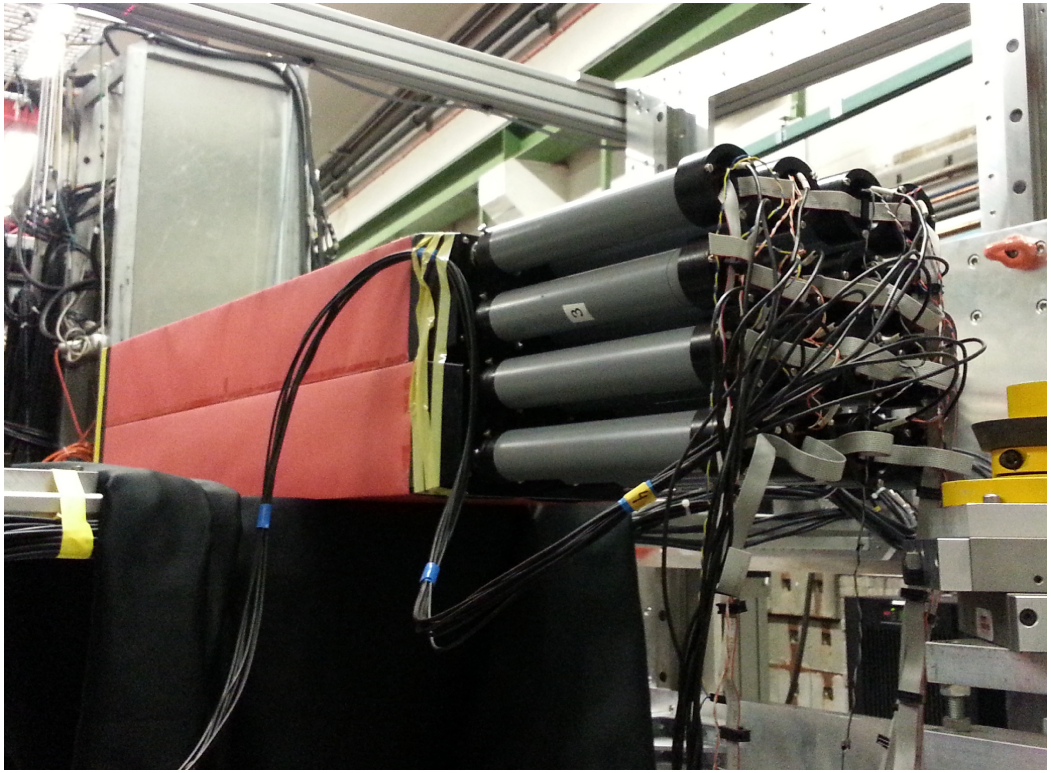
Forward Spectrometer Calorimeter

Detector control system



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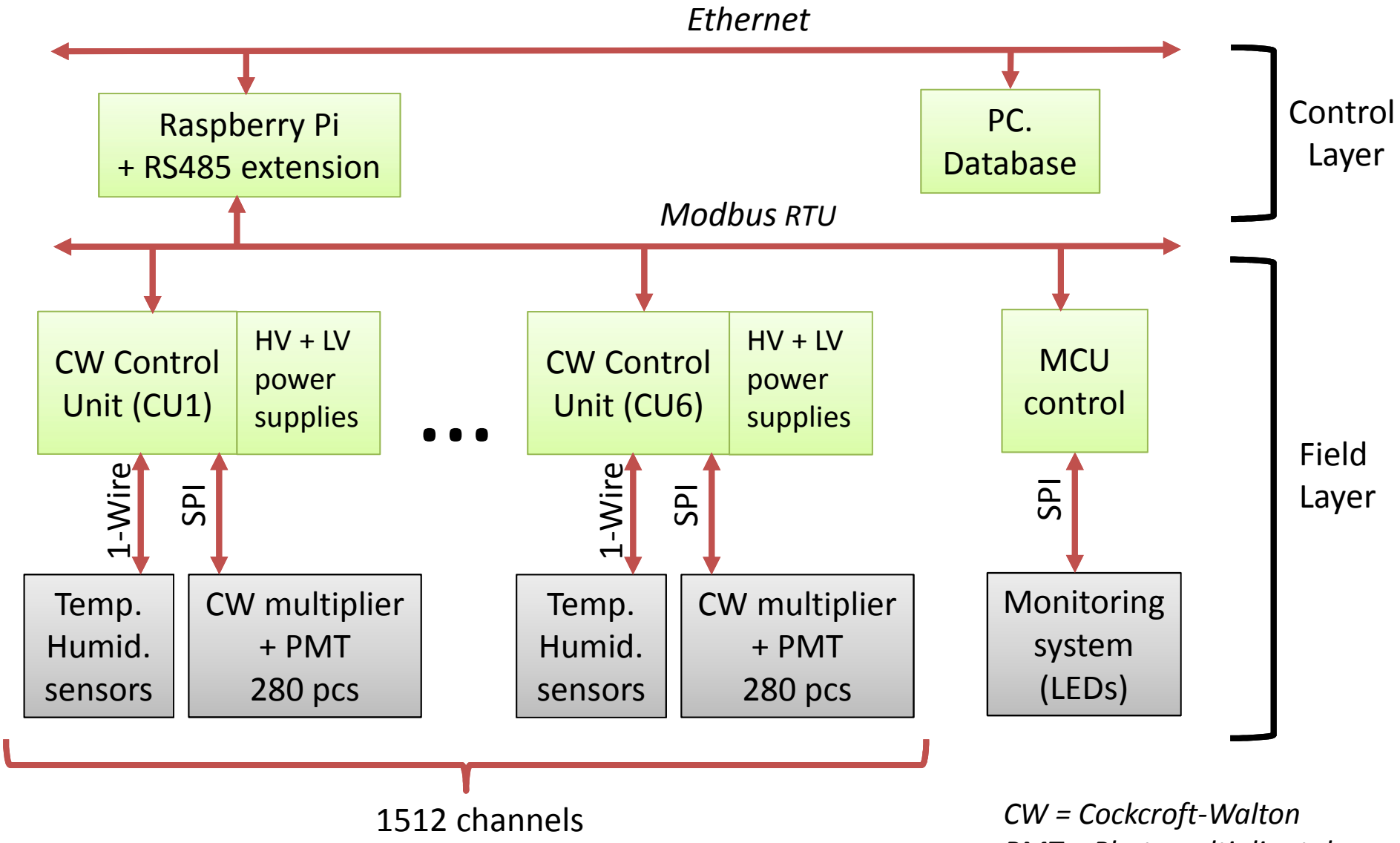
FSC slow control system: Schematic diagram



