

## New web GUI architecture for industrial embedded devices

**Prima Electro** is a strategic EMS partner in high-tech sectors such as railway, energy and industrial automation. For over forty years, we have been converting ideas into full-custom embedded products, becoming the reference point for all those companies wishing to improve the features and performances of their systems with industrial-grade solutions. Always at the cutting edge of technology in power and control electronics design and production, Prima Electro offers support from the concept and preliminary analysis through the qualification and production stage, supervising the whole manufacturing process. Our business model can be summed up in the acronym DOTS (Dedicated Off The Shelf), because we are able to offer custom “end-to-end” turnkey solutions with a fast time-to-market and competitive costs.

### Background:

All industrial embedded devices designed by us are reachable through a GUI (Graphical User Interface) that is essential for development, debugging, testing, maintenance and support.

Currently we use a Win32 application developed in C/C++, while an older graphics software is used for the graphics part. It communicates with the device through the UDP protocol (Modbus encapsulate UPD).

The current GUI is an executable (.exe) that incorporates all existing system information and depending on the system to which it connects configures its own graphics.

The desired would be to integrate the information within our systems and make external access unconstrained by applications and/or files. At the moment, this requirement will be the study considering the limited resources of the CPUs used for embedded devices (STM32 ARM Cortex®-M microcontrollers).

Two solutions should be explored:

- Webserver embedded in the microcontrollers
- Remote Webserver on a PC.
- Any alternative efficiency solution with combine the two above.

The first one would have the huge advantage that a standard web browser is sufficient for the interface (from any device PC, tablet, smartphone, etc.), but web pages need to be developed on a microcontroller with limited resources.

The second, instead, requires to load files in the remote device (PC, tablet, ...) connecting to the embedded target, the advantages would be the limited use of the microcontroller's resources.

The third one includes any new alternative that could be exploited based on the state of the art's technologies.

**Type of work:** Master Thesis.

The goal is to design a new GUI architecture which meets at best the requirement of ease of uses and flexibility.

### Expected tasks:

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| • Analysis and requirement of existing application       | 15% of time |
| • Analysis of possible development environments          | 10% of time |
| • Architecture for new GUI with demo                     | 15% of time |
| • Implementation of the application for existing devices | 40% of time |
| • Experimental testing on an industrial device           | 10% of time |
| • Documentation of all the activities                    | 10% of time |

### Requirements:

- Good knowledge front end web site development (HTML, JavaScripts)
- Good knowledge development C/C++
- Basic electronics communication protocol (UDP, Modbus, TFTP, Serial RS-232/422/485)
- Basic knowledge of electronics devices
- Analytical skills

**Duration:** 6-9 months.

### Contact:

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