ITU Kaleidoscope 2014

Living in a converged world - impossible without standards?

PROPOSAL OF "CYBER PARALLEL TRAFFIC WORLD" CLOUD SERVICE

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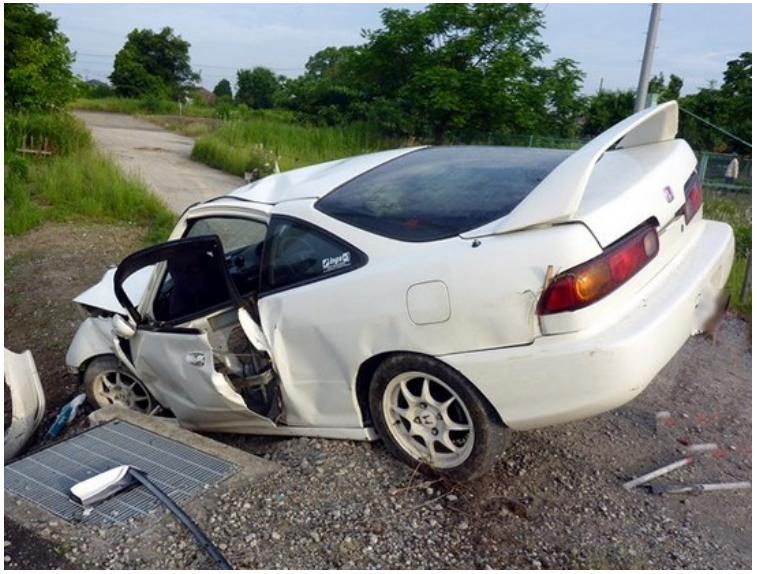
Background

