

TUNGSRAM™

Innovation is our heritage
EST. 1896

TUNGSRAM SMART SOLUTIONS

The future of technologies for
cities and businesses of today



CLAIMING THE GLOBAL SPOTLIGHT

Over the past 120 years, Tungsram had gone through many changes and became an innovative global brand. The company has systematically built new solutions, often leading to exponential sales growth. Today, Tungsram is much more than a lighting manufacturer. It is a global company that delivers future-proof technologies combined with a century of expertise in high-quality lighting solutions.

Tungsram, the iconic lighting brand seeks to serve its target markets with high-quality lighting solutions.



Highly skilled colleagues



more than **4000** employees

Up-to-date technology and certified quality assurance



Expertise in lighting



Tungsram Operations

TUNGSRAM SMART SOLUTIONS INTRODUCTION

Tungsrám's vision is to deliver innovative physical and digital solutions for both enterprises and inhabitants of a city to strengthen their environmental, social, and economic sustainability. Tungsrám is a technology solution integrator, which delivers end-to-end solutions by tapping into its widespread partner ecosystem.



The aim of Tungsrám's Smart Solution portfolio is:

- to improve a city's attractiveness to citizens, visitors, and businesses by adding efficient and innovative services
- to enable better decision-making through the use of data
- and to provide a better quality of life.

The results are:

- improved quality of service for citizens and businesses
 - economic competitiveness by attracting businesses and visitors
 - an environmentally and economically conscious focus on energy efficiency
- more efficient and responsive environment that feeds back into the ecosystem.

Tungsrám Smart Solutions, amongst all, can help you establish a more comfortable environment, let it be indoors or outdoors, achieve energy savings for buildings, reduce the time spent on driving, increase retail and parking revenue, and it enables you to save costs while you operate and maintain a building.

Tungsrám's smart city portfolio contains a variety of solutions for smart buildings, smart transportation, smart parking and the option for a centralized, location-based data analytics.

Step into the world of Tungsrám Smart Solutions in 60 seconds

Search for Tungsrám Smart Solutions on Youtube [or scan the QR code](#)



The journey of Tungsrám started as a lighting manufacturer, then we grew beyond



TUNGSRAM SMART SOLUTIONS COMPETENCIES AND IMPLEMENTATION APPROACH

Tungsrám gains its global insight into market needs by constantly interlocking with its widespread global partners and sales network. It possesses a stable yet flexible hardware production capability and has access to core city and building infrastructures (lighting). Being a global player, Tungsrám has global product introduction capabilities and uses the latest innovation management techniques to plan and deliver its solutions. Tungsrám leverages on its strategic partners niche competencies by integrating those into its own products and services portfolio.

Tungsrám's implementation approach includes:

- | Technology integration on database layer
- | Handling all sensors' data in one platform instead of leaving them spread across monolithic systems,
- | Unified service level and business continuity management,
- | Single user interface with a white label approach and a unified user experience with completely harmonized subsystems,
- | Single point of contact for the entire development as well as for later requests,
- | Scalable, modular, and future-proof systems.

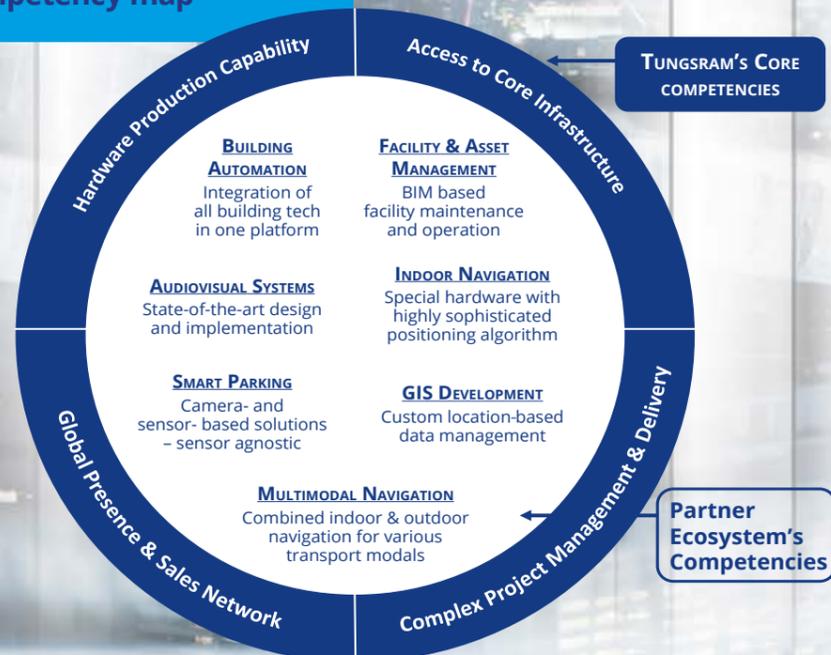
TUNGSRAM SMART CITY MODEL

Tungsrám Smart City

Tungsrám is an independent smart solution service integrator covering a broad range of smart city services customized and localized for a city's needs.



