NEW GRAPHICAL APPLICATION FOR HIGH-LEVEL SYNCHROTRON CONTROL WITH PARTICULAR EMPHASIS ON THE CORRECTION MODULE

M. Mleczko, W. Wiatrowska, M. Floras, P. Andryszczak, E. Beyer

SOLARIS National Synchrotron Radiation Centre, Jagiellonian University, Krakow, Poland, www.synchrotron.pl

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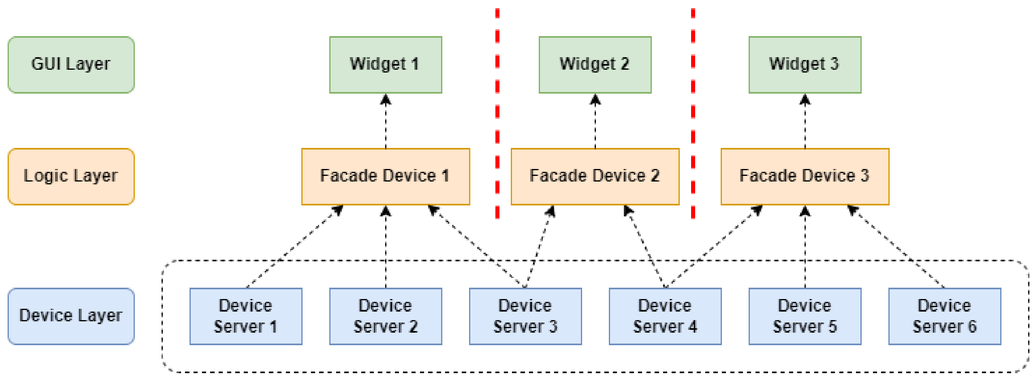
ARCHITECTURE AND TECHNOLOGY

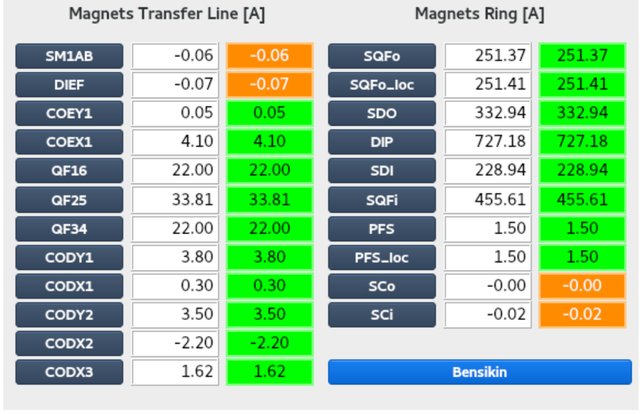
The new high-level graphical synchrotron control application consists of 15 widgets. Due to the complexity of the synchrotron subsystems, a comprehensive, easy-to-maintain application architecture is desirable. The project is structured in 3 layers: Device layer, Logic layer and GUI layer. Application was developed in Python based on Tango Controls framework and PyQt library.



Application architecture.

MAGNETS MODULE

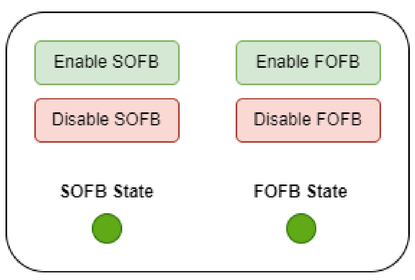
Crucial devices for operators are also magnets. On the following widget there are two sections, first dedicated for magnets in Transfer Line and second one is for magnets in Ring. Operators can indicate precise current for particular magnet.



Magnets parameters for Transfer Line and Ring sections.

BEAM CORRECTION MODULE

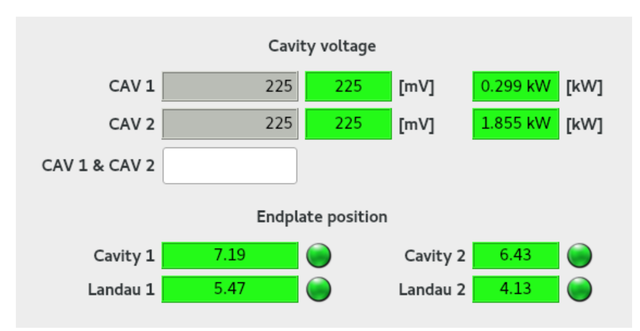
Beam Correction module gives operators the ability to manage and follow statuses of Slow Orbit Feedback (SOFB) and Fast Orbit Feedback (FOFB) algorithms.
During beam injection and ramping process, this is one of the key functionalities.