CW = Cockcroft-Walton
PMT = Photomultiplier tubes

FSC control system: Components

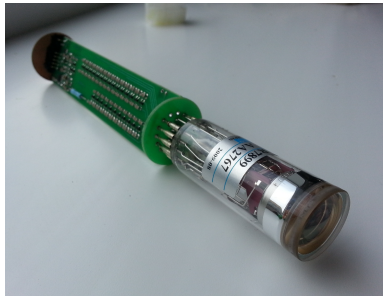
- IOC: Raspberry Pi Model B with isolated RS485

- Power supplies.

<u>Low voltages +6V, -6V:</u>
SP-75-7.5, EPS-65-7.5 (“Meanwell”)
<u>High voltage 90V:</u>
EL-AS (“Elim”), EPS-65-48

- Cockcroft-Walton multipliers & PMTs:

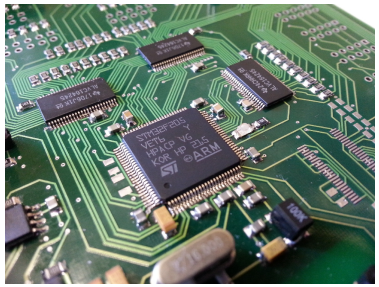
Produced 30 multipliers.
16 PMTs with CW-multipliers
were tested at MAMI (July, 2014).
20 PMTs for prototype of 36 channels
we`ll get soon.



- Temperature sensors DS18S20

FSC control system: CW control unit

CW control unit:

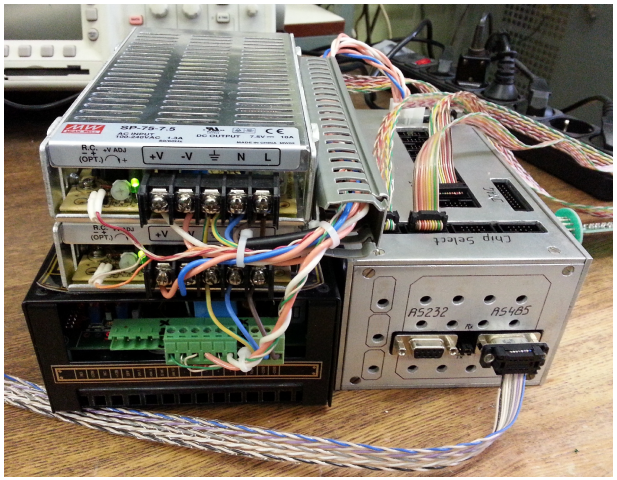


- STM32F205VE: 32-bit ARM Cortex-M3 MCU (120 MHz max).
- Control and adjustment of LV, HV.
- Current measurements on LV&HV by I2C sensors INA209.