(a) View from the following vehicle

(b) View in front of the vehicle

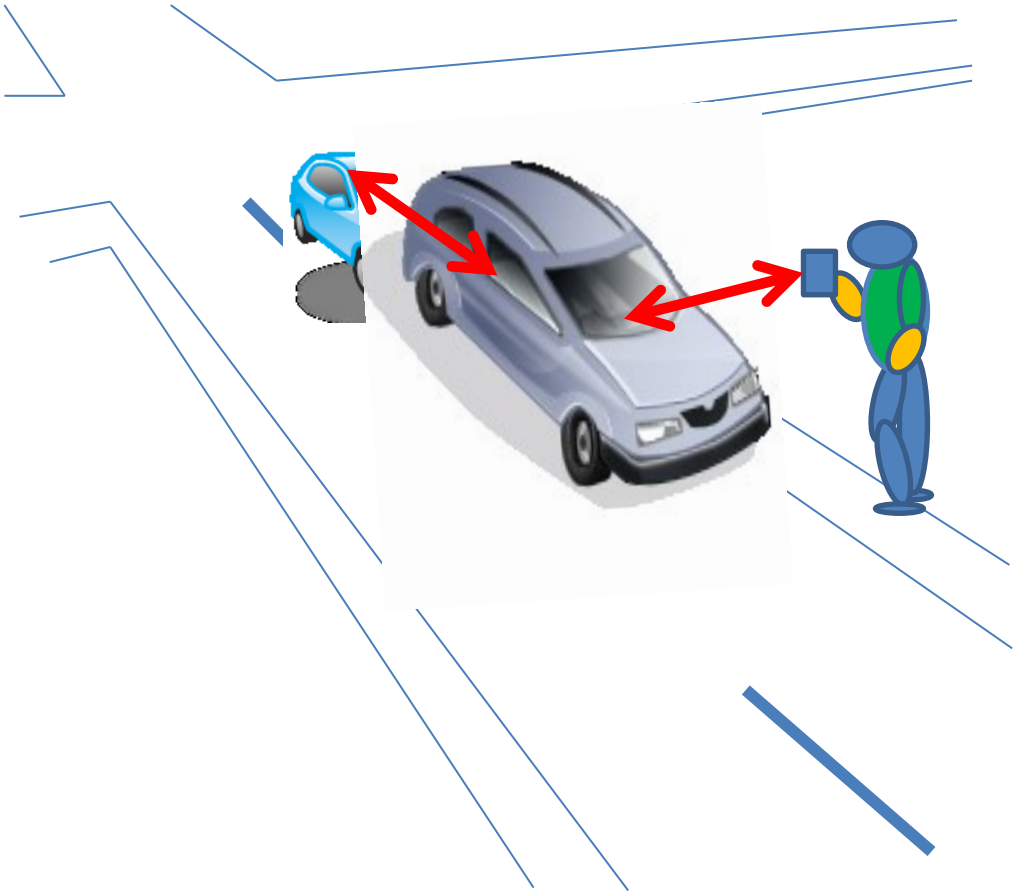
Background

(c) Traffic jam



(b) View from a head vehicle of the traffic jam

What is the cyber parallel traffic world?



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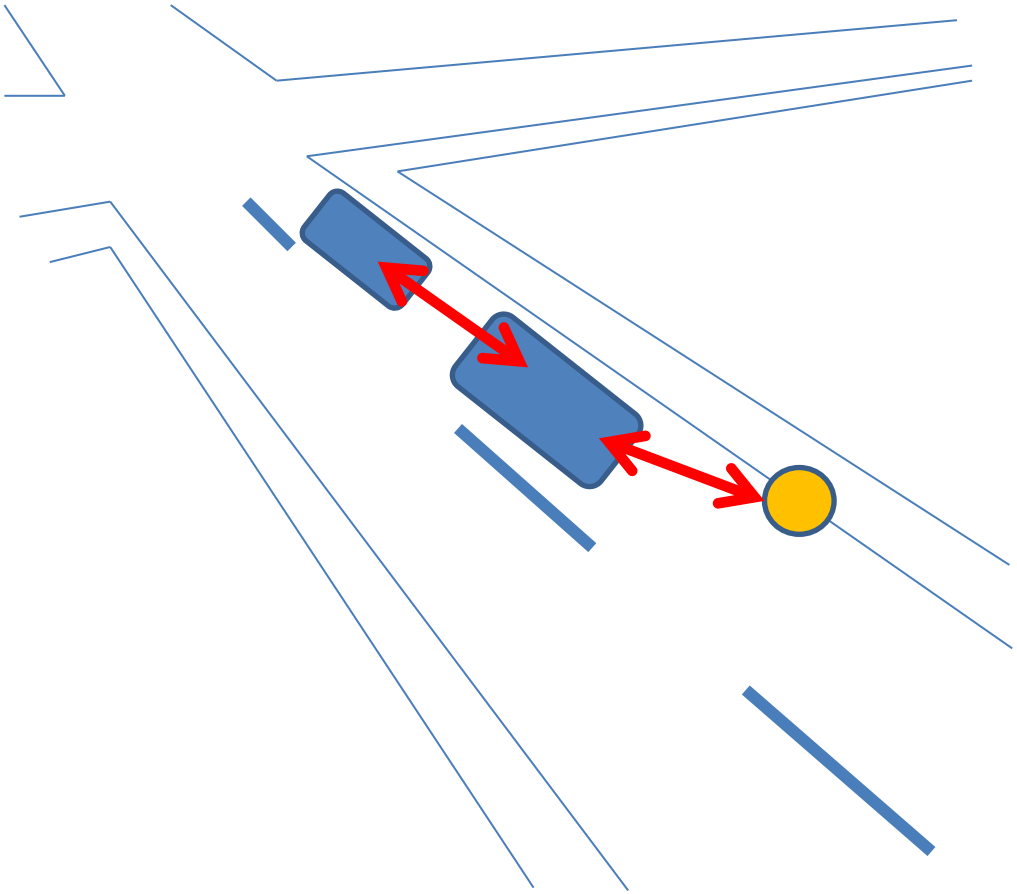


Development concepts

- Our aim is to provide a standardized CPTW for use by people worldwide at little or no cost.

- No expensive traffic facilities
- Information is gathered through smartphones and vehicle-mounted devices
- Resident participation design: local residents construct the parts of CPTW in which they live.
- Enough income for operation and development .

- Open sources and an open standard scheme.

