**RISC-V and Machine Learning Accelerators Hackathon – Enhancing Undergraduate Students Perception of Essential Chip Design Skills**

Freddy Gabbay1, Yinnon Stav1, Benjamin G. Salomon1 and Rafi Cohen1

1Ruppin Academic Center (ISRAEL)

 The demand for chip design skills has never been so high as it is today. While semiconductors companies struggle to hire skilled students and engineers, the design complexity of VLSI (Very Large-Scale Integration) systems is continuously growing. Such technological challenges might introduce an entry barrier for many students from expanding their VLSI knowledge and design skills. Furthermore, it is even more challenging to attract students to this field also due to the competition by new emerging domains such as data sciences, cyber and mobile applications.

 In this paper we present a novel hackathon that aims to intensify undergraduate students’ insight of digital hardware design skills alongside discovering its broader contexts in machine learning computational acceleration. The hackathon theme introduces a design challenge of a machine learning accelerator in conjunction with a RISC-V microprocessor on an FPGA (Field Programable Gate Array) platform. The hackathon offers the participants a learning environment where they can practice, collaborate with teammates, bring innovative ideas and enhance their soft skills without any formal educational supervision.

 As part of the hackathon, an FPGA board was provided to each participant with a reference design as a baseline for the hackathon challenge. In addition, a training workshop was conducted which included basic training in operating the FPGA board, designing in Verilog, running the software toolchain and machine learning basic. All the needed tools, training workshop recording and reference material were provided online to all hackathon participants.

 Through the analysis of the hackathon data, which was performed as a part of this study, we examined students’ perception of the required skills, prior to the hackathon challenge as well as following 24 hours afterwards. Thirty students, spanning from junior to senior years of study in the electrical and computer engineering department at the Faculty of engineering, answered open questionnaires prior and after the event. In addition, students were asked to point-out any significant change of their perception following their hackathon participation. Quantitative and qualitative data extracted from the questionnaires was validated, processed, analyzed and categorized by engineering educational experts. According to our findings, while technical know-how and persistence skills were considered as essential pre and post the event, students testified that the event intensified the importance of additional skills such as team collaboration, system-level thinking and hardware-software integration perspective.

**Keywords: Hackathon, RISC-V, Machine Learning, Students’ perception, Electrical and Computer Engineering**