INTEGRATED SERVICES & SOLUTIONS
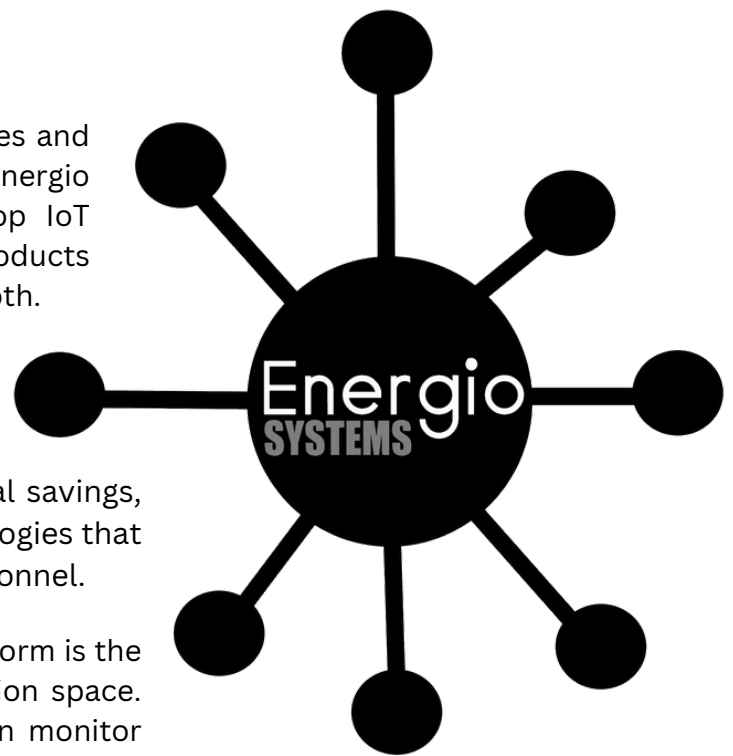
Energio SYSTEMS

TOTAL BUILDING AUTOMATION

Energio Systems

Energio Systems is a unique collection of companies and solutions for commercial and industrial buildings. Energio Systems partner companies are some of the top IoT solutions providers in the world, with unique products and patented technologies. Energio can integrate both. Open and proprietary communication protocols collect, report, and automate data from virtually any type of system.

Energio Systems provides energy savings, material savings, life safety, and employee morale-boosting technologies that can be monitored and adjusted by authorized personnel.

One of the key features of the Energy Systems platform is the ability to optimize office, warehouse, and production space. With our wide range of sensor capabilities, we can monitor traffic patterns, show both people and equipment counts, and help reconfigure a space for maximum efficiency.

Internet of Things or
Total Building Automation

We are constantly hearing people talk about the Internet of Things (IoT), but what does that really mean?

Energio Systems can help simplify the concept and put it in perspective for commercial and industrial buildings. We feel a better term is Total Building Automation (TBA).

The simplest definition of TBA is that EVERY system within a building can communicate, share data, and interact with any other system.
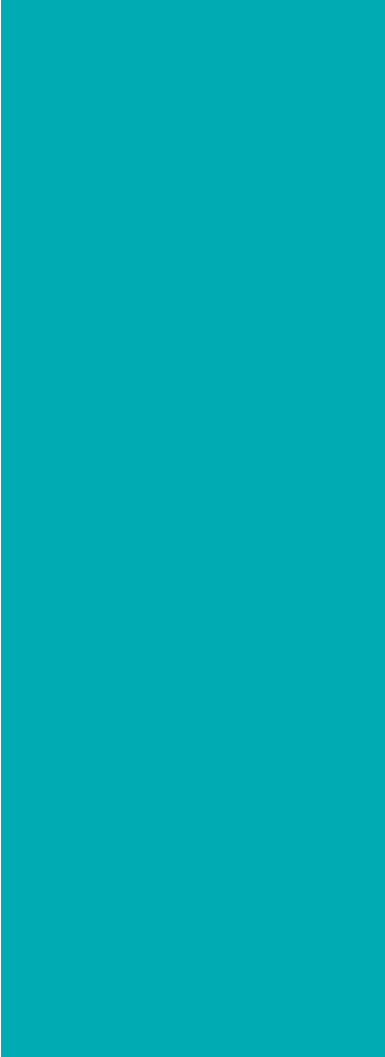
So how do we accomplish this? Well, the Internet certainly plays a big part, but the bigger piece of the puzzle is the use of open standards and open protocols. OPEN is the great equalizer when it comes to building automation. Protocols that are not exclusive to just one company and allow any manufacturer to create devices using those protocols are the first step toward Total Building Automation.

