

SUSTAINABLE DEVELOPMENT GOALS



7.2.2 Have plans to upgrade existing buildings to higher energy efficiency?

Yes, at the University of Business and Technology (UBT), energy efficiency and sustainability are central to our infrastructure strategy.

UBT's Building Management System (BMS)—installed across the Dahban and Corniche campuses—forms the backbone of its plan to continuously upgrade existing buildings to higher energy-efficiency standards. This advanced system integrates smart light, motion, and heat sensors to monitor and automatically regulate electricity and HVAC usage in real time. By adjusting lighting and temperature based on occupancy levels and ambient conditions, the BMS reduces energy waste and optimizes consumption in accordance with the UBT Energy Policy UC.02.01 and ISO 50001 Energy Management Principles.

The university's upgrade roadmap includes:

- Retrofitting legacy systems with energy-efficient HVAC units and motion-controlled lighting.
- Expanding BMS coverage to all academic and administrative buildings by 2026.
- Integrating renewable-energy inputs through future on-site solar installations.
- Conducting annual performance audits to benchmark efficiency gains and identify next-phase retrofit priorities.

This forward-looking plan ensures that all existing facilities transition toward smart-building standards, minimizing electricity use, lowering CO₂ emissions, and aligning with Saudi Vision 2030 objectives for sustainable infrastructure.

Supporting Institutional Evidence

To demonstrate UBT's commitment and active plans to upgrade existing buildings to higher energy efficiency, the following internal reports and pilot studies are attached. These evidences highlight both the technical systems already in place and the ongoing retrofit initiatives that ensure continuous improvement of campus energy performance.

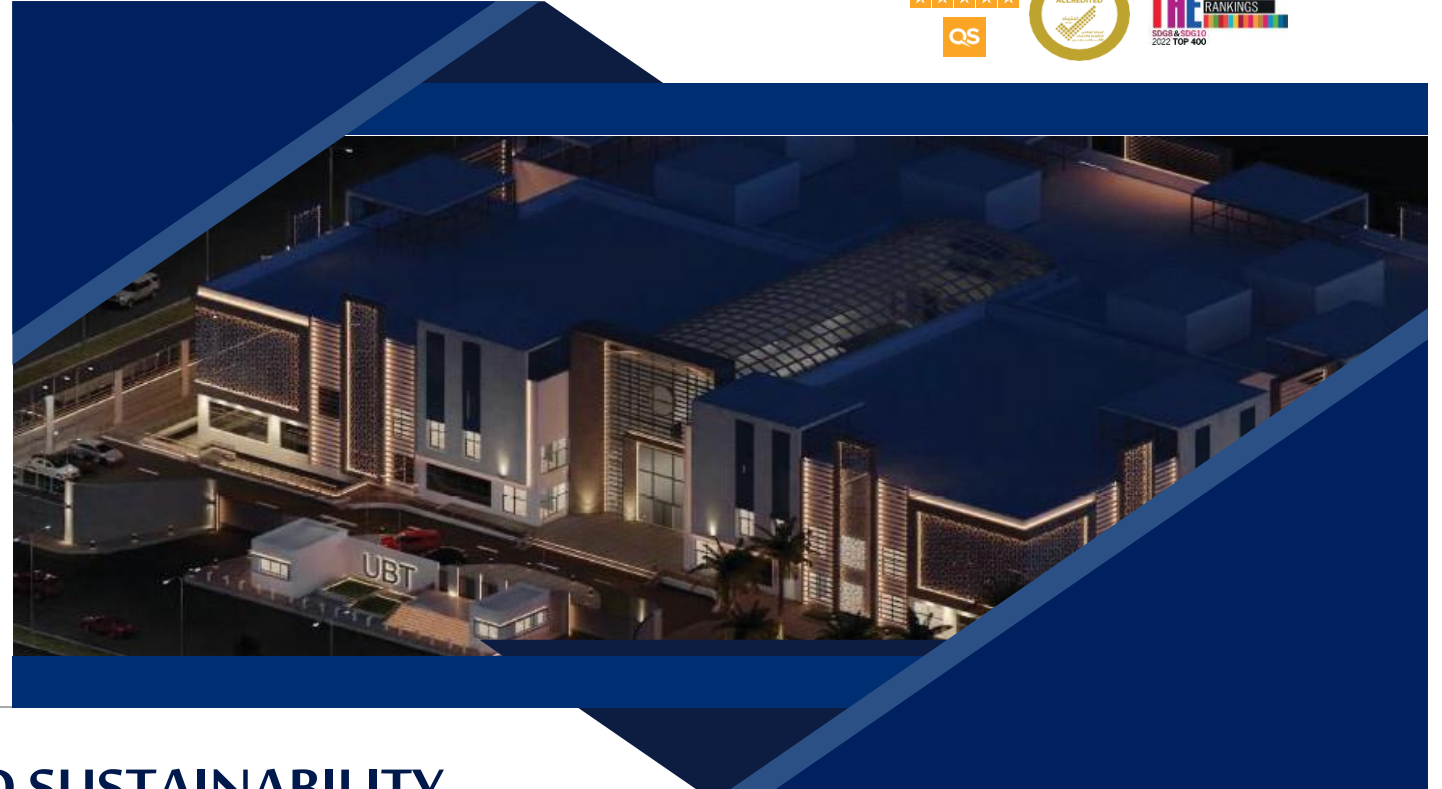
UBT Building Technology & Sustainability Report (Architecture Department, 2024)

This presentation, prepared by *Arch. Maram Abuznada*, outlines the advanced technologies implemented across UBT campuses to optimize energy use in existing facilities. It details the Building Management System (BMS), IoT-based lighting and occupancy sensors (Enlighted System), and Total Room Automation (TRA) projects that collectively enhance HVAC efficiency, control lighting and power systems, and minimize unnecessary energy consumption. The evidence demonstrates how BMS integration and real-time monitoring have been embedded into older campus structures as part of UBT's continuous-upgrade plan toward a smart, sustainable campus.

Pilot Study: Evaluating Energy Efficiency Using Occupancy Sensors (Engineering College, 2024)

Conducted by *Dr Yasser Aboelmaged* and *Dr Amr Yousef*, this pilot project measures the energy savings achieved by retrofitting an existing engineering laboratory with Philips-type occupancy sensors. The study compares lighting energy consumption before and after installation, recording a measurable reduction in usage and providing data-driven insight into the impact of smart-sensor integration. This pilot forms the foundation for scaling energy-efficient retrofits across other buildings, aligning with UBT's Energy Policy UC.02.01 and ISO 50001 principles.

Together, these evidences demonstrate that UBT's approach goes beyond planning—combining policy-driven governance, technical innovation, and evidence-based retrofitting to upgrade all existing buildings into energy-efficient, smart, and sustainable facilities consistent with SDG 7 and Vision 2030 objectives.



UBT COR TECHNOLOGY AND SUSTAINABILITY

ARCH. MARAM ALBADR ABUZNADA

Introduction

The University of Business and Technology is highly aware of its effect of in the environment and the community and as part of its mission is to sustain all resources and implement system aim for sustaining the building and boost the building users' comfort and Experience.



