Controls Electronics Mechatronics (CEM) group

Alessandro Masi

CEM – Controls Electronics & Mechatronics

Group Leader : Alessandro Masi
Deputy GL   : Javier Serrano

The CEM group develops and maintains a centralised competence in controls hardware custom design, low-level software & infrastructure support, electronic development/production & radiation tolerance, mechatronics & robotics, tests and measurement systems.

CEM – Controls Electronics & Mechatronics

Group Leader: Alessandro Masi

CEM
Controls Electronics & Mechatronics
GL: A. Masi
DGL: J. Serrano

EPR
Electronics Prod. & Radiation Tolerance
SL: S. Danzeca

EDL
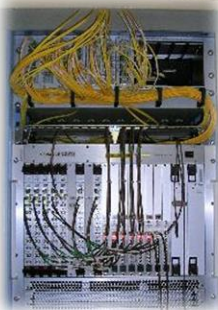Electronics Design & Low level software
SL: J. Serrano

IN
Infrastructure
SL: I. Kozsar

MRO
Mechatronics, Robotics & Operation
SL: M. Di Castro

MTA
Measurement, Test & Analysis
SL: O. Andreassen

Responsible for the specification, design, procurement, integration, installation, commissioning and operation of low-level controls infrastructure: field buses, timing, embedded system, commercial and custom control modules for all CERN Accelerators, their transfer lines and the Experimental Areas.

Field buses:
WorldFIP, MIL-1553
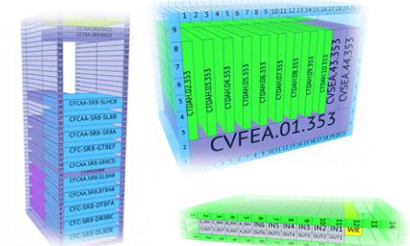
Timing distribution: GMT, White Rabbit

Front Ends: VME, cPCI and PICMG1.3, mTCA, PXIe form factors

Infrastructure Asset Management and Diagnostics

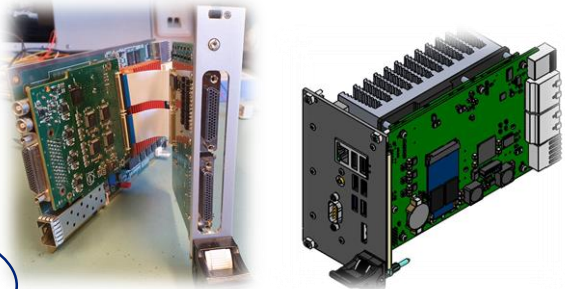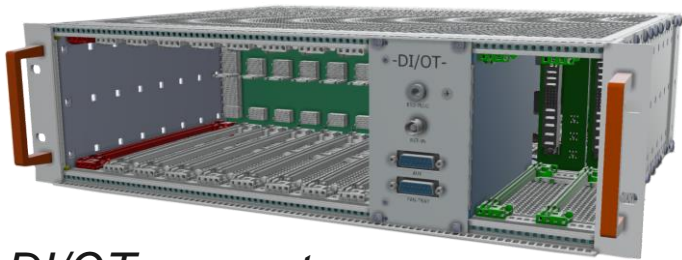# CEM – Controls Electronics & Mechatronics

Group Leader: Alessandro Masi

Responsible for the development, production and support of most of the generic custom electronic modules for controls, data acquisition and motion control including Linux device drivers, C/C++ libraries and associated test programs.

FMC Kit and front ends boards: Ex. Sensors Acquisition & Motion Control (SAMbuCa) ecosystem (https://ohwr.org)

Accelerators timing solutions: GMT and White Rabbit (https://ohwr.org/project/white-rabbit/wikis/home)

