

School and Dept.	Accelerator Science, High Energy Accelerator Science Dept.
Name	Kazakov Artem
Destination country	Germany
Receiving Univ./institute	DESY
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Thanks for the SOKENDAI's financial support I had a chance to visit DESY, which is Accelerator Research Laboratory in Hamburg, Germany. That facility is similar to the one I belong now here in Japan (KEK).

As far as my original citizenship is Russian Federation, I had to obtain visa to enter EU. But thanks to good paperwork handling from the DESY's international office I had no problem getting visa. I got it the same day as I applied for it, which was very pleasant surprise for me, because usually it takes several times to visit an embassy to get a visa.

### [Information about my daily life and some advice for future applicants](#)

Upon arrival I get a room in DESY's dormitory, which was not so bad, just a bed and a cupboard. The very next day I met the inviting professor and got a working place and a computer and everything I needed to perform my research (and even a bicycle to move around). So I would say I'm very satisfied with it. During two month which I spent working at DESY I had my own desk and office which I shared with one other person. And it was very good because the other person worked on the same project, so if had any question we could discuss it easily. Basically this was the research scheme for me, and among that we had a weekly meeting with the professor and several other people involved in the project. All the people I had to communicate regarding my research spoke English fluently so for me there was no language problem at all. And even more, in Hamburg many people speak English quite well (which I cannot say about other German cities).

I have to admit that Hamburg is very nice and beautiful city with many water canals and bridges. There are many interesting places to visit and walk around. But the weather is not so nice, I think. 50% of my stay it was raining, and at first, after coming from hot and sunny Japan, I felt cold and uncomfortable. But after two weeks I accustomed and started to enjoy.

And because of the DESY's dormitory policy I had to move to private apartment after two weeks of my stay. But I managed to find nice place very close to the working place. The cost was 350 euro per month, which is quite reasonable price in that area. And the varieties of foods (especially vegetables and fruits) are very good in Hamburg. Probably because it is the biggest European "food-port". And the prices are a bit higher than in Japan, but fine and around 30 euro/day is enough if cook by yourself (including the money for the room). But dining out is quite pricey, and in Germany you have to leave tips at the restaurant (around 7-10% of the bill). Also in Germany in general, and especially in Hamburg, there are many Russian immigrants, so I met many people who I could befriend and spent time. And even Russian-goods supermarkets are present there, where I could buy many different food which I miss so much here in Japan.

DESY laboratory is located near big forest park where I could jog during lunch time and at weekends, when I had no other plans. And one this which is definitely worth to mention is the transportation system at Hamburg. It is VERY GOOD. First of all, during the day time buses go every 5-20 minutes, depending on the route. And second, they operate at night every 30-60 minutes. So even late at night, when the railways are not operating it is

possible to get around the city. And for 30-60 euro/month you can get so called "fahrkarten" - which is basically the pass for all kinds of transportation within a city including buses, trains and even a ferry!

But foreigners coming from other countries and especially Japan, should be warned that ALL shops are closed after 20:00 (though there very few which work until 22:00) and NO shops work on Sundays. Though bars and restaurants are opening till morning, even on Sundays.

### Study and research during my stay

My main goal within my visit was to port this Redundant EPICS IOC to other operating systems (such as Linux). Therefore it was very important to discuss a lot and work in a team with people who create the original version. And to start working with this project, at first I had to understand how it works and get some experience with their original installation they use for development and testing. After that I was able to recreate that system on PC-architecture with Linux.

And here is the excerpt from my "Application for the Study Abroad Program" below.

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Topic of my doctoral research is improving reliability of accelerator control systems. This is quite wide area and it implies many different approaches. To achieve the best results I would like to meet other people working in this area to gather their experience and knowledge.

Also I would like to get hand-on experience in developing reliable and highly available control systems and study other aspects of engineering such systems. Dr.Clausen and his group are very experienced in the field of my interest and I would like to work with them. My research is mainly based on EPICS environment and Dr.Clausen has several projects connected with EPICS and I believe our interaction will be mutually useful.

Dr. Matthias Clausen is a head of Cryogenics Control group at DESY.

His group is responsible for operation of Cryogenic Plant at DESY which requires very high availability and stability. And now they are developing control system for cryogenic plant for the European X-Ray Laser Project XFEL. For this purpose EPICS environment is being extended to support redundant controls. RMT (Redundancy monitor task) and CCE (Continuous Control Exec) software has been developed for that purpose.

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And my research plan:

1. To port RMT to Linux (and possibly to FreeBSD) - Accomplished
2. Integrate RMT to caGateway - Accomplished
3. Study RMT and CCE internals - Accomplished
4. Study other EPICS-related topics - Accomplished
5. Study current and future implementations of redundant controls system - Accomplished

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As a result now it can be used on wide variety of operating systems and recently we started to use it at KEK. And personally I've got deeper and better understanding of EPICS internals and this knowledge is very helpful in my everyday tasks at KEK.

To summarize I'd like to say that I really enjoyed my trip. And it was very fruitful in terms of accomplished work and resulted in a paper which was submitted to the ICALEPCS2007 conference. And this is directly connected to the topic of my doctoral thesis.

However it is difficult to represent my work in one or two pictures, therefore I attach a short presentation below which I used when reported to my colleagues at KEK.

[RMT report \(PDF\)](#) RMT & CCE porting to EPICS-OSI. Redundant & load balancing gateway implementation