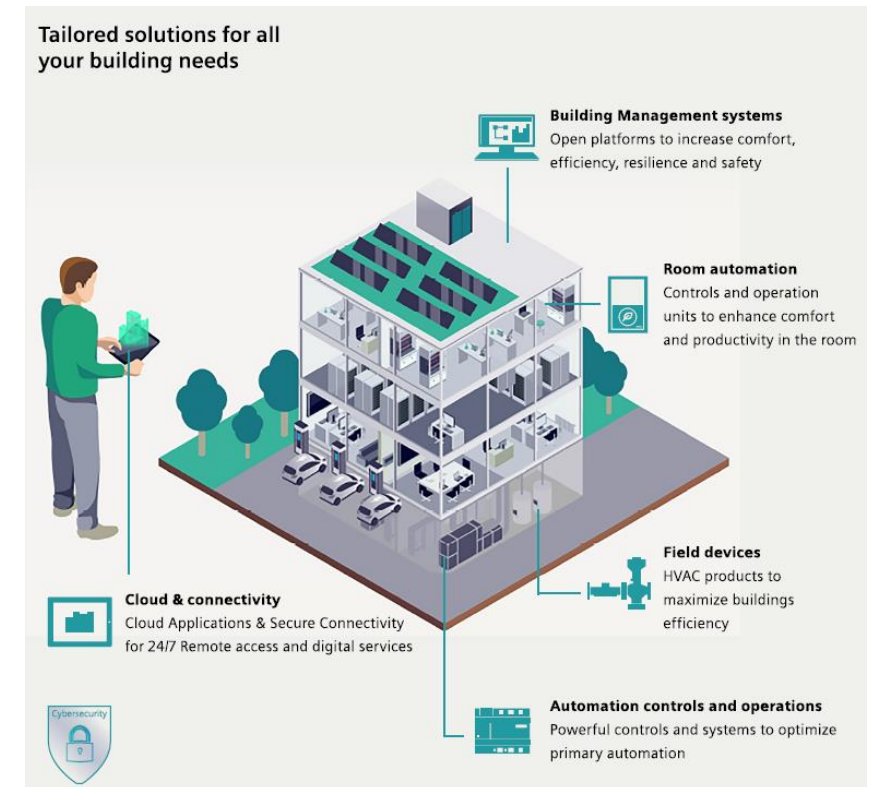
BMS – Building Management system



Building Management System

To conserve energy the university will be using a building management system that tracks energy usage and uses automated AC switch on and off mode.

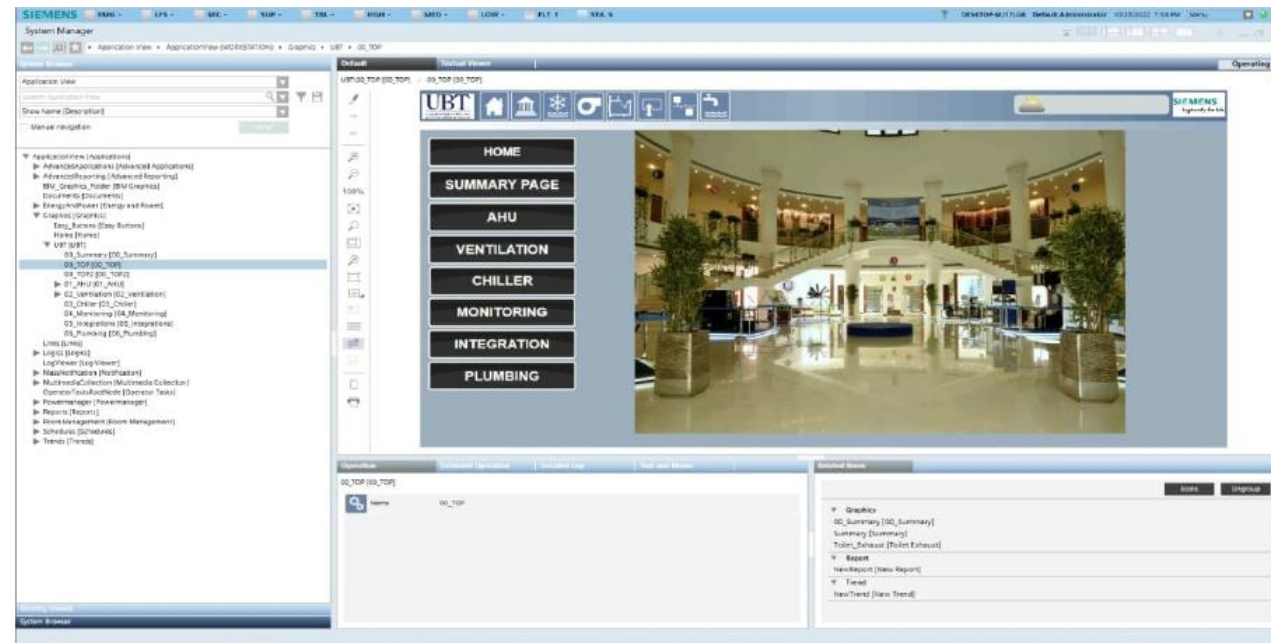
Operation department is responsible on track energy consumption and can remotely turn off and turn on when needed





Building Management System

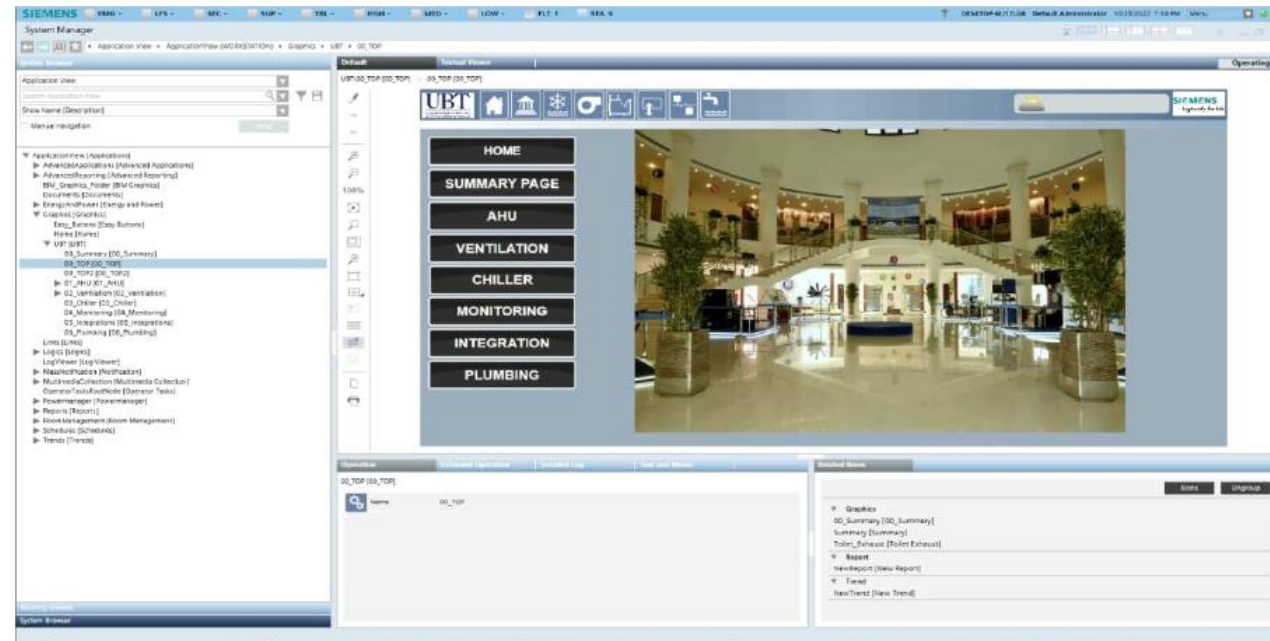
Operate, monitor and manage HVAC, fire, lighting, power management, security, video and third-party systems through one single interface





Building Management System

Operate, monitor and manage HVAC, fire, lighting, power management, security, video and third-party systems through one single interface



Why BMS integrated in UBT

Energy Efficiency

Monitoring and Control: A Building Management System (BMS) continuously monitors energy consumption across various systems, including lighting and HVAC (Heating, Ventilation, and Air Conditioning).