Tungsrám's competency map



INDOOR AND OUTDOOR POSITIONING

Our indoor and outdoor positioning system with route tracking, navigation, and location-based analytic capabilities is integrated in one mobile application. The client can create its own “Google Map” for outdoors and a digital building model for indoors with one meter accuracy by using our specialized beacon technology and our sophisticated algorithm.



The solution can locate and navigate to various Points of Interest (e.g. meeting rooms, departure platforms, storage rooms, lavatories, exhibitions, stores, lecture rooms, terminals). It can also send location-based information or push notes with advertisements. The solution is also capable of tracking the preferred routes of personnel and visitors. Implementation results in better employee, visitor and customer experience, increased retail sales, and a decrease in cleaning needs, costs and false complaints.

TECHNICAL DETAILS

Functionality

- | Better utilization of mobility infrastructure
- | Location-based data management, including pipeline network, dynamic assets, fleet management
- | Indoor navigation
- | Asset and people tracking
- | Fleet management
- | Multimodal transportation route planning
- | Seamlessly integrated indoor and outdoor functions

User Experience

- | Single application for indoor and outdoor navigation
- | Mobile and web application
- | Customizable for the client’s design requirements
- | Highly focused on user experience
- | Easy-to-understand reports about location-based data (heatmap, dashboard)

Installation Requirements

- | Detailed floorplan, BIM model, or building survey for indoor positioning
- | WLAN and power supply for indoor asset tracking

Hardware and Software Architecture

- | Single application architecture with multiple permission levels
- | Cloud agnostic or on premise or hybrid/distributed installation
- | Demand-driven scalability
- | Tungsram installed in its HQ 35 BLE sensors across a 1,000 m2 area to achieve one-meter positioning accuracy
- | Beacons can run for 5 years with their replaceable batteries
- | 1-meter accuracy can be achieved by installing 35 sensors on a 1000 sqm area

REFERENCE IMPLEMENTATIONS OF OUR STRATEGIC PARTNER'S SMART SOLUTIONS

Customer Name

National Road Toll Payment System (Hungary)

National Mobile Payment Plc. (Hungary)

ÉMI Non-Profit LLC for Quality Control
and Innovation in Building

National Rescue Services (Hungary)

Implemented solutions

Complete GIS backend and data management

GIS backend of mobile parking payment

Indoor and outdoor navigation on the premises
of ÉMI, designed for the international Solar
Decathlon competition

Route planning for ambulances based
on real-time location data

SMART PARKING

Smart Parking is a convenient and user-friendly parking solution for parking slot reservation, navigation and monitoring parking lot utilization. Users can navigate their complete journey from their outdoor location to their parking space (both indoor and outdoor) using one application.



THE SMART PARKING SYSTEM



helps users find the optimal parking slot, ensuring the least amount of time spent driving around in parking lots. It can monitor real-time parking lot utilization and the clients can optimize their parking areas based on actual usage data. The system can also be integrated with a mobile payment service to also pay for the parking.

With this solution, inhabitants, employees, and visitors can greatly reduce their time finding parking spots in parking lots or public spaces, while building and parking lot operators can decrease costs by optimizing the layout of parking areas.

Camera-based sensors:

- | Can be mounted on top of lamp posts
- | Requires continuous power supply and internet access

HARDWARE AND SOFTWARE ARCHITECTURE

- | **Sensor module, connectivity module** and server application interface
- | Cloud or on-premise data storage and analytics
- | Edge computing module (optional)

TECHNICAL DETAILS

FUNCTIONALITY

- | Available sensor technologies in our system: infrared, magnetic, camera based
- | Hardware agnostic
- | Navigation towards available or reserved parking slot
- | Possible connection to a mobile payment system
- | Battery lifetime: 5-10 years
- | Vandalism proof

USER EXPERIENCE

- | Easy-to-use mobile interface for parking slot reservation and navigation
- | Parking lot occupancy monitoring and analytics visualization via the dashboard and heat map

