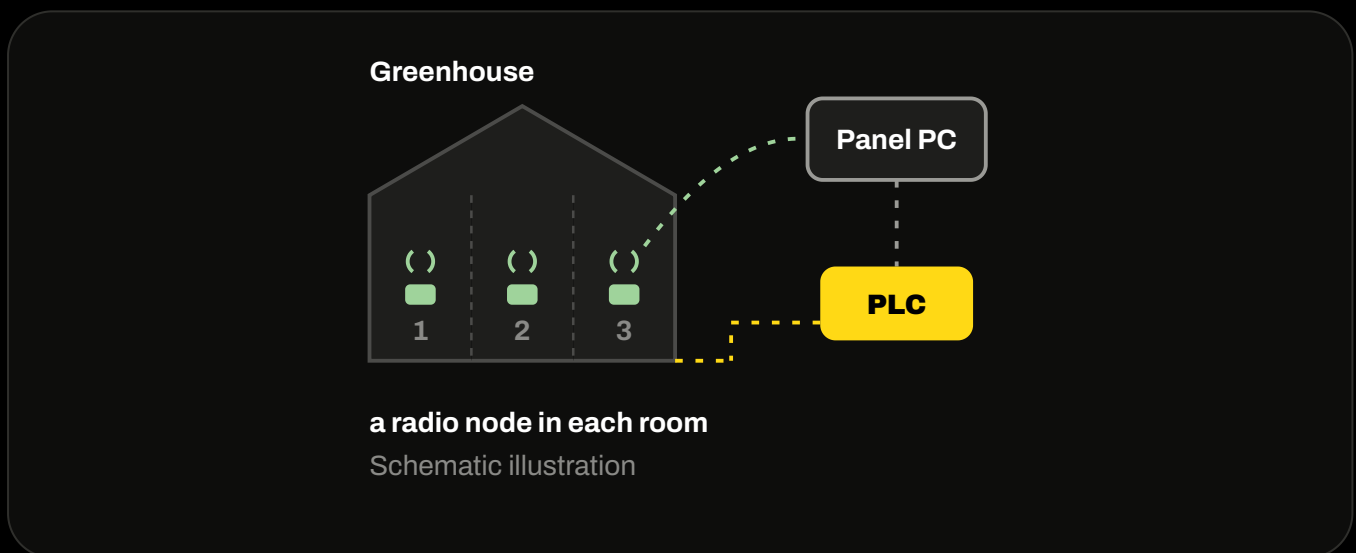


GREENHOUSE · M-DUINO 57R

A radio node in each room. One PLC acts where it is needed.

Low-power Open Mote nodes, a Panel PC and an Arduino based PLC.

[Read the interactive case study online ›](#)


4

values per node: humidity, temperature, pressure and brightness

2.4 GHz

radio from the nodes to the gateway, with the free Contiki software

< 50 μ A

consumption of the Open Mote, as the case gives it

12

relay outputs in the scheme: 3 for each of the 4 rooms

THE CHALLENGE

Know the climate of every room, and act only where a value is wrong.

The greenhouse has a main room and other rooms. The customer wanted to read several sensors in each room, to see all the data in one place and to start the actuators of the room where a value is not wanted. The sensors had to talk to the terminal without wires, so the nodes can go wherever they suit the room.

01

One climate per room

Each room has its own Open Mote with a sensor board for humidity, temperature, pressure and brightness. The data of one room is kept apart from the others.

02

Nodes where they fit

The radio link lets you place the nodes throughout the greenhouse. All of them send to a single Open Mote that works as the gateway.

03

Low power

The case gives a consumption of less than 50 μ A for the Open Mote, which is why it can work for a long time on its own.

04

One screen for all

The gateway node plugs into the USB port of the Panel PC. The data of every room ends up on one screen.



Radio for the readings, wires for the loads

The nodes only carry small readings by radio. The fans, valves and pumps are wired to the relay outputs of the PLC in the main room. The case does not publish results or figures.

