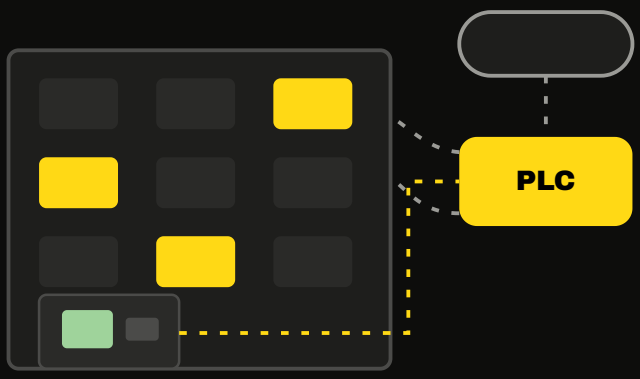
SMART HOTEL · RASPBERRY PLC 19R

Check in at reception. The room gets ready.

One ID scan at the entrance. A PLC and a panel in every room.

Read the interactive case study online ›



check-in, rooms and bath on one network
Schematic illustration

1 panel at the entrance for the check-in	**4** room loads on one PLC	**2** valves, hot and cold, for the bath	**4** links: RS-485, Ethernet, Wi-Fi and mobile data

THE CHALLENGE

Connect the reception, every room and the cloud.

A smart hotel is a hotel where the devices are connected to each other and to the cloud. Guests control many devices from one point, and the system answers their preferences. The goal of the model is a viable way to do it: PLCs, panels, sensors, an ID scanner and a server for all the information.

01

Check-in at one point

A panel at the entrance welcomes the guest. It scans the ID, fills the forms, asks for the signature and sends a copy to the guest by email.

02

A room on preferences

On the same panel, the guest chooses preferences. The room is assigned from them, and the data and the room number go to the room before the guest does.

03

A room that starts with the guest

The fridge switches on when the room is assigned, not before. The air conditioning stops at the set temperature. The LED lights change intensity.

04

Information at hand

The room panel shows the clock, the hours to checkout, the next alarm, the best time for the spa or the gym, city maps, restaurant times and menus, and the hotel contacts.

One master, many rooms

The PLC at the entrance is the master of a Wi-Fi network. A PLC and a panel in each room are its slaves. The master sends the guest data to the cloud over mobile data (GPRS in the 2020 case).

HOW IT WORKS

Three loops: check-in, room, bath.

Loop 1 · Check-in

Scan the ID once. Assign the room from the preferences.

At the entrance, the master panel welcomes the guest. The scanner reads the ID card over RS-485, the panel fills the forms, asks for the signature and emails a copy.

- ID scanner on RS-485
- Forms, signature and email from one scan

Loop 2 · The room

Climate, light and fridge, from the room panel.

In each room, a PLC with relay outputs switches the 230 V loads, and a panel is the point of control. A temperature sensor reads the room and the air conditioning runs on a relay.

- Air conditioning on a relay, off at the set value
- LED intensity from a PWM output

Loop 3 · The bath

Fill the bath from the panel.

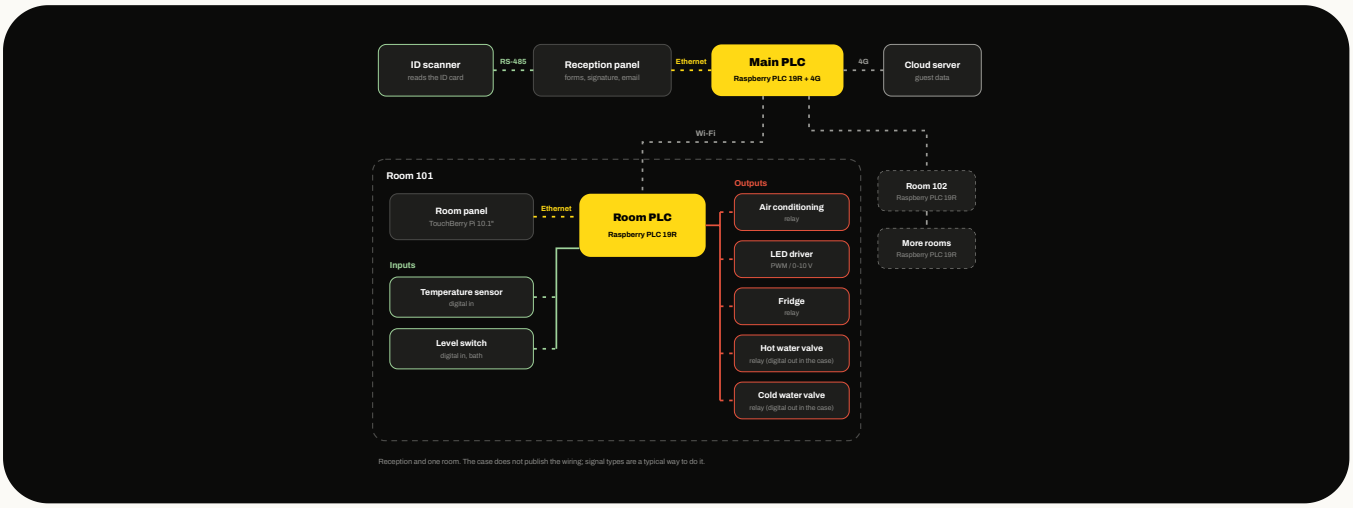
Two solenoid valves, one for hot water and one for cold, sit on outputs of the room PLC. The guest starts the filling from the panel and finds the bath ready.

