

Age of Technocracy

By: P. MEDVEŠČEK (COBIK* and COSYLAB)

I heard somewhere it is good to start with a quote. Makes you look well read. But if I think again, who reads these days? We are in an age of visual imagery, therefore, let me start with a picture and continue with a follow-up question.



What does it actually say?

To me it says that approximately the population of Slovenia (if a bit sloppy with the details) viewed this and some of them bothered to express their opinion. After some investigation one finds out that actually only one person might have looked at this 1,491,766 times and in between spent his time clearing cache/cookies or perhaps if not very computer-savvy, changing computers. Not very likely, but hey, it is possible. He might even have written a few lines of code that could be doing this while he was doing more important things.

Ask a stereotypical engineer and he might

start calculating percentage of people that responded or percentage of "likes" and "dislikes", ask a media reporter and he will say that opinion seems to be divided on this one and that we will have to leave it there, ask a web designer and he might say that font that was used is so Web 1.0, ask an ordinary guy on the street and he will probably say: "Why are you asking me this?" and if he is busy he will just go with "Should I care?"

No, he should not. Because these are just plain numbers and without any context they are somewhat useless. And in some cases even with proper context we should not care about them as much as we sometimes do. Just because we can calculate something it does not mean we should do it. The result might not tell us anything or even worse, it might lead us in the wrong direction. And what is truly scary, we will have a Result as an argument whenever somebody will benevolently try to steer us back onto the right path.

But please, do not get me wrong. I am very enthusiastic about the current technology and what we can do with it today. Never before was it so easy to connect with people or businesses on the other side of the globe, never

before was it so easy to work from home (although in a lot of cases I would argue the concept is a contradiction in terms ;) and never before was it so easy to check the budget spent on your project in real time. The technology is all there.

What I am not enthusiastic about is this "popularity" concept, that I sometimes feel almost imposed on the world around me. Opinions are listed according to the number of "likes" minus "dislikes" they receive, people send you something that has been rated as 5-star with a message "you have to see this." You check it out and you do not want to give them your honest opinion. My thoughts in such moments are "Something is wrong with me or with the world. And I appreciate there are things that are wrong with me, but not in this case."

And I confess, my background is engineering. 0,379% of people responded. Likes win: 52% vs. 48%. Additionally, this piece has exactly 3157 characters, 585 words, 39 lines. I spent 87 minutes writing this or at least that is what my word editor tells me. It definitely feels a lot more, but who am I to argue with a computer?

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Integrating an Ion Source into MedAustron's Control System

By: M. KLUN (COSYLAB)



MedAustron is an ion beam research and therapy centre under construction in Wiener Neustadt, Austria. The facility features a synchrotron particle accelerator for light ions. As part of our framework contract, the control system framework, timing system, hardware development and integration of numerous accelerator subsystems are being done in close collaboration between MedAustron's and Cosylab's development teams.

When I first heard about ion sources, I thought that it's a single device with one communication protocol. But upon joining this project, I realized that I couldn't have been more wrong...

In total, MedAustron's Ion source consists of more than 30 devices that use 6 different protocols! For example, isolation valves have a simple digital input/output interface, the microwave signal generator uses Ethernet, mass flow controllers use Profibus, etc. Our job as control system integrators was to develop a common interface to each and every device, while also allowing interaction with the ion source on different levels of abstraction.

Manual vs. Automatic Mode

We implemented two modes of machine operation into the control software. Expert users can operate the device in manual mode, which gives the freedom of turning specific devices on and off or tweaking any of their parameters with practically no limitations. For normal users, we provide a simple automatic mode which enables inexperienced operators to run the source by the press of a button.

