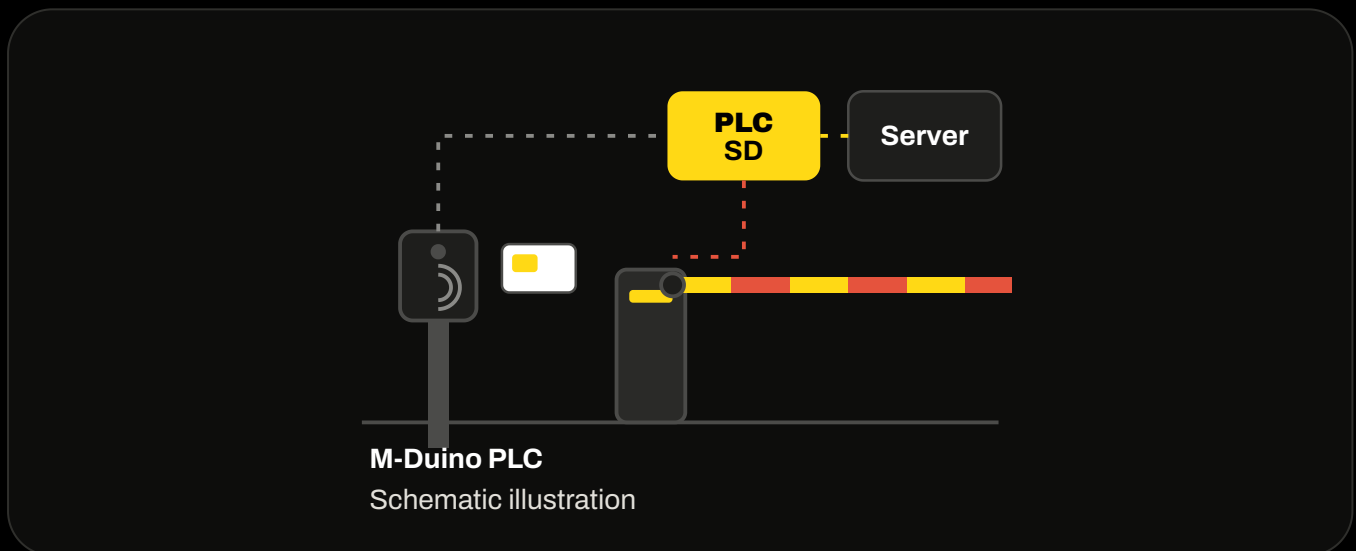


CAR PARK ACCESS · M-DUINO PLC

A card at the gate. The PLC knows every user.

RFID cards for a company car park, with the user list on the PLC itself.

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


1

PLC that knows every registered card and drives the gate

SD

local copy of the user list, on the microSD card of the PLC

3

links: SPI to the RFID reader, serial to the panel, Ethernet to the server

8

relay outputs on the M-Duino 19R, the PLC that the case names

THE CHALLENGE

One controller at the gate. A user list that changes in the office.

The company wanted to control the access to its car park with open source technology and a single PLC. That PLC must know all the registered users, accept changes to the list from a distance, act on the gate and let people follow the whole process.

01

Read the card

Each user has a personal card with a unique reference. The reader must detect it each time a driver presents it.

02

Check it against the list

The PLC decides if the reference belongs to a registered user. Only then does the gate open.

03

Change the list from the office

Users are added and removed on a server. Each change must reach the PLC without a visit to the gate.

04

Show the driver what happens

A panel next to the reader shows the reading process while the driver waits at the gate.

Open source, and a single controller



The customer asked for open source technology and one PLC that knows every user, can be changed remotely, drives the gate and lets the process be monitored. The answer was an Arduino based M-Duino PLC with Ethernet, with the RFID reader, the panel and the server around it.

HOW IT WORKS

Three steps: read and decide, keep the list in sync, show and record.

Step 1 · Read and decide

A card at the reader. A yes or a no from the PLC, in front of the car.

