Cities are presently facing new challenges. Some citizens complain about air quality, while others complain about the lighting conditions in their city districts, not to mention the problems associated with waste management, traffic-related problems, parking, security, climate change, the insufficient provision of information, or problems relating to ever-growing urbanisation. Most cities attempt to address certain problems by making use of partial systems. On the other hand, we offer the integration of all these systems into a single and unique CitySys solution.

CitySys means Innovative and Sustainable Solutions for Smart Cities and is able to efficiently use the public lighting network to build the infrastructure for your Smart City. By replacing the luminaries in the public lighting system, it is possible to create a data collection communication network in the fastest and most cost-effective way.
The main reason is that lights can be found in all important parts of the city. Every light is evenly distributed. Every light could be replaced with an LED luminaire which brings savings and, in turn, the municipality will get funds for further city development, a power reserve and extended functionality. Lights are ideally distributed and spaced, which means their installation height protects them from vandalism. This means better conditions for the propagation of RF communication and an ideal location for installing cameras and sensors. There is no need to build a new electricity grid, it is possible to use the power network of the lighting system. A constant 230V power supply forms the basis for most sensors and devices in the SmartCity.

Why via lighting?

- **UNIFORMLY** located network in the city
- **ECONOMICAL** financing through energy saving
- **SMART** network by lighting replacement
- **CONSTANT** voltage available at 230V
- **SUITEABLE** positioning at heights
- **SIMPLE** administration and maintenance

You don’t need to build a new electricity grid: it is possible to use the power network of the lighting system.
CitySys is an open platform integrating multiple applications and they build the smart city. Data collection, transmission and evaluation are secured by the CitySys comprehensive control system based on the ThingsBoard IoT platform in the OPC standard. The Open Platform Communication is a series of specifications from software vendors and developers defining the interface between clients and servers, including real-time data access, alarm and event monitoring, access to historical data, and other applications. Its hardware component provides direct connectivity via standard interfaces and protocols, specifically: Powerline, Bluetooth, KNX, Z-Wave, ModBus RTU/TCP, BACnet IP, EnOcean, DMX, M-Bus, GSM, 1-wire, and DALI. It also offers the issuance of a standardised API, specifically REST API. We use the Powerline system for communication between the lamps. This means that the communication signal is transmitted via the standard 230V power supply network. In terms of connection with third-party systems, and thus also the existing systems already installed in the city, Citysys is open to MQTT, JSON, XML, XMPP, SMTP, and RSS communication protocols. The collected data is stored in the Cloud Server.
BIG DATA
The CitySys IoT Platform has multiple interesting benefits which can help the customer to decide to integrate Smart technology. Our platform is horizontally scalable and it’s built by using open-source technologies. The platform is fully fault tolerant, because every node in the cluster is identical. Its really strong benefits are that the platform is robust and highly efficient. This means that every single node can handle ten or even hundreds of thousands of devices. The platform has customisable widgets, a rule engine and a plugin system, which makes it really expandable.

Data collection (Big data) in a Smart City is secured by multiple sensors that monitor different parameters. It includes multiple sensors of interest, such as motion sensors, traffic sensors, parking space occupancy detectors, weather stations, waste management sensors, noise sensors, gunfire detection, CCTV cameras and emergency buttons. All of these devices can be implemented directly into the luminary or may form part of a Smart Pole. The platform is horizontally scalable and is built using open-source technologies.
### SMART CITY STRUCTURE

All areas of the city where we receive data can be divided into several modules: infrastructure, environment, social, well-being, public, and intelligence. Modules are assigned to applications that can evaluate, manage and modify acquired data. CitySys is a platform that integrates all applications into one intelligent system.

<table>
<thead>
<tr>
<th>MODULES</th>
<th>APPLICATIONS</th>
<th>FUNCTIONALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOCIAL</strong></td>
<td>Health &amp; care, Safety &amp; security, Accident analyses, Crises, Electronic service delivery</td>
<td>- Disease control, Emergency response, Patient authentication - Crime detection, Crowd control, CCTV</td>
</tr>
<tr>
<td><strong>WELL-BEING</strong></td>
<td>Cultural, Leisure, Entertainment, Hospitality, Shopping malls, Event management</td>
<td>- -</td>
</tr>
<tr>
<td><strong>PUBLIC</strong></td>
<td>Citizens’ Portal, Electronic Services Delivery</td>
<td>- Citizen Consultations, Citizen Engagement, Public Information Grievance Redressal - Shared network, Connected communities, Municipal Services, City Database</td>
</tr>
<tr>
<td><strong>INTELLIGENCE</strong></td>
<td>Connectivity, Integrated services, Building automation, Small &amp; medium enterprises, Smart business centre, Digital signature</td>
<td>-</td>
</tr>
</tbody>
</table>

[CitySys logo]
The software can be applied simply by adding secure connectivity/hosting through the air. It is possible to connect only one luminaire or a group of luminaires. It enables an inter-cloud Wi-Fi Connection between selected sustainable luminaires.