DI/OT ecosystem (https://ohwr.org/project/diot/wikis)
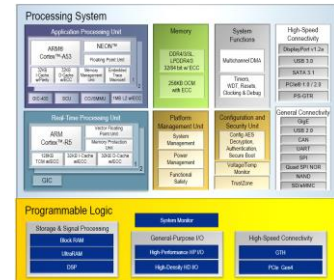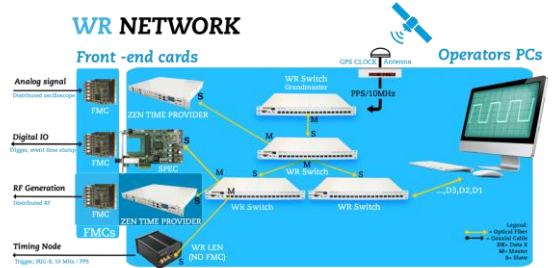
SoC and Front-ends Linux standardisation
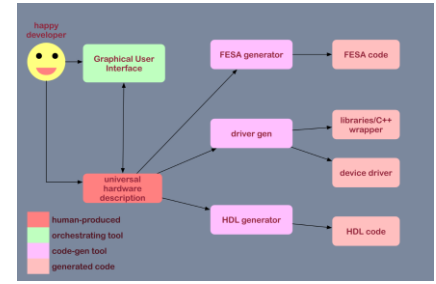
HDL and drivers generator

White Rabbit in CEM

- CERN focused on WR building blocks and non-GMT applications:
  - BTrain
  - LLRF
  - WR Trigger Distribution
- Recent decision to fund migration of GMT and BST systems to WR
- Development of new WR switch (v4)
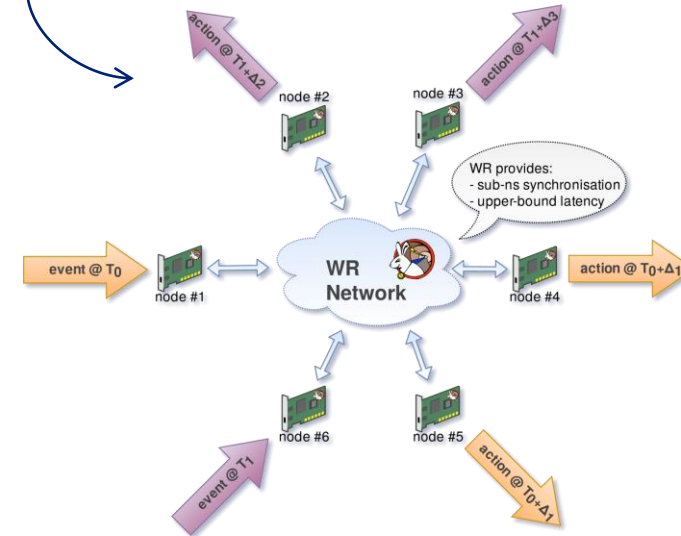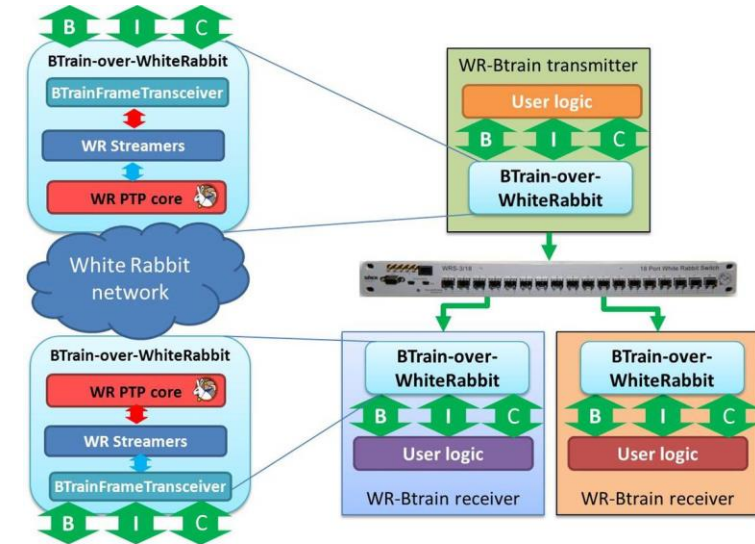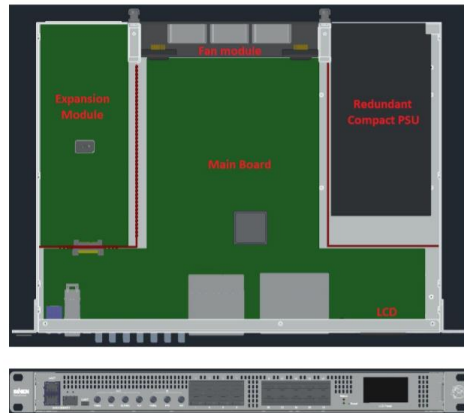
CEM – Controls Electronics & Mechatronics
Group Leader: Alessandro Masi