Issues to be addressed

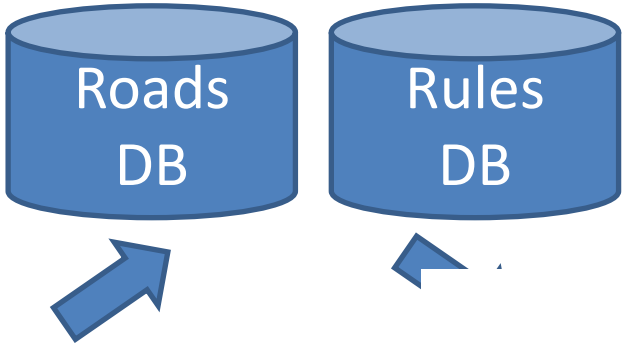
- The specifications:
  - Service contents
  - System structure
  - Protocol between object nodes
  - Synchronization scheme between vertical traffic signals and real traffic signals, - - -
- How to verify the developed technologies, software, and equipment to ensure they meet the specifications.
- How to managing the income and distribute funds to participating organizations for development costs.
- How to provide the service and manage its operation.

How to construct the virtual structure and traffic rules

Google Maps
Google Earth

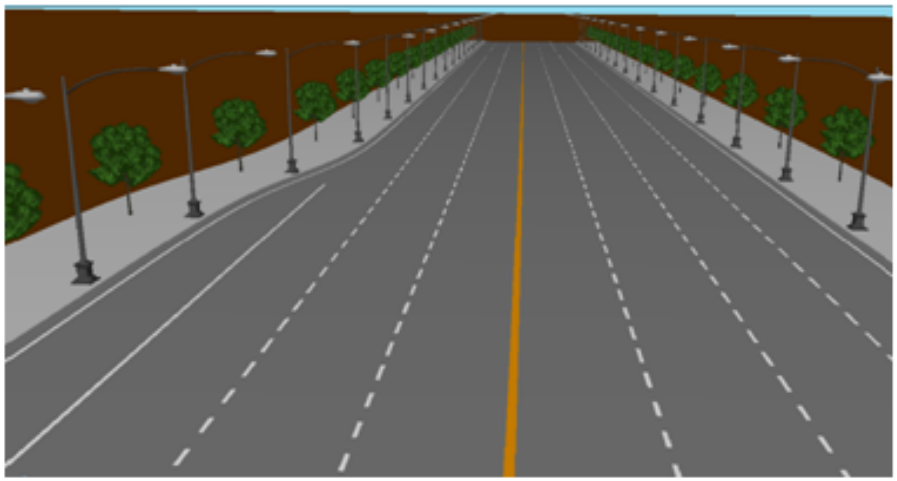
Traffic rule books

Constructor
- Extract road data
- Search traffic rules



Roads

(a) A straight road

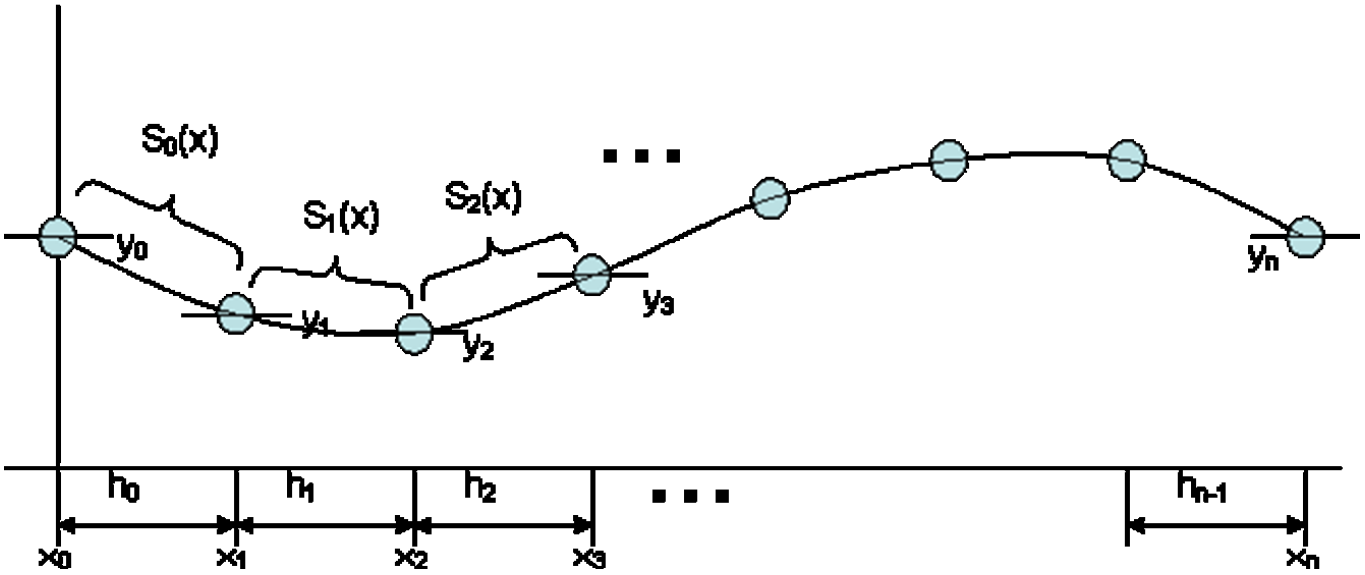


(b) An intersection

