
elekon
Smart Building Technologies
R&D

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Since 2006

In Pursuit of an Economic, Smart and Sustainable Future.

Elekon, founded in 2006 with entirely domestic capital, is an engineering firm offering design and engineering solutions in various fields including building technologies, internet of things (IoT), security, automation, and lighting. The company has two offices: the Ankara Head Office and the Istanbul Office.

In the building technology industry, we team up with Carrier, a major player in this field. We are a tech partner for Helvar, based in the UK and Finland, specializing in IoT, automation, and lighting components as they commemorated their 100th anniversary in 2021. Furthermore, we collaborate with Mackwell from the UK on emergency lighting solutions.

In 2019, we launched our initial R&D initiatives with the goal of creating our own software and product groups by implementing business methods and technologies we learned from our international collaborative companies.

We are in the process of transforming our company from being an integrator to becoming a technology producer and developer with its own resources in Turkey.

We are making applications to register our designs as utility models while continually conducting new model studies.

1000+ PROJECTS IN 22 COUNTRIES

8.000.000 m^2 PROJECT FIELD

Our Fields of Activity

Engineering;

Project Analysis | Feasibility | System Design | Project Design | Supervision | Implementation Reporting | Testing and Commissioning

Information Technologies;

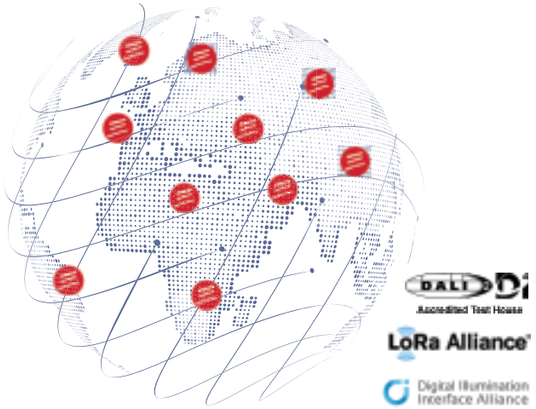
Security Systems | Automation Systems | Integration Platform | Smart Thermostat | Lighting Systems | Internet of Things (IoT) | Smart City Solutions

Service;

Periodic Maintenance | 24/7 Service | Business Support and Reporting

Agriculture;

Soilless Agriculture | Sapling Production | Smart Cabin



DALI Ready Accredited Test House

LoRa Alliance

Digital Illumination Interface Alliance

Our Main Design Areas

- Fire Detection and Control Systems
- Emergency Announcement and Voice Evacuation Systems
- Emergency Communication Systems
- Emergency Lighting and Security Systems
- Access Control Systems
- Security Cameras and Management System
- Lighting Management and Automation Systems
- Hotel Automation Systems
- Smart Cities Wireless Monitoring and Control Automation
- Smart Greenhouse and Cabinet Automation Systems
- System Integration and Management Software Design
- Operation Maintenance and Service Optimization Software
- Designs of Soilless / Home Agriculture Application Projects

Given the upcoming rise in our R&D activities and project load, we are offering training to our R&D staff on patent registration and preparing patent files.

In 17 years, we have been involved in more than 1000 projects in 22 countries on 4 continents.

In addition to providing design and engineering solutions in the Turkish market, we have expanded our operations to include exporting design and engineering services abroad.

Elekon has a highly experienced team of around 65 staff members, including electrical engineers, electronic engineers, technical personnel, and draftsmen.

Our R&D center has a team of 22 staff members, which comprises 12 engineers, 4 technicians, 2 support personnel, and 4 individuals specializing in basic sciences like mathematics and design.

We have 22 staff members in our R&D center: 1 doctoral student, 3 grad students, 3 master's graduates, 10 with bachelor's degrees, and a vocational school graduate.

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In today's world, energy efficiency is increasingly important. We prioritize solutions that enhance efficiency and operational capabilities through project-specific designs.

Elekon DALI Thermostat

Activities for Developing an R&D and Design Culture

We are committed to increasing our budget for the cultural and technical training of our employees. We also plan to expand participation in seminars, conferences, and scientific events. In 2021-2022, the number of R&D personnel increased by 40%, and face-to-face trainings were conducted to promote an R&D and design culture within the R&D center's personnel.