So what can we expect from Total Building Automation? Well, the first thing is, believe it or not, it will pay for itself. TBA not only saves more energy than standalone control systems, but it also reduces the overall number of components used in the building. The real benefit, however, is the increase in employee safety and employee satisfaction. Higher employee satisfaction results in higher productivity and increased profits.

Office workers will first notice the detailed level of control over their working environment. After choosing a working area or entering their office, light levels and the HVAC will automatically adjust to their preset preference, while taking into account other occupants around them. Using their laptop, tablet, or smartphone, occupants can manually adjust their lighting and HVAC settings as well as use the integrated chat, messaging, and meeting platforms.

If the employee needs to locate other associates or assets, they will be able to see people and equipment via a digital twin of the building floor plan. If they need to move to a different area on campus, the integrated indoor navigation system will route them using the most efficient path.

Facility people will be able to see real-time data on the status of all lighting fixtures, detailed information on all HVAC components, trash and recycling levels, kitchen and bathroom stocking levels, restroom maintenance status, and much more.

Energio also works to improve the safety of the workplace. You can easily create the safest environment possible using many of the same systems and devices already in use for lighting and HVAC control. Single sensors can detect occupancy, temperature, light levels, fires, and air quality. Energio Systems can monitor and treat air quality, monitor the number of people in specific areas, and detect personnel that may be running fevers.

In the case of weather, fire, hazards, or intruder emergencies, the Energio System can send out individualized notifications directing people to the nearest shelter, exit, or instructions to shelter in place. All of this can lead to additional savings through lower insurance premiums.

The system can also be used by production. Lighting can be automatically adjusted by task, tools, equipment, and assets can be tracked, and the health of key pieces of equipment can be monitored and automatically alert maintenance.

As new technologies and solutions are developed, the Energio Systems platform can be expanded and continually refined.

Energy Savings

Physical comfort — the quality of light, air, temperature, sound, and ergonomics — is vital to job satisfaction and productivity. If employees are physically uncomfortable or if the building is unhealthy, work doesn't happen well.

Below are details outlining the capabilities of just some of the systems that can be integrated.

Lighting

Office Lighting

Office lighting can be set to both automatic levels and also manually adjusted in several ways. For example, lighting can be set to dim and raise based on the amount of daylight present or change color based on the time of day.

The lighting can also react to individual preferences and either automatically adjust when a particular person is detected in a space, or the occupant can simply adjust settings through wall-mounted controls, touch screens, or a smartphone.

Site Lighting

Site lighting will be primarily controlled by the system's astronomical timekeeping function and backed up by a series of networked photocells. The photocell(s) will act as an override in the event of storms or dense cloud cover and will ensure there is always sufficient illumination for safe conditions.

After hours, non-critical lighting will be turned off with pole-mounted motion sensors acting as an override. Once a sensor detects motion, the system will anticipate the route of cars and people and begin to turn on ahead of the predicted route.

Manufacturing and Warehouse

Manufacturing and warehouse lighting can be automated by shift with the lights going to a minimal level during shift changes. In the warehouse, aisle-ways can be set to a minimal level and then triggered to go to full brightness when people or forklifts turn down the aisle.

If skylights are part of the facility, networked photocells can be evenly distributed throughout the facility to ensure a constant and safe light level throughout the work area.

Task lighting at workstations or for specific pieces of machinery can also be controlled via a schedule, motion, or automatically when the operator is present.

Power Management

Renewable Energy Distribution

Solar and other renewable energy sources typically generate electricity in the form of DC power. The power is then commonly converted to AC and then back to DC again to power devices like cell phones, computers, and lighting. The problem is that every time power is converted, there is a power loss of up to 30%.

Energio Systems can provide patented technology that allows long-distance transmission of DC power and the installation of a DC micro-grid that allows devices to be powered without the power loss that occurs during voltage conversion.

Power Monitoring

Energio Systems can also monitor the energy consumption of every lighting fixture as well as circuits powering on-demand outlets and powering machinery. The system can even automatically trigger demand response events, reducing power in non-critical areas to reduce peak demand.