We offer a variety of smart services, cloud post and applications, which can be added at any time without any additional effort. Every new sensor can be simply connected.

CitySys uses a widget system where a user is able to customise the graphic interface based on the user’s needs. (Graphic of user interface customisation). A web application is created in responsive design. The layout adapts to the viewing environment by using proportion-based grids and flexible images.

CitySys customises the graphic interface based on the user’s requirements.
The Control system provides many functions which are helpful for its users. It provides a basic overview of the status of each device managed by the platform. You can see the list of electric distributors with their current values and it is possible to filter and display required details. The information section about events and failures, with a quick look at electricity consumption, is really useful.

The CitySys system allows for direct lighting control, and this is done in multiple ways:
- using the remote switching of power contactors based on the system’s button functionalities
- using the automated switching of power contactors based on pre-set Switching Profiles
- Dimming Profiles are commonly used to dim the lighting, which are assigned to individual luminaries
- naturally, manual dimming of the luminaires is also possible via the system’s button functionalities, which is possible for individual lights, groups of lights, or for selected lights via the map.

The statistics on the status of devices in a selected group of switchgears are a must.

An interactive map preview is displayed at all viewing levels. Users can display edit view, switch map type, choice, which devices will be displayed, add virtual points to the system, monitor device status, creation of device groups, etc.

LIGHTING

The CitySys lighting module provides access to the management and monitoring of public lighting where the implementation of specific operations is made via modern widgets. This means that a module is summarised in 4 chapters: Control, Data, Optimisation and Maintenance.

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The traffic application contains the main pillars such as Traffic data, Traffic planning, Traffic management and Traffic information. Access to and calibration of the transport system will increase the quality of city life. Improvement of collection, management and utilisation of traffic data and increased traffic mobility and fluidity are only a few of the benefits which it can bring to citizens. It can be really helpful for citizens due to the fact that the application will provide accurate traffic information to drivers, and even to passengers, plus support multi-modal and alternative transport. One really interesting and useful function is the possibility of maintaining traffic even during an emergency. Traffic data provides necessary information about vehicles in your city. The system can detect the speed of vehicles, gaps between vehicles, travel time, information about the traffic situation, and the number of pedestrians or cyclists on the road.

Through that, traffic planning is customisable in order to make a model of the traffic situation by inputting traffic intensities from traffic sensors, a matrix of transport relations, a public transport model, traffic infrastructure and traffic accidents. Further traffic planning includes a traffic forecast with infrastructure toward development and traffic planning, and planning to implement public traffic policy.

The customer will really appreciate its scenario assessment, whereby the customer can create macroscopic and microscopic transport models and/or optimise mobility and territorial plans. Traffic management uses sensors, which work even when their capacities have been exceeded. The customer can design and simulate algorithms for automatic control system response and to deploy higher strategic management in practice. The system also offers the possibility to evaluate and check effectiveness and exchange data with other systems, such as information which will be given to / by the customer by the traffic system, the position of vehicles, delays, lockouts, information from public transport dispatchers, and paths by the start-end system.

The main focus it to find the optimal connection according to the current traffic situation in multimodality mode. The system is prepared for creating various model situations. In the event of an accident, we can use the CCTV system or Bluetooth technology to create a light wave along the path of the emergency vehicle heading to the accident site.
**PARKING**

Modern cities are faced with many daily issues, which can be solved by our Smart Parking Solution.

Many people travel daily into cities for work or business, and that’s the reason why traffic increases and it brings problems with finding parking spaces. Its demand totally exceeds its supply and drivers do not have any information about free parking places. They look out of their cars’ windows and this is another reason why traffic increases more.

The Smart Parking Application can be used to search for free parking places and to pay parking fees due to the fact that more than 75% of drivers use a mobile app or GPS navigation. The opportunity to pay for available parking places through that application will be accepted by owners of the parking places, too. And last, but not least, citizens and visitors will appreciate comfortable mobile payments.

The Smart Parking Application consists of a web application for parking place owners, parking service providers and cities, easy to maintain and native mobile apps, and a responsive web application for drivers. It also offers supporting applications such as an Android native mobile app for mobile service providers. Services for 3rd party use are available via API.

All communication is processed via APIs. The parking policy is configurable for on-street / off-street and offers a wide range of designs.

On-street parking means increased utilisation of your parking places and a better payment system.

Off-street parking is set up for closed parking areas, i.e. for shopping malls.

The mobile user app offers a basic view and payment option. In the basic view the customer can filter actual data and information as needed, i.e. actual occupancy information, price for parking, information about IoT parking navigation to the IoT parking, and purchase a parking ticket. The payment part includes a view of the amount of parking fees, duration of parking, car type, and choice of payment type, payment, and navigation back to the car, plus a reminder of when the parking time ends. Other useful functions which the mobile app offers are the history view and the possibility to edit the profile.
E-CHARGING

Smart grid technology created smart charging, the ability to manage the flow of electricity from the grid to the vehicle. A Smart charging grid can be transformed by advanced networking, communication and automation technologies.