Scientific Events We Have Participated In

- Eco Climate: Economy and Climate Change Summit (2022)
- CI-CS 2021 International Conference On Informatics & Computer Science (2021)
- 9. International Conference On Electrical and Electronics Engineering (ICEE 2022)
- 8. International Conference On Electrical and Electronics Engineering (2021)
- 6. International Conference On Mathematics and Artificial Intelligence (2021)

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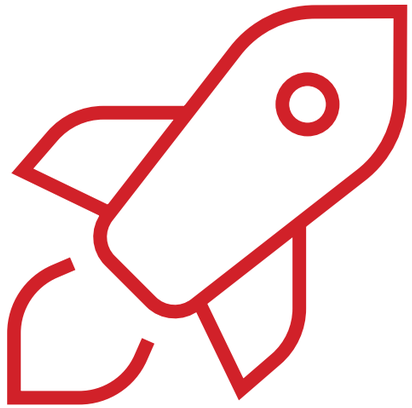


Our Planned Projects

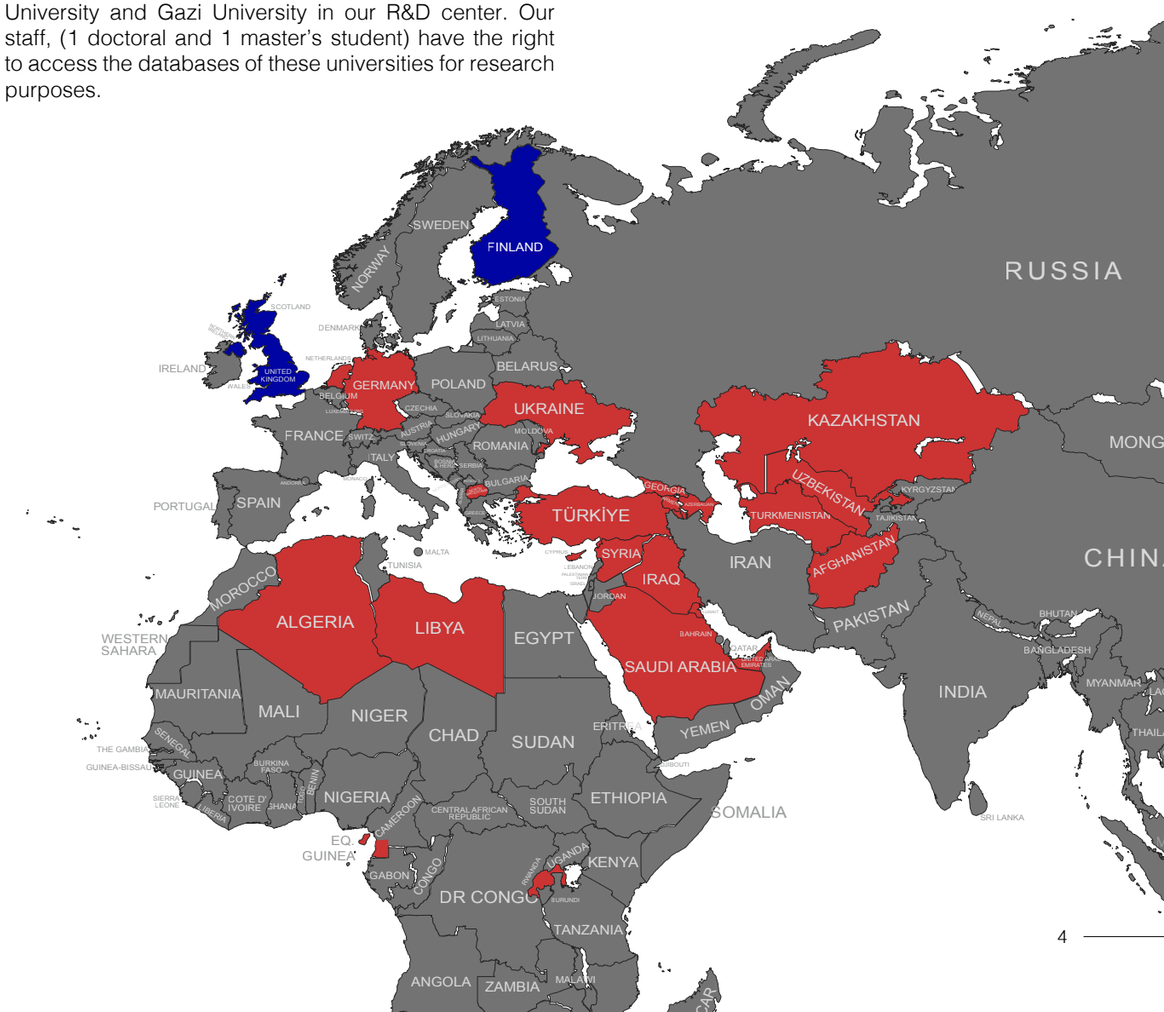
- Development of Emergency Fixtures
- DALI-2 Autonomous Building Management System with Intelligent Multi-Master Application IoT Controller and Machine Learning
- Occupancy Estimation in Buildings with Machine Learning (Ensuring Energy Efficiency, Air Quality and Thermal Comfort by Mapping)
- Creating a Wireless MESH IoT Sensor Network
- Electronic Label
- Smart Agriculture IoT Applications using LoRaWan Infrastructure