Example of beam correction widget.

CAVITY MODULE

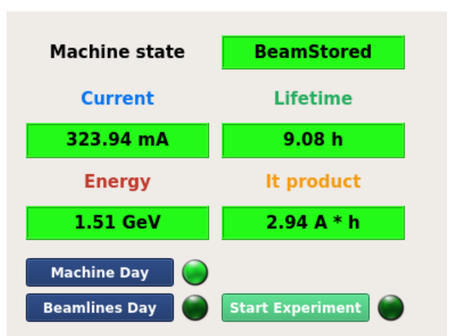
Very important and necessary for successful injection and ramping beam is Cavity module. It allows operators to have those parameters under strict control.



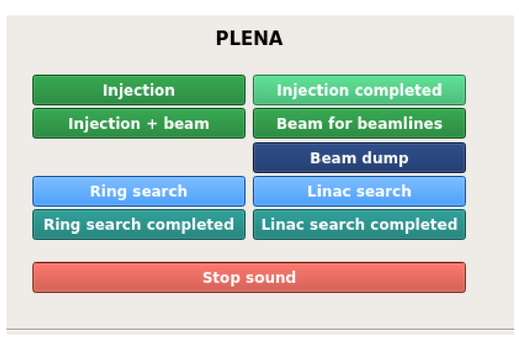
Cavity widget with all parameters and statuses.

INFORMATION MODULES

One of the simplest widgets are Machine Statuse and Plena. It consists of information such as: Machine State, Current, Energy, Lifetime or I*t product and provides features to play messages via speakers placed in experimental hall as well as in Linac tunnel.



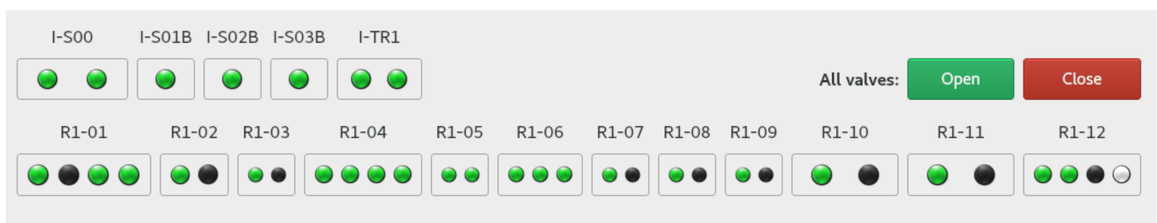
Current parameters of synchrotron.



Buttons to play particular message.

VALVES MODULE

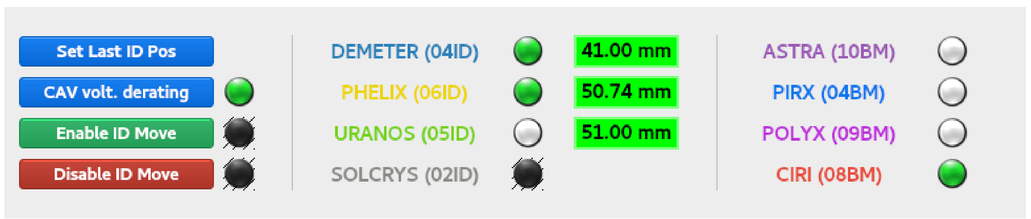
Linac and Ring sections are devided into many subsections. Each of it is separated by valves. In case of accidental, radical decrease of vacuum those valves are automatically closed to separate defective subsection. State of each valve is displayed at widget below. Operators can also take an actions across all valves: open or close them using dedicated buttons.



Valves states for Linac and Ring sections.

BEAMLINES MODULE

Widget which informs about currently conducting reasearch is Beamlines. It shows which beamlines are open and which ones is closed or is under construction (e.g. Solcrys beamline). Moreover there is also infromation about parameters of insertion devices.
Operators also have at their disposal features to control resonance cavity derating and insertion devices.



Beamlines widget with current statuses.

SUMMARY

- The graphical application for high-level synchrotron control was partially successfully developed and implemented.
- Used architecture makes application easier to maintain and future development.
- Simple and well-known technologies sets entry level relatively low for future developers which should boost their work at first stages.
- The new module for controlling SOFB and FOFB correction algorithms is now available for operator as a intuitive widget and make thier work much easier.
- In the future there will be implemented functionality for intelligent management of interlocks.

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