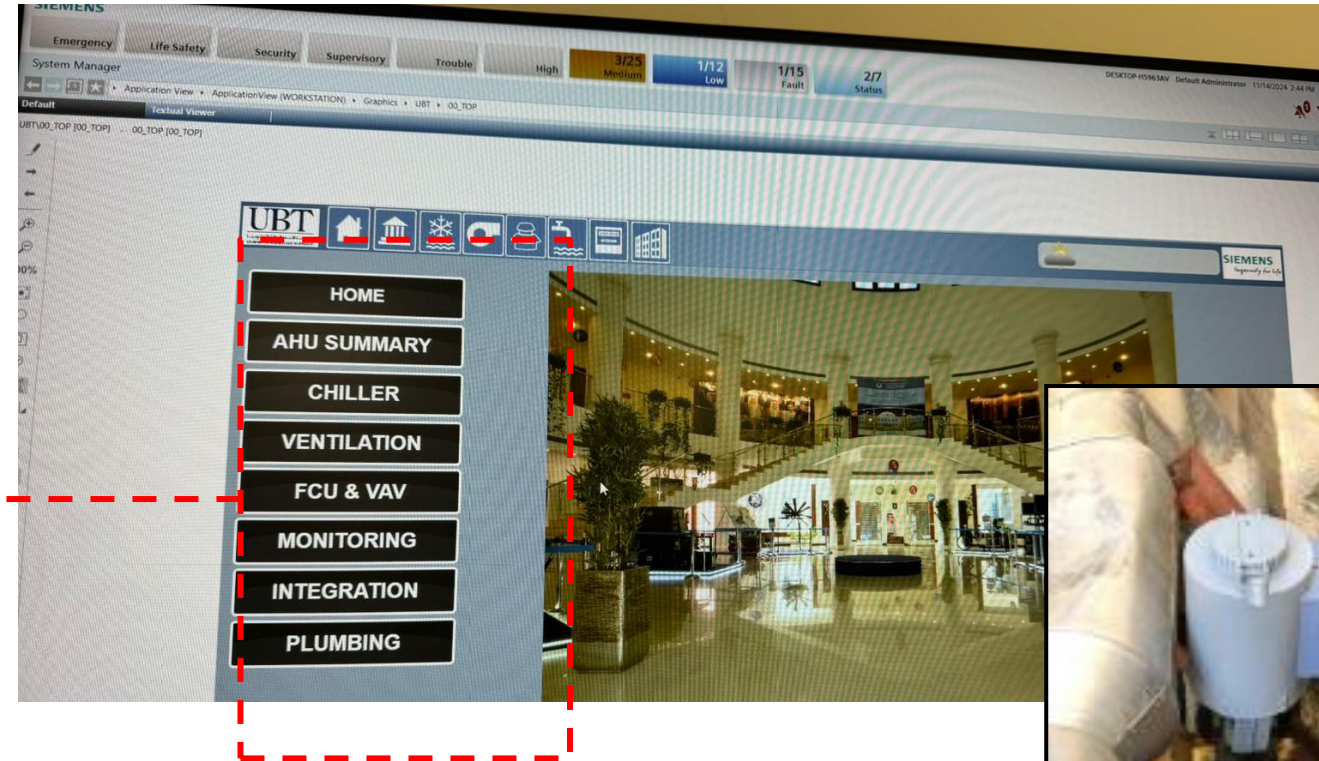
It ensures that these systems operate efficiently and are turned off when they are not needed.-

Load Management: The BMS adjusts energy loads based on occupancy and real-time demand, helping to prevent energy waste.



UBT - Building Management System

The UBT BMS workstation homepage displays systems viewable in terms of expected upcoming maintenance, monitoring, malfunctioning items, and operational adjustments. Each system contains installed sensors.



Example: Duct Sensors

BMS Dashboard

One example of a component monitored by a Building Management System (BMS)
Fresh Air Fan (FAF)

This fan's main function within a mechanical system is to bring in fresh air. It plays a crucial role in maintaining ventilation by eliminating stale or stagnant air and distributing fresh air throughout the building.

Image 01 – Illustrates the status of FAF , H = manual ,
A= Auto..

Image 02 – Illustrates the status of the need of
maintenance.

