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Existing example of V2I (based on smartphone)

Intelligent Parking Information System (IPIS)

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Intelligent Parking Information System (IPIS)

Impact on urban parking:

- Many cities, e.g. Beijing, Moscow, London, Vienna report problems due to poor parking.
- Worldwide average is 15min for parking search; worst case up to 30min.
- This has crippling effects on people's time efficiency and the economy at large

Financial Implications

Direct financial losses for city halls:

– inefficient parking place utilization

Indirect financial losses for city halls:

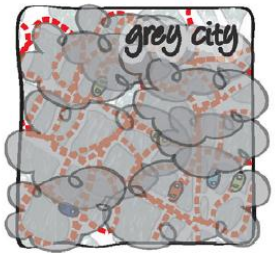
– less attractive to come downtown due to headache of finding parking

– many accidents due to drivers not concentrating

– massive pollution due to parking traffic with long-term health impact

IPIS

Provide information about the current parking situation to the end-user via mobile application and navigate the end user to the vacant parking lot.



IPIS principles:

- Parking lots vacancy detection
- Information gathering
- Sensors technology
- Navigation and positioning technology e.g. GPS
- Mobile technology.
- V2I (Infrastucture to vehicle technology)

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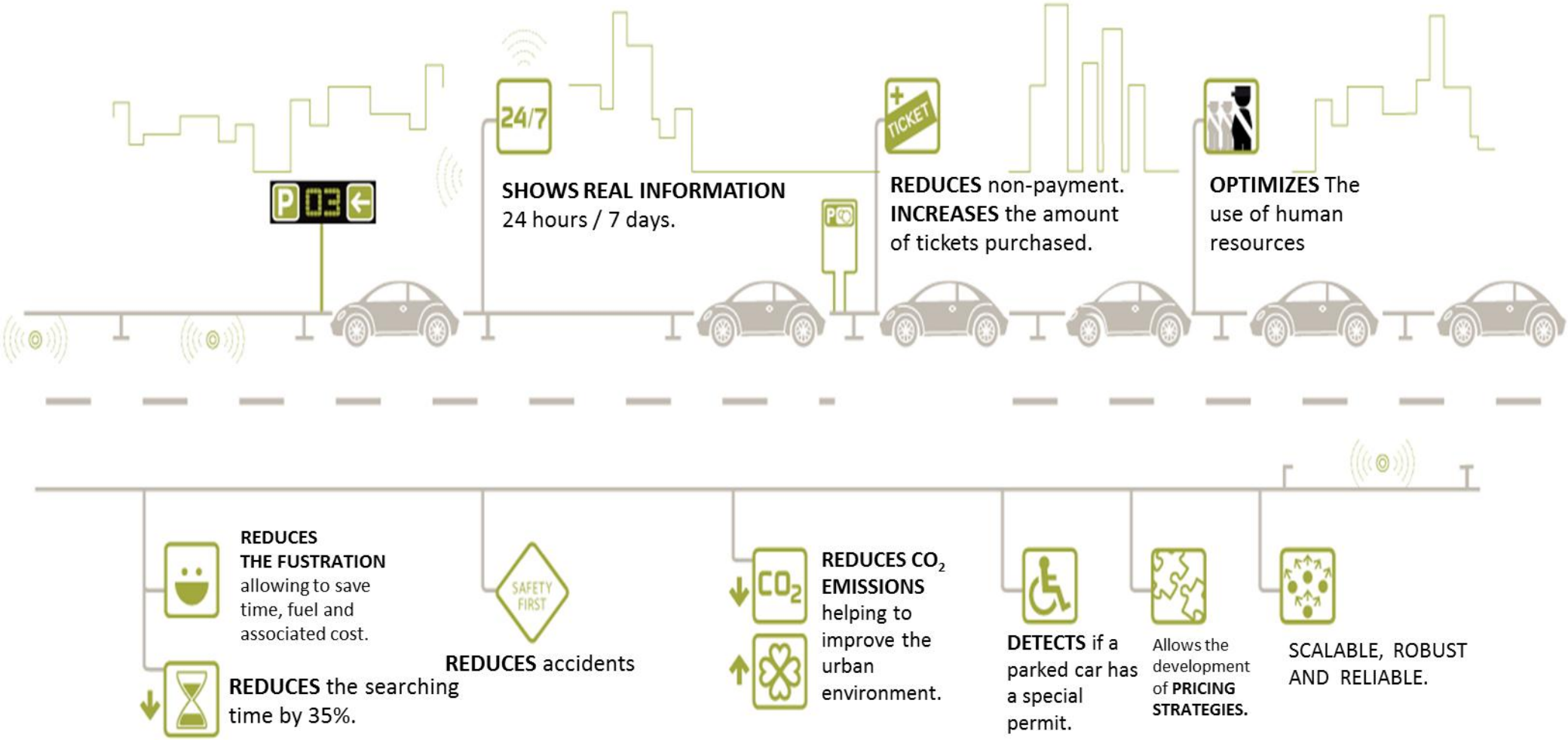
Active Smart Parking Systems