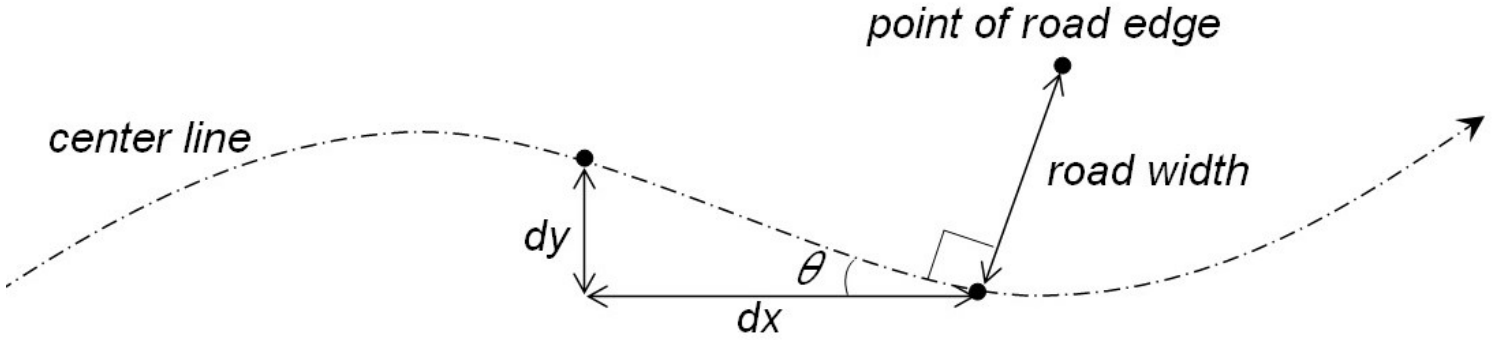
3D spline curve

2D B-spline curves

Roads



(a) 3D spline curves on plotted points

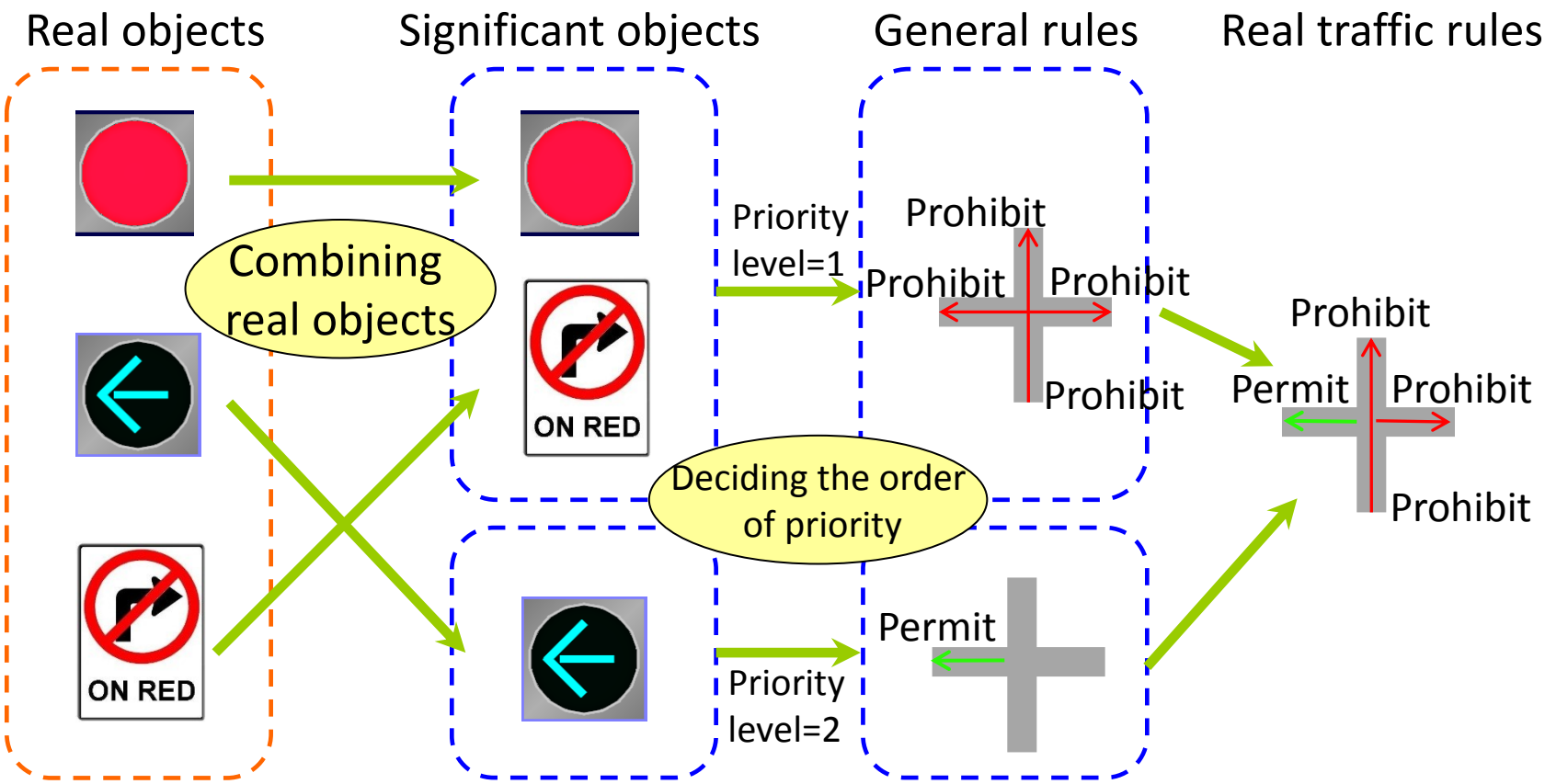


(b) Method for creating 3D roads

Traffic rules model

Layer name	Function
Real rule layer	Creating real rules by combining general rules
General rule layer	Assigning a traffic rule to a combination of elements
Significant object layer	Combining elements of object that have significant rules
Real object layer	Providing elements of traffic signals o traffic sign such as kinds of lights, colors and condition

How to define real traffic rules from real objects



Traffic rules model

3D models derived from traffic signal data

Traffic rules derived from the created 3D traffic signal

Structure of database

- Rules DB
  - Lamp_object
  - Lamp_status
  - Status_group
  - Signal_expression
  - Expession_to_intersection
  - Intersection_rule
  - Country
  - Rule
- Roads DB
  - Real_lamp_object
  - Intersection_cycle_time
  - Signal_state_transition
  - Road
  - Intersection

Demonstrations (1)

(a) 3D roads and traffic rules

Demonstrations (2)

(b) A vehicle plotted on 3D roads with GPS data measured on a real vehicle

Conclusion

- Cyber Parallel Traffic World (CPTW)
  - 3D roads, etc. are presented the same as them in the real world.
  - Vehicles, pedestrians, etc. move in synchronization with their real-world movements.
  - Virtual vehicles can also be driven in CPTW.
  - Vehicles, pedestrians and virtual vehicles can communicate each other by pointing their positions.
  - Local residents construct the parts of CPTW in which they live.
- We recruit colleagues to develop the CPTW together.