

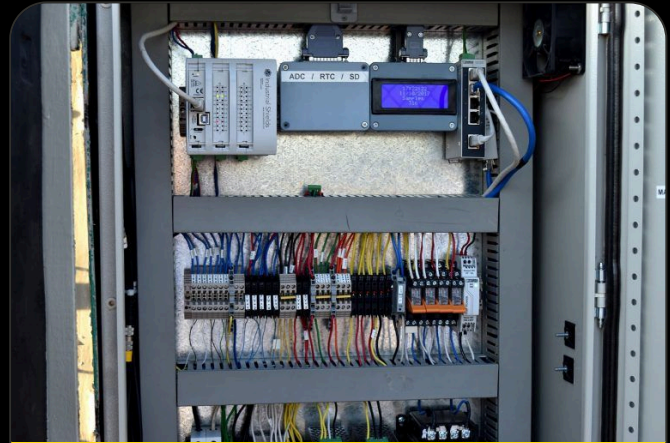
RÍO YAQUI IRRIGATION DISTRICT, MEXICO

Weather data from the Yaqui Valley, on any screen. **One M-Duino 42** runs the station.

A real weather station in Mexico. One M-Duino 42 reads six ADCON sensors, keeps a local copy of the data and sends it to MetApp, the station web app. The meteorologist reads it from a desk or a phone, and changes some settings from a distance.

[Read the interactive success story online ›](#)


The weather station in the Yaqui Valley, Mexico: sensor mast and field cabinet.



Inside the cabinet: the Industrial Shields PLC (top left), a module labelled ADC / RTC / SD and an LCD display.

6

weather variables from ADCON sensors

1

M-Duino 42 controls every device of the station

MetApp

web app with the readings, on desktop or mobile

Remote

setup of some station settings over Telnet

THE CHALLENGE

A station that works alone. A team that sees it from far away.

The customer needed an autonomous weather station. Its data had to be easy to read from a distance. The design had to be easy to copy to other points of the area. And the setup had to change without a site visit. This is the brief of the case.

01

Autonomous

The station works on its own in the field. It reads its sensors and keeps its data, with nobody on site.

02

Remote monitoring

The meteorologist sees the main weather parameters of the site from a desk or a phone.

03

Easy to replicate

The design has to be easy to copy to other points of the area.

04

Remote configuration

Some settings change from a distance, through the Telnet platform. No trip to the station.



Developed by Ing. Juan Carlos Raygoza

Ing. Juan Carlos Raygoza developed, designed and installed the project. The PLC program was written in the Arduino IDE. The customer knew well-known PLC brands and also Arduino. That gave the project a broader view: industrial PLCs based on Arduino.

HOW IT WORKS

Three loops: read, survive, adjust.

Loop 1 · Read and publish

From six sensors to a web page

The M-Duino 42 reads the ADCON sensors: temperature, humidity, solar radiation, wind speed, barometric pressure and rain. It stores the data on the SD card with the time from the RTC, and sends it to an intermediate Telnet server. The server keeps a database and a REST service. MetApp, built with Angular 4, shows the values on a desktop or a mobile device.

- Six weather variables from ADCON sensors
- Local copy on the SD card, time from the RTC
- Telnet server with a database and a REST service

Loop 2 · Link loss

The link drops. The data stays in the station.

A remote station loses its link from time to time. Here the PLC keeps a local copy of every reading on an SD card, with the time from the RTC. So a gap in the web is not a gap in the data. The case does not publish how the station sends the stored rows again. The panel shows a common pattern: store and forward.

- Each reading goes to the SD card with its time
- Link down: the rows wait in the station
- Link back: the pending rows go to the server (example)

Loop 3 · Remote setup

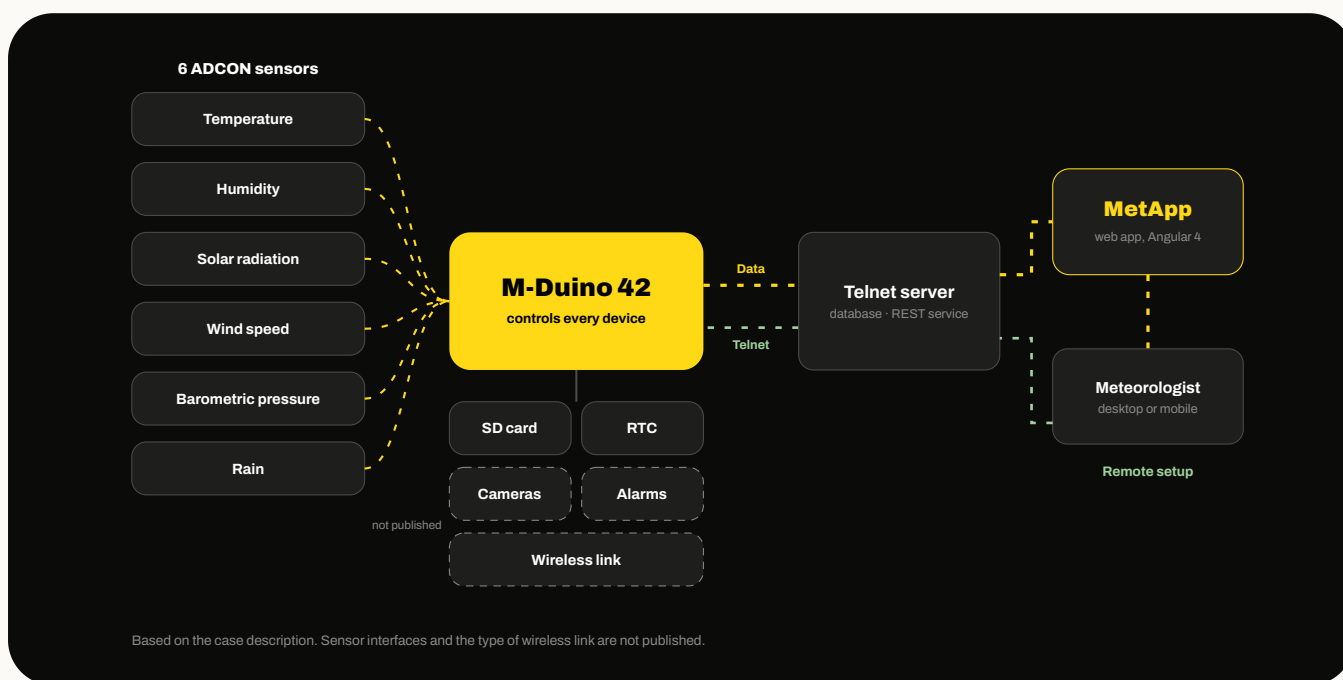
Change a setting without a site visit.