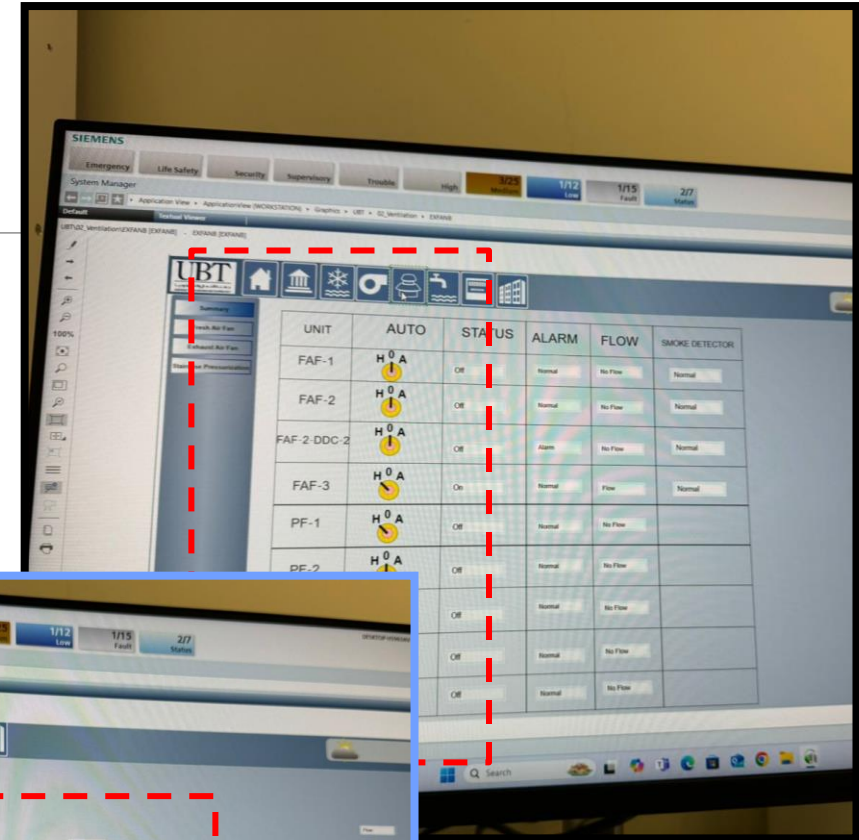


Image 01

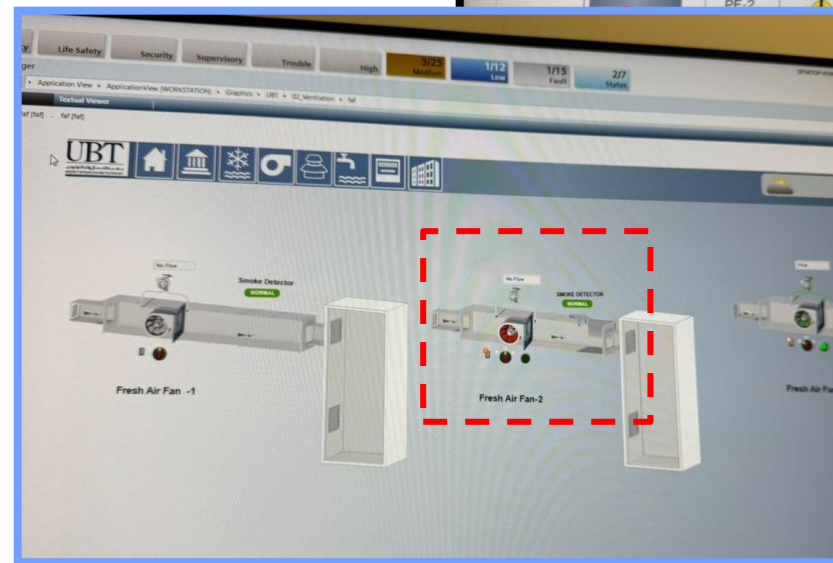
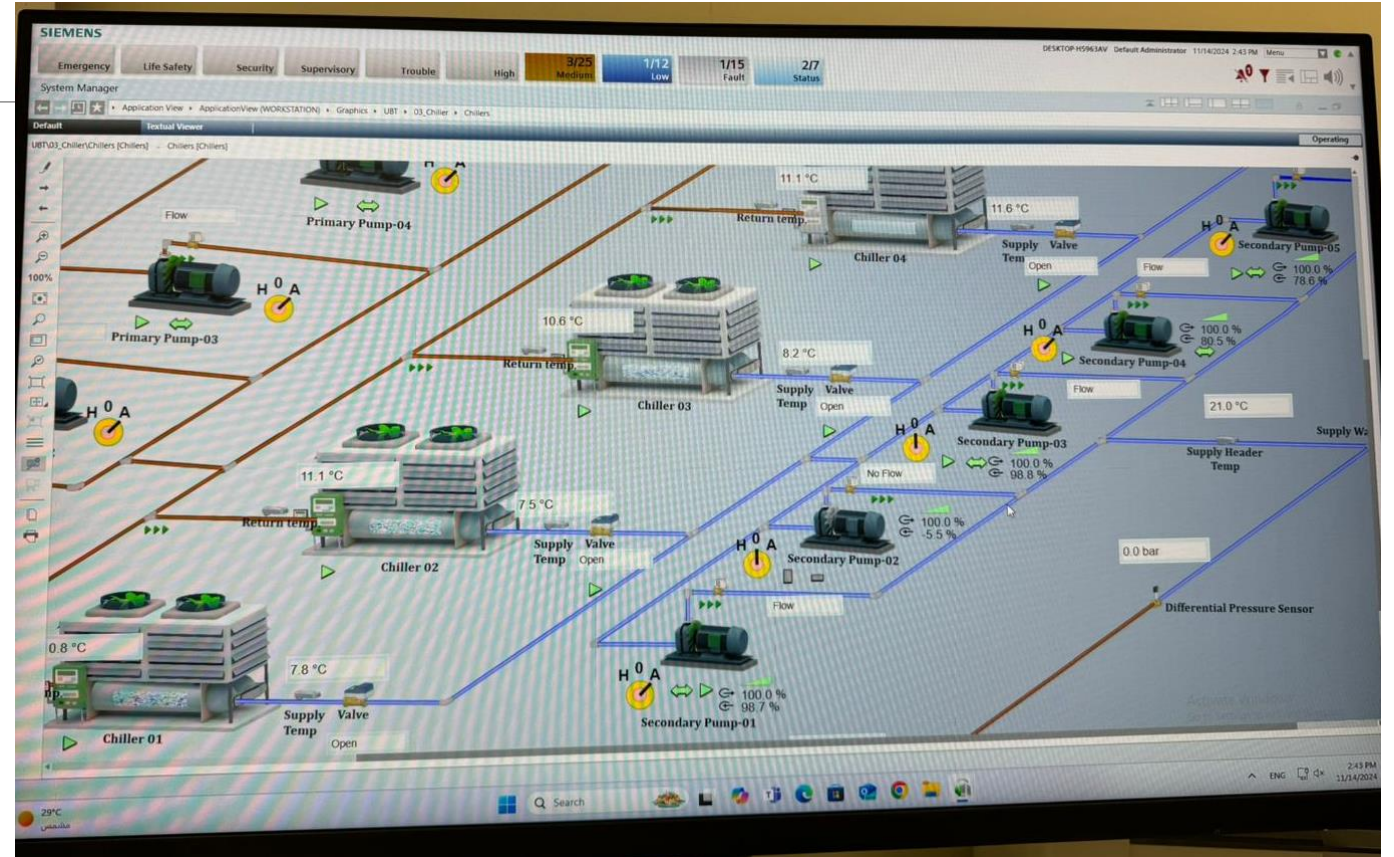


Image 02

Chillers integration

HVAC BMS integration is that it provides the opportunity for energy optimization.

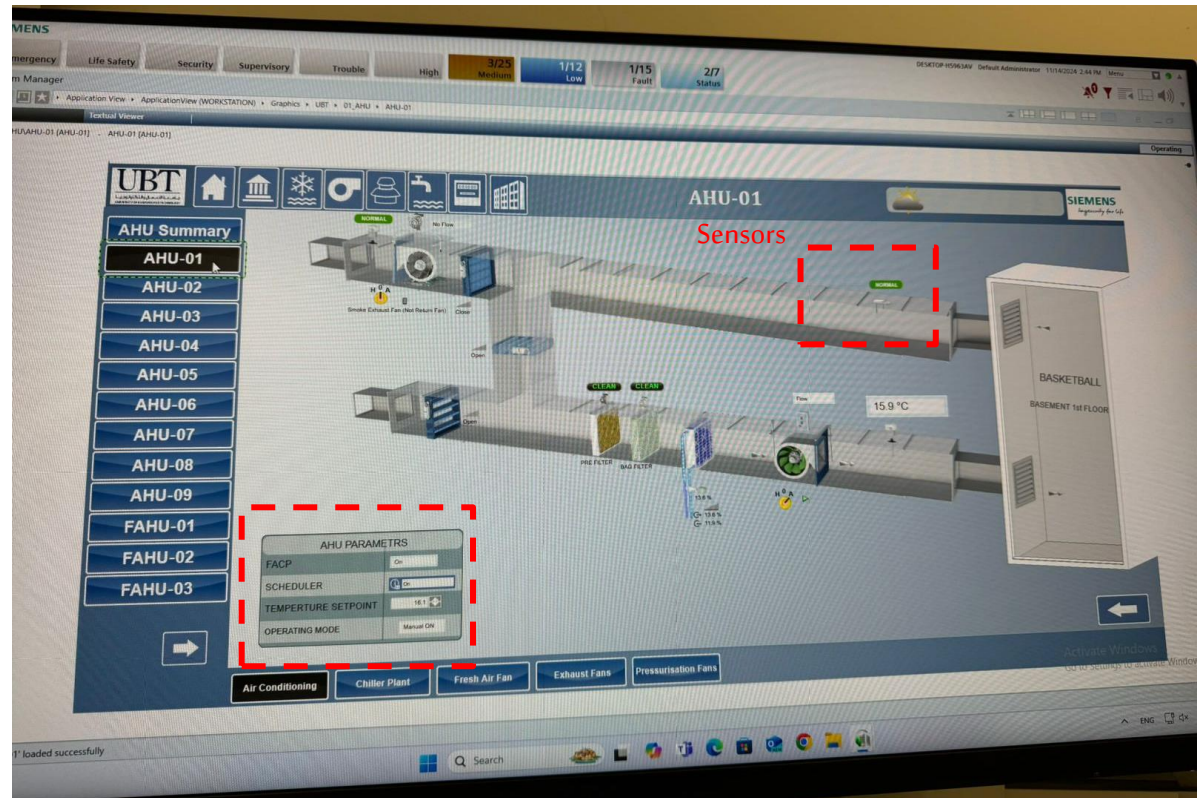
BMS can schedule the **operation of the chillers** as well as record the **efficiency and power consumption of the chillers**



Air Handling unit

An Air Handling Unit (AHU) is an important part of large HVAC systems. It helps treat, regulate, and circulate air by collecting it, removing dust, and adjusting temperature and humidity.

Building Management Systems (BMS) use sensors to monitor all parts of the HVAC system. This allows for remote adjustments. The sensors also help with maintenance by alerting users to any errors, so they can act quickly to keep the system running well.



