



Field Report

„Fablab Polytech“

at

State Polytechnic University of St. Petersburg

(April 4th 2016 – April 11th 2016)

and at

Leibniz University of Hanover

(June 11th 2016 – June 15th 2016)

by

Viacheslav Chernogorskii, Eyvgeniy Redkin, Andrey Shubin,

Martin Bergen, Alexey Rybakov and Lars Wolters

1 Introduction

From April 4th till April 11th 2016 and from June 11th till June 15th 2016, the Fablab Polytech took part in St. Petersburg, Russia and Hanover, Germany. It was the first time that German students visited Russia and Russian students also visited Germany for each one week of working on a self-chosen prototype workshop. The project was funded by the “Strategische Partnerschaft” program of DAAD. We, the students, had to develop an idea of a prototype and then build it within about 2 months. Before the time in Russia, we had to finalize the idea. Our team chose to build a coffee machine based on the Senseo principle. In Russia, we could build the main components and use the machinery. In the time between the German visit in St. Petersburg and the Russian visit in Hanover, we could order some missing components and discuss various ideas. Finally, in Hanover, we had to assemble the machine and present it.

2 Organization

2.1 Application for the project and organization in Germany

To apply for the project, each student had to write a motivational letter, why he wants to go to Russia and why he is suitable for the job to build a prototype of some sort of machine in English language. For the scholarship, we also had to hand in a resume and a score record. At a pre-meeting in Hanover in February, we received information by Mr. Christopher Tidy and Dr. Thomas Jambor about the goals of the project and the process of the project in Russia. We also got some tasks to do. Each student had to design his own mini-prototype as a suggestion for what to build later on in Russia. This was a little complicated since it was exam-time in Germany and time was short.

We received the money for the scholarship to buy plane tickets and visas quite fast. Unfortunately, the exact time table was not clear to all of us, so we had some minor difficulties booking a flight. To receive a visa, you have to apply at the homepage of the Russian consulate. This is quite easy. For receiving the visa, you have to bring an invitation of the State Polytechnic University in St. Petersburg and some money to get it. Of course, you need a valid international passport. The consulate is located in Hamburg where you also have to pick up the visa.

2.2 Journey to Russia and accommodation

Since there is no direct flight to St. Petersburg from Hanover, you have to go to Hamburg another time. The flight was quite early in the morning, so some students took the bus and

some other students stayed in Hamburg the night before. There is also the possibility to go to Moscow before the beginning of the project, if your studies allow it.

The flight was uncomplicated. We were picked up by the Russians from the airport. This was very good, since it is quite difficult to speak to Russian taxi drivers since their English is quite bad. The ride from the airport to our accommodation was about 45 minutes depending on traffic.

Our accommodation was located very nearby to the Fablab. It was about 5 minutes to go there. At the beginning, it was not clear if we had to pay for accommodation or not. But in the end, we had to pay about 60-70 € for the whole week. We were accommodated in 3-bedrooms sharing one toilet and one shower. It was not super clean, but it was okay for a week. The payment in the end was quite complicated since we did not know how to use the machine. Fortunately, some local Russians could help us and show us how to pay the machine. Be careful, the machine will not give any change.

For the return journey, the Russians brought us another time to the airport. This was a really good service since our flight was very early in the morning.

3 The project in Russia

3.1 Our team

Each team consisted of six students in total, three Russian students and three German students. On the picture from left to right: Andrey, Zhenya, Slava, Alexey, Lars and Martin.

