Connected Smart Cities and Communities

Intelligent Technologies in Smart Cities

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Connected Smart Cities and Communities

Connected and Smart Cities

Intelligent Mobility

Urban Traffic Data

Introducing Autonomous Vehicles

Quality of Life in Urban Areas

Indicators in urban areas

- Attractive for visitors and businesses
- Education
- Healthy environment
- Infrastructure
- Poverty reduction
- Efficient public services for citizens
  - Sustainable transport systems
  - Green open spaces
  - Cultural and sports facilities
- Improving safety and security
  - Promote social and interaction among communities

Source: Urban quality of life – concepts and measurements; http://www.developmentprogress.org/blog/2014/02/06/urban-quality-life-–-concepts-and-measurements

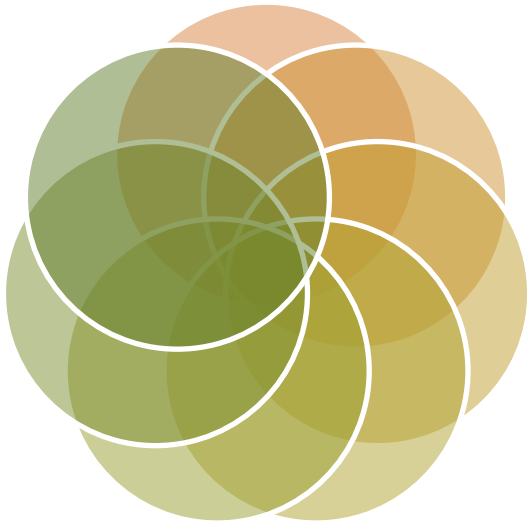
What Makes a City Smart?

www.clipartlord.com

Improved IT and communication systems

Funding requirements and sources

Energy efficiency and sustainability initiatives



Public safety and security

Citizen engagement and empowerment to find out needs

Transportation, parking, traffic management

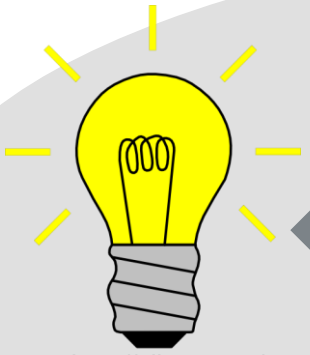
Open data and government transparency

Adapted from “Smart City Readiness: Understand the Issues to Accelerate the Journey”, White paper Cisco, 2014

Energy efficiency and sustainability initiatives

http://sweetclipart.com

City Infrastructures



http://cliparts.co/

energy

water

transportation systems

Adapted from “Smart City Readiness: Understand the Issues to Accelerate the Journey”, White paper Cisco, 2014

Connected Smart Cities

Broadband connectivity

Information and Communication Technologies (ICT)

Tools and technologies to process collected data

to ensure social benefit

Connected Smart Cities

Collaboration within and between cities

http://www.collaborativeconsumption.com/wp-content/uploads/2013/10/ShareableCities.jpg

http://www.scords.gov.uk/course/index.php?categoryid=11

Collaborative Technologies

www.vectorstock.com/royalty-free-vector/city-people-vector-50077

Citizen-driven collaborative technologies

Citizen-centered sustainable, efficient city

Disney mural..Source: http://www.roadtrafficsigns.com/blog/wp-content/uploads/2013/05/future-city.jpg

Intelligent Mobility

Actions

- Use of public transportation instead of personal vehicle for a traffic reduction
- Improvements in mobility through planning of routes in real time

GOAL

- Sustainability
- Environmental benefits
- Preservation of transportation infrastructure

http://www.123rf.com/stock-photo/carbon_icon.html

Intelligent Mobility

Electric Vehicles

Driving Behavior Patterns

Road Safety

Helmbrecht, M., Olaverri-Monreal, C**.,** Bengler, K., Vilimek, R., Keinath, A. (2014) "How Electric Vehicles Affect Driving Behavioral Patterns.", *In IEEE Intelligent Transportation Systems Magazine. Special Issue on Electro-Mobility.* Volume 6, Issue 3, pp. 22 - 32.

