BACHELOR‘S THESIS ASSIGNMENT

I. Personal and study details

Student's name: **Beqiri Dion** Personal ID number: **480810**

Faculty / Institute: **Faculty of Electrical Engineering**

Department / Institute: **Department of Control Engineering**

Study program: **Electrical Engineering and Computer Science**

II. Bachelor’s thesis details

Bachelor’s thesis title in English:

Open Rapid Control Prototyping, Education and Design Tools

Bachelor’s thesis title in Czech:

Nástroje pro podporu návrhu řídicích aplikací pro výuku a prototypování

Guidelines:

The need to develop quickly and user friendly control systems is growing.
Education and industry would gain from solutions which allows complete introspection not only of generated code but even of complete tool-chain.
Open, extensible and freely accessible solution is win for education, industry and enthusiasts.
Combination of NuttX RTOS and pysimCoder project has potential to take this role for constrained MCU based systems and GNU/Linux with fully preemptive kernel for larger ones. Both provide POSIX API so porting is and developing for both i possible.
1) Familiarize with pysimCoder, NuttX and GNU/Linux
2) Test and document setup for more simpler plans control (DC motor, the ball on the beam)
3) Test/extending device support to ESP32-C3 and Xilinx Zinq based MZ_APO education kits
4) Extend pysimCoder for vector support and and optionally even different data types of signals
5) Reuse of blocks and mechanisms in other OS (Linux)
6) Demo of achieved Results, by controlling some peripheral using pysimCoder and NuttX
7) Documenting results and setups for educational purposes

Bibliography / sources:

1) Bucher, R.: Python for Control Purposes, http://robertobucher.dti.supsi.ch/wp-content/uploads/2017/03/BookPythonForControl.pdf
2) pysimCoder, GitHub https://github.com/robertobucher/pysimCoder
3) NuttX, GitHub https://github.com/apache/incubator-nuttx
4) NuttX, Documentation https://nuttx.apache.org/docs/latest/
5) Lenc, M.: Google Summer of Code 2021, NuttX Support for Rapid Control Applications Development with pysimCoder https://summerofcode.withgoogle.com/projects/#4867567685992448