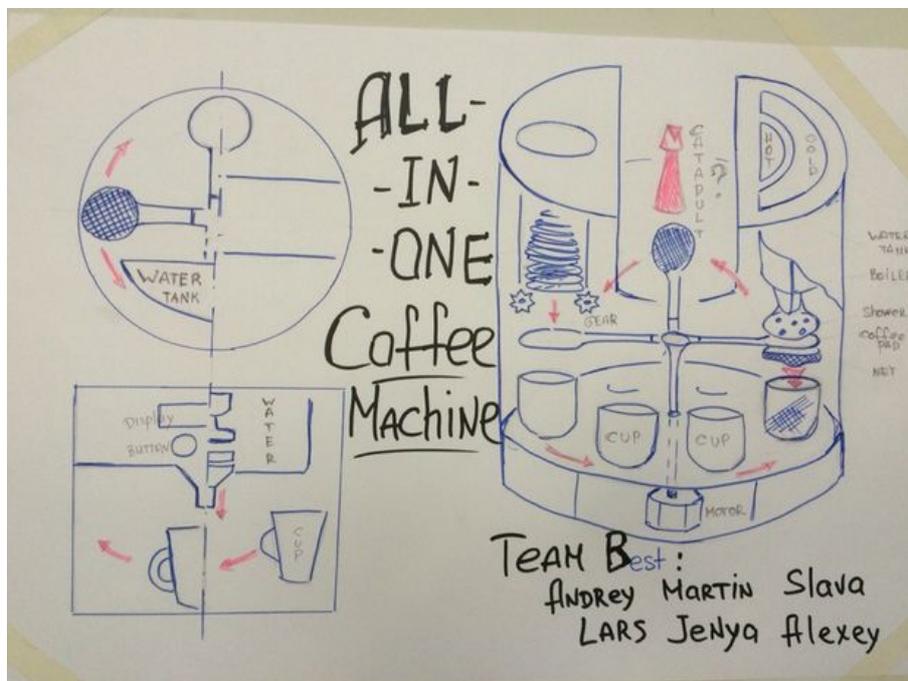


3.2 The coffee machine

The goal of our team was to build a coffee-machine, where nothing needs to be done further than pressing ONE button to get a coffee. All components for a coffee, like coffee pad, water and a cup are inside of the machine and will come together automatically by some motors and an Arduino.

Therefore, we had to think and develop a lot of new mechanisms for the several parts in the machine. The plan was to have a finished concept of the coffee machine before we arrived in St. Petersburg, but when we came together and thought again about the mechanism, we have made a new concept. In fact, by having some communication problems, the concept was not ready.

The procedure in St. Petersburg was to make some hand drawing sketches, discuss the sketch and make a 3D model sketch to cut some stuff with the laser cutter or with the milling cutter from wood or print something with the 3D printer. These machines are part of the Fab-Lab and could be used by us with the collaboration of responsible for the Fab-Lab. With the cut thing, we could assemble and test our ideas of a mechanism. So at the end of the week in St. Petersburg we had the mechanical parts except one of the coffee machine.

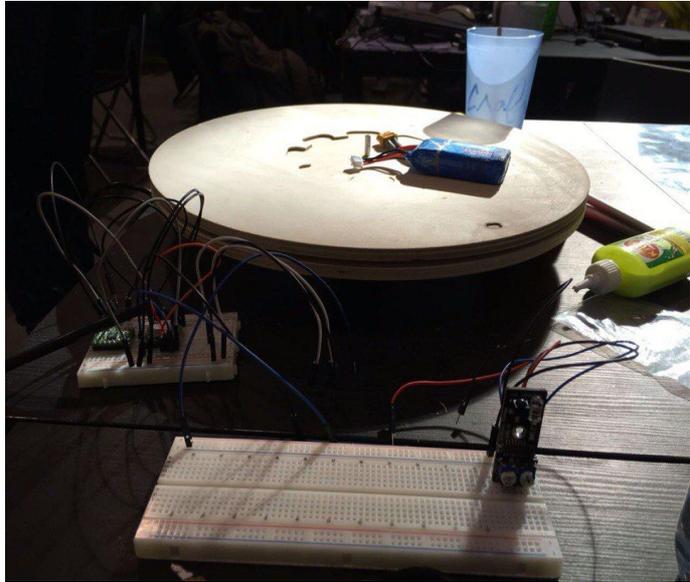


The electronical part of the mechanism didn't work as well as the mechanical part, because of broken Arduinos and broken and missing motor drivers.

In the following will be described the parts of our coffee-machine that were made during our stay in St. Petersburg.

3.2.1 Rotary plate

The rotary plate is for the cups to move them to the right position. We cut out a platform for cups with a laser machine and connected it to the motor. For the best sliding we used steel balls.