Responsible for the CERN-wide support for all tests & measurement systems based on LabVIEW and a selected set of commercial off-the-shelf products.
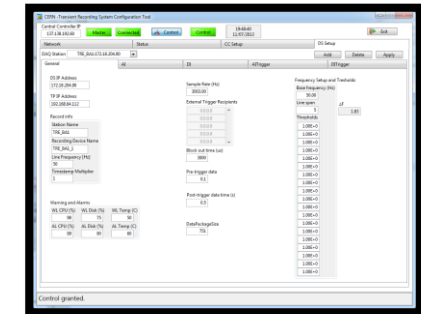
CERN LabVIEW support

SM18 superconducting magnet test stands

Oscilloperturbography (EN-EL)

CEM – Controls Electronics & Mechatronics

Group Leader: Alessandro Masi

CERN central service for the layout, industrialisation and production of electronic modules based either on industrial standards or detector-specific technologies. CERN-wide support on radiation-tolerant electronics, radiation tests and radiation monitoring for evaluating the dose to electronics installed in radiation areas.

PCB Layout design, production and assembly for boards and crates

Repair and rework of almost any type of components
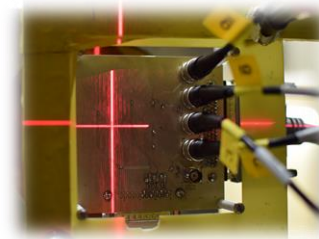
Radiation tests Service for COTS and systems qualification
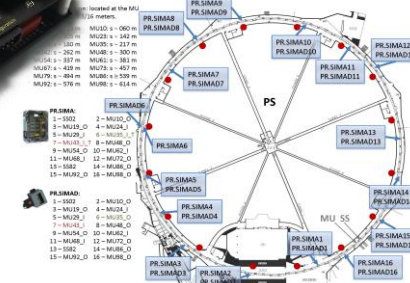
500 RadMon devices installed in the accelerator complex

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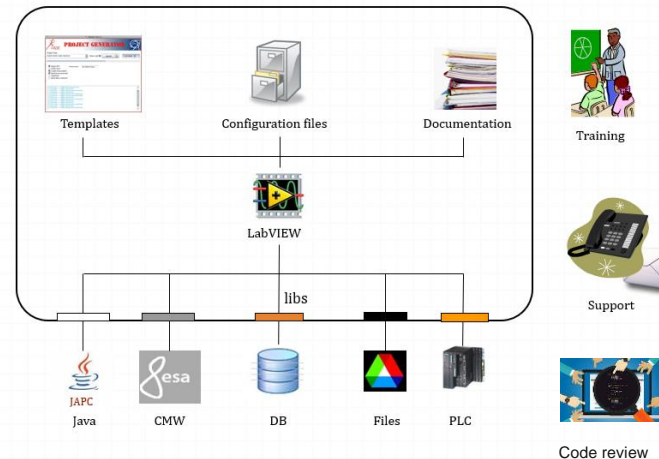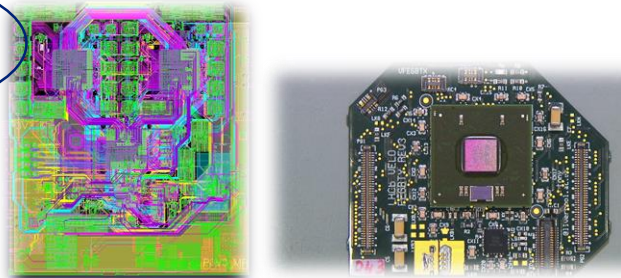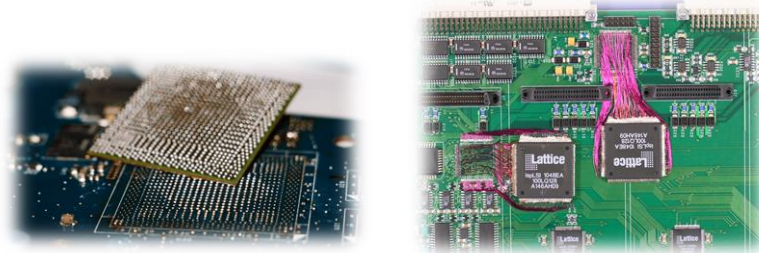SL: J. Serrano