Asset Tracking

Utilizing Bluetooth tags, Energio can track almost anything in the facility;

People - Employee badges or smartphones can be used to indicate where people are in a facility.

IT Devices - Computers, printers, and other valuable IT devices can be tracked throughout the building.

Equipment - Portable equipment can be monitored as it moves through the building to help maximize resources.

Material - Material used for battery production can be tracked to improve efficiency and aid in inventory management.

Finished Goods - Finished goods can also include a tag that can be used not only at this facility but throughout the distribution process.

Employee Comfort

Physical comfort — the quality of light, air, temperature, sound, and ergonomics — is vital to job satisfaction and productivity. If employees are physically uncomfortable or if the building is unhealthy, work doesn't happen well.

Lighting and HVAC

Lighting Optimization

Lighting that reacts to the person, not the other way around. Employees can set their own lighting preferences for their workspace and manually adjust lighting in other areas.

HVAC Integration

Energio Systems can indicate to the HVAC system when a space is occupied and even indicate the number of people present. Heating and cooling levels can automatically adjust to the number of people in a space and even take into account the preference of each occupant.

In addition, Energio allows users to do something that hasn't been a regular function of a building in almost 100 years, open a window! The system can detect when a window is open, compare that with current weather data, and adjust HVAC levels accordingly.

Desk Hoteling and Conference Room Reservations

Energio has the built-in ability to facilitate reserving work areas. The system takes into account employee preferences, weather, people count, and life safety conditions.

Indoor/outdoor Campus Navigation

Using a smartphone app or tablet, employees can receive turn-by-turn navigation throughout both individual buildings and the entire campus.
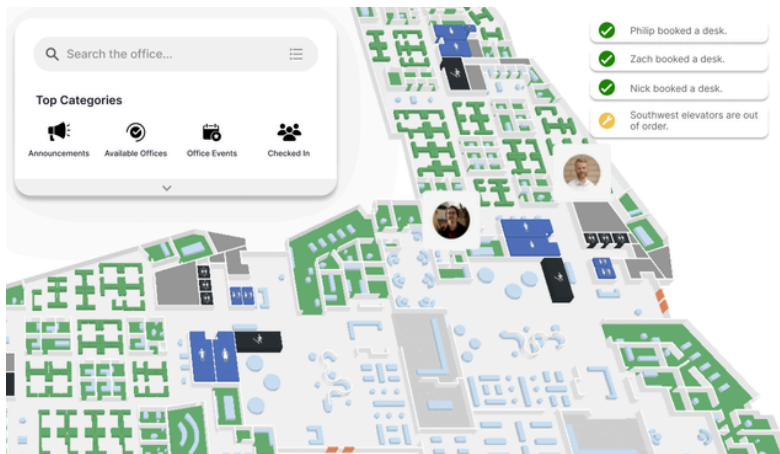
Noise/Noise Pollution Reduction

Special acoustic light fixtures can be placed in high traffic or common areas to reduce the level of ambient noise.

Facility Maintenance

Employees have the ability to alert maintenance staff that restroom and kitchen facilities need attention. In addition, maintenance staff can get automatic alerts when supplies like soap and paper towel dispensers are low or out. Trash and recycling bins can also be monitored with maintenance staff alerted when they are full.

Life Safety

Life safety refers to the design and operating features of a building that provide its occupants a reasonable level of safety during fires and other emergencies.

Air Quality Monitoring and Purification

Energio air quality sensors can automatically trigger our air purification units. The units can completely circulate 100% of the air in a room in less than 20 minutes using UVC air purification technology.

Continuous Surface Disinfection

Energio Clean White light fixtures are safe for human presence and can kill 99% of viruses, mold, fungus, and other pathogens.

People Counting

Energio can utilize two different people-counting technologies for the most accurate count in the industry. People counting can assure compliance with fire codes and ensure safe egress out of common areas.

Active Shooter Tracking

Using both acoustic and thermal sensors, a firearm discharge can be detected and the shooter tracked throughout the building. This information can be relayed to law enforcement and safety instructions can be sent to every employee.

Fire/Bio-hazard Location

Using thermal and air quality sensors, fires and biohazards can be quickly detected and employees can receive instructions on where to exit the building safely. The system will also automatically alert the fire department and can even inform fire officials if and where employees are in the building.