INSTALLATION REQUIREMENTS

Magnetic and infrared sensors:

- | Can be installed in the asphalt or concrete pavement
- | Requires P2P gateway installation with one gateway connecting to the Internet

REFERENCE IMPLEMENTATIONS OF OUR STRATEGIC PARTNER'S SMART SOLUTIONS

Customer Name	Implemented solutions
Parkopedia	Global on-street parking data management
City of Kecskemét (Hungary)	Complete parking lot monitoring system
ÉMI Non-Profit LLC for Quality Control and Innovation in Building	Indoor and outdoor navigation on the premises of ÉMI, designed for the international Solar Decathlon competition
Tungfram	Development system at Tungfram's Headquarters

TUNGSRAM INNOVATIVE SOLUTIONS

ArchiFM

ArchiFM is a web-based Computer Aided Facility Management Solution (CAFM) using BIM technology and the world-renowned software: ArchiCAD. ArchiFM is however much more than just a piece of software. It features all asset and property management functionalities, and all the related maintenance modules. You can also use it on your **mobile** or on the **web**, which offers additional **convenience, quality, and freedom** of choice to its users.

ArchiFM provides decades of knowledge, experience, and know-how in installing and monitoring smart sensors, or keeping an accurate and up-to-date documentation of a lighting modernization performed. That is why it achieved remarkable success in the Central European region in the past decade, and it also has a presence over the entire Europe, Japan, South-Africa, and has countless partners in four continents.



Why ArchiFM?

Because you will love it when you use it. It remains simple and user friendly, while there is a fully integrated and robust CAFM/CMMS system running in the background at full speed. In addition, it offers you the freedom of choice between web-based or mobile, on-premise or cloud, and it is interoperable with ArchiCAD, BIM/IFC, OrthoGraph (a 3D building surveying system) which no other facility management software can do.

Benefits

- Full access to all your data anytime, anywhere
- On-premise or cloud SaaS (no need for initial investment)
- Integration with countless other systems (SAP, ERP, BMS/BAS/EMS, GIS)
- Centralized document repository
- Flexible and customizable
- We support all our partners with an extensive customer service
- Tungsrám, which guarantees continuous innovation, uninterrupted operation, and financial stability

TECHNICAL DETAILS

Functionality

- Accurate area and asset management with BIM/IFC integration possibilities
- Support of operational workflows
- Corrective, preventive and condition-based maintenance management
- Automatized workflow management
- Centralized document register
- Utility meters and consumption monitoring
- Efficient energy management and easy cost sharing functionality
- Strong analytics, prediction capabilities

User experience

- Impressive user interface
- Easily customizable system
- Efficient workflow handling
- Real time and automatic task allocation
- Automatically generated worksheets from BMS/BAS systems
- Paperless digital administration
- Automatic and real time reporting



Installation requirements

- Hosted Cloud version needs no Software installation
- On-premise installation also possible
- Both approaches provide simple customizability and centralized system administration
- In the cloud version new updates are automatically installed

Hardware and software architecture

- On premise or cloud version available
- Responsive web application for PC, Tablet and smartphone
- Integration framework to connect other systems (e.g. BMS/BAS, IoT, ERP etc.)



REFERENCE IMPLEMENTATIONS OF OUR STRATEGIC PARTNER'S SMART SOLUTIONS

Customer Name

MOL Hungary (integrated oil, gas and petrochemical group)
Audi Hungary (Car and Engine Factory)
TODA- Japanese Construction Company

Implemented Solution

ArchiFM for facility management
(1.6M EUR yearly saving achieved)

ArchiFM was implemented to handle 600.000 m² and 150.000 worksheets related to facility management on a yearly basis

BIM Interconnection, visualization of workflow, reporting, CO₂ and energy reduction, facility cost evaluation

BUILDING AUTOMATION

Unique industrial monitoring and control systems – custom developed or Siemens technology to increase efficiency by applying an integrated control platform that includes behavioral analysis and machine learning in these areas: heating and cooling control, lighting control, HMV, doors and other closing systems control, HVAC, water measurement, alarm and electricity network control. Full integration of new and old systems with a universal protocol to ensure a personalized, cost-efficient system at a significantly lower price than offered by others on the market.



The implementation of building automation improves energy efficiency of the building by harmonizing and centrally controlling systems. This also reduces CO2 emissions, and it provides a sustainable management in the building's operation. Depending on the building and machinery it can result in up to a 30% reduction in the building's energy consumption.