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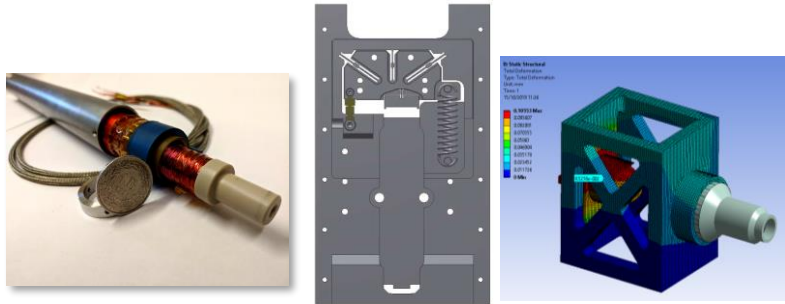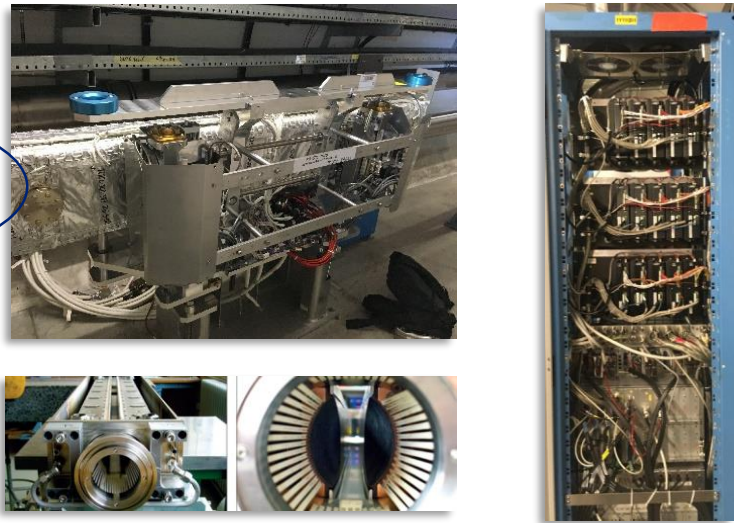Measurement, Test & Analysis
SL: O. Andreassen