- Hot and cold solenoid valves
- Started from the room panel

SYSTEM ARCHITECTURE

How do you build a smart hotel with PLCs?

At the entrance, the ID scanner reaches the reception panel over RS-485, and the panel talks to the main PLC over Ethernet. The main PLC is the master of a Wi-Fi network to the rooms and sends the data to the cloud over mobile data. In each room, a panel talks to a Raspberry PLC 19R over Ethernet, and the PLC switches the air conditioning, the LED driver, the fridge and the two bath valves. The scheme of the case shows the same links.



Inputs and serial · Outputs to the loads · Ethernet · Wi-Fi and mobile data

Signals and data for the reception and one room (example)

Signal	Between	Type	Purpose
ID data	ID scanner → reception panel	**RS-485**	Fills the forms and the guest record
Check-in and room	Reception panel ↔ main PLC	**Ethernet**	Preferences, signature, room assigned
Room commands	Main PLC ↔ room PLC	**Wi-Fi**	Room number, guest name, check-in and checkout
Guest data	Main PLC → cloud server	**Mobile data (4G today, GPRS in the case)**	Stores the check-in data
Room temperature	Temperature sensor → room PLC	**Digital in (as in the case) or 0-10 V analog in**	Compared with the set value of the guest
Bath level	Level switch → room PLC	**Digital in**	Stops the filling (example)
Air conditioning	Room PLC → air conditioning	**Relay out**	On away from the set value, off at it
LED lights	Room PLC → LED driver	**PWM / 0-10 V out**	Light intensity
Fridge	Room PLC → fridge	**Relay out**	On only while the room is assigned
Hot water	Room PLC → solenoid valve	**Relay out (digital outputs in the case)**	Fills the bath
Cold water	Room PLC → solenoid valve	**Relay out (digital outputs in the case)**	Fills the bath
Room menu	Room PLC ↔ room panel	**Ethernet**	Set values, light, bath, guest information

HARDWARE USED

One PLC model for the entrance and the rooms.



RASPBERRY PLC 19R

An industrial PLC built around a Raspberry Pi 4, with 6 inputs and 11 outputs, 8 of them relays, two Ethernet ports, two RS-485 ports, Wi-Fi and Bluetooth LE. In each room it switches the loads; at the entrance it is the master of the Wi-Fi network.

Inputs	**6: 4 analog/digital (0-10 V, 12-bit), 2 digital optoisolated (5 to 24 Vdc)**
Outputs	**11: 8 relays, 3 analog/digital/PWM (0-10 V, 12-bit)**
Relays	**Up to 4 A at 230 Vac or 2 A at 24 Vdc, resistive load**
Comms	**1 x Gigabit and 1 x 10/100 Ethernet, 2 x RS-485, Wi-Fi, Bluetooth LE**

The slides of the case name Raspberry based PLCs and the scheme labels the room PLC "Raspberry Relay PLC"; the web version says Arduino PLC. No source fixes the model. This page uses the Raspberry PLC 19R: its relays switch the 230 V loads, an analog/PWM output drives the LED driver and Wi-Fi is built in. For the main PLC, the 4G board replaces the GPRS link of the 2020 case, as many operators have switched 2G off or plan to. See the product page for the family datasheet.

See the Raspberry PLC 19R ›



TouchBerry Pi Panel PC 10.1" CORE

The point of control: a Raspberry Pi 4 behind a 10.1" capacitive touchscreen, on Ethernet to the PLC. At the entrance it runs the check-in; in the room it shows the menu for the climate, the light, the bath and the guest information.

Screen	**10.1" IPS, 1280 x 800, capacitive, 900 nits**
Software	**Linux preinstalled; HMI in Node-RED, Python or a browser**
Comms	**Gigabit Ethernet, 4 x USB, one serial port (RS-485, RS-232 or TTL, chosen at order)**

The original case names the TinkerTouch S 10.1", which is no longer sold, and the web version links to the TouchBerry 10.1". Today it is the TouchBerry Pi Panel PC 10.1" CORE. In the scheme of the case, the ID scanner connects to the reception panel over RS-485: order that panel with its serial port as RS-485. For a full-screen guest menu, see kiosk mode for a Node-RED dashboard. The FLEX version adds options such as an IP65 front.

See the TouchBerry Pi 10.1" ›

One scan, many uses

The ID is read once at the entrance. The same data fills the forms, goes into the email to the guest, picks the room and reaches the room panel, which greets the guest by name.

One master, many rooms

Every room has the same PLC, the same panel and the same program. A new room is one more slave on the Wi-Fi network of the master PLC.

A control network for the hotel

A typical way to do it: the room PLCs use their own Wi-Fi network, separate from the guest Wi-Fi, so a guest cannot reach a room controller. In a real building, the network runs on the hotel access points; the main PLC is the master of the data, not the radio.

AUTOMATING A HOTEL?

Tell us about your hotel. An engineer will answer.

Tell us how many rooms you have, how check-in works today, which loads each room has and how the building is connected. We will propose the controllers, the panels and the network.

FULL CASE STUDY ONLINE

industrialshields.com/case-study-smart-hotel-raspberry-plc

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