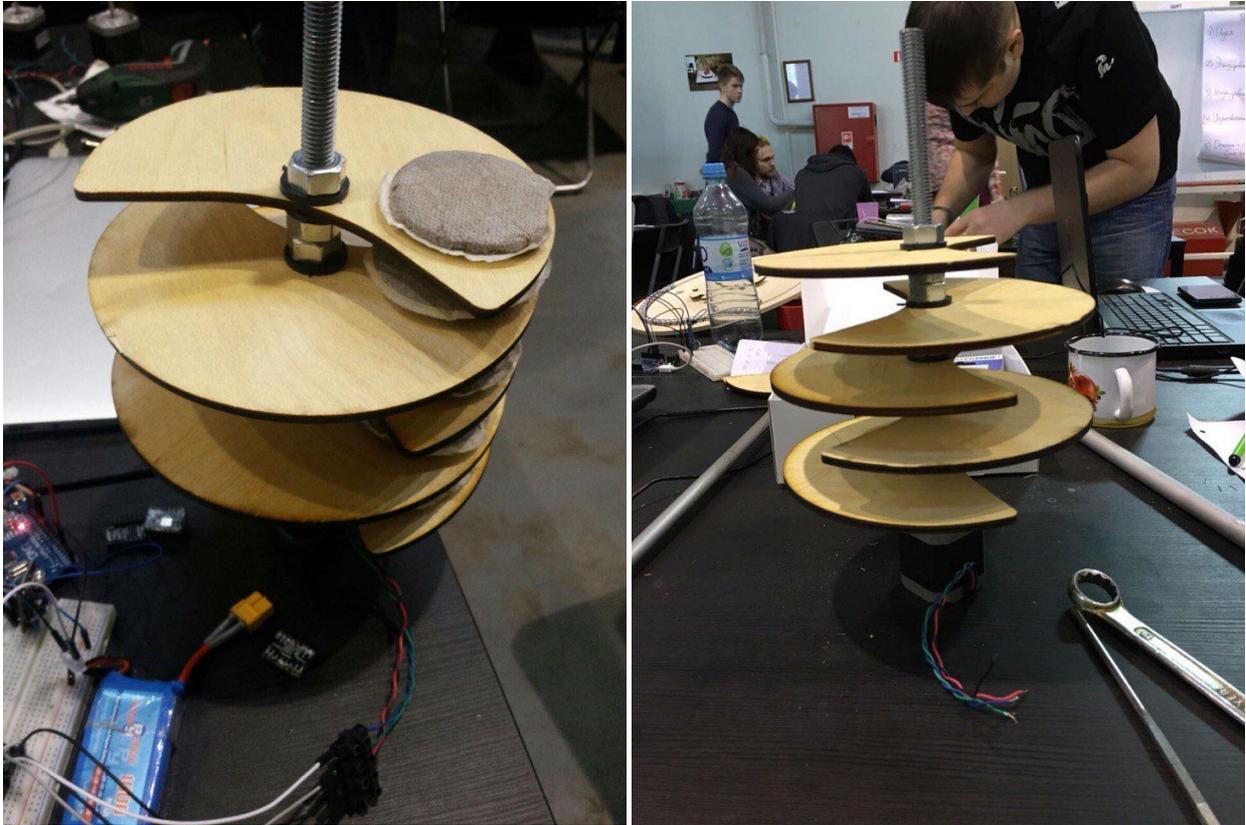
3.2.2 The whole truth of coffee

We took a water boiler, pump and tank from the old coffee-machine. From steel mug with nice style, wood and the silicone isolation between we made a hermetic chamber for brewing coffee. From aluminum sheet we cut plate with holes for pouring.



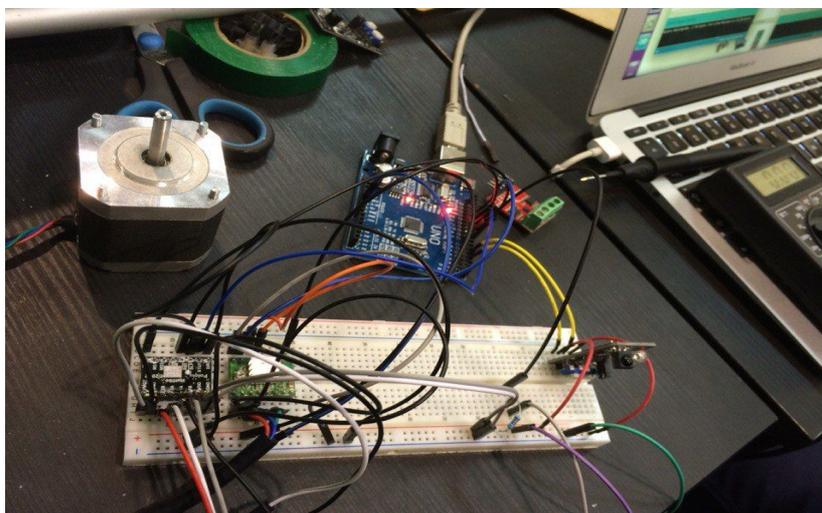
3.2.3 Pad carousel

You put coffee pads on the platform, and it gives you one by one while rotating them. Profit!
Rotation is realized by stepping motor and the threaded rod.



3.2.4 Electronic parts

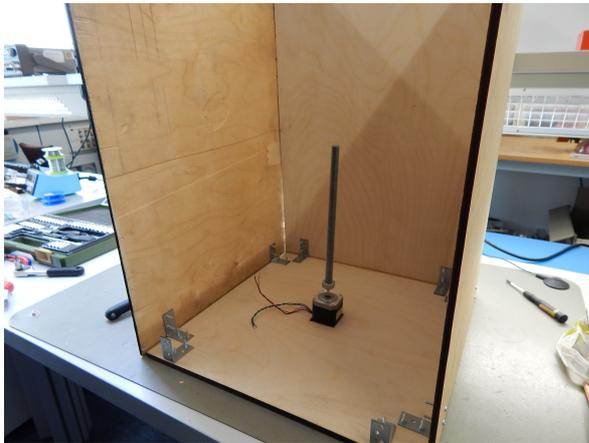
In St. Petersburg, the electronic part was assembled at a breadboard. So, we could test our ideas of the mechanism directly.