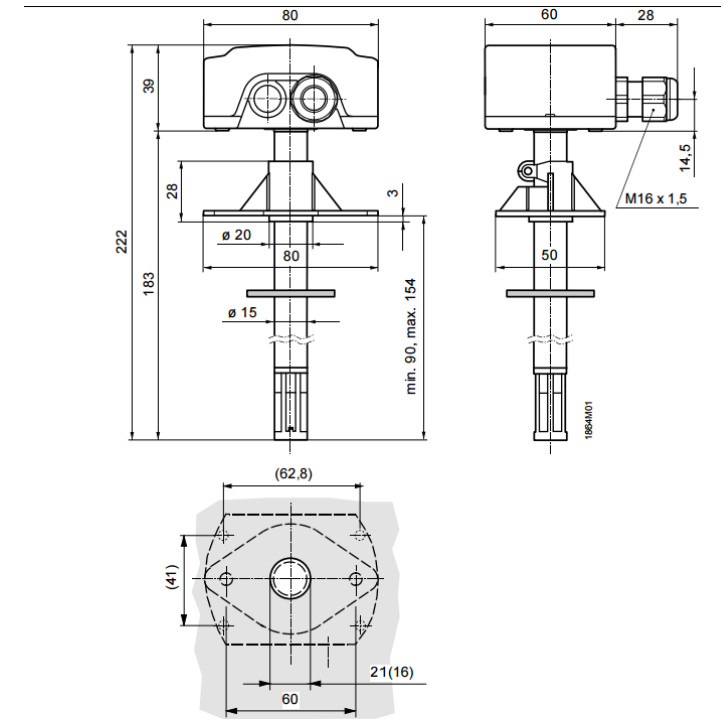
Duct Sensors

Sensors Use:

The QFM21.. duct sensors are for use in air ducts of ventilation and air conditioning

plant for acquiring:

- The relative humidity and
- The temperature.
- The sensors are used as:
- Control sensors in the supply or extract air
- Reference sensors, e.g. for shifting the dew point
- Limit sensors, e.g. in connection with steam humidifiers
- Limit sensors, e.g. for measured value indication or for connection to a building automation and control system
- Sensors for enthalpy and absolute humidity, together with SEZ220 (see Data Sheet ---- N5146



Drilling plan with (without) mounting flange

Dimensions in mm

Internet of Things (IOT)

Internet of Things (IOT)

The Enlighted Micro Sensor, 8-pin, is our fifth-generation sensor, delivering all the functionality of our other sensors in a minimally-sized package. Integrated sensors capture data that is both processed locally and transmitted over the Enlighted network, enabling a full suite of applications. In addition, the sensor supports Bluetooth® Low Energy communication with tags and other BLE devices



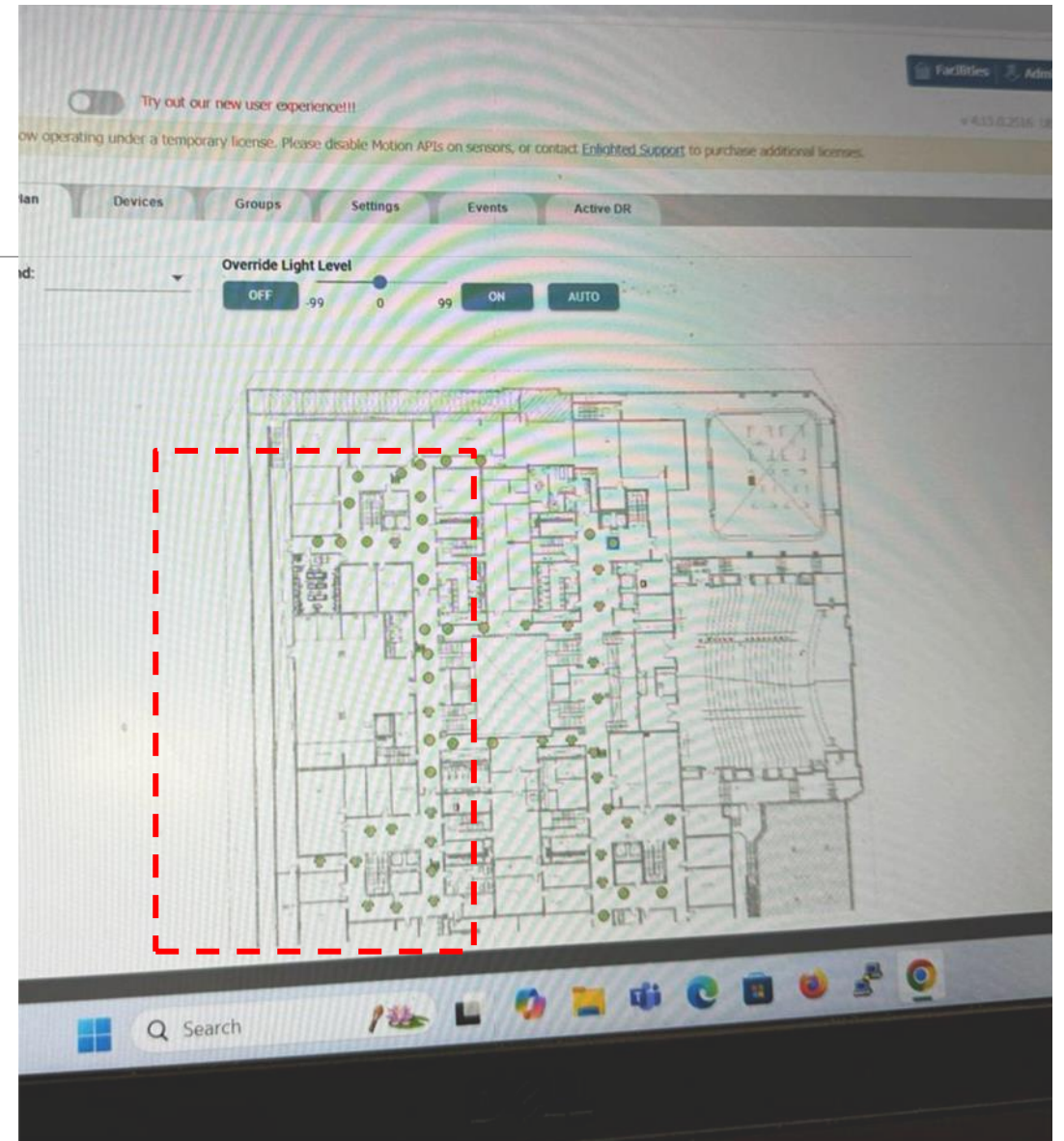
Internet of Things (IOT)

Occupancy and Thermal Sensing:

A digital Passive Infrared (PIR) sensor combined with separate ambient and temperature sensing supports precise motion identification while minimizing false detection events.

Room and Zone Control:

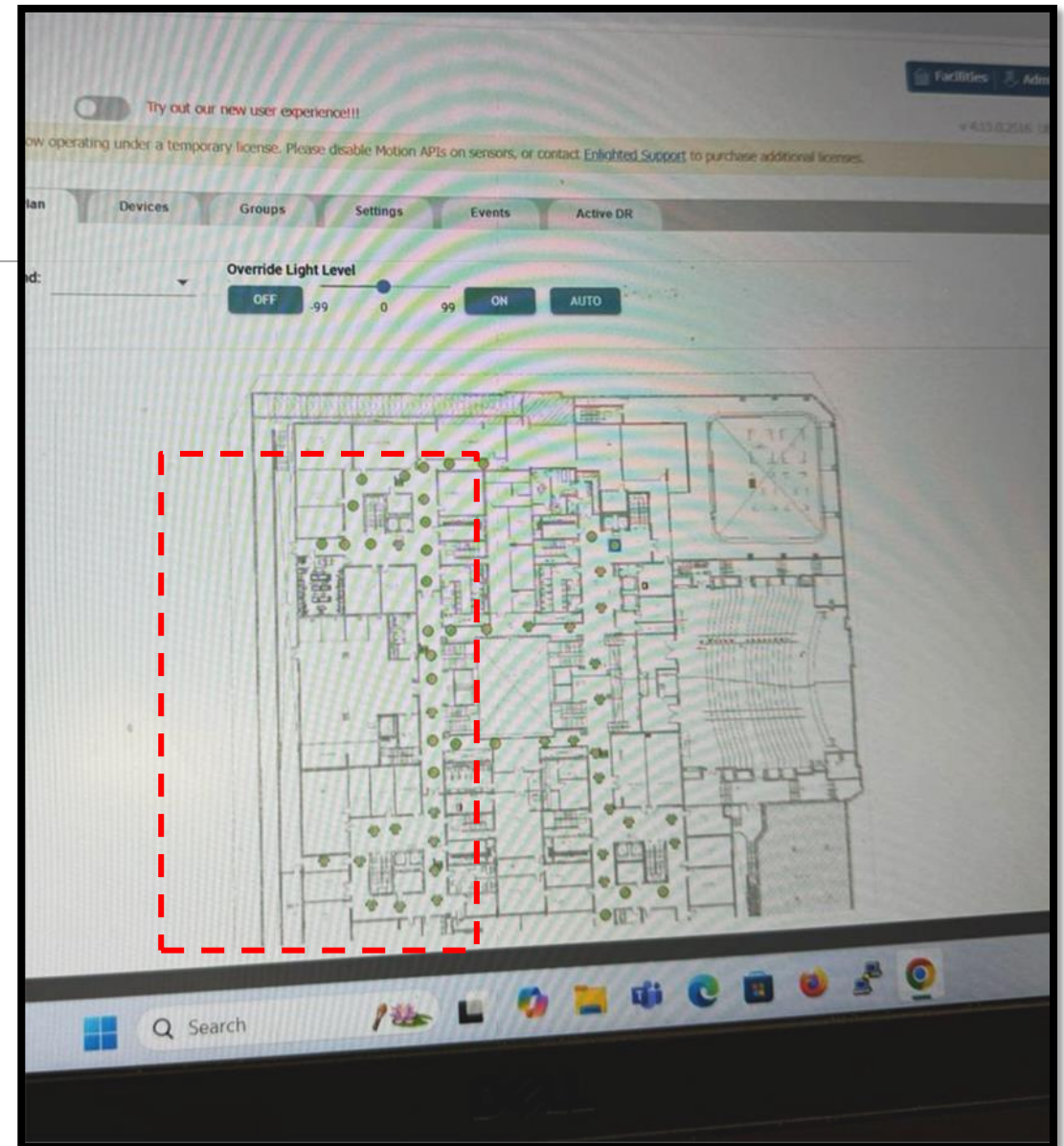
Sensors can be grouped into zones that share occupancy sensing data and coordinate light control based on detected motion.