Public Transport

http://utrack.com/benefits-for-passengers/

- Faster commute
- Environmental benefits
- Decrease of fuel, insurance and parking costs

Public Transport

Business World from Vector.me (by vecteezy.com)

Citizens

www.destination-spain.com

Public Events

Weather

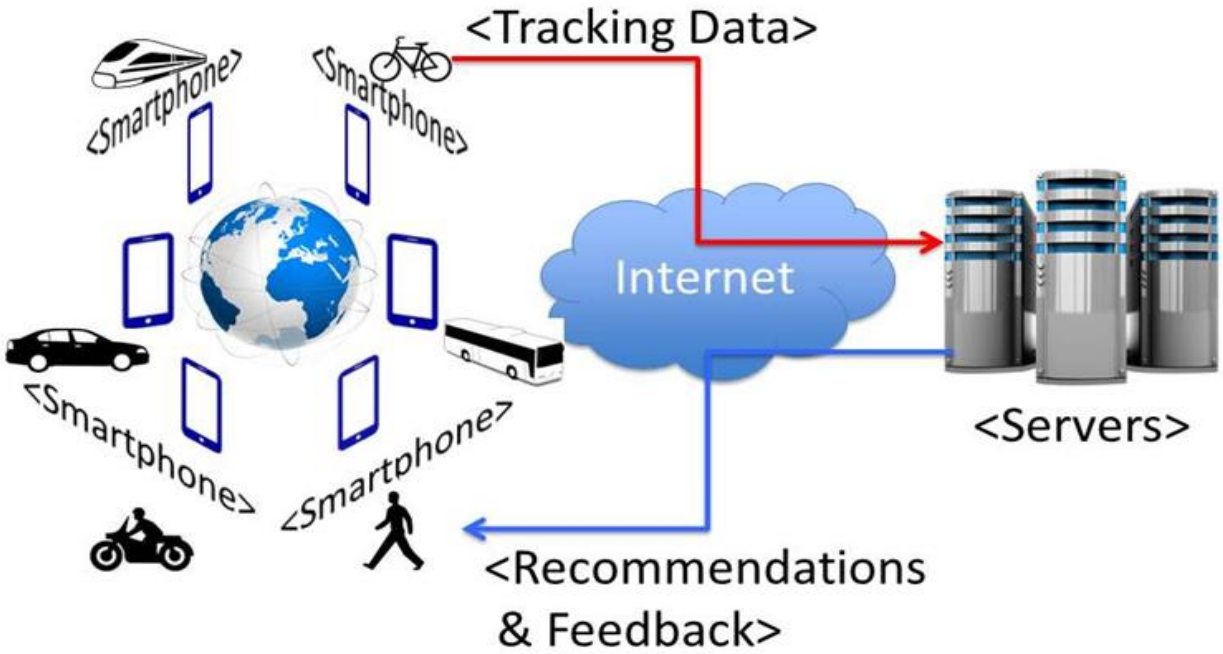
https://openclipart.org/user-detail/ryanlerch

Road work

https://openclipart.org/user-detail/Z

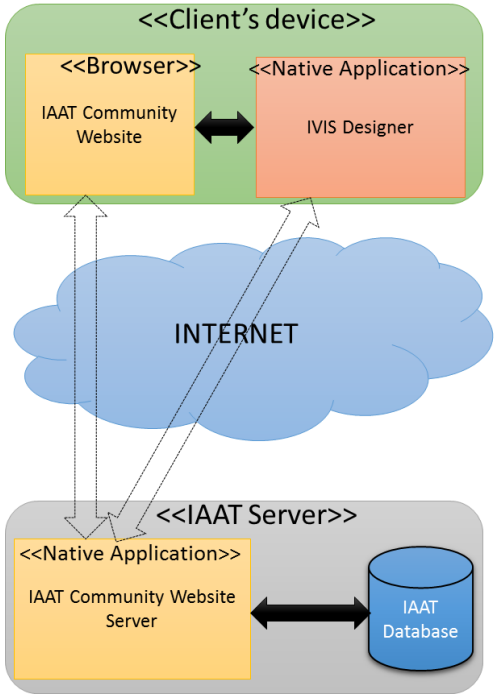
Accidents

Data Acquisition



Gonçalves, J., Gonçalves, J. S. V., Rossetti, R., Olaverri-Monreal, C. (2014) "Smartphone Sensor Platform to Study Traffic Conditions and Assess Driving Performance", *Proceedings 17th International IEEE Conference on Intelligent Transportation Systems, Qingdao, China,* 2014

Data Acquisition



Olaverri-Monreal, C., Gonçalves, J. (2014) "Collaborative System to Investigate Mental Models: the Information Architecture Automatic Tool (IAAT)", Proceedings International Conference on Collaboration Technologies and Systems, Minneapolis, Minnesota, USA, pp. 616-621.

Providing personal multimodal mobility services based on crowd-sourcing data through cloud based architectures.