Software Development

The whole MedAustron control system is

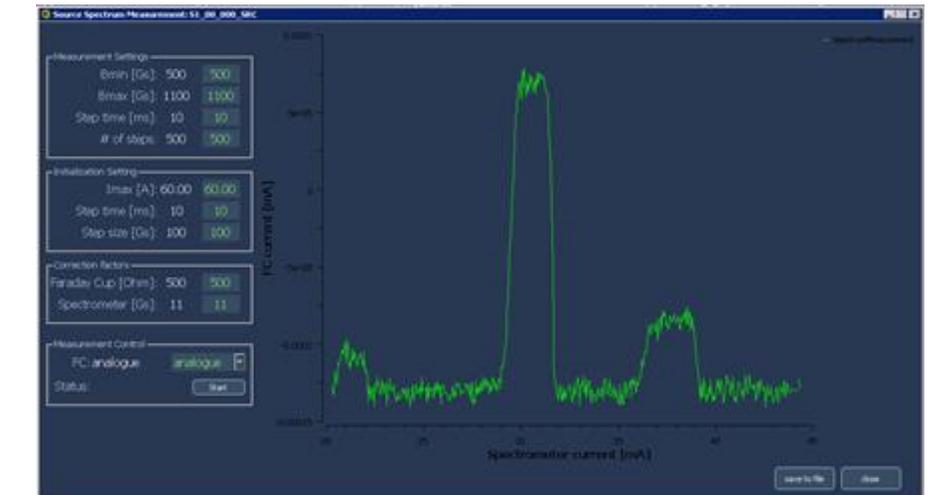


Figure 2: Ion beam spectrum shown in MedAustron's control system GUI

developed in Labview and based on the Front End Controller Operation System (FECOS [2]), a control system framework developed by Cosylab. FECOS and all device support software is implemented through object-oriented programming in LabVIEW, also known as LVOOP. This approach enables a streamlined development process, although LabVIEW's limits are often stretched, sometimes just because of the project's sheer size.

Testing

To ensure a sound, working system at development end, periodic testing on the actual ion source was crucial. But there was a catch! Hands-on access to a device like the ion source is usually impossible or limited at best. Quite some logistic effort and "time-multiplexing" with other MedAustron development teams was required to get the access to the ion source. In

our case, the device was located in CERN (Genève, Switzerland) and the software was developed at Cosylab (Ljubljana, Slovenia). This made us split the integration into stages. Each included an on-site integration visit, where we tested and optimized the software while running it on the actual device.

The last integration visit was in June 2012. Under complete control by the MedAustron control system, fully synchronized with the timing system [3], the ion source produced its first ion beam!

This success already has us looking forward to seeing live action from other devices, e.g. low level RF, power converter controller [4] and others in the accelerator chain, supported or developed by Cosylab in close collaboration with MedAustron.

[1] <http://www.medaustron.at/en>

[2] <http://accelconf.web.cern.ch/AccelConf/icalpecs2011/papers/mobaust03.pdf>

[3] <http://accelconf.web.cern.ch/accelconf/icalpecs2011/papers/wepmn015.pdf>

[4] http://www.cosylab.si/resources/our_newsletter_control_sheet/2011091509203311/1/#CS9_t3

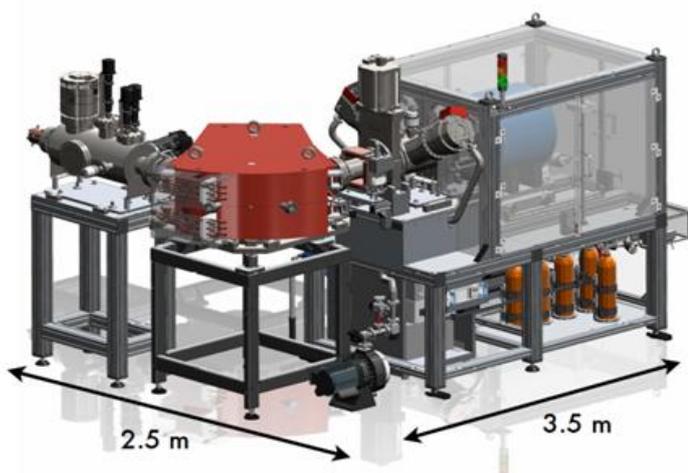


Figure 1: Ion source

Development of a Tokamak Simulator plug-in for the CODAC Core System

BY: D. GROSELJ AND K. ŽAGAR (COSYLAB)

CODAC and Simulations

The ITER CODAC Core System [1] is a large collection of software components and Cosy-lab has developed a simulator plug-in that uses CODAC to make changes of tokamak models or simulation environments easier to handle.

The main idea since the start of development on the simulator plug-in was to use the infrastructure of the CODAC Core System wherever possible. Basically, CODAC allows the whole state of the tokamak from plasma current, gaps, X-point, magnetic coils and power supplies status and many more to be represented by EPICS records.