Our R&D and Design Infrastructure

We have established academic cooperation with Ankara University and Gazi University in our R&D center. Our staff, (1 doctoral and 1 master's student) have the right to access the databases of these universities for research purposes.

1 Patent Application

3 Design Registered Projects



Our Sustainability Objectives

- Green Building Certification
- Contributing to the development of structures in line with WELL standards
- Integration Platform
- Smart Air Conditioning
- Smart Lighting and Comfort Management
- IoT Solutions
- Smart City Solutions

Our Strategic R&D Objectives

Enhancing our edge in both the global and local markets and making strides in establishing a strong brand presence.

Creating efficient energy lighting automation systems, low-voltage systems, and ensuring their management solutions within the smart building technology sector.

Fostering collaboration between universities and industry to create original designs and products.

Advancing product development while continuing research & design endeavors with Helvar, Carrier, Mackwell - companies for which we are authorized distributors.

Developing partnerships with domestic and foreign companies and universities for joint projects to design value-added systems for our country and our company.

Expanding our efforts in smart agriculture, including the analysis of big data using artificial intelligence, and providing heat and light control solutions.

Conducting patent, utility model, and registration studies aligned with our work.

Leveraging artificial intelligence applications such as deep learning, machine learning, and internet of things.

Our R&D Organization Scheme

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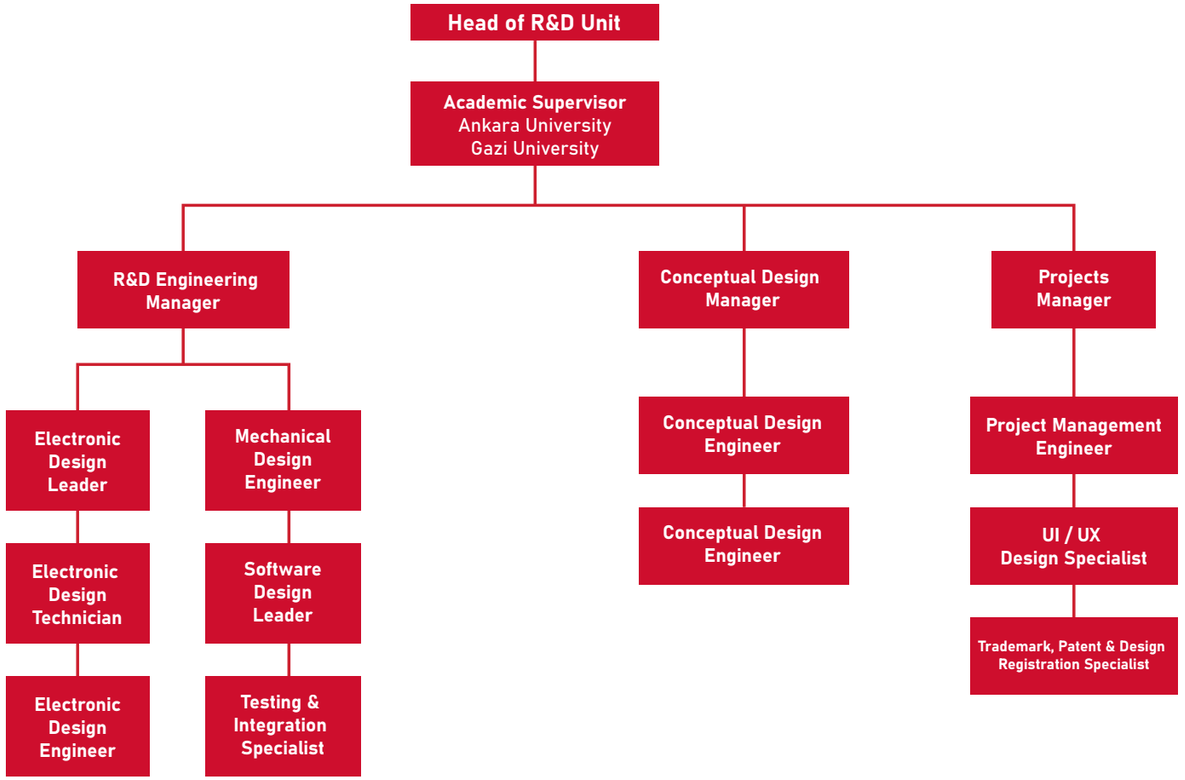