The provider gets full service for implementing an e-charging system. The provided services include customer identification, RFID, Plug&Charge, even Direct Payment.

The possibility to integrate a smart grid within load management is also provided. Billing, installation and maintenance will be provided as another part of the service.

Public charging can be simply integrated in lighting infrastructure. Electric vehicles and bikes can be charged through lighting. It also offers city-wide charging network distribution or smart utilisation of lighting infrastructure for mobility. It has also big potential for integration into intermodal mobility services and other value-added services.

Advantages of E-mobility

E-mobility reduces global and local emissions from road transport, which will help bring cleaner air to us without harmful substances. The other strong reason why you should implement e-mobility is that e-mobility will increase economic independence from energy monopolies and constantly rising energy prices.

The other reasons are strong social and legal aspects also with economic and technical aspects. The reduction of emissions is a strong theme and it goes hand in hand with a requirement for cleaner air and less noise in cities. The investment into innovative solutions will increase the protection of human health whilst decreasing costs. The cost of installing a charging point into existing luminaires represents approximately 10% of the cost of creating a totally new charger.
The current generation requires meeting their needs without compromising future generations.
We are a part of really modern and fast global changes. Most of those changes put pressure on our world and it is important to start caring about our environment. A good start is by implementing waste management systems into our villages and cities. The waste management system offers smart reverse vending machines, and smart waste management such as IoT, underground Bins and Environmental Gadgets.

All those parts have huge potential to take care of our environment. What can we achieve with that set up? First of all we can achieve clean cities, lower carbon emissions, lower fuel consumption, less collection time, fewer vehicles and, of course, lower service costs.

The main function of waste management is its effectiveness. It enables the optimisation of collection operations and maximises the use of valuable resources. The waste management device supports information such as container fill level, container temperature, fire detection, container collection detection and GSM signal quality.

How does it work? The sensor in the waste vehicle sends information on the container ID to a reader when a vehicle is collecting the waste. The reader sends the complete information with the container ID, collection time, location and vehicle ID to the cloud server. According to this information the user can monitor the status of each container in real time plus actively tag detected collection of the container.

Have you ever heard about underground bins? The container is separate from the waste entrance platform in a reinforced concrete tank. When the upper platform is opened, the inner container is lifted by a crane mounted on the vehicle and the waste is taken by the vehicle.
AIR QUALITY

Air quality technology scans air pollution dispersal in the square and pollution exposure for pedestrians, bikers, drivers and local residents. It also monitors and stores relevant air pollutants and produces reports to assist urban planning. The smart city pole duct sensor detects air quality, temperature and humidity all in one.

APPLICATION

Duct air quality sensor for detection of VOC air quality, and optional humidity combined in one unit. Designed for duct mounted applications with up to 3 0..10 V outputs. The sensor consists of a transmitter with VOC sensor, based on a heated tin oxide semiconductor. With the option board relay two-point controllers or a 2-stage 2-point controller for temperature or humidity can be realized.

TYPES AVAILABLE

- Duct sensor VOC + temp (opt.) + rH (opt.)
- active 1x/2x/3x 0..10 V | 2x 4..20 mA
- LK+ VOC V
- LK+ VOC VV
- LK+ VOC AA
- LK+ VOC 3xV
- Duct sensor VOC + temp
  - active 2x 0..10 V + relay
  - LK+ VOC VV Relay
- Options: additional passive temperature sensor eg: PT100/PT1000/NI1000/NI1000TK5000/NTC10K...

WEATHER MONITORING

Weather monitoring technology measures atmospheric conditions to provide information for weather forecasts and to study the weather and climate. It also provides actual information for citizens about temperature, atmospheric pressure, humidity, and wind speed or direction. The weather monitoring technology measures data automatically (once per hour).

“Weather and air have a direct impact on each of us.”
The safety of people in cities is one of the main requirements of city representatives. Emergency security solutions for town and city centres bridge the gap between the public and security personnel. The smart city pole is an opportunity for how to make a city safer with its emergency call station. The emergency call station cooperates with the control desk. The web application interfaces with 3rd party systems, video surveillance and real time analyses. The safety & security technology consists of help points with audio, video and signalisation and emergency help points with bollard/barrier control. Emergency stations can be set up on public transport stations, in subways or other places where there is a high movement of people. Another important function is the communication server, from where information is sent to a control room with visualisation SW and CCTV integration. Information is then sent to the police or patrols via integrated mobile radio, and other rescue services may be called, if needed.

“...The majority of citizens don’t perceive their city to be a dangerous place.”
The smart city concept combines multiple components: the innovative use of information technology, efficient transport, sustainable energy consumption, and a clean environment.

At the same time, citizens will receive services that offer them more comfortable and better lives in the city, because it is they who are the direct beneficiaries of the smart city’s advantages. All this thanks to the public lighting system, through which cities are able to build their own infrastructure without any unnecessary costs.

“Cities are key partners in support of a low-carbon and clean economy.”