INSTALLATION REQUIREMENTS

- | Automation engineering design: analysis of existing building engineering and their communication protocols and integration design
- | Energy audit (optional)
- | Energy strategy design

HARDWARE AND SOFTWARE ARCHITECTURE

- | Integration with all intelligent controllers possible (Honeywell, Siemens, Schneider, Philips, Johnson, etc.)
- | Universal protocol for heterogenous systems and devices (can handle all building automatic standards)
- | Monitoring and control platform on the premises or in the cloud
- | Mobile application available
- | DDC modules & Network (Bus/IP etc.)

TECHNICAL DETAILS

FUNCTIONALITY

- | Integration of the old and new building engineering in one platform without replacing existing systems
- | Real-time statistics, analysis for preventions, control and planning
- | Remote, instant access to mechanical elements, managing corporeal devices on a common platform
- | Consumption load, capacity peak level management
- | Customized monitoring and controlling system

USER EXPERIENCE

- | Tailor-made user experience
- | Easy-to-use, user-friendly interface
- | Responsive platforms
- | Easy to configure
- | Map view
- | Instant access to all buildings
- | Any process can be tracked with a tablet or a phone
- | Automated alarm

REFERENCE IMPLEMENTATIONS OF OUR STRATEGIC PARTNER'S SMART SOLUTIONS

Customer Name	Implemented solutions
OPEL Factory Szentgotthárd	Centralizing building control systems and eliminating the need for local personal controlling, achieving a 30% energy consumption decrease
National Instruments	Centralized building control system for a healthcare center
MÁV Hungarian Railways	Elevator monitoring systems - remote, instant access to mechanical elements, customized monitoring and controlling
Schott Glass Factory	Complete building automation system

PEOPLE COUNTING

A highly accurate, camera-based people counting solution for office usage in cooperation with Analog Devices. The technology enables no image data leaving the edge node, thus it complies with GDPR requirements.



The people counting sensors create real-time and historical data for occupancy in office areas (open offices, meeting rooms, communal spaces, etc.). Based on the actual utilization data, the client can optimize the interior setup and layout of their meeting rooms and other selected indoor spaces.

TECHNICAL DETAILS

FUNCTIONALITY

- | Provides information about people's locations inside rooms
- | Counts number of people
- | Can be configured for different selected locations
- | 90%+ accuracy for 3m radius, expected accuracy at 5m is 85%
- | Coverage area of 5m radius at 2.6m - 2.9m height
- | Remote and secure device management provisioning and over the air updates

USER EXPERIENCE

- | Visualize insights by aggregating edge-node data
- | Flexible, versatile and rich User Interface
- | Turnkey data visualization dashboard

INSTALLATION REQUIREMENTS

- | Power supply
- | Network access (Internet or internal network etc.)
- | Commissioning process: manual or automatic commissioning based on 3D BIM model

HARDWARE AND SOFTWARE ARCHITECTURE

- | Sensor module, connectivity module and server application interface
- | Cloud or on-premise data storage and analytics
- | Edge computing module (optional)

Reference implementation occurred at Tungfram's HQ

AMBIENT SENSOR NETWORK

Sensor boxes that can measure various key environmental indicators are important for the client's operation. Tungfram can measure and analyze any environmental indicator for which there is an existing sensor technology available. Furthermore, Tungfram can install any type of sensor into its existing IoT architecture with the standard protocols.

The sensors can be used for adapting AC, lighting, and ventilation to different environmental indicators and building utilization levels. Since it is adjustable, it can create a comfortable environment for all the occupants in line with the actual environmental conditions.

The implementation of sensors can result in decreasing a building's energy consumption due to aligning building systems with the people's actual activity in the building areas. Research also shows that better air quality can increase cognitive performance of employees by 100%.

TECHNICAL DETAILS

FUNCTIONALITY

- | Assembly can be customized on demand (what specific sensors to include in a sensor box)
- | Automatic alerting based on predefined values (SMS, email, push notification)
- | Analytics of sensor data on the selected IoT platform
- | Example of installed sensor box content: temperature, CO2 level, air pressure, humidity, motion, light conditions, noise level

USER EXPERIENCE

- | Visualize insights by aggregating edge-node data
- | Flexible, versatile, and rich user Interface
- | Turnkey data visualization dashboard

- | Exclusive sensor box design to meet the client's high expectations

INSTALLATION REQUIREMENTS

- | Power supply
- | Network access (Internet / internal network etc.)
- | Sensor box can be installed on (or in) the ceiling, on a wall, pillar, etc.