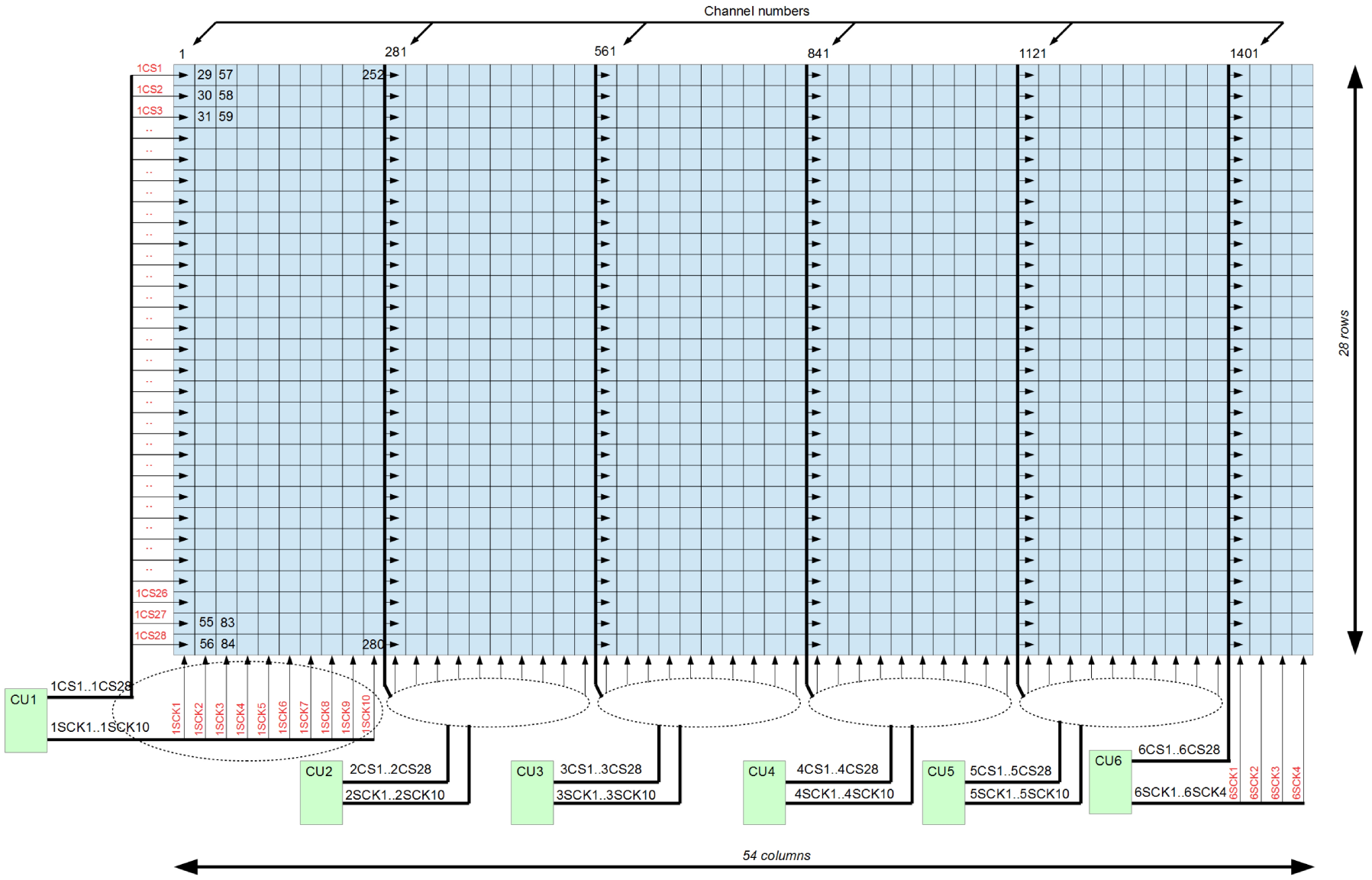
To measure currents on -6V and +90V were used ADuM1250 isolators.

- Provides the reference voltage codes for the 280 CW-multipliers by SPI.
- Supports two interfaces: RS232 and Modbus on RS485.

The CW-CU prototype was tested
with 28 CW-multipliers that were connected by SPI.



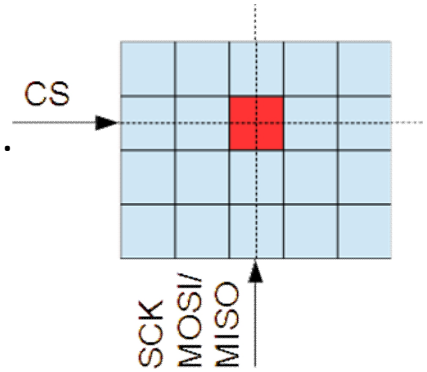
FSC control system: SPI addressing



FSC control system: SPI connection

CS = Chip Select. SCK = Clock. Data (MOSI, MISO) goes with SCK.