The RC522 reader sends the unique reference of the card, its UID, to the PLC over SPI. The PLC looks for it in the user list on its microSD card. If the card is there, the PLC switches its output to the motor of the gate until the gate is fully open, and closes it afterwards. If not, the gate stays closed. Pick a card and present it.

- UID read over SPI from the RC522
- Lookup in the local list, with no call to the server
- Output to the motor only for a registered card

Step 2 · Keep the list in sync

The office changes the list. The PLC updates its SD card.

The master list of users is on a server. When someone adds or removes a user, the server tells the PLC, and the PLC updates its local list on the microSD card. Because the list is local, a cut in the network does not stop the gate: in a typical design the PLC keeps working with its last list and takes the changes when the link is back. Add a user, remove one, cut the network and test the cards. To see a PLC that takes its orders from a database table, and what it does when the link drops, open the [Gate control simulator](#).

- Master list on the server, local copy on the SD card
- The server tells the PLC when the list changes
- Last list in use while the network is down

Step 3 · Show and record

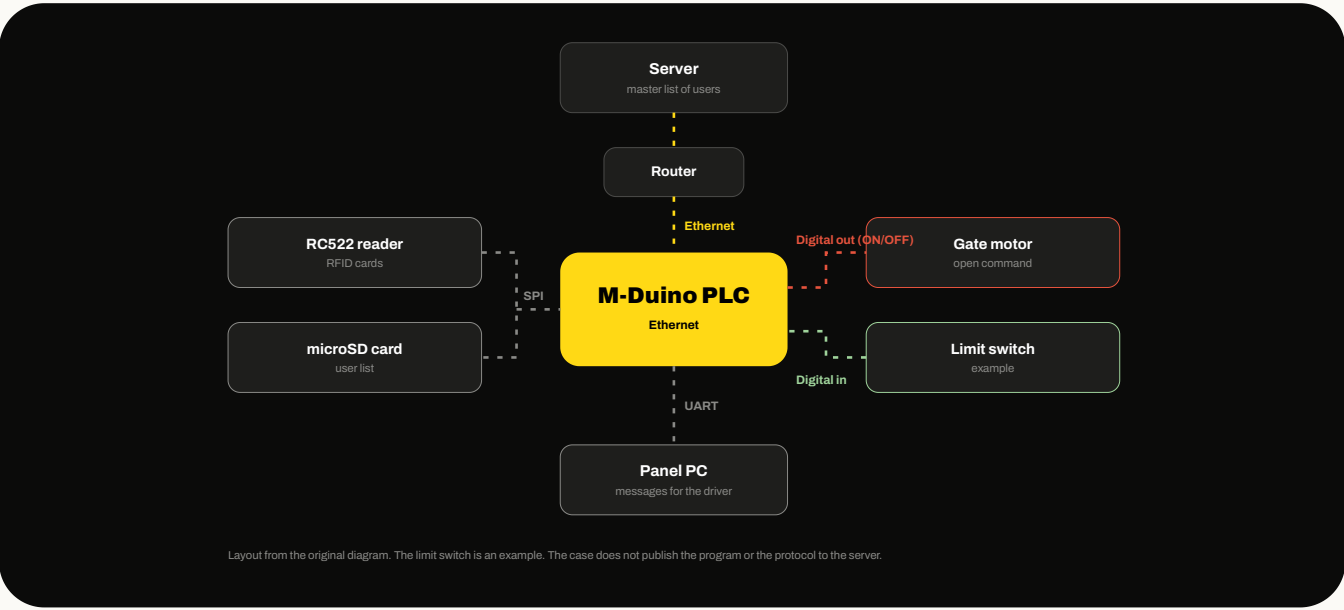
The driver sees each step. The office can see each read.

A Panel PC next to the reader is connected to the PLC on a serial port (UART). It shows the reading process: card read, user found or not, gate opening. A typical addition: the PLC also sends each read to the server with the time of its real-time clock, and keeps the reads on the SD card while the network is down. Present a card, cut the network, and present it again.

- Panel PC on the serial port of the PLC
- A message for each step of the read
- Example: each read sent to the server, kept on the SD card when offline

How does an RFID parking access system with a PLC work?