Our Software and Artificial Intelligence Implementations

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Optimizing building automation for energy efficiency by using machine learning algorithms to consider environmental conditions such as asset tracking, time profiles, and daylight.

Remote monitoring, sensor fusion, autonomous decision-making, and decision support software for Smart Building, Smart City, and Industrial IoT applications.

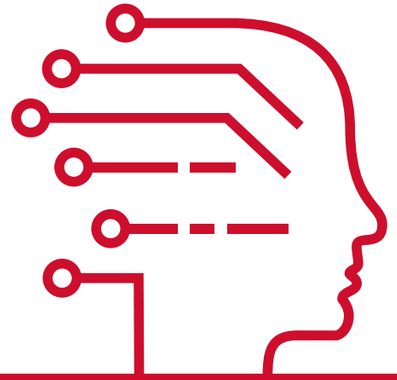
Artificial intelligence analysis software that enhances efficiency and safety by creating maps of asset status and energy consumption within campuses and buildings.

Smart software for IoT systems in campus and district security.

Simulation software for developing, modeling, and testing wired and wireless communication protocols.

Reporting and notifications using data analytics algorithms to enhance comfort areas, ultimately boosting employee productivity and customer satisfaction.

Intelligent software for predictive maintenance with precise fault tracking.



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RCU Lightweight

We have developed the RCU LIGHTWEIGHT room control device with built-in relays, digital inputs, real-time clock, ethernet and DALI interface. The RCU controls internal relays as well as any gear in the DALI line (such as DALI relay, DALI led driver, or DALI dimmer) based on its profile and input data from either the DALI line or its own inputs.

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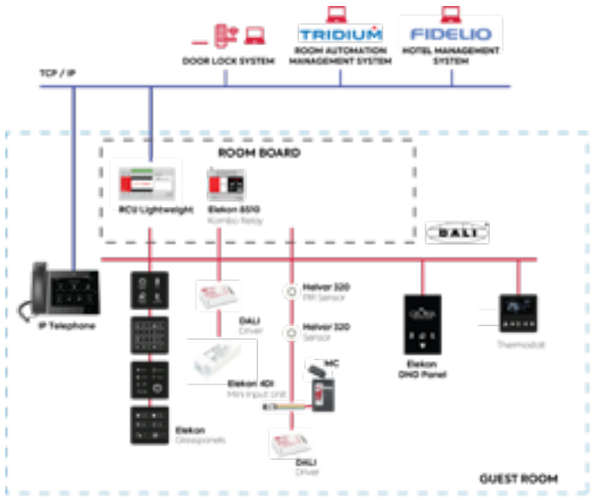
Central Room Control Units installed in buildings serve as an interface for users, enabling automatic control of building assets such as lighting, temperature, curtains, audio-visual devices and other technological elements.

Smart building automation systems aim to enhance service quality and customer satisfaction by controlling in-room services. This includes regulating the comfort area according to user preferences and their health status.

The panel connected to the sensor and control network via the DALI interface allows for flexible designs with additional features tailored for managing in-room services.



candela

Smart City IoT Management System

Candela is a system that allows remote monitoring of luminaire status, faults, and energy consumption in smart cities over the LoRaWAN network. The Smart Street Lighting IoT System analyzes centralized data to create energy consumption reports and optimize the management of lighting units.