HOW IT WORKS

Three jobs: read every room, check the values, act in the right room.

Job 1 · Read every room

Four values per room, sent by radio.

In each room an Open Mote with its sensor board reads humidity, temperature, pressure and brightness. It sends the values on 2.4 GHz, with the free Contiki software, to the gateway node in the main room.

- One Open Mote and one sensor board per room
- Radio on 2.4 GHz, Contiki
- One Open Mote as the gateway

Job 2 · Check the values

The Panel PC sees every room and spots the wrong value.

The gateway node sits on the USB port of the Panel PC. In the scheme of the case the Panel PC runs Node-RED and a Mosquitto MQTT broker. It shows the data and, when a value from a room is not wanted, it notifies the PLC over the Ethernet cable.

- Gateway node on USB
- Node-RED and Mosquitto MQTT on the Panel PC
- Ethernet from the Panel PC to the PLC

Job 3 · Act in the right room

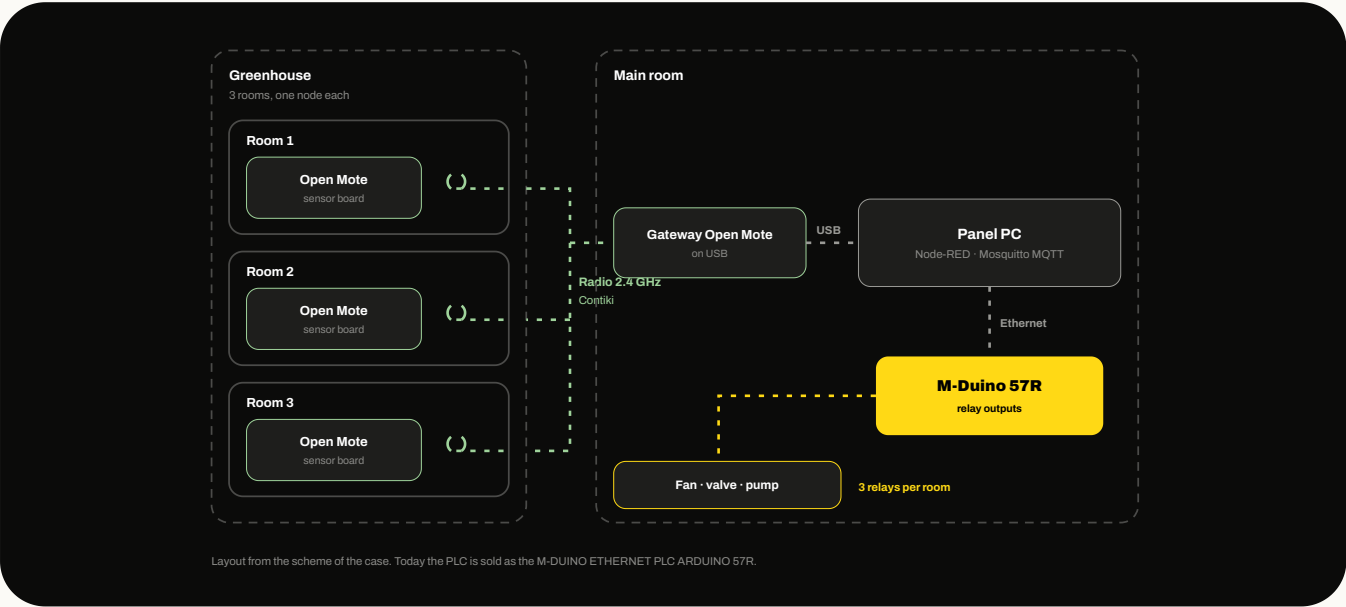
Only the room with the problem gets its actuators on.

The M-Duino 57R I/Os PLUS in the main room has the actuators wired to its relay outputs. When it gets a notice, it switches the actuators of the room where the unwanted value was detected. The other rooms stay as they are.