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Active Smart Parking Systems (London)

SmartParking Features

- ✓ The system in London is called SmartParking and is operated by Westminster Council.
- ✓ It has been started in 2012 when a trial was done with 189 sensors in 5 streets
- ✓ The installation of the sensor network has been started in January 2014
- ✓ More than 3000 RFID equipped infrared sensors were installed on parking bays to detect vehicles.
- ✓ In phase 2 further 7000 sensor will be installed on the network.
- ✓ A team of three workers is able to install sensors with a rate of 50 a day.

SMART PARKING

Costs

- The Westminster Council calculates with costs up to 889,395 pounds, which is approximately 1.1 million euros.
- The costs of the sensor including installation are estimated to 217 pounds.
- The project is founded from revenues raised through paid-for parking in Westminster.

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Active Smart Parking Systems (London)

Technology

- The system uses infrared sensors equipped with RFID technology.
- Each sensor is a completely wireless, battery operated independent unit and the battery life is up to five years.
- Transmission is done by so called zones controllers which are installed on streetlights or on traffic signs beside the roads.
- The zone controllers are gathering the information from the sensors wirelessly and transmit the status consequently in real time.
- The data is transmitted via cellular network to central server.

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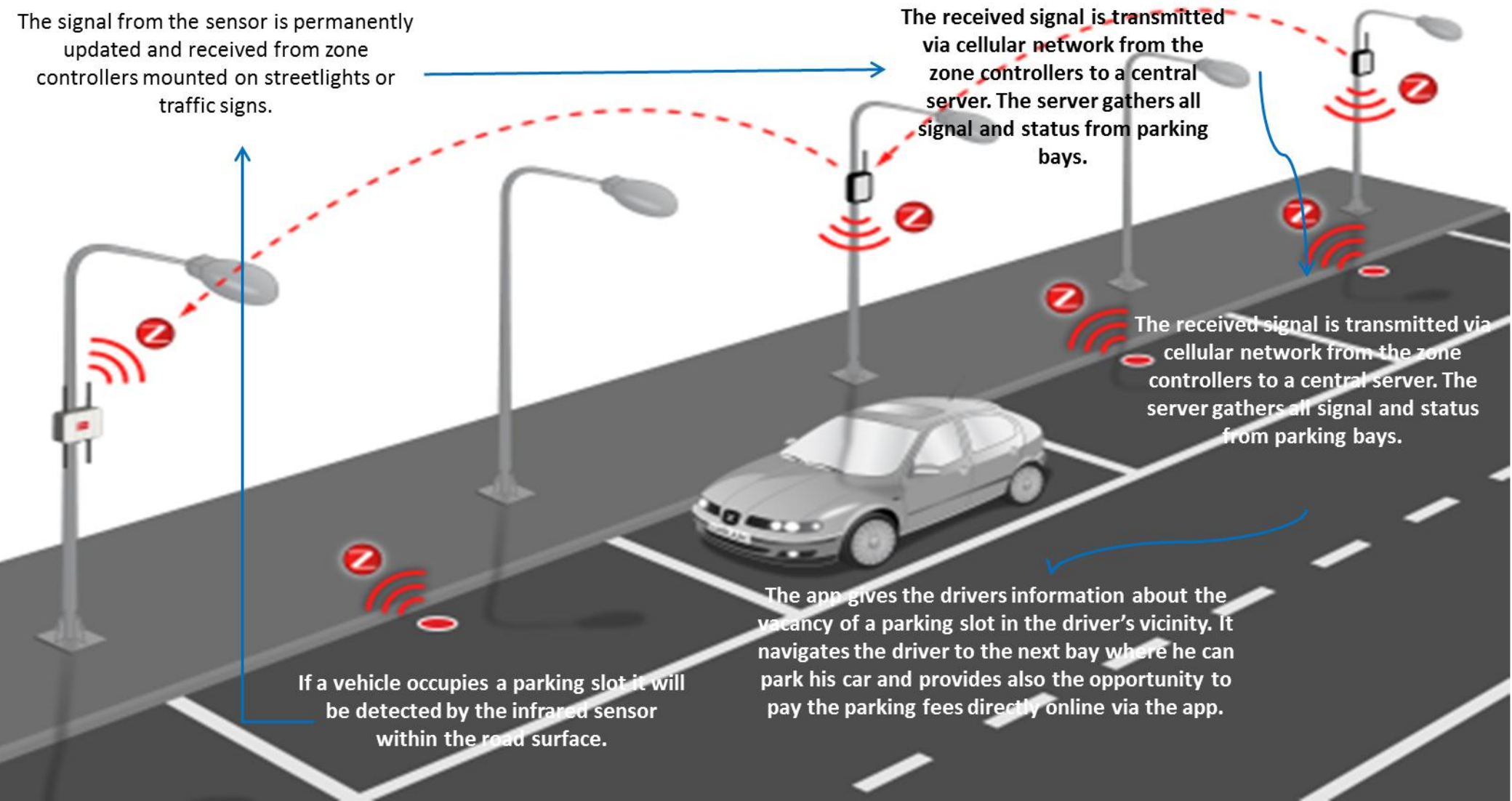
Active Smart Parking Systems (London)



