

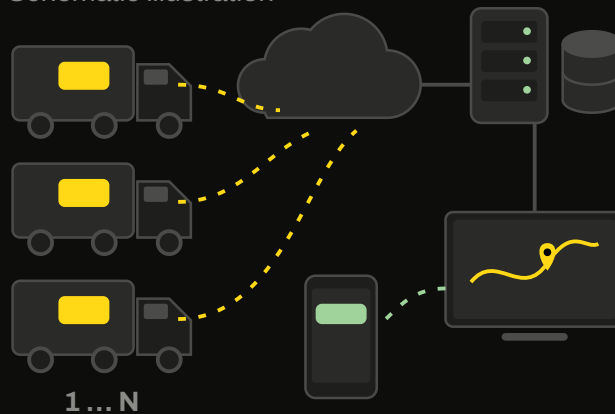
VEHICLE TRACKING · M-DUINO

Every truck reports. Headquarters can answer.

GPS, GPRS and Bluetooth on one Arduino based PLC per truck, on 12 V.

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

Schematic illustration



3

modules per truck: GPS,
GPRS and BT/LE

12V

truck supply for the PLC

1

Arduino based PLC per
truck

N

trucks: new ones join
without breaking the
system

THE CHALLENGE

See every truck. Reach every driver.

The goal: install in each vehicle of the fleet the same Arduino based equipment, with its set of sensors and actuators. It must get the location, direction and speed of each vehicle, send them to a server with its database, show them on screen at headquarters, and let headquarters send a message to the desired truck.

01

Where is each truck

Location, direction and speed of every vehicle, from a GPS module on board.

02

Data on a server

The data goes to a server and is stored in a database, so headquarters can reach it from the cloud.

03

Messages to the driver

Headquarters sends an alert or a message to the desired truck. The driver gets it on the mobile phone.

04

A fleet that changes

New trucks join the fleet. They must not affect the correct operation of the fleet management system.



One PLC, three modules

Each truck carries an Arduino based PLC on the 12 V supply of the truck, with a GPS module, a GPRS module with a SIM card and a BT/LE module.

HOW IT WORKS

Three loops: report, message, scale.

Loop 1 - Report the position

GPS to the PLC, GPRS to the server, server to the screen.

The GPS module gives the location, direction and speed of the vehicle. The GPRS module, connected to a SIM card, sends the data to the cloud. The server collects it and stores it in the database, then sends it to the terminals at headquarters, which show it in a visual graphic interface. Press the button to follow one record.

- GPS module: location, direction and speed
- GPRS module with a SIM card: data to the cloud
- Server and database, screens at headquarters

Loop 2 - Message the driver

From the screen at headquarters to the phone in the cab.

In the terminals, the same interface sends alert messages to the desired truck. The message travels over GPRS to the Arduino based equipment. The BT/LE module passes it on, and the mobile phone of the driver receives it instantly. On the phone, an app receives the message over Bluetooth LE; the case does not publish the app. Pick a truck and send a message. A typical design choice: keep the message on the PLC if the phone is not connected.

- Alert messages to the desired truck
- GPRS to the PLC, Bluetooth LE to the phone
- The driver phone gets the message instantly

Loop 3 - Add trucks

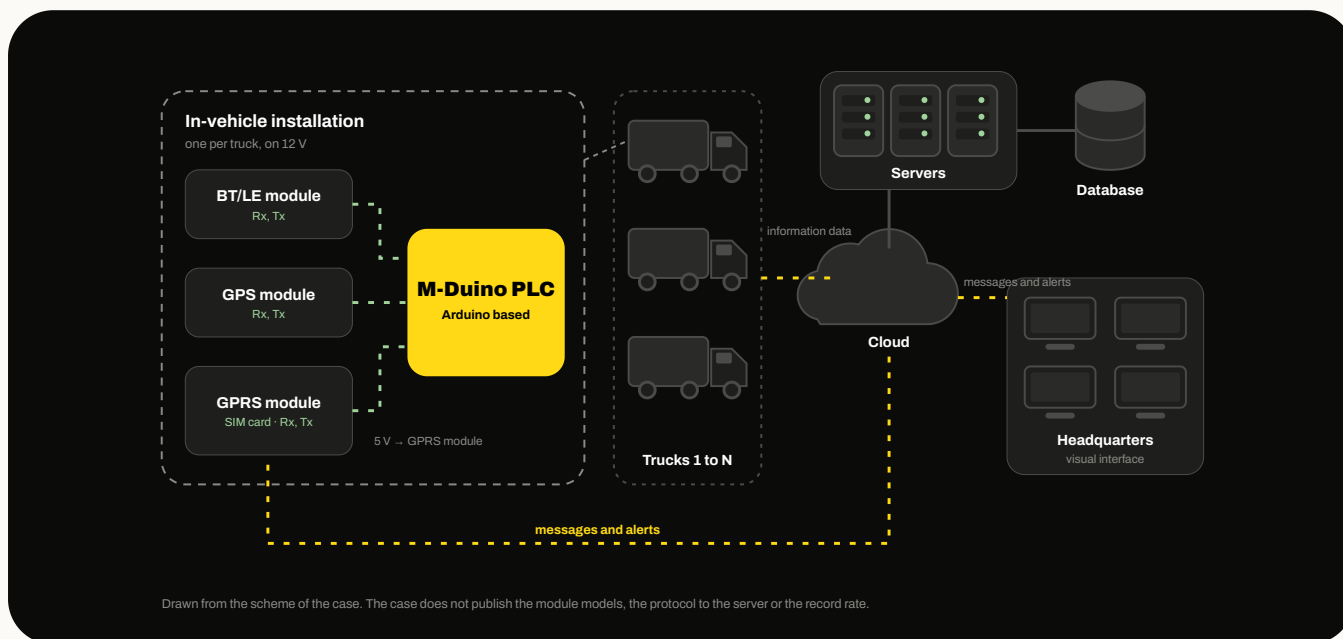
New trucks join the fleet without breaking it.