UBT Enlighted System

- Enhance the overall quality of lighting through the utilization of LED and sensor-equipped light fixtures.
- To promote efficient operations, Achieve energy savings in lighting of up to 90% and reduce maintenance costs for lighting by as much as 25%.

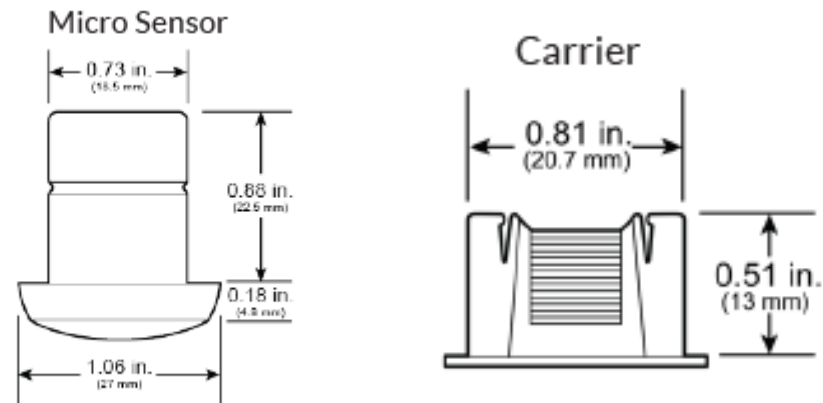
UBT has implemented lighting sensors within its corridors to minimize energy consumption and automatically deactivate lighting in areas with low occupancy.



Internet of Things (IOT)

Mounting

The Enlighted micro sensor is designed to be easily mounted into lighting fixtures or ceiling tiles such that only the discreet white faceplate is visible



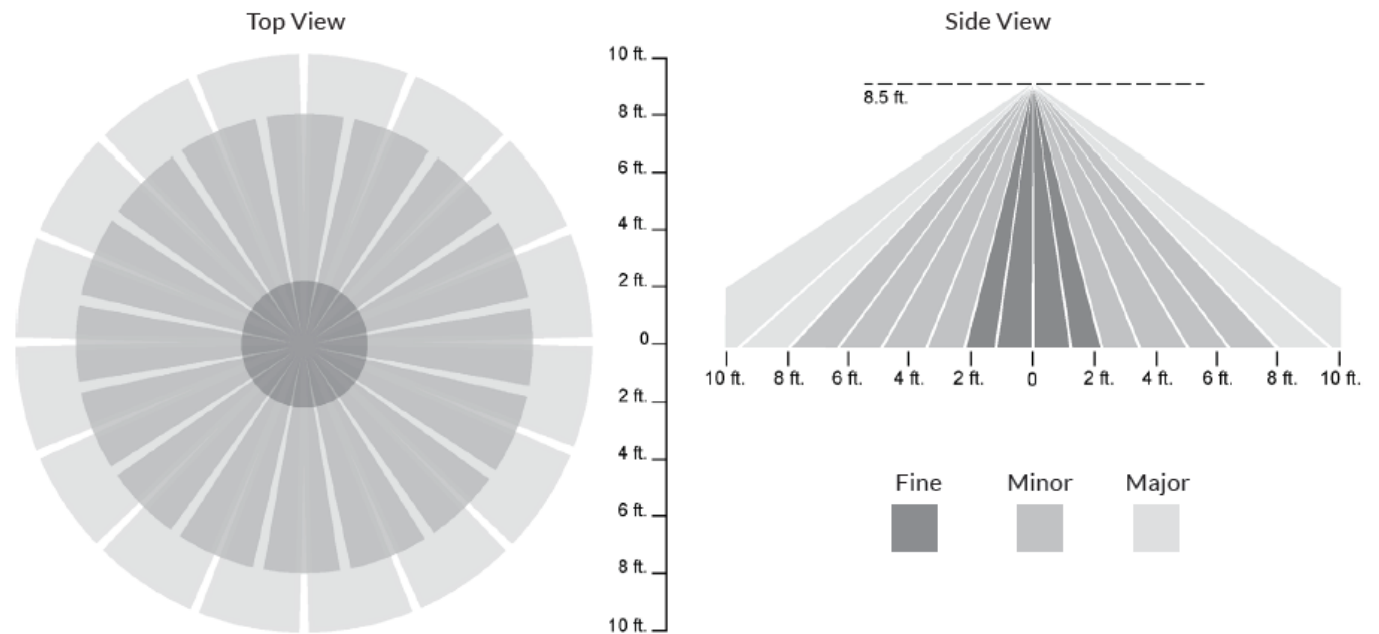


| Ceiling Height | Fine Motion (Radius) | Minor Motion (Radius) | Major Motion (Radius) |
|----------------|----------------------|-----------------------|-----------------------|
| 8.5 ft/2.6 m | 2.3 ft/0.7 m | 8 ft/2.4 m | 10 ft/3.0 m |
| 15 ft/4.6 m | 4.0 ft/1.2 m | 10 ft/3.0 m | 18 ft/5.5 m |

Internet of Things (IOT)

SENSOR COVERAGE PATTERNS

The Enlighted Micro Sensor incorporates an optical Fresnel lens that works with the digital Passive Infrared (PIR) sensor to detect occupancy and motion. The multifaceted lens focuses light onto the PIR to produce an all-encompassing field of view through aggregation of many narrow fields of view. When the Micro Sensor is deployed as recommended, the area covered by each sensor overlaps, reinforcing coverage and accuracy across the entire floor plan.



Wireless Access Control System

UBT COR Wireless access control

Ensuring building security UBT COR implementing a high security project which can be integrated with the monitoring system (BMS) to monitor doors and register the entry of users within security system

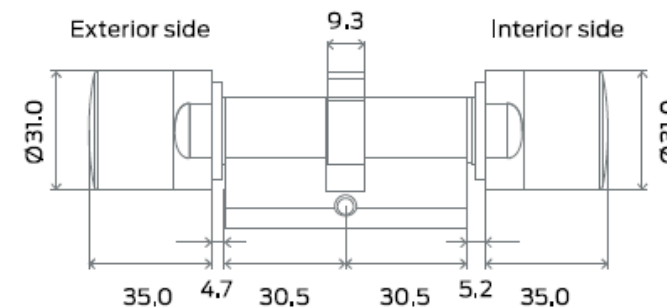
Type of Locks:

- Digital Cylinders (glass doors)
- Smart Handle (wooden door)

Digital Locking Cylinder

provides high security standard, flexibility and is also extremely easy to fit. It is installed in minutes with no need for any wiring or drilling. Standard button cells reliably ensure up to 80,000 locking operations in a wireless online network. An average battery life of five years can be expected in standby mode.

In other words, like other SmartIntego components, the locking cylinder is maintenance-free for many years



Smart Handle

Digital Padlocks are available in manual and self-locking versions with different shackle diameters. A securing chain prevents the padlock from being stolen or falling onto the floor. It is suitable for outdoor use and can record who and when a lock has been opened

diameters. A securing chain prevents the padlock from being stolen or falling onto the floor. It is suitable for outdoor use and can record who and when a lock has been opened



Gateway

Each GatewayNode is capable of communicating with up to 16 locking devices via an 868 MHz wireless connection capable of transmitting white list data from AC2000 to the locks



Hybrid + Semi Hybrid Classes

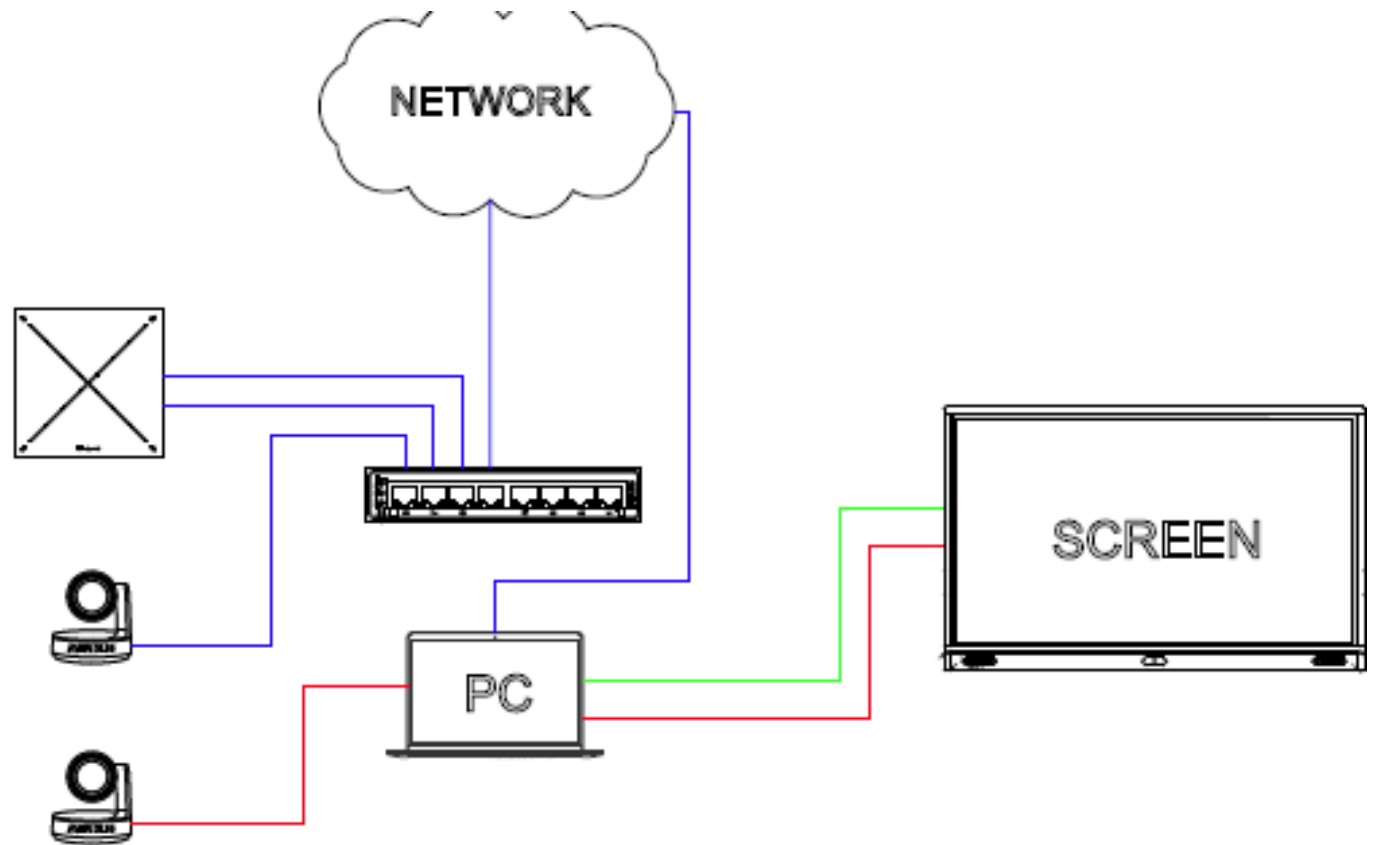
Semi Hybrid Classes

A smart learning Experience to ensure the efficiency of remote learning by utilizing the classes with the below system items