Addressing to channel occurs by crossing of a column with a string.



FSC control system: Raspberry Pi usage

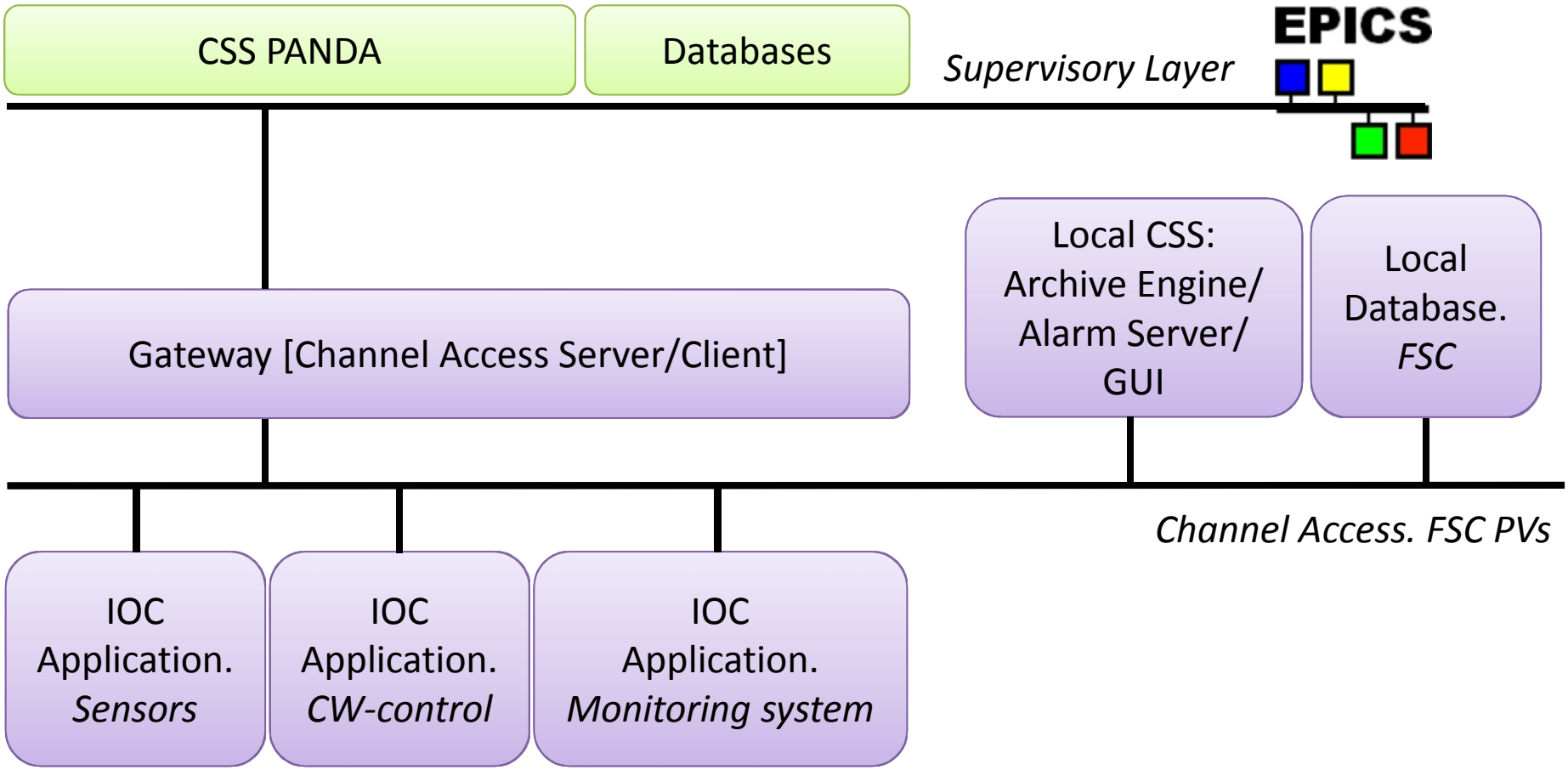
Plans:

To produce PCB extension for RS485 with isolation (on ISO3082 chip).

To develop IOC application based on driver support for Modbus protocol under EPICS

http://cars9.uchicago.edu/software/epics/modbus.html

FSC control system: Slow control architecture



FSC control system: Plans

New version of CW control unit is expected for the next 36-channel prototype:

- produce new PCB;
- produce a case and place the power supplies there;
- add the 1-wire serial driver for the temperature sensors (DS2480B).

Start to develop Modbus application for Raspberry Pi

Interface to the monitoring system