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zone
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Apartments adapted for people with disabilities

Building Automation Systems + IoT = Endless Possibilities

Due to the critical lack of apartments adapted for people with disabilities in the Quebec City area, the O'Drey Group, a non-profit organization, has launched an innovative housing project based on social diversity and inclusion. The objective is to offer an alternative solution to long-term care facilities and private residences for retirees, which are not adapted to the needs and reality of young adults.

The building, which will be in the Vanier sector of Quebec City, will offer year-round services and include more than 80 apartments, of which more than forty of them will be fully adapted for disabled people. Construction has already started in May of this year and is expected to be completed in 2022.

For this project, the engineering firm Pageau Morel retain the services of **Régulvar** because of our extensive and unique innovative solutions.

In that context, once again, the **Internet of Things (IoT)** provides a variety of interesting possibilities in the field of building automation and intelligent buildings.

Connected solutions

For the project of O'Drey Group, **Régulvar** offers 2 types of solutions:

1. **A basic solution for standard apartments :** control of heating, cooling and air conditioning systems.

2. **A customized solution for disabled people's apartments that includes :** Adapted control solutions according to the person's specific disability. **Braille Thermostat** which was specially developed by Régulvar to suit blind and visually impaired tenants. **Voice-activated technologies** to control systems such as temperature, lighting, motorized blinds, wall socket and door access to assist people who are unable to use their hands.

Braille Thermostats : Each time the Braille buttons on the thermostat are pressed, the thermostat will beep to indicate that it is raising or lowering the temperature set point by half a degree.

Connected wall sockets : 120V IoT wall sockets are operated by voice command through Delta systems.

Battery less, wireless light switch : Can be easily installed in another room or adapted to the occupant's height.

Connected locks : they provide autonomy and security. For example, the door automation avoids the occupant from moving when someone knocks at the door.

Motorized Blinds : the control of the motorized blinds allows an efficient management of the sun's energy input. When unoccupied, the opening and closing of the blind can be programmed to simulate presence.

IoT = Full integration

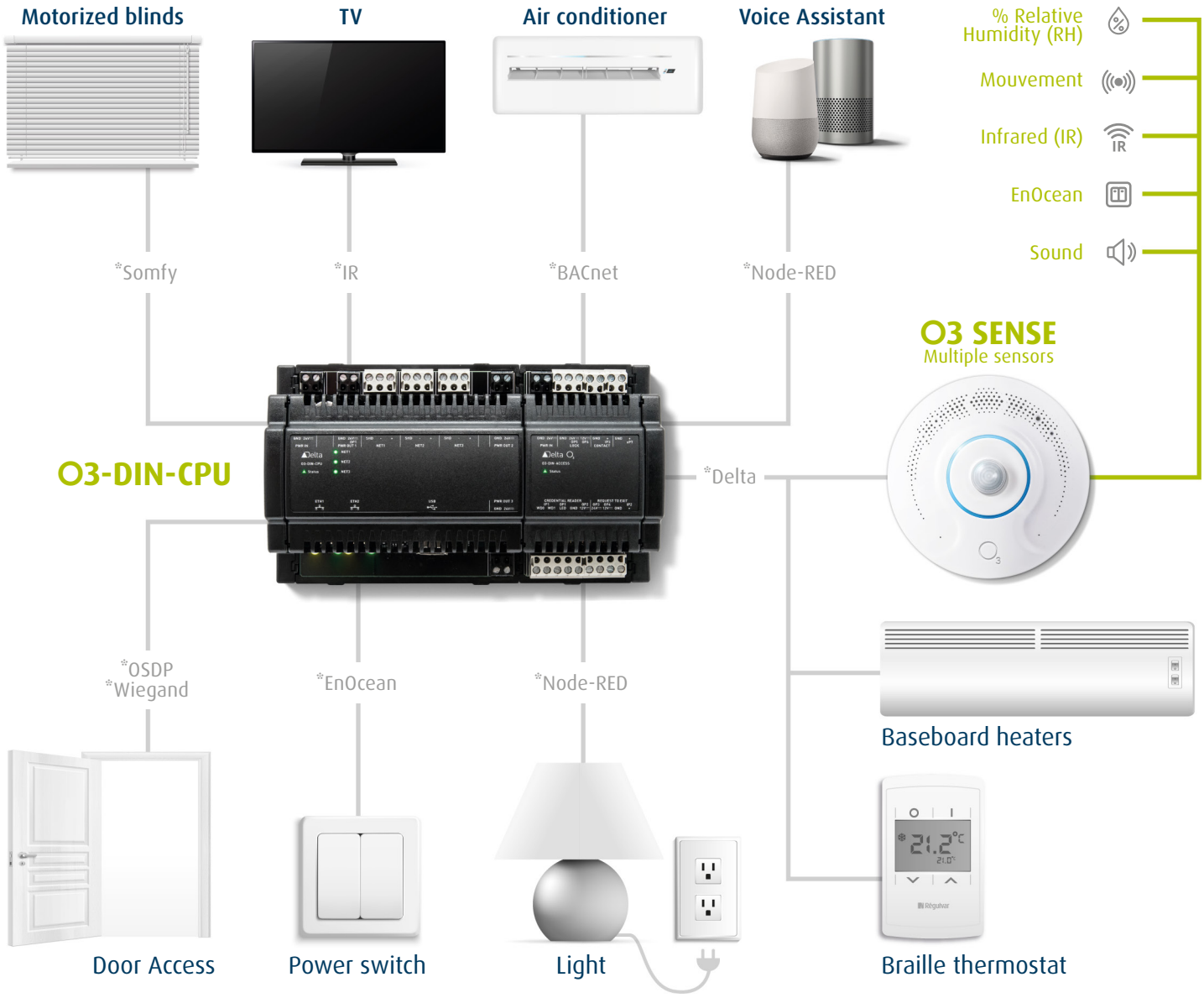
Today, any smart devices that allow full integration can be connected to the various access control solutions that are offered in the Delta Control's O3 products.

