THESIS SUPERVISOR'S REPORT

I. IDENTIFICATION DATA

Thesis title:	**CAN Bus Latency Test Automation for Continuous Testing and Evaluation**
Author's name:	**Pavel Hronek**
Type of thesis :	bachelor
Faculty/Institute:	Faculty of Electrical Engineering (FEE)
Department:	Department of Control Engineering – K13135
Thesis reviewer:	Ing. Pavel Píša, Ph.D.
Reviewer's department:	Department of Control Engineering – K13135

II. EVALUATION OF INDIVIDUAL CRITERIA

Assignment — **ordinarily challenging**

How demanding was the assigned project?

The actual task of automation of CAN/CAN FD latency testing and resulting data acquisition and processing into web daily updated presentation is ordinarily demanding, but the student had to step into the project running for a long time and familiarize with previous results, which required understanding how to setup system with own drivers, device-tree and FPGA controller design (CTU CAN FD). The server providing filesystems for targets and controlling the testing was installed, target systems bootstrapped and configured, etc...

Fulfilment of assignment — **fulfilled**

How well does the thesis fulfil the assigned task? Have the primary goals been achieved? Which assigned tasks have been incompletely covered, and which parts of the thesis are overextended? Justify your answer.

All negotiated goals have been fulfilled, and the system is running and providing daily results for actual Linux kernel mainline and real-time variant development source trees at https://canbus.pages.fel.cvut.cz/can-latester/ . All software is integrated as modules in CTU FEE CAN/CAN FD project group at https://canbus.pages.fel.cvut.cz/

Activity and independence when creating final thesis — **A - excellent.**

Assess whether the student had a positive approach, whether the time limits were met, whether the conception was regularly consulted and whether the student was well prepared for the consultations. Assess the student's ability to work independently.

The core part of the project, latency profile acquisitions and presentation into web pages, has been designed by the student, and he reacted quickly to usage-oriented remarks. Some help was required for hardware setup, systems installation, network configuration, and FPGA tooling, but it was expected because the project was built on 5 to 10 preceding theses and even the shoulder of Linux CAN bus subsystem creators from VW, Pengutronix, etc.

Technical level — **A - excellent.**

Is the thesis technically sound? How well did the student employ expertise in his/her field of study? Does the student explain clearly what he/she has done?

Python code representing the core of the automation and profiles data processing for the web as well as the JavaScript code for client-side interaction, seems clean written to me. It has been reported as a solid approach even by David Heidelberg, Mesa 3D continuous integration infrastructure maintainer.

Formal level and language level, scope of thesis — **A - excellent.**

Are formalisms and notations used properly? Is the thesis organized in a logical way? Is the thesis sufficiently extensive? Is the thesis well-presented? Is the language clear and understandable? Is the English satisfactory?

I consider the resulting text as well readable and understandable.

Selection of sources, citation correctness **A - excellent.**

Does the thesis make adequate reference to earlier work on the topic? Was the selection of sources adequate? Is the student's original work clearly distinguished from earlier work in the field? Do the bibliographic citations meet the standards?

Additional commentary and evaluation (optional)

Comment on the overall quality of the thesis, its novelty and its impact on the field, its strengths and weaknesses, the utility of the solution that is presented, the theoretical/formal level, the student's skillfulness, etc.

The thesis is part of CTU FEE contributing to CAN bus solutions for industrial control and automotive/vehicle applications for more than 30 years. CTU provided CAN cards with CAN open support and firmware for railway automation in the nineties; we have developed drivers for it for VME-based VxWorks and Linux systems and helped to form the unification of Linux subsystem for Linux, NuttX, and RTEMS kernels. We helped SocketCAN to replace others and even our previous attempts and then contributed by CAN FD cores, monitoring and testing systems, QEMU emulation used today by AMD/Xilinx, and many more. The minimization of latency and assurance of the behavior of the system is critical for their durable use in demanding and critical applications.

The student's task was to fill the final gap to provide CAN/CAN FD latency continuous evaluation based on our tooling. The system already caught a problem in the PREEMP_RT Linux kernel release and development process, which has been resolved promptly by its maintainer, Sebastian Andrzej Siewior (Intel/Linutronix). We have already scheduled meetings with experts for real-time quality assurance from OSADL.org, Volkswagen, and more who plan to use our results and duplicate setups.

III. OVERALL EVALUATION, QUESTIONS FOR THE PRESENTATION AND DEFENSE OF THE THESIS, SUGGESTED GRADE

Student started the work early and shown initiative. There was some period of lower intensity of the work when he focused to solve exams from other subjects. But then he got into full pace again.

The grade that I award for the thesis is A - excellent.

Date: **5.6.2023** Signature: