Open Hardware Technologies in Engineering Education (OpenHWEE'21)

Overview

The popularity of cost-effective, single-board computers (SBCs) and microcontrollers (e.g. ESP8266, Arduino, Raspberry Pi, BeagleBone … etc.) opened a large space for innovative projects at both the undergraduate and graduate levels. These devices stand out as full-fledged systems that support a variety of capabilities like several programming languages, several I/O interfacing technologies, storage options, and cutting-edge networking standards to name a few. From simple engineering projects at the sophomore cohort level to advanced, complex projects at junior and senior levels, these devices proved to be essential tools and assets for instructors in engineering education. Furthermore, these devices achieve a major speedup in product prototyping and proof-of-concept. Training engineering students on engineering concepts becomes facilitated with the availability of such systems. Whether the scope is digital or analog circuitry, microelectronics, computer architecture, embedded systems, microprocessors, or control systems, these devices can find diverse applications. Their effectiveness may extend to include research fields like wireless sensor networks, Internet-of-Things, intelligent transportation systems, energy monitoring, and body area networks. This special session aims at shedding the light on the importance of training students on the use of SBCs and microcontrollers. It also highlights the criticality of using these systems as part of the engineering curriculum. It will bring instructors, educators, and researchers to draw on their experiences in integrating the use of these systems in their courses and curriculums.

Topics of Interest

This special session aims at presenting the latest developments in the application of open hardware technologies in engineering education, exchanging new ideas and discussing open research questions and future directions. Original contributions that provide novel applications, studies, and experiences related to this topic are very welcome. Potential topics include, but are not limited to:

- SBCs and the Internet-of-Things education.

- Project-based learning using SBCs in engineering courses: digital and analog circuitry, embedded systems, signal analysis, control systems, cloud computing … etc.
- Simulators for SBCs and microcontrollers.
- Research and prototyping using SBCs.
- Remote and online laboratories using SBCs.
- SBCs utilization in capstone design courses.
- Experimental comparisons between different SBCs for education.
- SBCs for distant learning in the era of COVID-19.

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