- Actuators on the relay outputs
- 3 relays per room in the scheme: fan, valve, pump
- The other rooms do not change

How do you control several greenhouse rooms with wireless sensors?

Put one radio node with its sensors in each room, and one receiver, the PLC and the screen in the main room. In this case each room has an Open Mote with a sensor board for humidity, temperature, pressure and brightness. The nodes send their values on 2.4 GHz to an Open Mote that works as the gateway, plugged into the USB port of an Industrial Shields Panel PC. The Panel PC shows the data and, when a value is not wanted, notifies an M-Duino 57R I/Os PLUS over Ethernet. The PLC switches the actuators of that room on its relay outputs.



Radio, 2.4 GHz USB and Ethernet M-Duino relay outputs

Signals and data

Signal	Between	Type	Purpose
Room climate	Sensor board → Open Mote	Humidity, temperature, pressure, brightness	One sensor board on the Open Mote of each room
Room readings	Open Mote of each room → gateway	Radio, 2.4 GHz, Contiki	Sends the values of the room to the main room
Collected data	Gateway Open Mote → Panel PC	USB	All the rooms reach the Panel PC
Monitoring	Panel PC → user	Node-RED, Mosquitto MQTT	Shows the data of every room; software from the scheme of the case
Notice	Panel PC → M-Duino	Ethernet	Sent when a value from a room is not wanted
Actuators	M-Duino → each room	3 relay outputs per room	Fan, valve and pump in the scheme of the case

The PLC and the Panel PC of today. The nodes of the case.



M-DUINO ETHERNET PLC ARDUINO 57R

The case names the M-Duino 57R I/Os PLUS. Today this PLC is sold as the M-DUINO ETHERNET PLC ARDUINO 57R.

Role in this design

Gets the notices of the Panel PC and switches the actuators of each room

Inputs

18: 12 analog or digital (0-10 V), 6 digital optoisolated

Outputs

31: 23 relays (230 Vac 4 A, resistive), 8 analog, digital or PWM (0-10 V)

Comms

Ethernet (RJ45), RS-485, RS-232, TTL, I2C, SPI

Power supply

12 to 24 Vdc

Mounting

DIN rail TS35, IP20

[See the M-Duino 57R >](#)



Panel PC with Raspberry Pi

An Industrial Shields Panel PC takes the gateway node on USB, shows the data of every room and notifies the PLC over Ethernet.

Role in this design

Gateway on USB, monitoring, notice to the PLC

Software in the scheme

Node-RED, Mosquitto MQTT broker

Links

USB to the gateway node, Ethernet to the PLC

The case does not publish the exact Panel PC model. The image shows the TouchBerry Pi Panel PC 10.1" FLEX.

[See the TouchBerry Pi 10.1" >](#)



OpenMote B (image from the original case)

One Open Mote with a sensor board in each room, and one more on the USB port of the Panel PC as the gateway.

Sensors

Sensor board with humidity, temperature, pressure and brightness

Inputs

Digital and analog, for other sensors

Radio

2.4 GHz antenna, free Contiki software

Consumption

Less than 50 µA, as the case gives it

OpenMote is no longer in the Industrial Shields catalogue. The pattern still applies: low-power radio nodes, one receiver, a Panel PC and a PLC with relays.

[Ask about the nodes >](#)

No sensor cables across the rooms

The radio link means the nodes can go wherever they suit each room. Moving a node does not mean pulling a new cable.

Low power in the nodes

With less than 50 µA of consumption, as the case gives it, the Open Mote can work for a long time on its own.

One gateway, one screen

All the rooms meet in one gateway node and one Panel PC. One place to see the whole greenhouse.

ROOMS WITH DIFFERENT CLIMATES?

Tell us your rooms and your variables. An engineer will answer.

Tell us how many rooms or zones you have, what you want to measure in each one, which actuators you need to switch and where the data must go. We will propose the sensors, the radio, the PLC and the screen.

READ IT ONLINE

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