Generally to simulate the tokamak, you would use a simulation environment to set up a model of the tokamak, create the EPICS database files and finally create the operator displays to monitor the simulation experiment from Control System Studio.

various tokamak measurements should always be independent of the simulation environment. In such a case, the OPI screens can be set up in advance and organized logically according to the type of information they represent.

When you decide what kind of simulation environment or model you are going to use, then all you have to do is provide an XML configuration file, describing the available signals from the simulator. This file is then automatically parsed by a configuration script and retrofitted into the project in the form of an EPICS database.

This extra database maps the raw simulator signals to appropriate places in the static part of the EPICS database. Whether you can use all the developed OPI screens or just a subset depends on the amount of information available from the simulator.

Channel Access (MCA) interface was used to pass simulator data from Matlab to EPICS. The interface provides wrapper functions for calls to Channel Access functions like 'caput' and 'caget'.

This specific simulator does not require external input, but to demonstrate the concept of two-way data transfer, we generated random values for plasma poloidal beta and internal inductance variations on the EPICS side and sent them to Matlab, where they were used as a disturbance to the linearized plasma model.

The simulator plug-in is functionally adequate. In the future, we also plan to demonstrate its use with other control laws and plant models. In addition, we plan to transfer the control laws from the Simulink environment to CO-

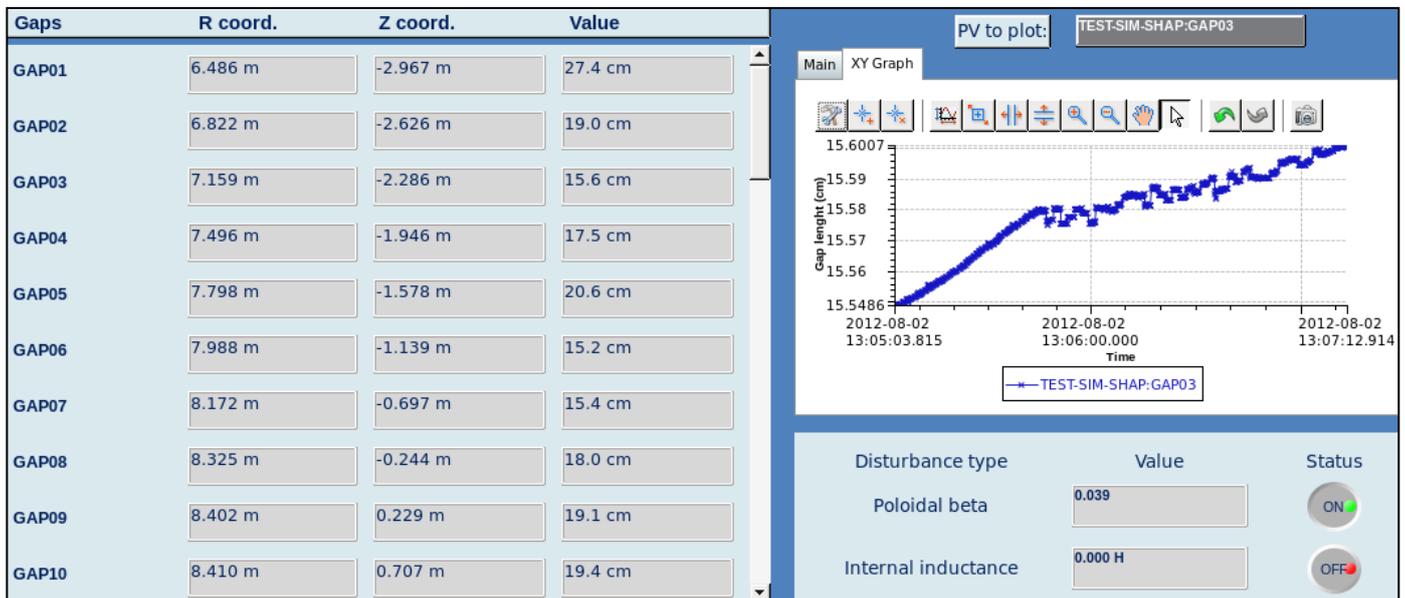
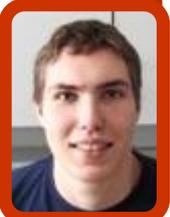


Figure 1: First glitch of a simulator OPI screen displaying the plasma gaps.

Changing Models

However, it can happen that one might want to change models or simulation environments. In this situation, it must not be necessary to repeat the development process with regards to the EPICS database files and the Operator Interface (OPI) screens. It is with this in mind, that the 'plug-in' nature formed the key part of the development process for this project.

