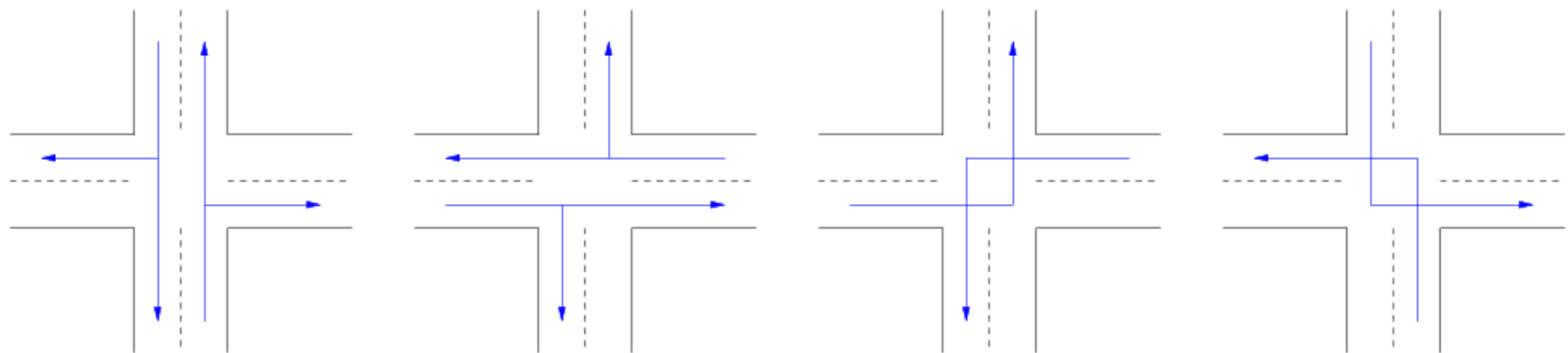
- Your traffic simulator is capable of simulating
 - ◆ Flexible traffic networks given in XML
 - ◆ Textual and visual output of simulation results
- Drawbacks
 - ◆ No treatment of intersection behaviour
 - Collisions may occur
 - No realistic behaviour
 - ...

Intersections

- Intersections given by nodes in traffic network
- Turns take place at intersections
- Real-world intersections have great variety of characteristics
 - ◆ Traffic lights
 - ◆ Roundabouts
 - ◆ Prioritized traffic
- Models developed and integrated in order to simulate realistic scenarios

4-Phase Model

- Basic model for description of traffic behaviour at intersections
- Four phases with different behaviour
- Each Phase lasts a certain amount of time steps p_1, \dots, p_4
- During a phase certain turns are allowed, all others are prohibited



4-Phase Model – Drawbacks

- Model defined for intersection of four streets
- No special priorities provided for faster turns,...
- Not very flexibel
- Therefore, extensions required

Traffic Lights

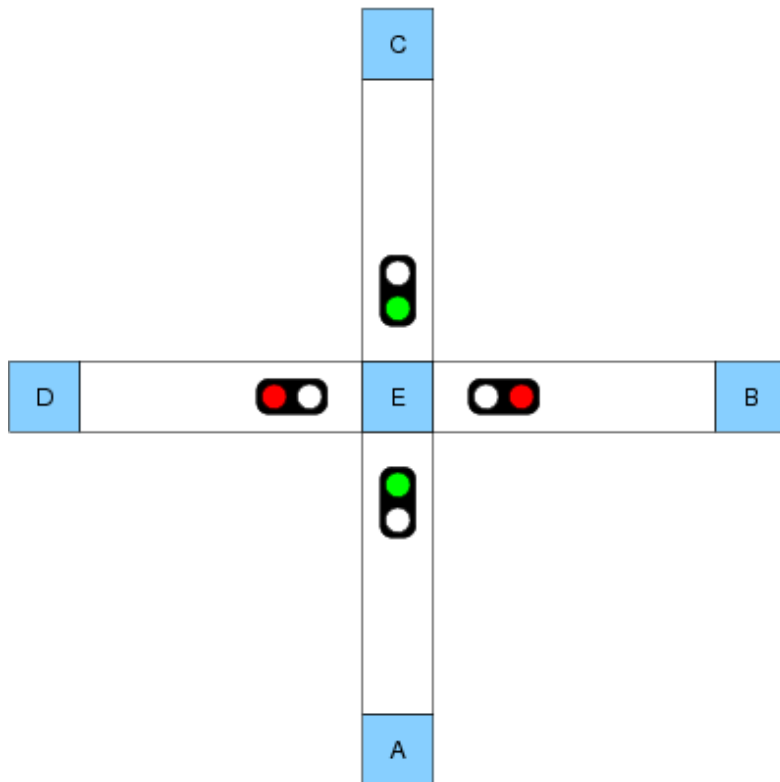
- Traffic lights common in real-world
 - In spite of increasing importance of *roundabouts*
- Allow flexibel (and adaptive) steering of traffic
- Usually three phases: green, yellow, red
- Often centralized coordination
- New technologies for adaptive systems being tested

Traffic Lights – Our Model

- Only two phases: *red* and *green*
- New XML description for modeling each traffic light

```
<TrafficLight>  
  <nodeNr> </nodeNr>  
  <fromNodeNr> </fromNodeNr>  
  <initialPhase> </initialPhase>  
  <cycle> </cycle>  
  <initTime> </initTime>  
</TrafficLight>
```


Traffic Lights – Example



```
<TrafficLight>
  <nodeNr> E </nodeNr>
  <fromNodeNr> A </fromNodeNr>
  <initialPhase> green </initialPhase>
  <cycle> 5 </cycle>
  <initTime> 10 </initTime>
</TrafficLight>
...
<TrafficLight>
  <nodeNr> E </nodeNr>
  <fromNodeNr> B </fromNodeNr>
  <initialPhase> red </initialPhase>
  <cycle> 5 </cycle>
  <initTime> 10 </initTime>
</TrafficLight>
```

Prioritized Traffic

- Standard on non-signposted intersections
- In Germany: Rechts-Vor-Links
 - ◆ i.e., vehicles arriving from the right have priority
- Questions to consider:
 - ◆ How can streets be identified?
 - ◆ Which street is right and therefore has priority?
 - ◆ How to avoid deadlocks?
 - ◆ Efficient treatment of determination of priority?
 - Ad-hoc or preprocessing?
 - ...

Questions?

