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Academic Affairs Committee
University of Iceland

September 9, 2021

Ref: Funding granted on 29.4.2020

Final Report to Academic Affairs Fund Call in 2020

Background

Academic Affair Committee granted 250'000 ISK funding for my proposal on purchasing equipment for organizing new course(s) focusing on software development and experiments on small (embedded) computers (in the area of Internet of Things, home automaton, and sensor networking). The initial payment was 187.500 ISK. The remaining part would be paid when the committee receives a report explaining how the money has spent.

This report explains the current situation.

Summer 2020

The summer 2020 was unexpected due to the arrival of the global pandemic. The department of CS responded to this by offering several summer courses. Consequently, the granted funding was quickly put into good use as two summer courses, TÖL026M and TÖL027M, were organized using this funding. We purchased a large number of ESP32 and ESP8266 devices, two Raspberry Pi computers, 50 humidity & temperature sensors, and some other supporting equipment (eq. power supplies). This setup allowed us to organize the *new courses in adhoc manner* with a very short notice time.

Autumn 2021

The two summer courses were well received and teachers also learned a lot. This fall we are organizing the "second revision" of the course(s). The current course, TÖL103M – Programming Projects on Internet of Things, is aimed for more advanced students. We have about 20 students each working with two decices. Students work in bi-weekly schedule on assignments that lead to a large (demo) system where different devices co-operate for a common objective. This requires taking into account (wireless) communication protocols, type of information acquired (and processed), as well as, security. The tasks will be demanding, but also rewarding!

In other words, the course curriculum is significantly larger and tasks more demanding than in summer 2020. We have also purchased 10 new sensors (measuring air quality) and 4 solar panels to complement the variety of example scenarios we can work with. Some electrical components are still needed in order to connect the sensors to devices (adapters). Ideally the demo equipment would be installed inside a proper case. That is, both the course material and the course equipment are in active development!

Future

This laboratory course benefits from constant development. For example, equipment handed to students may occasionanally get lost or damaged. Similarly, new devices and sensors become available. On positive side, prices of this type of equipment are low, often order of 1000ISK per device, and hence keeping up with the development is affordable. We foresee that this course, reinforcing students' programming skills and establishing strong links between the theoretical concepts and practice, will be highly valuable addition to our selection of courses also in the future.

Therefore, I am very grateful for the funding and also convinced that our students feel the same way.

Yours sincerely,

Esa Hyytiä
Reykjavík, 9.9.2021

References:

1. TÖL103M Programming Projects on Internet of Things
   https://ugla.hi.is/kennsluskra/index.php?tab=nam&chapter=namskeid&id=71119420216
2. Demo running in our Raspberry Pi (with data coming from ESP-based nodes):
   http://iot.rhi.hi.is:8020/groska/