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Methodological Support in the Development of Digital Electronic Skills and Application CDIO Standards for Cyber-physical Education in Mechatronics and Robotics

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Introduction

Manufacturing, transportation, health care, and other industries are increasingly utilizing cyber-physical systems (CPS). Highly qualified CPS engineers with solid engineering knowledge and excellent transferable skills are required to develop these complex interdisciplinary systems. To teach CPS engineering, academic institutions provide a variety of modules and curricula. However, the literature indicates a mismatch between industry expectations and CPS graduates' competencies. This paper introduces and describes a holistic educational framework (T-CHAT) for teaching CPS engineering at the module level in order to bridge this gap. Two use cases were analyzed to evaluate this framework using self-perception surveys and semi-structured interviews with students. For the survey data, descriptive statistics and t-tests were computed. A General Inductive Approach was used to code and analyses the interviews. The results of the analysis were discussed by comparing the T-CHAT implementations in these two use cases.

CPS are highly complex interdisciplinary engineering systems that span academic disciplines such as embedded systems, sensors and communication networks, software engineering, cyber security, big data and artificial intelligence, physics, human factors, ethics, and law [1,2].

Description

As CPS continue to expand and impact our society's economic and social development, the demand for qualified engineers and experts capable of developing, operating, maintaining, and managing CPS grows.

As "everything" becomes connected and technological development accelerates, embedded and cyber-physical systems education faces a number of challenges as well as opportunities. CDIO, as well as several other academic and industry initiatives to develop new CPS programs, demonstrate a strong interest in and awareness of these challenges. We provide an overview of anticipated educational needs, the current state of the art in education, and an analysis of the subject of CPS in order to comprehend the implications for education. The study highlights critical issues in curriculum design, such as balancing depth and breadth, theory and practice, academic and industrial needs, and core technical skills with complementary skills. Curricula in CPS could educate future CPS engineers who are "ready to engineer" if the right balance is struck. We conclude by synthesizing high-level guidelines for CPS curriculum development in terms of strategies and considerations [3].

The development and operation of networked CPSs necessitates the use of trained engineers and computer scientists who can deal with the systems' complexity and interdisciplinary nature [4,5].

Conclusion

Physical and cyber components are seamlessly integrated in cyber physical systems (CPS). CPS are becoming pervasive in all spheres of modern society as a core and essential component of the digitalization process. Understanding CPS structures and associated functionalities necessitates a multidisciplinary body of knowledge as well as engineering skills. Furthermore, they are on the cutting edge of a wide range of methodologies and technologies, ranging from mechatronics, communication, control, and automation to information technologies, which are permeating every aspect of society. The lifecycle of CPS, i.e., the life cycle of the physical-part and the digital thread of the cyber-part, makes it clear that developers, operators, and managers of CPS must obtain an essential interdisciplinary engineering qualification as well as a combination of skills and competencies from many different disciplines, including social and psychological aspects, among others.

References

1. Anderson, Garry, and Nancy Arsenault. Fundamentals of educational research. Routledge, (2005).
2. Anderson, Lorin W., and David R. Krathwohl. A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. Longman, (2001).
3. Andrade, Heidi, and Ying Du. "Student responses to criteria-referenced self-assessment." *Assess Eval High Educ* 32 (2007): 159-181.
4. Atkins, Ella M., and Justin M. Bradley. "Aerospace cyber-physical systems education." *In AIAA Infotech@ Aerospace (I@ A) Conference* (2013): 4809
5. Barnett, R. The limits of competence: Knowledge, higher education and society. *Buckingham: Open University Press* (1994).

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