Access Control

Energio System can monitor and adjust access control systems and also enable or disable points of entry in the event of an emergency.

Personnel Health and Safety (occupant body temp and occupant down)

Using thermal sensors, personnel can be scanned as they enter the building, and anyone with an above-average body temperature identified. In addition, thermal sensors throughout the building can identify if a person is down and alert medical and other life safety personnel.

Weather Notifications

Severe weather alerts can be broadcast to all employees with the weather status, road conditions, and where to shelter if needed.

Dashboards, Apps and other interfaces

Elevated

Our Elevated monitoring and control platform allows employees and management to view and interact with all relevant data via a web browser or smartphone app. Different levels of control can be based on a hierarchy set up by the end user.

Elevated can provide a customized dashboard based on an individual user's needs and preferences. Data from multiple integrated systems can be shown on the dashboard and the user has the ability to create custom reports.

Individual Level Control and Services

Automatic and Manual Lighting and HVAC Control

Setting automatic personal lighting and HVAC preferences, as well as manual lighting and HVAC control.

Video Conferencing and Messaging Systems

Video conferencing platforms and messaging systems can be integrated into Elevated as well, creating a common platform for all day-to-day needs.

Elevated

Administration Level Control and Oversight

Overview and Approval of Individual Level Controls

Management can set user hierarchy and security levels and set limits on a user's ability to adjust lighting and HVAC systems.

System Programming Adjustments

Facility managers can use Elevated to make programming changes to the lighting and HVAC systems. This function can also be restricted by department or building area.

Monitoring

Security Camera Monitoring

Authorized personnel can view security cameras and thermal sensors through the Elevated interface.

Asset Tracking

Assets can be tracked in real-time, and their location shown on a digital twin map of the facility. In addition, reports can be created to show detailed analytics.

Energy Consumption

Energy consumption down to an individual light fixture can be monitored. The system can create reports and even trigger events based on consumption.

Manufacturing Processes

If PLCs are integrated into the system, informational dashboards can be created to track and monitor production and inventory.

Facility Maintenance

The system can be used to schedule facility maintenance, and things like kitchen and bathroom supply levels can be monitored.

Reporting

The system has a customer reporting interface that can pull data from any integrated data source.

Lighting as the Building Automation Backbone

To enable communication between systems across a building or campus-wide facility takes a robust, easily scalable, redundant, and totally secure communication network. Wi-Fi networks rely on gateways and do not allow individual devices to communicate directly with each other. An additional Wi-Fi network also increases the managed infrastructure for your IT department and if a separate network from your data system isn't created, it can also open up the possibilities of data breaches.
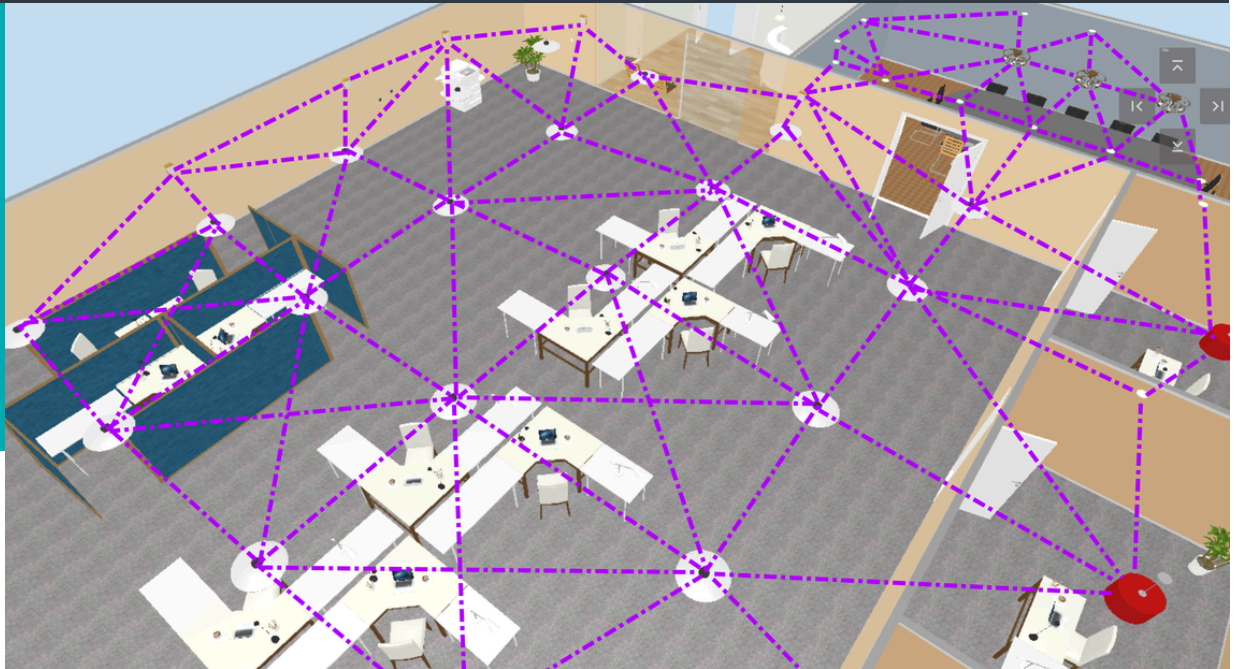
For a **Total Building Automation** network, you need a system capable of having each device talk directly to any other device within its range and also be able to communicate with devices anywhere across the entire building or campus. This necessitates the use of a massive mesh network structure.