Full integration implies that all the control systems (lighting, heating and cooling, door access, TV, motorized blinds, etc.) are connected to the Delta Controls O3-DIN-CPU, which become the centralized monitoring point in the apartment.

An overview of all the devices which will be implemented in the O'Drey Group project and which will be controlled by the various technologies integrated in the Delta Controls' O3-DIN-CPU controller.

Summary :

- Approximately **150 control points** for mechanical systems (general ventilation systems, common areas, parking lots).
- Approximately **350 thermostats** for apartments and common areas.
- Several technologies integrated by Delta Controls.



* Integrated Technologies

Key Products

O3-DIN-CPU

The O3-DIN-CPU is a fully programmable system of Delta Controls which represent the primary integration engine of the O3 system. It contains memory storage, external communication ports as well as the control logic for the expansion modules.It supports multiple communication protocols, including BACnet/IP, BACnet/SC, BACnet over Ethernet, BACnet MS/TP, Delta LINKnet, Modbus, Wiegand, OSDP, EnOcean, DALI and the Infrared Technology.

Thanks to these protocols, the O3-DIN-CPU can be interfaced with a variety of smart devices (switches, baseboard heaters, voice recognition assistants, etc.).

A maximum of four O3-DIN-8xP modules equipped with eight universal control points can be plugged to monitor various measurable variables (temperature, humidity, pressure, etc.) and/or to control several devices (fans, heating valves, air conditioners, etc.).

What's new? The Node-RED and Python application layers are installed in the O3-DIN-CPU. Thanks to these advanced programming languages, external technologies such as IoT devices can now be integrated to the building mechanic and available to the building management system by transforming their data to the BACnet protocol.

O3 Sense

The O3 Sense from Delta Controls combines several room sensors into one single device: humidity, temperature, passive infrared motion, brightness together with an infrared transmitter. Machine learning algorithms allow the fusion of its sensors to extract information such as occupancy, temperature at the centre of the room at 4 feet from the floor, the number of people in the room, etc. This multi-sensor is equipped with several interfaces which enable the communication and integration with various systems.

The O3 Sense is also equipped with a wireless EnOcean transmitter/receiver that can receive wireless data from up to 32 devices such as a wireless light switch using the same technology.

The O3 Sense contains an infrared sensor for TV remote control, as well as a Bluetooth beacon that allows occupants to manage the room's comfort settings by using the O3 mobile app directly from their phone.

The circular movement made by the coloured LED ring provides silent indications while the audio tones provide feedback to the room occupant.