HARDWARE AND SOFTWARE ARCHITECTURE

- | Sensor module, connectivity module and server application interface
- | All sensor modules and connectivity modules are placed in a sensor box, suitable for the location design
- | Cloud or on-premise data storage and analytics
- | Hardware agnostic approach

Reference implementation occurred at Tungfram's HQ



AUDIOVISUAL SOLUTIONS

The audiovisual solutions offer the most suitable systems for the opportunities and expectations of our clients, providing customized solutions in addition to products already available on the market. Tungram delivers project-specific solutions instead of promoting specific brands, and delivers customer and function-focused design.

The audiovisual solutions can be used to enhance visual experiences. Astonishing displays (e.g. LED screens) are placed within a building to emphasize preferred messages. Meeting rooms, exhibitions or events can be equipped with the most sufficient, fit-for-purpose high-tech devices.

TECHNICAL DETAILS

FUNCTIONALITY

- | Designing and constructing broadcast, digital signage, acoustic, lighting, audiovisual, and television technology systems
- | IT management of these systems
- | Audiovisual content management
- | Simulation and 3D modelling in the design phase
- | **FEM** (Finite element method) analysis and BIM design

USER EXPERIENCE

- | Create special, long-lasting experience, affecting on the senses of the audience with the audio-visual effects

INSTALLATION REQUIREMENTS

- | Assessment of the location for the audiovisual assets
- | Power supply

HARDWARE AND SOFTWARE ARCHITECTURE

- | Platform
- | Displays
- | Acoustic system hardware
- | User interface

REFERENCE IMPLEMENTATIONS OF OUR STRATEGIC PARTNER'S SMART SOLUTIONS

Customer Name

Puskás Stadium (Hungary)

Implemented solutions

Giant LEDs (460m2), Perimeter, Broadcast System

Al Bayt Stadium, Al Janoub Stadium, Lusail Arena (Qatar)

Acoustics, Electroacoustics and Rigging

Groupama Arena and Papp Laszlo Arena (Hungary)

Design and implementation of AVLC and ELV systems, maintenance and operation

Middle-Eastern Education References:
Two institutions

Acoustics, automatization, programming, presentation, conferencing systems, stage machinery



WORKSPACE MANAGEMENT

A flexible management tool is essential for an agile or smart work environment to increase the utilization of available space. This solution has a cloudbased, central data hub. It is easily customizable to each client's specific needs. No hardware installation is necessary, remote commissioning is feasible.



The workspace management solution can be used to gather information about the office space and to get insights into the relationships between organization units. The collated data helps to create an activity-based work environment and provide better service.

A better working environment and a better user experience increases employee engagement and motivation by implementing agile working methods. Overall, the solution creates an attractive office environment that improves the employee's performance in the short term.

With an optimized workspace, utilization and rental expenses can also be decreased.

TECHNICAL DETAILS

FUNCTIONALITY

- I Space booking: parking spaces, workstations, meeting rooms
- I Visitor management
- I Fleet management
- I Dashboard and reports based on the floorplan layout
- I Measures the actual utilization of workstations and meeting rooms
- I Use collated data to create an activity-based work environment and provide better service

USER EXPERIENCE

- I Fully customizable dashboard system with real-time data, available for multiple operation sites
- I Software service, easily accessible via any web browser, making the booking feature easy and transparent by using the office floor plan and calendar overview
- I Easy access from your desktop, mobile or tablets.

INSTALLATION REQUIREMENTS

- I Floorplan layout (including the location of desks, rooms and parking space distribution)
- I Integration with people counting, sensor box and parking sensor solutions is possible

HARDWARE AND SOFTWARE ARCHITECTURE

- I Wirelessly installed sensors (optional)
- I Dedicated cloud server is available for each client
- I Responsive web application user interface and application are available
- I High data security protocol

REFERENCE IMPLEMENTATIONS OF OUR STRATEGIC PARTNER'S SMART SOLUTIONS

Customer Name

Implemented solutions

Leading Global Energy Provider
(Shared Service Center)

Workspace management solution (resulted in increasing the headcount from 800 to 1,250 within the same space)

Leading Global Pharmaceutical Corp
(Shared Service Center)

Workspace management solution (resulting in increased headcount from 1,200 to 1,350 in the same space)

Leading Global Premium Spirits Corp

Workspace management solution (resulting in increased headcount from 1,200 to 1,350 in the same space)

Leading Global Automotive Manufacturer

Workspace management solution implementation is in progress in 5 office buildings of a total of 20,000 sqm

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