Sensors and other system devices alone do not make up the quantity needed to enable a network of this scale. It requires the addition of other communication nodes, evenly spaced throughout the building to be able to relay data and commands across the entire facility.

There is only one system in a building that is in every area, provides power at each location, and is equally dispersed throughout the facility; the lighting. This makes lighting the perfect backbone for secure building automation communication.

In 2004, the U.S. Government mandated that every state enact an Energy Code that dictates the level of control and energy usage in commercial and industrial buildings. The codes are based on ASHRAE 90.1 and mandate that almost every commercial building have an automated lighting control system.

These codes are updated every two years, and the capabilities and granularity requirements of the lighting control system are updated with each revision. A capability that will soon be mandated by the Energy Codes is Luminaire Level Lighting Controls (LLLC). LLLC simply means that each lighting fixture will need to be individually controllable and not hardwired into a specific group. Fixtures will have to have the flexibility to be part of multiple groups and scenes.

So now and into the future, we see two trends when it comes to lighting controls: wireless communication and LLLC. Both of these trends require a radio chipset in each fixture.

The key to the Energio System approach is to have each and every ceiling-mounted fixture include a wireless radio/controller. The controller uses a common industry chipset. We work with multiple lighting fixture manufacturers, and Energio Systems can provide any type of fixture, indoor or outdoor, with a factory-installed chipset, or the chipset can be field installed.

With a radio now in each and every lighting fixture, one device now serves two purposes: Luminaire Level Lighting Controls and the communication backbone of the Total Building Automation infrastructure.

Wirepas

The communication infrastructure was developed by Wirepas out of Tampere, Finland - known as the Silicon Valley of Finland. Founded in 2010, Wirepas has developed standards for massive IoT networks, with unmatched speed, scale, and security.

Coexistence with other technologies is essential when you talk about smart buildings. Our Wirepas connectivity has been designed for massive IoT and polite spectrum usage. Independently of your selected profile, the connectivity will always try to limit its impact on other devices. It does that by using – for example – listen before talk, adaptive transmit power, and having automatic channel selection among the 40 BLE channels in case of the Mesh 2.4 GHz profile. This makes Wirepas connectivity able to deal with massive IoT in smart buildings where the 2.4 GHz is usually used for many other purposes—leading to happy IT departments.

Wirepas 2.4 GHz global spectrum offers support for low-power or low-latency use cases. Available on a wide range of chipsets and modules. Supports positioning for massive tracking and inventory. With Mesh 2.4 GHz profile, deploy affordable, massive, and high-density short-range IoT applications with unprecedented performance. In addition, the Mesh 2.4 GHz profile is well suited for smart tracking, smart building, and smart manufacturing applications.

The Mesh 2.4 GHz profile operates in the 2.4 GHz spectrum and relies on the BLE physical layer.
Reliable: The 2.4 GHz profile supports mesh operation across all 40 available BLE channels allowing very reliable and robust communications. Thanks to Wirepas Connectivity's unique decentralized operation, the Mesh 2.4 GHz profile is well suited for indoor applications. It operates perfectly with other Wi-Fi, Bluetooth, or Zigbee technologies. Wirepas polite spectrum usage always minimizes the risk of interference to and from other radio technologies.

