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The 19th CDIO International Conference

Proceedings - Full Papers

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Editorial

The CDIO Initiative is an approach to designing innovative educational frameworks, aiming for educations that support students in developing the necessary professional skills required of a practicing engineer while simultaneously acquiring strong technical fundamentals This is done by providing students with dual-impact learning experiences that are based upon the lifecycle of an engineering project, the Conceiving-Designing-Implementing-Operating (CDIO) of real-world products, processes, and systems. Throughout the world, close to 200 institutions have adopted CDIO as the framework for curriculum development.

CDIO collaborators recognize that engineering education is acquired through programs of varying lengths and stages in a variety of institutions and that educators in all parts of this spectrum can learn from practiceelsewhere. Several times each year, CDIO collaborating institutions, engineering educators and researchers gather to exchange ideas and experiences, review developments, assess and further refine the CDIO approach.

The Annual International Conference is the key event for the CDIO community where CDIO practitioners from all over the world come together, share knowledge and promote the advancement of the practice of the CDIO initiative for producing the next generation of engineers. It includes presentations of papers as well as specialized seminars, workshops, roundtables, events, and activities.

The 19th CDIO International Conference took place in Trondheim, Norway, June 26-29, 2023, hosted by the Center for Science & Engineering Education Development (SEED) at the Norwegian University for Science & Technology (NTNU).

The main theme of the conference was **“Engineering education for a smart, safe and sustainable future".** The theme is present in the keynote presentations, paper presentations, roundtables, workshops, and the panel debate on the final day of the conference. The program covered many aspects of engineering education, such as sustainability, lifelong learning and change leadership. Specific topics covered were curriculum agility, emotion and reason in engineering education, digital transformations and of course aspects on operationalization of the CDIO Standards and the CDIO Syllabus.

The conference includes three types of contributions: Full Papers, Project in Progress contributions, and Extended Abstracts for Activities. The Full Papers fall into three tracks: Advances in CDIO, CDIO Implementation, and Engineering Education Research. All contributions have undergone a full single-blind peer-review process to meet scholarly standards. The Projects in Progress contributions describe current activities and initial developments that have not yet reached completion at the time of writing. The Extended Abstracts summarize the Roundtable Discussions and Workshops held at the event.

Initially, 216 abstracts were submitted to the conference. The authors of the accepted Full Paper and Projects in Progress abstracts submitted 128 manuscripts to the peer review process. During the review, 375 review reports were filed by 101 members of the 2023 International Program Committee. Acceptance decisions were made based on these reviews. The reviewers’ constructive remarks served as valuable support to the authors of the accepted full papers when they prepared the final versions of their contributions. We want to address our warmest thanks to those who participated in the rigorous review process.

A total of 78 educational institutions from 33 countries, representing 6 continents, were present during the conference. The total number of registered participants at the conference was 288.

This publication, which is available as an electronic publication only, contains the 85 accepted Full Papers that were presented at the conference, of which 3 are Advances in CDIO; 55 CDIO Implementation; and 27 Engineering Education Research. These papers have been written by 260 different authors representing 30 countries. Additionally, 21 CDIO Project in Progress contributions were presented at the conference but are not included in this publication. Also, a total of 33 collaborative contributions for activities in 17 Workshops, 12 Roundtable Discussions and 4 Working Groups took place, as well as a range of social events.

Note that the Conference Proceedings is SCOPUS Indexed.

We hope that you find these contributions valuable in developing your own research, curriculum development, and teaching practice, ultimately furthering the engineering profession. We also hope that you benefit through the truly unique community of practice that exists within the CDIO Initiative.

We wish all of you a wonderful CDIO experience!

Trondheim, June 30, 2023

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