Responsible for mechatronic systems and controls design, production, installation and operational support for the LHC Collimators and the Beam Intercepting devices in the CERN accelerator complex. Robotics developments and interventions for remote inspection and maintenance in radioactive areas.
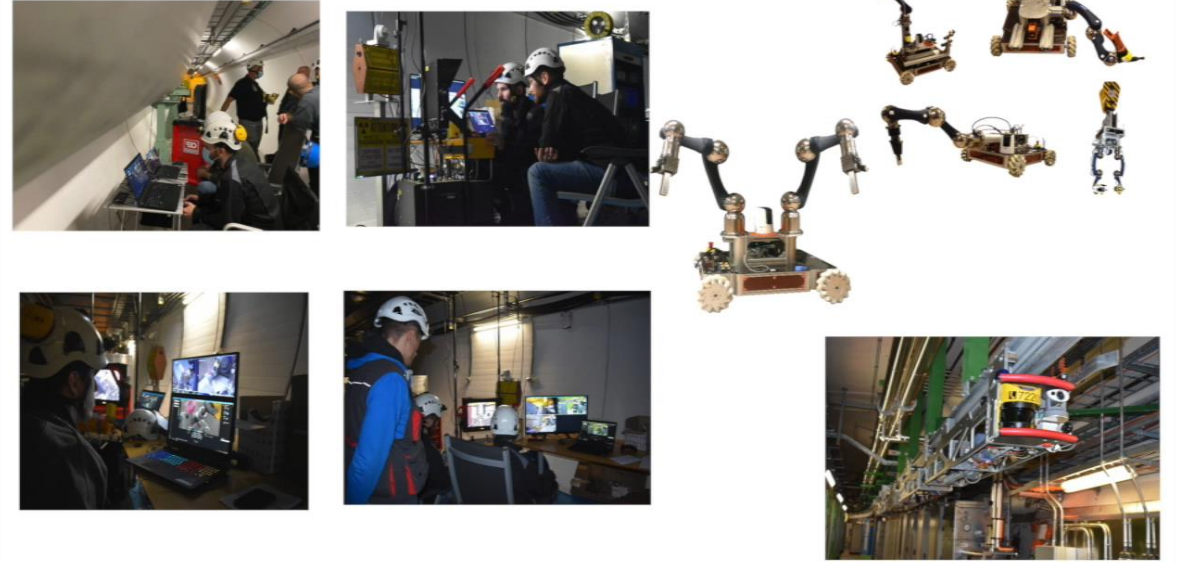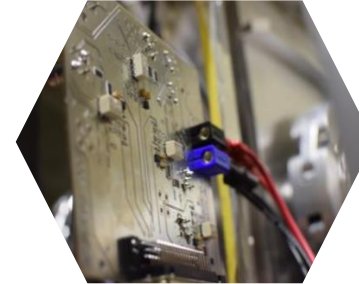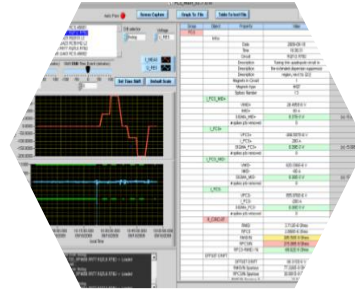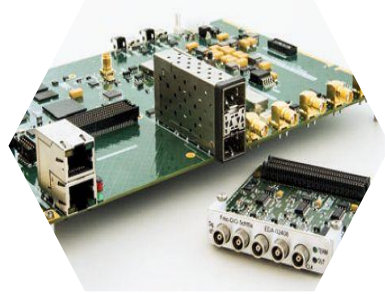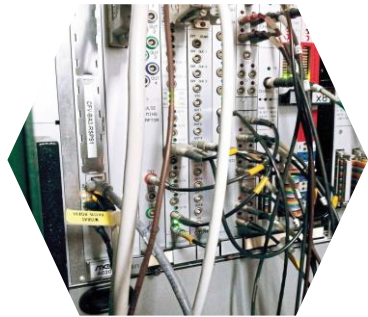
Actuators & position sensors R&D

LHC Collimators low level control

Robotics service

CEM mandates & services

specification, design, procurement, integration, installation, commissioning and operation of low-level controls infrastructure: field buses (MIL-1553, WorldFIP, GMT, WhiteRabbit), embedded systems and commercial modules VMEbus, cPCI, PXIe and PICMG1.3 form factors in for all CERN Accelerators, their transfer lines and the Experimental Areas

development, production and support of most of the generic custom controls and motion control electronic modules including Linux device drivers, C/C++ libraries and associated test programs

CERN-wide support for all test & measurement systems based on a selected set of commercial off-the-shelf products.
Support for the automation of the LHC magnets powering tests during the hardware commissioning Integration of LabVIEW in the accelerator infrastructure

CERN central service for the layout, industrialization and production of electronics modules based either on industrial standards or on fine-pitch, detector-specific technologies.
CERN-wide support on radiation-tolerant electronics, radiation tests and radiation monitoring for evaluating the dose to electronics installed in radiation areas

Design and operational support of the mechatronics of the LHC Collimators and the Beam Intercepting devices in the CERN accelerator complex Robotics interventions of remote inspection and maintenance in radioactive areas in the accelerator environment