Low-power or low latency: The Mesh 2.4 GHz profile supports low-power router operations. By lowering a mesh router's power consumption to a few tens of uA, the Mesh 2.4 GHz profile allows deploying almost entirely battery-operated networks in extensive areas without complex installation or cabling. This is also possible if you need low-latency communications, typically for Smart Lighting. You will need a cable, however. No magic here.

Built-in positioning and mass inventory: Thanks to its low-power operation, the Mesh 2.4 GHz profile is at the core of our Massive Tracking product combining the best performance for real-time location systems or massive inventory use cases. Read more about our Massive Tracking.

Affordable: The Mesh 2.4 GHz uses widely available BLE chipsets and modules from Nordic Semiconductor or Silicon Labs with several memory configurations. You get to select and mix the best chipsets for your application.

Wirepas also has unlimited scalability and can easily have every fixture on a campus-wide network.

Lighting Control Platform

With the lighting system as the backbone of the Total Building Automation infrastructure, let's first talk about the features and capabilities of the lighting control platform.

The firmware for the lighting control system is from INGY. INGY not only enables comprehensive lighting control but has also been designed as a platform for IoT building automation. Utilizing the wireless radio in each fixture, INGY enables each fixture to interface with any Bluetooth-enabled device including smartphones, tablets, and Bluetooth tags. Through the INGY smartphone/tablet app or the Elevated browser-based dashboard, any and all lighting control settings can be programmed or adjusted on-site or remotely.

Groups

Fixtures can be programmed into groups, and a fixture can be in more than one group. For example, a fixture may be in a group for a specific office but also part of a group that includes all offices along a common set of windows. Groups do not restrict how fixtures are programmed but rather aid in identification and programming.

Scenes

Scenes determine how the lighting reacts at different times of the day and during different events, situations, or conditions.

Scheduled Scenes

Preset scenes can be programmed to be triggered on a scheduled basis. A scene can be scheduled to happen only once on a specific day and time or on the same day and time every day or every week. Scenes can also be based around holidays and special events.

Automatic Triggered Scenes

Scenes determine how the lighting reacts at different times of the day and during different events, situations, or conditions.

Daylighting

Lighting can also be programmed to dynamically react to ambient light. Based on room purpose, task, and individual preference, light levels in a space will take into account both the contribution of daylight from windows and skylights as well as the lighting fixtures. Scenes can also play a role in daylighting with different target light levels for different scenes.

Daylighting is an automatic setting, but it can be temporarily overridden through any of the aforementioned manual controls. For example, if a task requires a higher light level or an employee with poor eyesight needs a little more illumination.

Color Tuning

Another feature of the INGY platform is both manual and dynamic color tuning. Many light fixtures can be automatically tuned from a warm color to a cooler white.

Human-Centric Lighting, also called Circadian Lighting, is where the fixtures mimic the color cycle of the Sun. In the morning, the fixtures will start out at a cool white color and then slowly "warm up" throughout the day. Human-Centric Lighting (HCL) has been shown to affect people in a positive way and help energize people in the morning and help them to sleep better at night.

The automatic color tuning can be temporarily adjusted at any time, but will always go back to the preset cycle after a period of time, the next time the lights are triggered, or the next day.

In other areas, the color can be strictly manually adjusted. Changes in color of the lighting fixtures can help bring out the color of furnishings and products. The marketing department, for example, might choose to have the ability to change their lighting color while laying out advertising campaigns.

Integration

With the lighting backbone in place, we next turn to the technology that allows disparate systems to exchange data and interact with each other. MobiusFlow has been integrating systems using both proprietary and open-standard protocols for over 18 years.


MobiusFlow

MobiusFlow offers the most comprehensive middleware integration platform on the market today, managing systems and solutions at sites like Heathrow Airport in London and worldwide for ExxonMobil, CBRE, Ingram Micro, IAconnects, TD Synnex, and IBM. MobiusFlow enables two-way communication between systems from different manufacturers using different communication protocols.

Scalable from a single sensor to a multi-site facility. Contained within MobiusFlow is logic, local control, and device drivers which can handle the data in both directions - simultaneously sending data for analytics to dashboards or third-party software in the cloud or delivering instructions to control devices based on the response from those analytics.