Integrated Technologies

1 Node-RED

Node-RED is an open-source programming tool used for wiring together hardware devices, APIs and online services to create visual flows of automated services. It provides a browser-based editor in which flow can be created using the wide range of nodes in the palette in a single click.

Collected data from several sensors can be visualized using the user's Web browser.Node-RED dashboard library allows the creation of dynamic and intuitive user-interface dashboards.It helps users to quickly visualize, design and deploy their building automation scenarios.

How does Node-RED works? Predefined blocks of code called "nodes" are utilized by the user to build the program by linking the different nodes.

By installing a third-party application, such as NORA, communication can be established between the Node-RED programming tool, the O3-DIN-CPU and the voice assistant integration services (e.g., Google Home).

2 EnOcean

EnOcean is a wireless, battery less radio frequency protocol.

How does it work? To create an electromagnetic signal, the EnOcean protocol uses energy either photovoltaically or piezoelectrically. Although these 2 technologies are not new, their utilization in the building automation industry is quite recent thanks to the improved version of miniaturization processes that are available nowadays.

How does a wireless, battery less switch works? The EnOcean's innovative technology is based on the principle of energy harvesting: where sensors use the energy generated by the mechanical pressure of the switch. (Piezoelectricity). When a switch is pressed, the temperature alters, or the luminance level varies. All these operations generate enough energy to transmit wireless signals by the Hertzian way (radio).

The O3 Sense multisensor is equipped with an EnOcean transmitter/receiver. Therefore, the integration of the EnOcean control technology is done within the O3 Sense multisensor.

Integrated Technologies

3 Wiegand

Wiegand is the trade name for a communication protocol used in card readers and sensors, particularly for access control applications.

There are also other types of detection devices that can exchange authentication parameters with a controller, such as a fingerprint reader or a biometric reader.

The integration of the Wiegand protocol in the O3-DIN-CPU is implemented in a plug-in module O3-DIN-ACCESS that connects to the O3-DIN-CPU. The card reader or other peripheral device together with the electric door lock and door contact is connected to this module.

4 Infrared control (IR)

An infrared control consists of an emitter (light-emitting diode) that sends an infrared beam to a receiver (Photodiode).

The O3 Sense multi-sensor has an infrared emitter that can control a device with an infrared receiver, such as a television.

5 BACnet

BACnet is a data communication protocol developed by The American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) that enables communication between third-party devices such as HVAC, lighting, access systems, etc.

Delta Controls has developed a complete range of native BACnet products – HVAC, lighting control and access. Interaction with third-party devices was not feasible before the creation of the BACnet protocol.

6 Somfy

Somfy's protocol allows the automation of the opening and closing of motorized blinds.

The motorized blinds can be controlled from the O3 application both manually and automatically by using the light sensor incorporated in the O3 Sense's multi-sensor.

How does the Somfy protocol works? It is integrated into an O3-DIN-CPU controller by means of a library (like Tahoma) installed in the Node-RED programming tool of the controller.

GROUPE O'DREY
FORCE | ÉQUILIBRE | DIGNITÉ

Completion of the project

Engineering Pageau Morel

Architecture Lafond Côté Architectes

Building automation Régulvar inc.

Conclusion

Nowadays, multiple devices (objects) and technologies can be both integrated into a single controller to avoid the proliferation of technologies that cannot communicate with each other in the same physical space. The Internet of Things (IoT) offers endless possibilities both in terms of integration and customization.

Written by
Caroline Gras, trad. a.
Communications coordinator
cgras@regulvar.com

Graphic Design
Stéphanie Harel
Graphic designer
sharel@regulvar.com

Sources
Michel Cochrane, T.P. — Associate and Branch Manager Québec City
Pascal Lambert — Technical support and programming
Simon Arpin, Eng. — Associate and Technical Director Building Automation Solutions and R&D

Upcoming Training

	In Laval (French)	In Gatineau (English)
BACnet object handling	13-14 September	Upon request
Advanced objects and controllers	15-16 September	Upon request
GCL programming	21-22-23 September	Upon request
Creating graphic interfaces with EnteliViz	28-29 September	Upon request
Creating graphic interfaces with Illustrator	Upon request	Upon request

For more information,
visit our Website
www.regulvar.com
or contact the
training department
at **450 629-0435,** ext. **1777**
formation@regulvar.com