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Active Smart Parking Systems (Moscow)

Fastprk Features

- The system employed, called Fastprk, is considered to be the largest smart parking project in the world.
- The technology was first trialed in the winter of 2011/12 and has been commercially operational since November 2012. The installation was realized in four stages:
  - ❑ The first stage: Took place in November 2012. 1,000 sensors were successfully installed in paying parking areas.
  - ❑ The second stage: (May-June 2013) included the instrumentation of around 2,000 parking spaces in total.
  - ❑ The third stage: (Dec 2013/Jan 2014) involved the installation of 12,000 parking sensors. With this deployment, Moscow's becomes the largest smart parking project in the world.
  - ❑ The fourth stage: (Mid 2014) include more than 50,000 sensors.
- On the top of the platform there is an integrated control system provided by ITS
- Active displays also installed on Moscow's paid-parking streets.
- Fastprk has been adapted to serve the disabled (10% of the spots), emergency services, ambulances and police cars.




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Active Smart Parking Systems (Moscow)

Technology

- The system uses sonar sensors equipped with a technology that provides magnetic detection.
- Fastprk is a wireless system, which means that it is scalable and paying for expensive cabling and installation is not required.
- The system contains few hardware components and software, which make it easy to install.
- The hardware contains:
    - Parking node on each parking spot (composed of sensor, radio, battery, and packaging)
    - Gateway guaranteeing Internet connectivity via cellular/Wifi/Ethernet
    - Relay node to help improve coverage of parking nodes to reach the gateway
    - Panels indicating to the drivers about the availability and direction of parking spots
- The informations are transmited to the driver via an application in the cellphone.

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Active Smart Parking Systems (Moscow)

How does it work?

One single gateway covers an area of about 1km^2.

The gateway sends the information via the Internet to the database in real time.

The occupancy is instantly reported to users via apps and iluminated panels in the street.

When a car parks over the sensor, it is detected and the sensor realys that information -wirelessly- to the gateway.

THE SYSTEM RELIES OF EMBEDDED SENSORS IN EACH PARKING BAY IN THE STREET.

When connected to the payment method system, the authority can identify non-paying cars and with the use of a tablet app, parking wardens can work more effectively.

REPORTING
The central control can get real time analytics about parking bays occupancy per areas and times of the day.