The system is scalable. It is designed so that new trucks can join the fleet without affecting the correct operation of the fleet management system. A typical way to do it: each unit sends its own ID with every record, and the server accepts a new unit once it is registered. Add trucks and watch the load on the server.

- Same equipment in every truck
- New trucks do not affect the others
- One server and one database for the whole fleet

How does a GPS GPRS vehicle tracking system with an Arduino PLC work?

In each truck, an Arduino based PLC on the 12 V supply reads a GPS module and talks to a GPRS module and a BT/LE module over serial lines (Rx and Tx in the scheme of the case). The GPRS module sends the data to the cloud, where servers store it in a database and send it to the screens at headquarters. Messages from headquarters take the same path back, and the BT/LE module passes them to the driver phone.

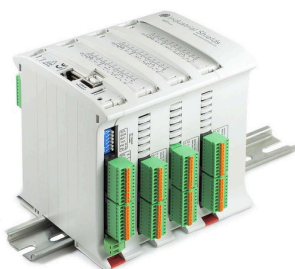


Serial lines in the truck GPRS data, up and down Cloud, servers and headquarters

Signals and data

Signal	Between	Type	Purpose
Position data	GPS module → PLC	Serial (Rx, Tx)	Location, direction and speed of the vehicle
Fleet data	PLC → GPRS module → cloud	GPRS, SIM card	Information data and driver messages to the server
Storage	Servers → database	Database	Every record of every truck
Display	Servers → terminals at headquarters	Visual interface	The fleet on screen
Alerts and messages	Headquarters → cloud → GPRS module → PLC	GPRS	A message to the desired truck
To the driver	PLC → BT/LE module → driver phone	Bluetooth LE	The driver phone gets the message instantly
Power	Truck → PLC	12 V DC	The PLC runs on the truck supply. The scheme shows 5 V to the GPRS module

An M-Duino on every truck.



M-DUINO ETHERNET PLC ARDUINO 58

An industrial PLC built on an original Arduino Mega 2560, with 36 inputs and 22 outputs, Ethernet, RS-485, RS-232, a real-time clock and a microSD slot, for DIN rail. The M-Duino family has GPRS/GSM versions. In this case the PLC of each truck reads the GPS module and talks to the GPRS and BT/LE modules.

Role	GPS reading, GPRS link, messages to the BT/LE module
Inputs	36: 16 analog/digital (0-10 V), 20 digital optoisolated
Outputs	22: 8 analog/digital/PWM (0-10 V), 14 digital optoisolated
Comms	Ethernet, RS-485, RS-232, TTL serial, I2C, SPI. GPRS/GSM version in the family
Built in	Real-time clock, microSD slot
Power supply	12 to 24 Vdc

The case says "an Arduino based PLC" and does not publish the model. The scheme of the case draws an M-Duino, and the original case material shows the M-Duino 58. The image and the link show the M-DUINO ETHERNET PLC ARDUINO 58.

[See the M-Duino 58 ›](#)

Same equipment everywhere

Every truck gets the same Arduino based PLC and the same three modules. One program, one way to install it.

Two-way link

The GPRS module sends the data up and brings the messages down. Headquarters can see and can answer.

The phone the driver already carries

The BT/LE module sends the message to the mobile phone of the driver. The case uses the phone instead of a screen in the cab.

Built to grow

The system is designed so that new trucks join without affecting the fleet management system.

Modules you can change

GPS, GPRS and BT/LE are separate modules on serial lines. If the mobile network changes, the modem can change with it.

A program you own

The PLC is programmed with the Arduino IDE. You can read the program, change it and add a sensor.

SIMILAR FLEET?

Tell us what each vehicle must report. An engineer will answer.

Tell us how many vehicles you have, what each one must send (position, speed, sensors), what must come back to the driver, where your server or platform runs, and which mobile networks you have on your routes. We will tell you which controller and which modem fit, and how to connect them.

READ IT ONLINE

industrialshields.com/vehicle-tracking-gps-gprs-bluetooth-case-study

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