

Expert at the RWTH Aachen University about the automation pyramid and the features of online learning

Foreign experts from SPbPU partner universities come to Polytechnic University every year to give lectures. This year the format has changed, and professors and lecturers are connected online: for example, Aleksandra MÜLLER, from RWTH Aachen University; Germany. Together with her colleague from RWTH Melanie BUCHSBAUM, Aleksandra gave a lecture on new automation architecture systems with the use of cloud systems and edge technologies for students of the [International Polytechnic Summer School](#). You can read about how the online format has changed presentation of materials, the automation pyramid, and more in our interview.



- Aleksandra, glad to see you! Please, share your impressions of the lecturing online.

- This was an interesting experience. I have never given lectures in this format before. Compared to regular activities, one feels that the online mode is less rewarding. Cameras and microphones are turned off; you do not understand how students perceive the material. Nevertheless, by the end of the lecture, I did

receive a good response, and the guys coped with the task.

- Tell us what your lecture was about?

- The lecture was titled "New Principles of Controlling Systems in Smart Factories". First, I talked about the classical theory of "Pyramid of Automation". It can be thought of as a triangle. There is an automatic process, and there are sensors that detect it; this is the first level. The second stage is a control element, a controller. Next goes the control of the production line, and then the control of all business processes. This all is a standard approach.

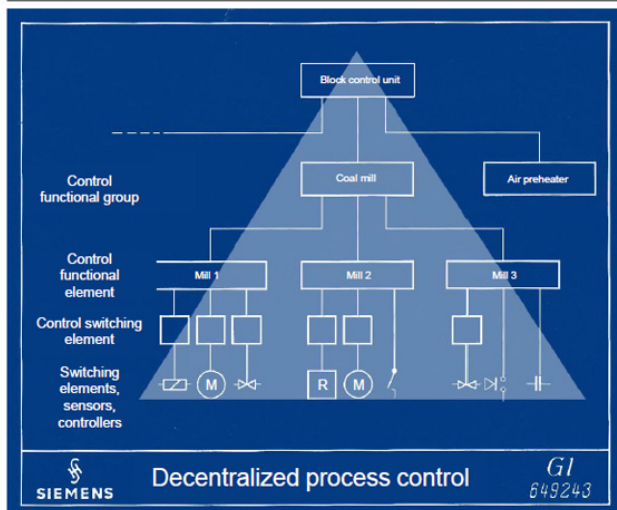
And we spoke at the lecture about that now more and more specialists dispose of this theory and strict vertical division. New development axes are added, cloud technologies are used to unite all levels of the pyramid. This helps to integrate different levels with each other, and not just go straight up. For example, using the cloud, sensors can communicate with higher-standing systems. That is, you can immediately reach the very top, and significantly save time. Thanks to new trends, the pyramid is becoming more flexible and suitable for modern production.

- Probably, your work at the University of Aachen is also connected with the automation of processes?

- I am engaged in industrial automation systems in various fields. In general, scientific activity takes about 80% of my working time. More precisely, at the University of Aachen I belong to the Chair of Machine Tools, where I study the autonomous production of machine tools. At the moment I am working on a scientific project where we are trying to automate the coolant filling system in a car. Now this is done manually, and we are creating a system and equipment to create a more autonomous process of pouring coolant into the car.

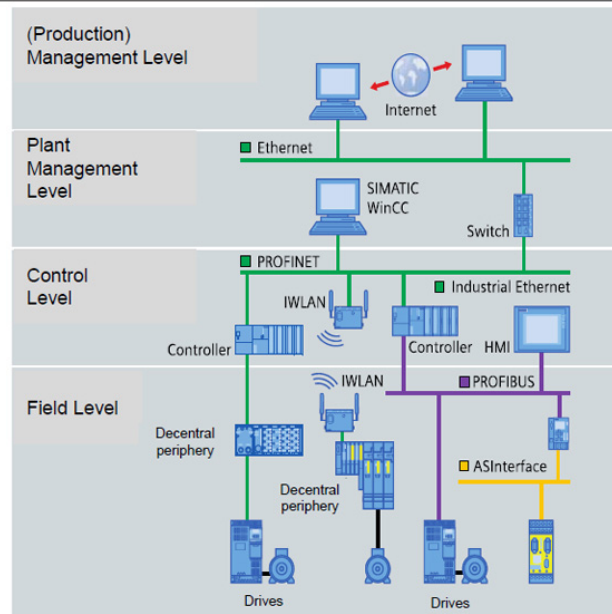
Pyramid of Automation

Comparison at a technical level



Decentralized control of function groups in the “automatic steam power plant” Siemens Pyramid from 1964

Source: Siemens



Automation Architecture - Today

- The line of studies you are working in is popular with students?

- Yes, this is a promising area. Many students are interested in it and want to write their theses on this topic. In general, at our university there is a paid position of “student assistance, assisting.” Students have the opportunity to help us with projects, conduct experiments. There always are many applicants for this position.

- How often do you work with foreign students?

- There are many foreign students, they are also interested in writing Bachelor’s and Master’s theses. Many students come from China, India, Europe, e.g., Belgium and Holland.

- Polytechnic University often holds summer and winter schools in cooperation with foreign partners. How do you feel about the idea of creating a joint course between SPbPU and Aachen University?

- Yes, this is quite promising, and we have already discussed this with our colleagues and management. It is doable, and we are interested in it. For my part, I’m ready to join!

- Summer and Winter Schools are very popular among students; many students from different countries come every year. What do you think,

from a teacher's point viewpoint, what is the key value of these courses for students?

- I believe that the value of such schools is not in specific knowledge but in broadening the horizons in general: programs and courses are very diverse. Topics, approaches of teachers, countries and universities are absolutely different. For example, my lecture, where I talked about the automation pyramid, is a standard that is known in many countries. But you can talk about that in dissimilar ways. Therefore, it may be interesting for students to see that the same topic can be viewed from unusual angles.

- What would you wish to colleagues and students at this difficult time for everyone?

- One day, this situation will end and everything will get back to normal. And we will have more experience in digitalization. Previously, no one knew how to conduct conferences in Zoom, but now everyone has learned that. So everything has its own good!

- Aleksandra, thank you for the interesting interview! We wish you success and new achievements in scientific activity!

Prepared by the SPbPU International Office

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