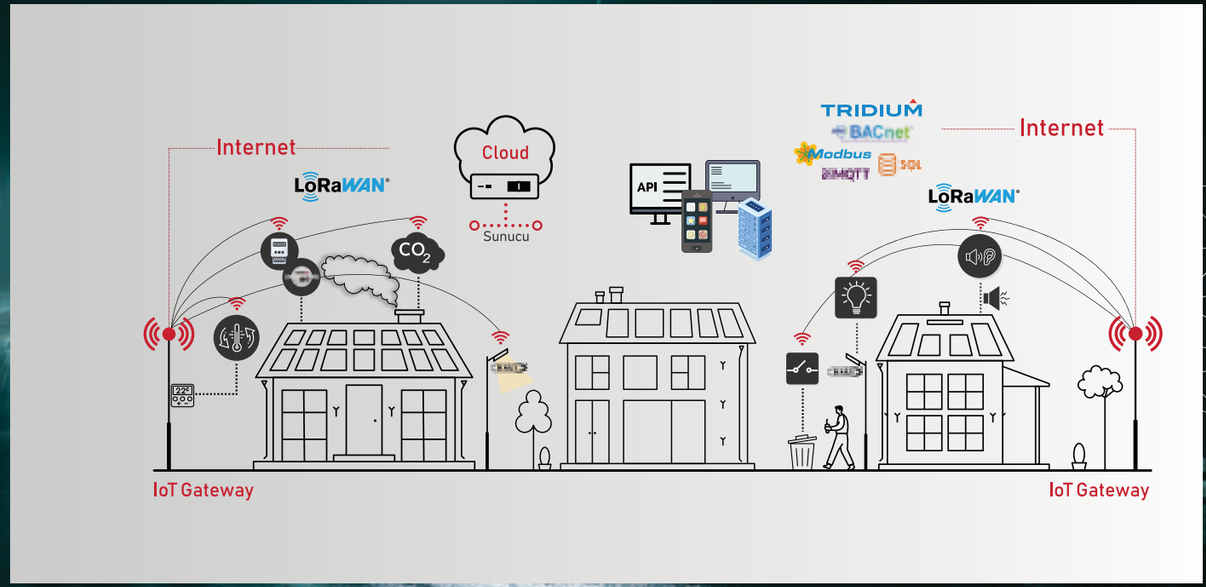
Energy saving up to 70%

An integrated smart city management and lighting platform based on the Internet of Things has been created within the project's framework. It is designed for easy expansion and integration to accommodate cities' evolving needs, providing energy-efficient solutions as well as centralized monitoring and control capabilities. Furthermore, it boasts simple installation and operation.

Thanks to the DALI protocol, it can work in harmony with DALI drivers from all manufacturers, regardless of the brand. This allows for energy savings of up to 70% depending on the lighting scenarios.

LoRaWAN® DALI®

CANDELA CATALOGUE



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Campus Environmental Monitoring & Security System

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Physical security measures are essential for environmental and regional protection, but evolving technologies offer more advanced solutions. These advancements enable the monitoring of larger areas and the detection of threats with fewer resources.

Radar and camera technologies, initially employed during the Second World War, are now widely used as perimeter surveillance systems. However, challenges related to material supply in RF and optical technology can lead to high procurement, operation, and maintenance costs for these systems. As an alternative to complex environmental protection systems, more compact and cost-effective solutions can be achieved with distributed sensors located within a region.

The Campus Environmental Monitoring and Security System enables the implementation of flexible and cost-effective environmental protection solutions, utilizing existing energy and communication infrastructures.

Wireless Sensor networks are integrated using LoRaWAN communication protocol.

Real-time threats can be detected through the use of multiple sensors (motion, vibration, acoustic, light, thermal, etc.) placed in a field.

Using artificial intelligence and big data analysis to differentiate and identify various objects such as humans, vehicles, animals and drones.

Utilization of the existing campus lighting infrastructure for an easy and cost-effective installation.

Development of machine learning systems to effectively distinguish and eliminate erroneous detections triggered by wind, rain, and other factors.

LoRaWAN communication technology, which provides secure communication within a point-to-point network over long distances and at low RF level.