The meteorologist can change some station settings by remote control, through the Telnet platform. The PLC applies them and the station keeps working. The case does not publish the list of settings. The panel uses example commands.

- Settings sent through the Telnet platform
- The PLC applies them and confirms (example)
- No trip to the station

How does one M-Duino 42 run a remote weather station?

Six ADCON sensors go into one M-Duino 42. The PLC also controls an SD card, an RTC, wireless communication systems, security cameras and alarms. It sends the data to a Telnet server with a database and a REST service, and MetApp shows it on the web. The case does not publish the sensor interfaces or the type of wireless link.



— Data from the station — Remote setup to the station — Detail not published by the case

Valores promedio en el Valle del Yaqui		
Temperatura: 16.03 °C	Horas Frío Acum. (Ciclo): 41.92 Hrs.	Vel/Dir Viento: 10.05 Km/hr 236.02 °N
Humedad Relativa: 71.21 %	Precipitación Acum. (Ciclo): 5.22 mm	Ráfagas de Viento: 12.16 Km/hr
Radiación Solar: 155.95 W/m²	Presión Barométrica: 771.67 mmHg	Punto de Rocío: 10.75 °C
Actualizada: 27/12/2017 16:51:18		

FROM THE FIELD

MetApp, the station web app: average values in the Yaqui Valley, 27/12/2017 16:51:18. Real screenshot.

Signals and data

Flow	Between	Type	Purpose
Sensor readings	ADCON sensors → M-Duino 42	Not published	Temperature, humidity, solar radiation, wind speed, barometric pressure and rain
Local log	M-Duino 42 → SD card	Local storage	Keeps the station data on site
Time	RTC → M-Duino 42	Real time clock	Gives the real time for each reading
Data out	M-Duino 42 → Telnet server	Telnet	Sends the readings to the intermediate server
Web data	Telnet server → MetApp	Database and REST	Feeds MetApp, built with Angular 4
Remote setup	Telnet platform → M-Duino 42	Telnet	Changes some station settings by remote control
Site devices	M-Duino 42 → site devices	Not published	Wireless communication systems, security cameras and alarms

One M-Duino 42 controls the whole station.



M-Duino Ethernet PLC Arduino 42

An industrial PLC built on an original Arduino Mega 2560, with 26 inputs and 16 outputs, Ethernet, RS-485 and RS-232, for DIN rail. In this station it reads the weather sensors and controls the SD card, the RTC, the wireless communication systems, the cameras and the alarms.

Inputs	26: 12 analog/digital (0-10 V), 14 digital optoisolated, 4 with interrupt
Outputs	16: 10 digital optoisolated, 6 analog/digital/PWM (0-10 V)
Comms	Ethernet (RJ45), RS-485, RS-232, TTL, I2C, SPI
Built in	Real time clock, microSD slot
Power supply	12 to 24 Vdc
Mounting	DIN rail TS35, IP20

The case dates from 2017 and names the M-Duino 42. The same product page now sells its current version, the M-Duino 42+, with a real time clock and a microSD slot built in. In the cabinet photo you can see a separate module labelled ADC / RTC / SD.

[See the M-Duino 42+ ›](#)

Easy to connect to the sensors

The customer wanted a PLC that integrates easily with the sensors. Here one M-Duino 42 reads all the ADCON sensors and controls every device of the station.

Easy to program, no licence fees

The PLC program was written in the Arduino IDE. The programming platform is free, and the customer valued the flexibility of the programming itself.

Built to be copied

One controller and one web app. The objective was a station that is easy to replicate across the area.

SIMILAR PROJECT?

Tell us your sensors and your sites. An engineer will answer.

Tell us which variables you measure, how many stations you plan and where the data must go: a web app, a SCADA or a cloud service. We will tell you which controller fits and how to connect it.

READ IT ONLINE

industrialshields.com/success-story-weather-station-arduino-plc-mexico

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