The original diagram labels the reader link SPI/I2C/Wiegand 26 (see the FAQ below) and the gate drive as a servomotor with an ON/OFF signal. On the M-Duino, SPI is also the bus of the microSD card. The Panel PC is on a serial port (UART). Ethernet goes through a router to the server with the master list. A typical addition, not in the diagram: a limit switch that tells the PLC the gate is fully open.



Inputs Digital output SPI and serial Ethernet

Signals and data

Signal	Between	Type	Purpose
Card reference (UID)	RC522 reader → PLC	SPI	Who is at the gate
User list	microSD card ↔ PLC	SPI, on the PLC	Local copy of the registered cards
Open the gate	PLC → motor of the gate	Digital out (ON/OFF)	Open for a registered card, then close
Gate fully open (example)	Limit switch → PLC	Digital in	Stops the open command. The case does not publish this signal
Reading status	PLC → Panel PC	Serial (UART)	Messages for the driver at the gate
List changes	Server → PLC	Ethernet	Users added and removed in the office
Reads (example)	PLC → server	Ethernet	A record of each read with its time

An Ethernet PLC at the gate, and a panel for the driver.



M-DUINO ETHERNET PLC ARDUINO 19R

An Arduino Mega 2560 based PLC for DIN rail with 17 I/O, 8 of them relays, Ethernet, SPI, RS-485 and RS-232, a real-time clock and a microSD slot. In this case it reads the RFID reader, keeps the user list on its SD card, talks to the panel on a serial port and to the server over Ethernet, and gives the open command to the motor of the gate.

Role	Card check, user list, gate command, link to panel and server
Inputs	6: 4 analog/digital (0-10 V, 10-bit), 2 digital optoisolated (5 to 24 Vdc), 2 with interrupt
Outputs	11: 8 relays (4 A at 230 Vac, 2 A at 24 Vdc, resistive), 3 analog/digital/PWM (0-10 V)
Comms	Ethernet (W5500, 10/100), RS-485, RS-232, TTL serial, I2C, SPI
Built in	Real-time clock, microSD slot, USB

The original page lists the M-Duino 19R (relay outputs) among the products of this case, and its main image shows an M-Duino 58. The image and the link show the M-DUINO ETHERNET PLC ARDUINO 19R, the current version of that model. For an inductive load such as a contactor coil, add an RC snubber sized for the load.

[See the M-Duino 19R ›](#)



TouchBerry Pi Panel PC 10.1" FLEX

The original page lists a TouchBerry Pi 10.1" with a Raspberry Pi 4B, on the serial port of the PLC. The TouchBerry Pi Panel PC 10.1" FLEX is the current version: a Raspberry Pi 4 behind a 10.1" touchscreen, with one serial port and Gigabit Ethernet.

Role	Messages for the driver at the gate
Screen	10.1" IPS, 1280 x 800, capacitive, 900 nits
Serial port	One: RS-485, RS-232 or TTL, chosen when you order
Front	IP20, or IP65 on the FLEX version
Comms	Gigabit Ethernet, 4 x USB, I2C, SPI

The image shows the TouchBerry Pi Panel PC 10.1" FLEX, not the unit of the installation. For a panel at an outdoor gate, check the front protection and the temperature range in the datasheet.

[See the TouchBerry Pi 10.1" ›](#)

One master list

Users are managed on the server. The PLC only keeps a copy and updates it when the server tells it that the list has changed.

Relays for the gate command

The M-Duino 19R has 8 relay outputs, rated 4 A at 230 Vac or 2 A at 24 Vdc with a resistive load. A relay contact can give the open command to the controller of the gate. Its 6 inputs leave room for a limit switch or a vehicle detector.

Open source the team can change

The program is written in the Arduino IDE. The customer asked for open source technology, so its own team can read and change the logic.

CONTROLLING A GATE OR A DOOR?

Tell us about your gate and your users. An engineer will answer.

Tell us which reader you use or want, how many gates and users you have, where the user list is, and what the gate must do when the network is down. We will propose a controller and an architecture.

READ IT ONLINE

industrialshields.com/case-study-rfid-parking-access-control-m-duino

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