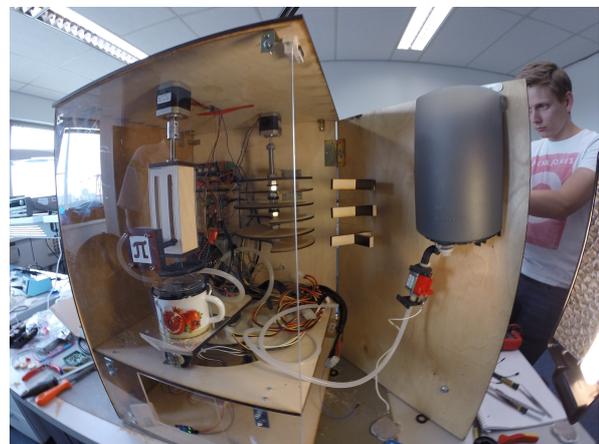
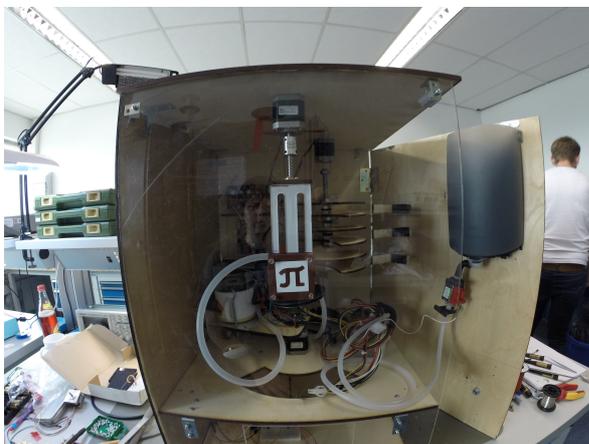
4 The project in Germany

Before the second part of the project in Germany we separated our tasks: German students thought about electronics (motors, sensors etc.) and their connection and made a case design of our coffee-machine; Russian students also thought about the design, but their main task was to cut the details of the case with a laser cutter and to finish them.

On 11th June 2016 our three Russian team members arrived in Hanover. Unfortunately, we had only two and a half days to complete our project. On 12th June we started to build up the case and the components that we made in St. Petersburg.



The case for device was made from plywood, but we used Plexiglas for face-side. We made it for watching a machine and for an attractive design. We solved lots of problems because there were so many different small but important things that we were absolutely forgotten during making of design. So for example the plate was to be put on holders because of the motor height. Also we had lots of different cables but not enough place for them. But in the end mechanical and electrical parts of our coffee-machine were ready and we started with programming.



During programming we realized that there were lots of things to do (calibration and adjustment of all rotated devices, set of sensors for the right position etc.) and we had not enough time for it. We tested the whole cycle of the coffee-machine starting with cup position on the rotary plate, putting of coffee pad in the chamber and ending with coffee brewing. It was okay. The adjustment of pad carousel was problematic, because it worked sometimes good but sometimes the pads blocked rotation of the carousel. That's why the coffee-machine didn't work well during the final presentation. But other components worked quite good.

5 Summary

We wanted to participate in the project because it was our first experience of work in an international team. It was completely different approach to the matter between all members. German students tried to consider beforehand all the components of the project carefully and meticulously as for the Russian members of the team they preferred to start doing something and solve problems as they come. The first step was the most difficult. It was in Sankt-Petersburg and we had to break the language gap, become acquaintance and start to work having no idea about abilities of our team members. The second step in Hannover was easier and we managed to finish our project.

We spent a lot of time discussing the subject for our project when we started to choose the work. The coffee-machine project is not an easy project, it includes many various elements, so we agreed to take a coffee machine, disassemble it and take some parts which we need such as water pump, boiler, sensors and other electronics for saving time and money. During our work we had lots of difficulties, because it's absolutely unreal to know all components, their sizes and position in the machine case at the stage of modeling working in two groups in different countries and having not enough time, because of exams, lectures and jobs. That's why some details were remade and new ideas were discussed. But we spent good time both in St. Petersburg and Hanover, communicating and working with people from other country and of course learning lots of new things.

We want to thank all IDP tutors from all heart, they helped us as much as possible and sincerely worried about us and our projects.