

Chapter 3

Mechatronics in CDIO Projects for Green and Sustainable Environments

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ABSTRACT

We live in the common Earth where the sustainable development depends on everybody's habit. To set up awareness, it is necessary to integrate this matter right from school teaching until the high education. An engineering education, concerning mechatronics in general and robotics in detail, will help to strengthen the skill and knowledge of students to find reasonable solutions for this problem. This chapter will contribute some experiences in the engineering education technology in university to show how the students can learn the robotics and apply their knowledge to design the machines with the software and simulation tools. All these activities are under the CDIO method - the modern approach in the engineering education. The research results illustrated in this chapter will clarify this concept.

INTRODUCTION

Social activities enable all students to get in touch with companies and community, to form social obligation from the time they start taking their engineering courses. This encourages students to select and work in areas that closely match not only their areas of interest, but also impact community. This is the new way to integrate the “human education” to teach technical disciplines. As a result of these activities, students can determine the target area related to their study chosen by themselves to

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learn better. This is the most valuable source of information that will help the team to set up their rough draft of entrepreneurship plan. (Duong et al., 2017). Interestingly enough, many of today's new technologies like Information Technology (IT), embedded system engineering and biotechnology no longer require vast amounts of upfront financial investment like before if we can find the niche market to get into. Given such opportunity, it will be the human capital that is more important than any other type of capital or resource (David et al., 2018). Engineering students were generally not equipped with knowledge and skills in social networking, money raising, financial dealing, Intellectual Property (IP), etc. to develop any motivation for entrepreneurship. Their curricula mostly focused on basic sciences and technical know-how. Worse, the big number of students in any one class made it hard to create an active and integrated learning environment, and their instructors are mostly of a past generation where "entrepreneurship" is still a strange word. The illustration for this solution will be found in case study of Mechatronics students at Duy Tan University who worked with their instructors on an entrepreneurship project of a robot which helps detect welding defects on ship and vessel hulls. As much as the technical aspect of the project is very complicated, we will look into what changes are made to our Learning Outcomes (CDIO Standard No. 2), Curriculum and Learning Experience to make them more active and integrated (CDIO Standard No. 3, 7, 8) in an effort to build students' entrepreneurial skills. Lessons learned from this case study, from miscellaneous issues to macro-level problems, will be of great benefit to universities and colleges which are looking for ways to improve their students' entrepreneurial skills and motivation. Finally, the green and sustainable environment set forth the effective treatment of plastic disposal. In this common struggle, mechatronics as the knowledge should be involved through the education to encourage the students make the innovation in reliable projects. As the practical and social impacted activity, this chapter described a new promotive environment friendly solution for plastic pollution by recycling bottles. The project has not only economic but also social value.

SHOWCASE ONE - AN INTEGRATED APPROACH FOR AN INTRODUCTION THE TECHNICAL SUBJECTS IN THE UNIVERSITY.

The integrated approach concerning the creative thinking, the innovation, the ability to adopt to changing environment, the team work skills and the active learning. This method encourages instructor and student to gain the increasing attention for the active learning for their outcome. It is noted that the project context is the main point of all inspirations and creativities. Therefore it is requested that instructor set

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