In principle, the EPICS record definitions for

First Prototype

For our first prototype model we decided to use the Matlab/Simulink simulation environment with a linearized model of the ITER tokamak combined with a plasma shape and vertical stabilization controller provided by researchers on plasma magnetic control from the CREATE Consortium in Naples [2]. The full set of data from the model consists of about 70 signals which are sent during the simulation from Matlab to EPICS. The Matlab

DAC (C code running within EPICS IOCs) which would allow verification of actual implementations of control law algorithms.

References

- [1] CODAC Core System: <http://www.iter.org/org/team/chd/cid/codac/coresystem>
- [2] Create Consortium: <http://create.unina.it/>
- [3] CCACT: <http://www.tvp.si/index.php?id=88>

Development of a Tokamak Simulator plug-in for the CODAC Core System ...continued

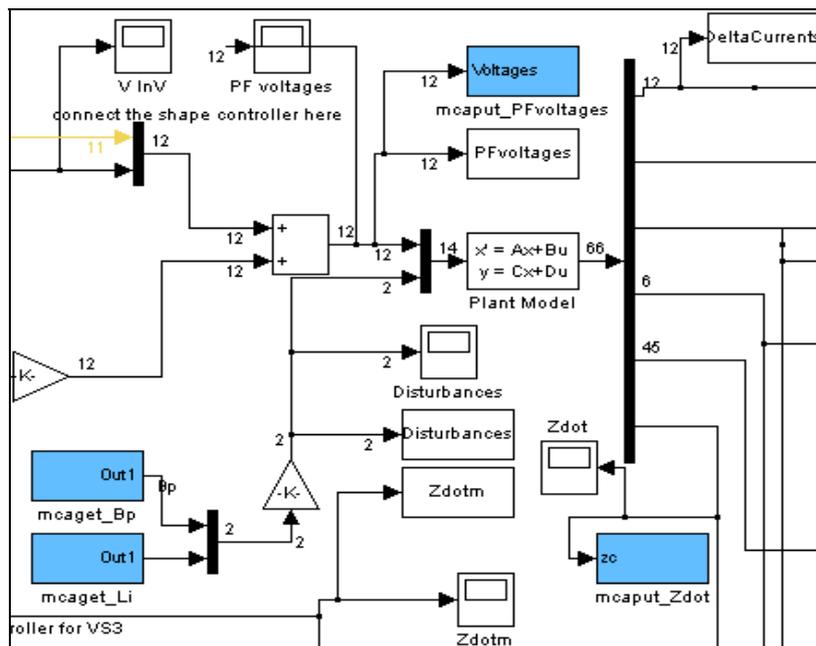


Figure 2: Fragment of Simulink simulator scheme. The blue blocks are used to interface signals to EPICS.

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T-Shirt Crazy!

Luca Rumiz, Marco Zangrando and Eric Mazzucco from Elettra-Sincrotrone Trieste have taken up the offer of Cosylab T-shirts in return for an "interesting" picture. Thanks guys!

Dear All,

We remember that you encourage to send some funny picture with your T-shirts. Et voilà!

We shot this picture in our linac tunnel of the FERMI@Elettra project during the last machine shut-down. Eric, don't touch that button!

We hope you enjoy it and...if you have some new T-shirt (L size) somewhere in your lab...we would like to receive!

Thank you!

Our best regards,

Luca, Eric, Marco

If you, like Luca, Eric and Marco, would like another Cosy T-shirt, send in an interesting photo of yourself wearing a Cosy T-shirt or a photo of you with a person from Cosylab wearing the T-shirt.

Email your photo *today* to

controlsheets@cosylab.com to qualify for the bonus offer of getting your photograph published in the next edition of Control Sheet.



Merry Christmas and Cosy 2013!

Hello all,

Einstein said: “Learn from yesterday, live for today and hope for tomorrow” and you don’t get a bigger celebration of new hopes, dreams and opportunities than New Years Day.

Have a festive holiday season, keep warm if you are in the Northern Hemisphere and enjoy summer if you are in the Southern Hemisphere.

To complete the 2013 Cosylab greeting, click on the image below.

Merry Christmas and Happy 2013!

The Cosylab Team

<http://www.cosylab.com/ny2013/>