LoRaWAN®

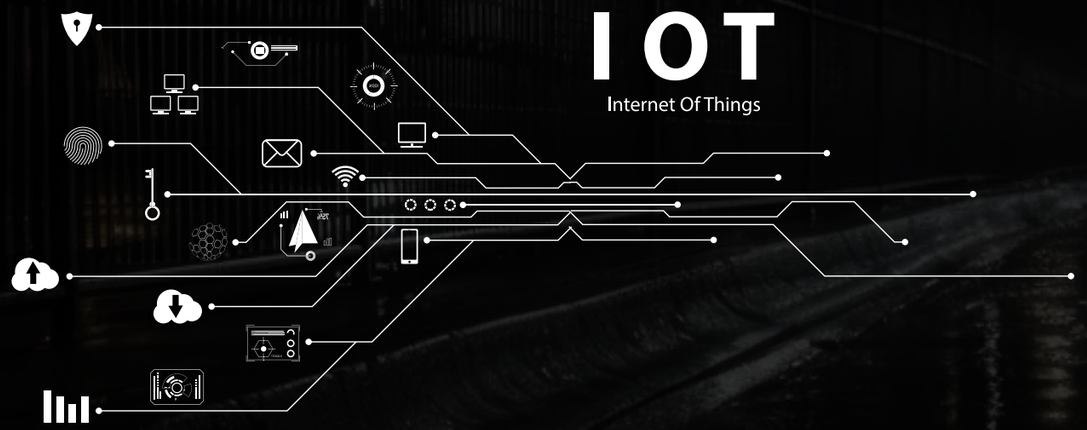
Campus Environmental Monitoring & Security System

Pilot Application Areas

Internally or distributed, it can be included in the automatic network. By creating remotely monitored/programmable and modular sensor networks that support the LoRaWAN protocol, reliable remote communication is provided with all sensors and controller units.

Cost-effective and safe environmental monitoring systems are implemented through IoT Controller and Wireless nodes integrated with sensors.

The data collected in the Central Application and Network Server is analyzed using Machine Learning techniques to detect and report threats and abnormal situations to the users.



IOT

Internet Of Things

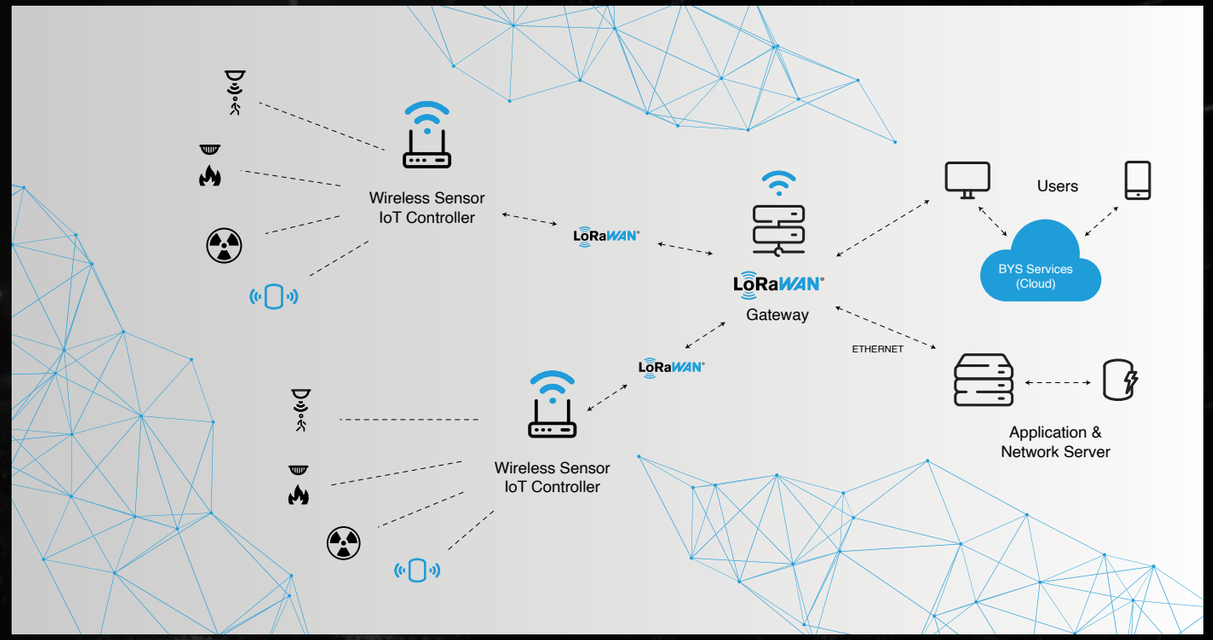
Subunits of the System

The system comprises a zone control unit for each zone and client Sensor IoT Controller units that rely on this zone control unit. The data received from the Sensor IoT Controller units is transmitted to the zone control units via LoRa, and then the zone control units transmit the data to the main control units via GSM/GPRS. Communications are half-duplex.

