

# Real-time data visualization and control using modern Web technologies

June 5<sup>th</sup>, 2016  
Caffè Pedrocchi, Padva, Italy

## Overview

This tutorial teaches modern web technologies for real time visualization and control of processes and experiments. The course starts from basic HTML elements, and then covers modern HTML5 technologies and their usage to display any graphical data. An embedded web server on a Raspberry Pi computer is written from scratch, which can be controlled from any browser using the above technologies to read sensors and switch outputs.

## Requirements

Basic knowledge of HTML and C/C++ is helpful but not required.

## Material

Every attendee is encouraged to bring her/his own laptop to interactively develop and test all examples. A wireless private network will be available. It is recommended to have a quick look at JSFiddle (<https://jsfiddle.net>) since this tool will be used throughout the course. More advanced users can have a look at the WebStorm tool (<https://www.jetbrains.com/webstorm/>).

## Agenda

- Basic Web technologies
  - HTML
  - CSS
  - Forms
  - JavaScript
  - DOM
- Advanced Web technologies
  - AJAX
  - JSON
  - Promises
  - Canvas
- Server side implementation
  - Apache vs. embedded servers
  - Mongoose server
  - REST interface
  - Implementation on Raspberry Pi
- Advanced web concepts
  - Push technology with Websockets
  - JSON-P
  - Window auto resize
  - Cursor feedback
  - Keyboard input
  - Drag & Zoom
  - Floating dialog boxes
  - Dialog objects
- Applications
  - Temperature display
  - Turning LEDs on and off on server
  - Bar graph, line graph
  - Real time asteroid simulation
  - Oscilloscope application