

ICARUS DAQ

INFN Padova

By Lorenzo Castellani

The application for data acquisition of a single MINICRATE (nine A2795 cards) via A3818 (PCI optical Link) or A4818 (USB 3.0 optical Link) has been implemented to be compiled on both Linux and Windows operating systems, the user interface based on WEB page allows both local and remote use, so a simple WEB server for http file transfer has been implemented in the same application, a WebSocket server to control the cards and displaying the captured data.

When the application starts, if the configuration file is not specified in the argument, the file is searched first in the folder where the program is installed, then in the local folder.

Below are the various pages of the user interface:

- 1) From the RUN page it is possible to control the start and stop of data acquisition, which can be saved on disk or not, the acquired data is analyzed in real time from the point of view of noise, the result is shown on the NOISE page

The screenshot shows the ICARUS DAQ web interface. The browser address bar indicates the URL is `icab133.pd.infn.it:8080`. The page features the INFN Padova logo and the text "by Lorenzo Castellani". The main heading is "ICARUS DAQ". A green bar at the top of the main content area indicates "Connected". Below this, there are "Connect" and "Disconnect" buttons. The interface displays real-time data for seven cards (0-6). The "Run" status for all cards is indicated by green circles, while "Ready" and "Busy" are indicated by black circles. Below the status indicators, there are fields for Temperature, Event number, and Rate. At the bottom, there are controls for Run Start (5), Run Stop, Write File (toggle), Trigger Mode (Software), and Rate (Hz) (50). A "Save CFG" button is also present.

- 2) From the DAQ Control page and the DAC & TP Control page you can change the contents of the various registers of the A2795 cards detected in the MINICRATE.

ICARUS DAQ

Non sicuro icab133.pd.infn.it:8080

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ICARUS DAQ

Connected

Connect Disconnect

V1.0
APP V2.0-65-ga54e89e

	0	1	2	3	4	5	6
Run	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ready	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Busy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature	31 27	32 27	32 27	32 28	31 28	30 28	29 27
Event number	63769	63769	63769	63769	63769	63769	63769
Rate	32.3						

	BufferSize	Force Run	Master Inhibit Trigger	Test Pattern Enable	Front Panel TT-Link propagation Enable	Post Trigger
0	4096	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2048
1	4096	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2048
2	4096	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2048
3	4096	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2048
4	4096	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2048
5	4096	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2048
6	4096	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2048

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	0	1	2	3	4	5	6
Run	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Ready	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Busy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature	31 27	32 27	32 27	32 28	31 28	30 28	29 27
Event number	66248	66248	66248	66248	66248	66248	66248
Rate	32.3						

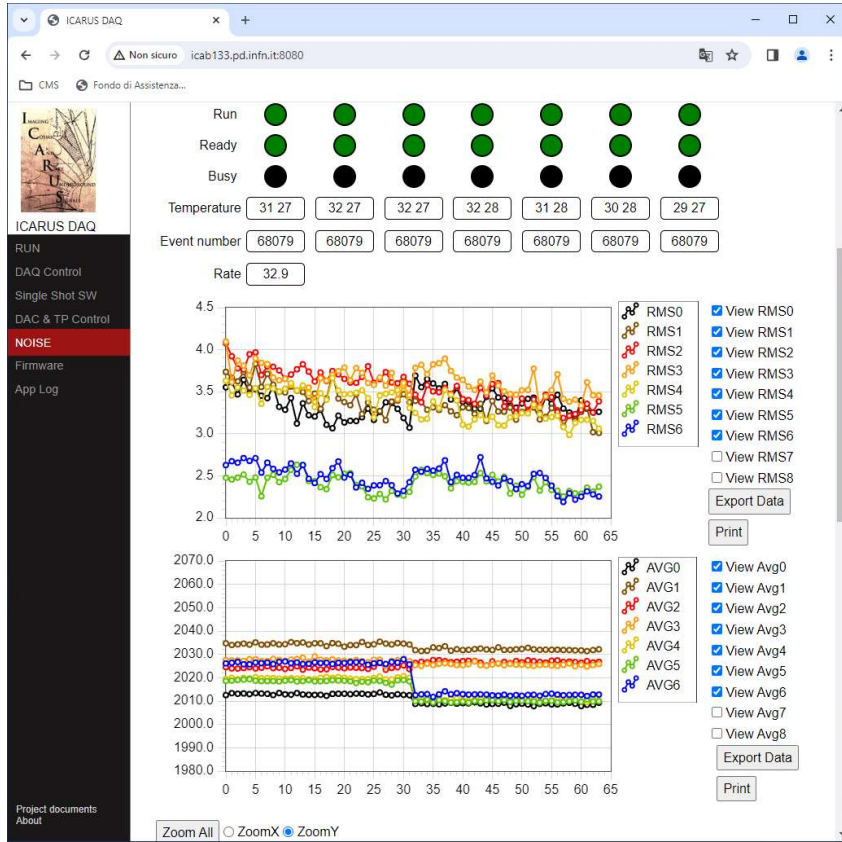
	Test Pulse CH ODD	Test Pulse CH EVEN	DC Level 0..31	DC Level 32..63	Test Pulse Control
0	1792	1792	2048	2048	disabled
1	1792	1792	2048	2048	disabled
2	1792	1792	2048	2048	disabled
3	1792	1792	2048	2048	disabled
4	1792	1792	2048	2048	disabled
5	1792	1792	2048	2048	disabled
6	1792	1792	2048	2048	disabled