Two types of keys are used for mutual identification:

One for the application and the other for the network. This allows applications to be end-to-end encrypted using the 128-bit AES algorithm for cryptology.

The Zone Controller supports the MQTT Protocol and is made up of a mini computer with a Real-time Operating System (RTOS) or embedded Linux.



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Integrated Sensor Units

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In the Internet of Things (IoT), sensor-based technologies are utilized to collect data for analysis by decision-making mechanisms in security solutions. In this context, we can outline the sensors that may be employed and their respective functions.

Security Sensor Units in Modern Security Systems

Infrared (IR/PIR) Safety Sensors

Infrared sensors detect motion using infrared light. In a security system, this movement can trigger an alarm, turn on lights, or send an alert. The most commonly used type of motion detection device in home security systems is the Passive Infrared Sensor. PIRs work by detecting body temperature, i.e. infrared energy and movement. An alarm is triggered if a moving object blocks most of the sensor's grid squares and IR levels change rapidly.

Photoelectric Sensors

Photoelectric sensors can be helpful in environments where entry is restricted, such as areas inaccessible to people or objects. These sensors use invisible IR light and can transmit beams over significantly longer distances compared to PIR and IR sensors – up to 100 meters away. The emitted source is focused through a lens, creating an invisible barrier that triggers a safety notification when breached.

Microwave Sensörleri

Microwave radiation sensors are generally much more sensitive than infrared sensors. Unlike IR sensors, microwave sensors can detect movement in non-metallic materials such as wood, plastic, and drywall. Additionally, they are more durable and suitable for outdoor or continuous-use applications. While requiring more power to operate than infrared motion sensors, they offer higher sensitivity and the ability to detect motion over long distances.

Integrated Smoke Detectors

Integrated smoke detectors alert you to a fire whether you are inside or outside your property, unlike standard smoke alarms that only trigger an audible siren when smoke is detected.

If you do not respond to the warning within a specific timeframe, emergency services and a pre-determined individual are notified.

Fiber Optic Sensors

A fiber optic sensor is a device that uses fiber optic technology to detect physical or chemical changes. The sensor contains the fiber optic cable used for the transmission of light signals. The sensor element is designed to change the light transmitted by the fiber optic cable to react to changes in the environment. Fiber optic sensors offer many advantages compared to traditional electronic sensors, such as high sensitivity, immunity to electromagnetic interference, and the ability to operate in harsh environments.

Tomographic Motion Detection Sensor

Tomographic motion technology does not need a direct line of sight to trigger the safety alert. Relatively new and still proprietary, tomographic motion detection uses a network of radio transmitters and receivers to detect any movement within the network. This sensor technology works by detecting interruptions in signals between transmitters and receivers, which are interpreted as movement.

Microphones and Vibration Sensors

Microphones have a much finer perception capacity than the sounds detectable by humans. For instance, the refraction of glass emits ultrasonic frequency bands that are beyond human hearing range but can be detected by microphone sensors to trigger alerts and alarms. Microphones possess an extremely omnidirectional sensing capability and are less restricted by line-of-sight use compared to electromagnetic-based sensors. Nevertheless, they rely more heavily on peripheral hardware and complex software for processing the signals they pick up.

Other Optional Environmental Sensors

- Temperature and Humidity Sensor
- pH Sensor
- Air Quality Sensor
- Light Sensor
- Color Sensing Sensor
- Ultrasonic Distance Sensor

Campus Environmental Monitoring & Security System

Key Features

By using standard interfaces in existing infrastructures, new or existing security systems can be made smart in a cost-effective way.

LoRaWAN technology enables wireless devices to communicate uninterruptedly at low power within a dynamic network structure.

Having a centralized control and management system, either autonomously or via the Cloud.

Ensuring intelligent security management through the use of machine learning techniques and scenario-based algorithms.

Automatic identification of device replacements with point-traceable fault detection (auto-healing).

Designing the devices with an open architecture that allows integration in various areas and application-specific settings, thanks to its flexible structure and sensor interfaces.

Its dynamic network structure and automatic identification features make the system easy to install using plug-and-play logic, designed in a cost-effective manner.

The product's development relies entirely on national resources.

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New Istanbul Airport, İstanbul

Orjin Maslak, İstanbul
Orjin Maslak, İstanbul

Garanti Teknoloji Merkezi, İstanbul
Garanti Technology Center, İstanbul

Hilton Tashkent City, Özbekistan
Hilton Tashkent City, Uzbekistan

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