- Smart screen**
- speaker**
- ceiling microphone**
- Tracking Cameras**

Semi Hybrid Classes plans

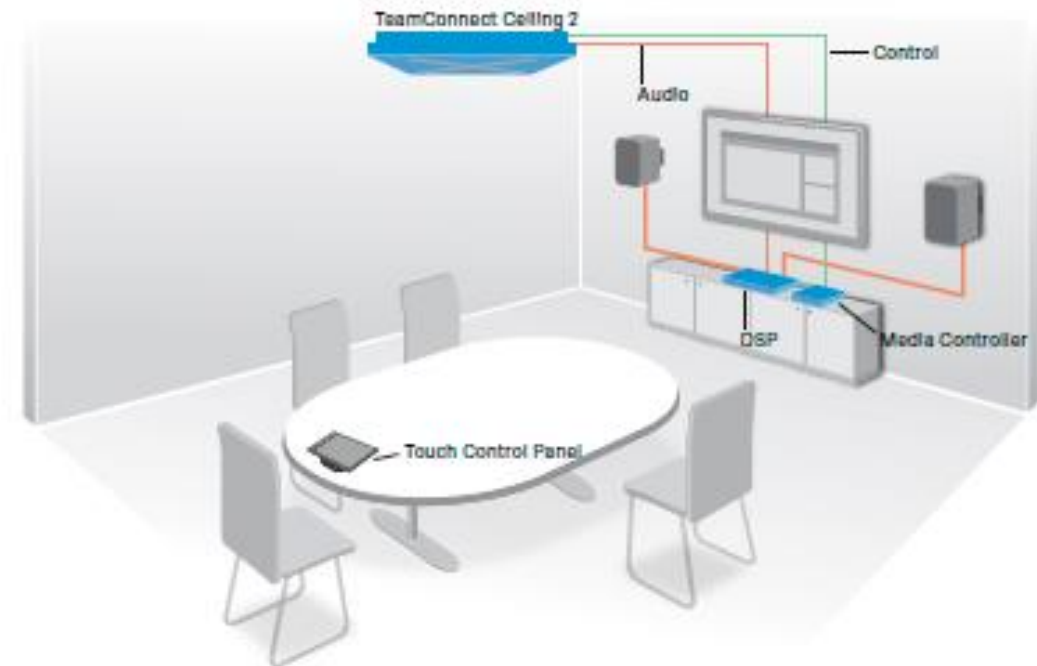
Method of Integration and
installment



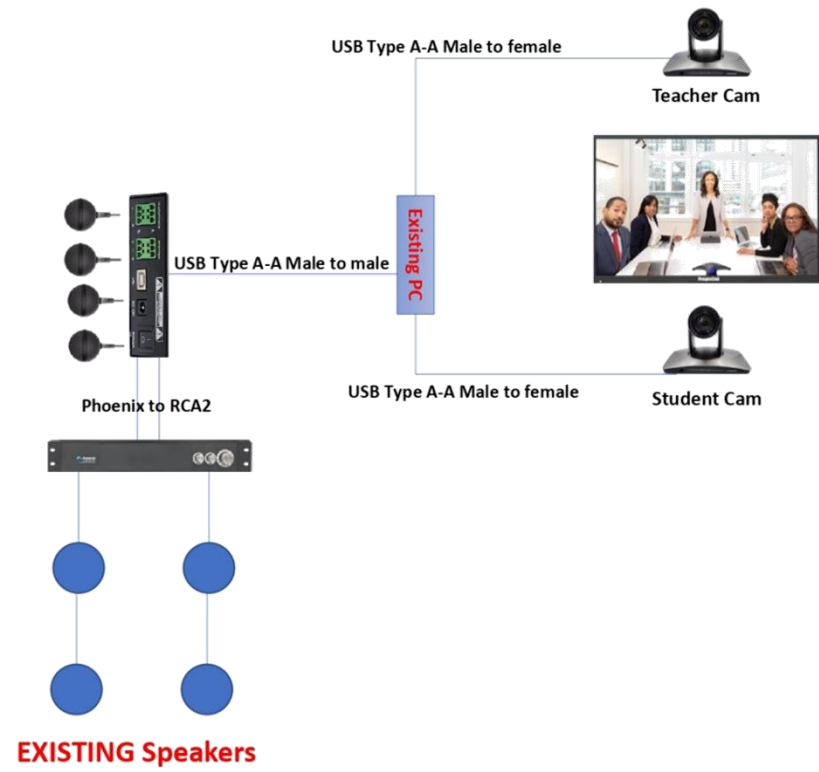
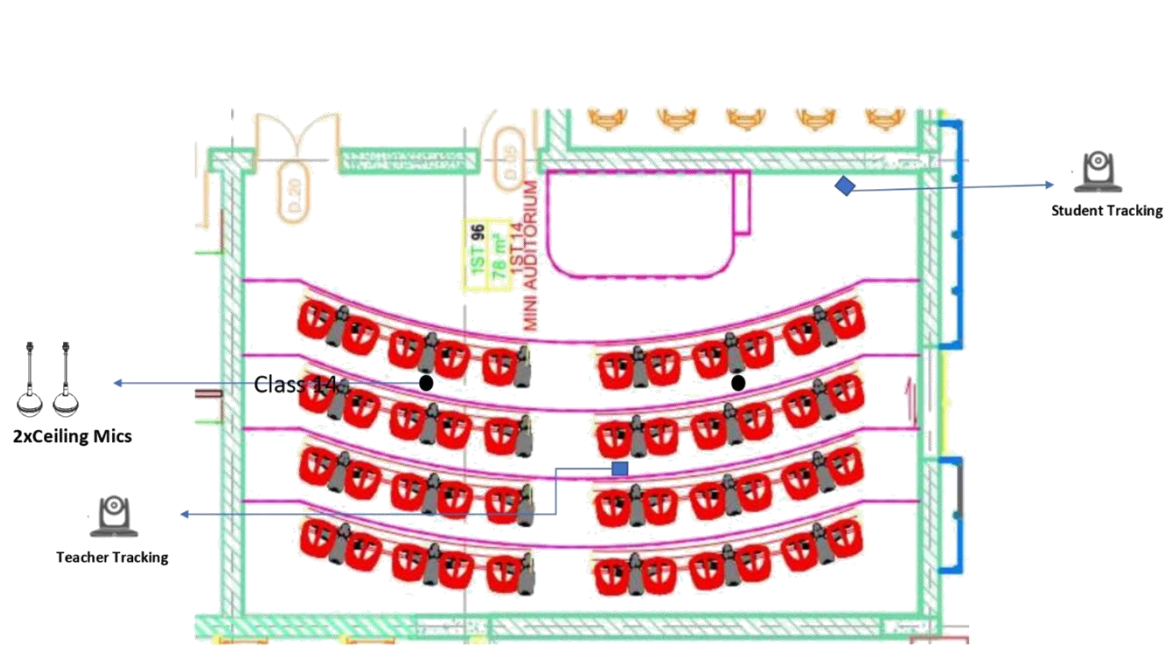
Semi Hybrid Classes



Sample application:



Hybrid Classes



Hybrid Classes



Total Room Automation (TRA)

On Going project

Total Room Automation (TRA)

Intelligently combining heating, cooling, ventilation, lighting and shade control into a single platform

- Optimal, integrated air flow management – By connecting air flow controls in rooms and hoods,
- Greater occupant comfort – The HVAC strategy sustains comfortable temperatures, good air quality, and humidity while the lighting and shade controls respond to occupancy.



UBT

جامعة الأعمال و التكنولوجيا
UNIVERSITY OF BUSINESS AND TECHNOLOGY

Pilot Study to Evaluate Energy Efficiency Using Occupancy Sensors for Lighting



Prepared by:

Dr Yasser Aboelmaged - Dr Amr Yousef

September 12th 2024

Introduction

Energy efficiency is a key concern for both financial savings and environmental sustainability. One of the most effective ways to manage energy consumption in buildings is through occupancy sensors, particularly in controlling lighting systems. These sensors detect when a room is unoccupied and automatically switch off the lights, reducing unnecessary energy consumption.

This pilot study will evaluate the energy savings achieved by installing occupancy sensors in **LAB 115** (4 m by 6 m). The goal is to assess the impact of these sensors on the room's lighting energy usage. The study will use Philips-type occupancy sensors, as detailed in the UBT QUOTE # 2024-0419-REV, with a total installation cost of **SAR 5,002.50 (including VAT)**.

Objectives

The study's primary objective is to determine the extent to which occupancy sensors can reduce lighting energy consumption in the room. Specific goals include:

1. Measure energy reduction in lighting due to the installation of occupancy sensors.
2. Compare energy usage before and after the sensors are installed.
3. Analyze occupancy patterns and their influence on lighting energy savings.

Methodology

Room Setup:

The study will be conducted in LAB 115 in the Engineering College. The lab is about 4 m by 6 m and equipped with standard lighting. To establish a baseline for energy usage, the lighting will initially operate without sensors on a fixed schedule.

Phase 1: Baseline Measurement (Pre-Sensor Installation):

For the first 7 days, energy usage will be recorded 24 hours a day to capture lighting consumption. During this period, the lights will follow a set schedule without any control based on occupancy. The data collected will serve as the baseline to compare against post-installation results.

Phase 2: Occupancy Sensor Installation:

As specified in the UBT QUOTE 2024-0419-REV, Philips-type occupancy sensors will be installed. These sensors will control the room's lighting system, ensuring that lights are turned off when the room is not occupied.

Phase 3: Post-installation Measurement:

After installing the sensors, lighting energy usage will be recorded again for another seven days. The goal is to capture how much energy is saved when the lights are only on when the room is in use. Data will be collected 24 hours a day using an energy meter.

Data Collection and Analysis

Data will be collected for 7 consecutive days, both before and after sensor installation, using the chosen energy meter. The collected data will be analyzed to:

1. **Calculate energy savings** by comparing the daily energy usage for lighting during the baseline and post-installation periods.
2. **Evaluate occupancy patterns** based on the sensor logs, correlating how often the lights were turned off during periods of non-occupancy.

Expected Outcomes

The pilot study is expected to yield measurable reductions in lighting energy consumption. Key outcomes include:

- Energy savings are due to lights being turned off automatically when the room is not occupied.
- Cost savings: The initial cost of the sensor installation (SAR 16,560 including VAT) will be offset by long-term reductions in energy bills.
- Sustainability: The installation will contribute to environmental sustainability efforts by reducing unnecessary energy consumption.

Conclusion

The installation of occupancy sensors in the room's lighting system is expected to result in significant energy savings, which will be easily measurable through continuous monitoring over a 7-day period. The energy data collected using the recommended meters will provide insight into the room's occupancy patterns and their impact on energy consumption. The outcomes of this study can serve as a model for future sensor installations across other rooms, driving energy efficiency and cost savings on a larger scale.