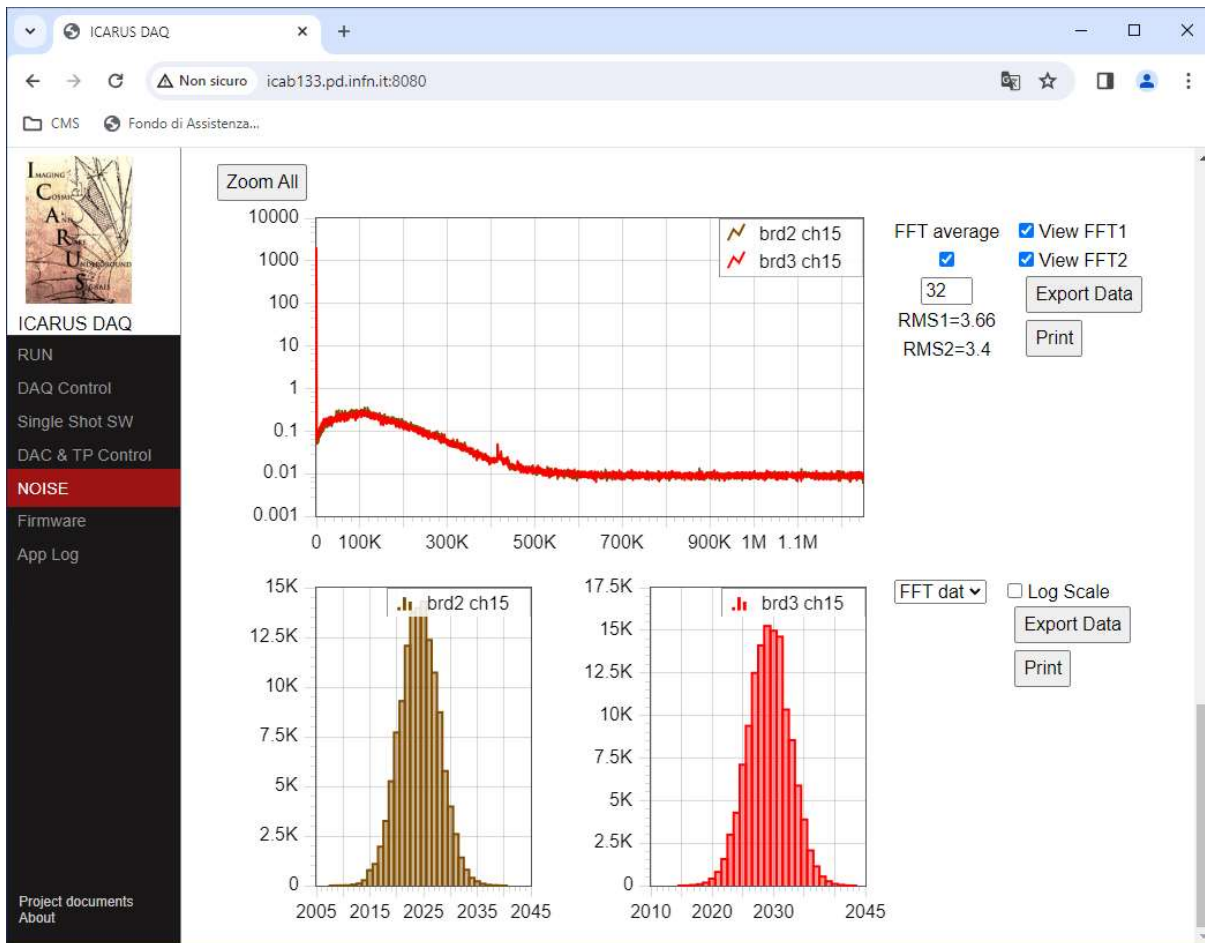
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- 3) On the Single Shot SW page you can send software commands to individual boards or via TT-LINK of the Master board