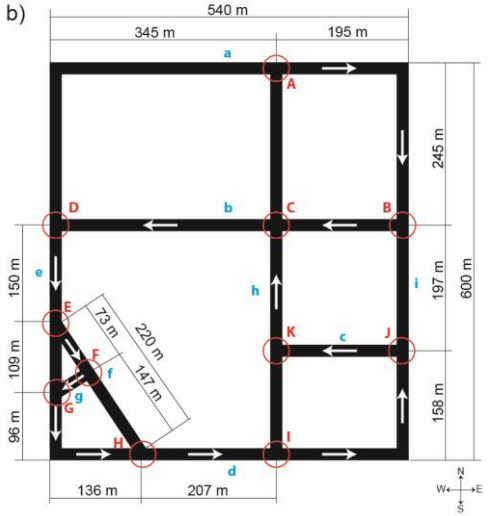
Filgueiras, J., Rossetti, R.J.F., Kokkinogenis, Z., Ferreira, M., Olaverri-Monreal, C., Paiva, M., Tavares, J.M.R.S., Gabriel, J. (2014) "Sensing Bluetooth Mobility Data: Potentials and Applications"

Collection and evaluation of urban traffic data through sensors available on road infrastructure or on the cars themselves.

Intelligent Transportation Systems

Olaverri-Monreal, C., Gomes, P., Fernandes, R., Vieira, F., Ferreira, M. (2010) “The See-Through System: A VANET-Enabled Assistant for Overtaking Maneuvers” Proceedings 2010 IEEE Intelligent Vehicles Symposium IV. San Diego, CA, USA. pp. 123–128.

Peláez, G. A., Bacara, D., de la Escalera, A., García, F., Olaverri-Monreal, C. (2015) "Road Detection with Thermal Cameras through 3D Information", Proceedings IEEE Intelligent Vehicles Symposium, Seoul, Korea, June 2015



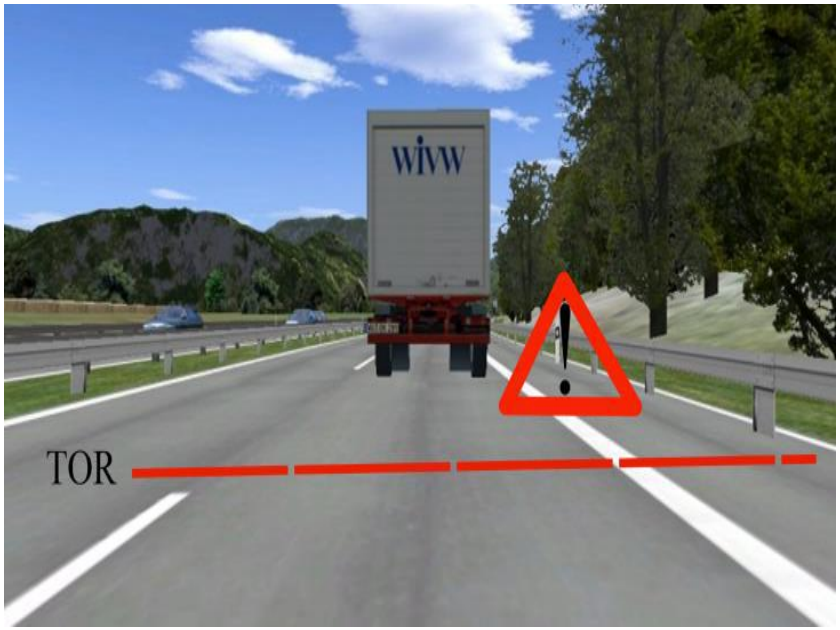
Olaverri-Monreal, C., Gomes, P., Krüger Silvéria M., Ferreira, M. (2012) “In-Vehicle Virtual Traffic Lights: a Graphical User Interface", Proceedings 7th Iberian Conference on Information Systems and Technologies, CISTI'2012, Madrid, Spain, pp. 1 - 6.

Safety

http://www.irishtimes.com/news/social-affairs/pedestrians-using-mobile-phones-in-danger-of-falling-into-zombie-trance-1.1834366

https://www.washingtonpost.com/local/trafficandcommuting/safety-experts-to-pedestrians-put-the-smartphones-down-and-pay-attention/2014/09/19/278352d0-3f3a-11e4-9587-5dafd96295f0_story.html

Automated Vehicles



Gonçalves, J., Olaverri-Monreal, C., Bengler K. (2015) “Driver Capability Monitoring: Evolving from State to Capability Monitoring”, in IEEE Intelligent Transportation Systems Conference, Canary Islands, Spain.

Control relayed back to humans, through Take Over Request (TOR)

Crucial role of prediction systems

Some Benefits of Automated Vehicles

Workload reduction	Reduction of traffic congestion
• Error reduction, • Safety enhancement	• Mobility enhancement • Fuel consumption reduction

Introducing Automated Vehicles to Smart Cities

Mostly used for commuting?

Insurance policies?

Road signals, VRU marking?

Dedicated roads, mixed traffic?

Societal organization

Effect on infrastructure