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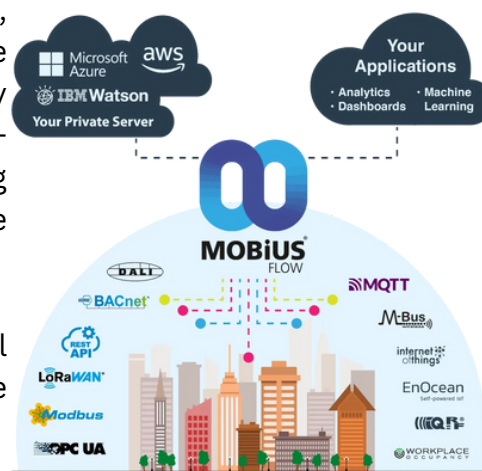
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Sensor Types

Any type of sensor can be used to collect and receive data and have it normalized by MobiusFlow and made available for use by all connected systems.

Thermal

Advanced thermal sensors can tell the difference between adults, children, and animals. Along with our advanced analytic technology, these sensors can count people and show traffic flow through the building. In addition, these sensors can measure body temperature and even detect whether a person is upright or has fallen down.

Thermal sensors can also be used to detect the temperature level of equipment and send alerts or even shut systems down. The system can also detect fires and automate alarms and even send data to the fire department.
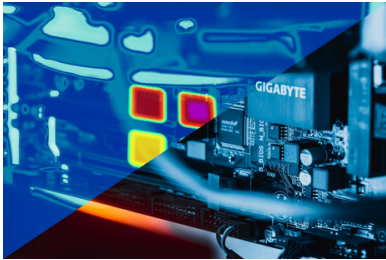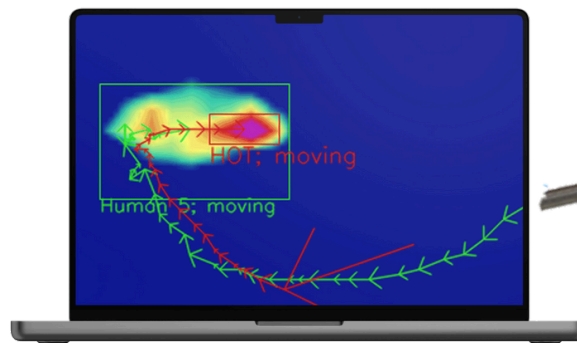
Acoustic

State-of-the-art broadcast and receiving technology is used in our acoustic sensors. Using a combination of a smartphone app and Bluetooth tags, the acoustic system can be used for people counting, asset tracking, as well as a broadcast system to display information relevant to a person's location or instructions in case of an emergency.

SHELTER IN PLACE!

ALL HANDS MEETING IN 5 MINUTES

EXIT THROUGH DOOR 10

Temperature/Indoor Air Quality

Our air quality sensors detect CO2 levels, total volatile organic compounds (TVOC), temperature, humidity levels, and particulate levels.

Passive Infrared

PIR sensors that detect only human movement are used to trigger lighting in common areas and switch off lighting when spaces are empty. These same sensors also detect the amount of daylight coming through windows and skylights.

Outdoor Day Light

Outdoor daylight sensors can work as an override for site lighting and signage.

Window/Door Contact

Wireless, battery-less contact sensors are used on doors and windows. The sensors can be used for both security and environmental control. Opening monitored doors and windows will send an alert to the security system and/or the HVAC system. Depending on programming, the HVAC will be disabled or set to a different level.
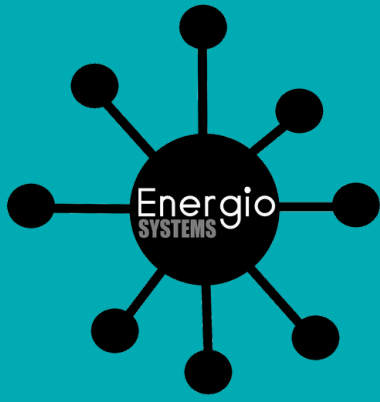
Vibration

Scenes can also be triggered manually and on demand. Wireless vibration sensors can monitor conveyor belts and other equipment to detect potential failures and for scheduling preventive maintenance.

Fluid – Flow/Pressure

Flow/pressure sensors can be used during production as part of the setup of metering pumps.

Thank You!

Hopefully, we can work together and this project will be successful.

Contact Us

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Visit Our Websites

www.energiosystems.com
www.globallightingcontrols.com