The screenshot shows the ICARUS DAQ web interface. The browser address bar shows 'icab133.pd.infn.it:8080'. The page header includes the logo of the Istituto Nazionale di Fisica Nucleare (INFN) and the text 'by Lorenzo Castellani'. The main title is 'ICARUS DAQ'. A green bar at the top indicates 'Connected'. Below this, there are 'Connect' and 'Disconnect' buttons. The interface displays status indicators for seven boards (0-6) for 'Run', 'Ready', and 'Busy'. The 'Run' indicators are green, while 'Ready' and 'Busy' are black. Below the status indicators, there are input fields for 'Temperature', 'Event number', and 'Rate'. The 'Temperature' values are: 31 27, 32 27, 32 27, 32 28, 31 28, 30 28, 29 27. The 'Event number' values are all 65533. The 'Rate' is 32.4. At the bottom, there are control panels for each board. Board 0 has buttons for 'Reset', 'Clear', 'Board Trigger', 'IND Test Pulse', 'COL Test Pulse', 'TT-Link Start Of Run', 'TT-Link End Of Run', 'TT-Link Global Trigger', 'TT-Link Send Comma', 'TT-Link IND Test Pulse', and 'TT-Link COL Test Pulse'. There is a 'Send' button for each board.

- 4) The NOISE page displays the data acquired from the point of view of noise, the first graph shows the RMS noise of all the channels of the cards, the second graph shows the average value of the base line, the third graph shows the acquired data on two channels selectable, on the fourth graph the FFT of the two selected channels is shown, it is possible to average the FFT (max 32), and finally the last graph shows the histogram of the two selected channels, of all the data acquired up to that moment from which the RMS is calculate, or only the data used for calculate FFT/FFT average .





The configuration file in addition to the parameters of the card contains the following parameters:

WebRootDir: specifies the location of HTML files (use the character / in the path also on Windows operating system) you can use environment variables with the notation of the operating system (example: %HOME% for Windows and \$HOME for Linux).

httpport: specifies the port used by the server WEB (port 80 cannot be used on Linux).

wsport: Specifies the port used by the WebSocket server.

localhostonly: specifies whether or not servers accept a connection from a remote PC.

AcceptHosts: if localhostonly is false it specifies from which remote PCs it accepts a connection, if the list is empty it accepts connections from any PC.

OpenBrowser: specifies whether to automatically open the Browser.

DataFolder: specifies where to save the acquired files (use the character / in the path also on Windows operating system) you can use the environment variables with the notation of the operating system (example: %HOME% for Windows and \$HOME for linux).

links : The array specifies the type of link used, with "type" PCI, the variable "arg" contains the number of the link while with "type" USB, "arg" contains the PID of the optical link that is printed on the USB module.

boards : The array contains the configuration of the cards.

Example of a configuration file with the configuration of only one board:

```
{
  "WebRootDir": "%LocalAppData%/INFN/IcaDaq/www",
  "httpport": 80,
  "wspport": 4444,
  "localhostonly": true,
  "OpenBrowser": false,
  "AcceptHosts": [
    "wxlecastellani.pd.infn.it"
  ],
  "DataFolder": "%LocalAppData%/INFN/IcaDaq/data",
  "links": [
    {
      "type": "USB",
      "arg": 25919
    },
    {
      "type": "USB",
      "arg": 25917
    }
  ],
  "boards": [
    {
      "control": {
        "buffer": 4096,
        "force_run": false,
        "inhibit_trigger": false,
        "test_pattern": false,
        "tt_link_prop_en": false
      },
      "post_trigger": 0,
      "dac": [
        1792.0000,
        1792.0000,
        2048.0000,
        2048.0000
      ],
      "test_pulse": "disabled"
    }
  ]
}
```