Co-funded by the
Erasmus+ Programme
of the European Union

Summary of the Report "MIND Curriculum"

Big steps have been taken by project partners towards the creation of Mechatronics 4.0 curriculum requested by the Industry 4.0 in the field of mechatronic in the three participating countries.

The objectives of IO2 are:

The MIND project is focused on developing mechatronics skills and innovative learning methods for Industry 4.0. To meet the employment needs of the next 5-10 years, universities must train students and develop interdisciplinary skills that combine mechatronic qualification with IT knowledge and superior social skills to create 4.0 specialists.

The following partners were involved in development of IO2: STU, UNI, UPT, UTCN (all the MIND consortium universities are involved).

In month March 2020, at the second project meeting (M2) that took place in Timisoara, Romania (organizer UPT) at this meeting, all the partners discussed, during 2 days, about the status of the project and the review of skills and competences needed for Industry 4.0 presented by UNI. At the end of this meeting, the host UPT presented a short report containing the main conclusions and the evaluation scores of the meeting. An evaluation form was completed by all the participants. At this gathering, participated trainers, teachers, industry and human resources representatives (IHR).

The objectives of IO2 are:

- Development of MIND curriculum.

- The target group of this intellectual output will be the professors and the beneficiaries will be the students.
- The structure of the new curricula Mechatronics 4.0 will be based on the modular concept of mechatronics curriculum and the role of this is to provide better mechatronics qualification skills for Industry 4.0. The content will be presented as lecture notes which includes text, images, tables.
- The number of pages of Mechatronics 4.0 course support (which will be IO3 report) is minimum 160 and the number of training hours is minimum 18 hours.
- IO2 report to be disseminated to the target groups (professors, students, industry representatives, technical trainers).
- Contribution of every participant to this intellectual output. All project partners were constantly available via mobile phones. Every participant to this intellectual output participated to regular based project meetings (Skype). Communication and cooperation were ensured by intensive use of the internet and e-mail contact.
- UTCN took the responsibility of collecting, organizing and uploading the materials on the project website. The other three Universities will be involved in the creation and delivery of this output.

The following issues were addressed in detail:

A. Does the current curriculum in Mechatronics introduce students to Industry 4.0?

B. How should Mechatronics departments in universities respond to Industry 4.0 through curriculum content enhancements?

C. How real and enduring is the Industry 4.0 phenomenon?

Acest proiect a fost finanțat cu sprijinul Comisiei Europene. Această publicație reflectă doar opiniile autorilor, iar Comisia nu poate fi trasă la răspundere pentru orice utilizare care ar putea fi făcută pe baza informațiilor conținute în acest rezumat.

The MIND training curriculum in mechatronics for Industry 4.0 focuses on the strategic deployment of mechatronics in universities. This will allow lots of hands-on practical work with mechatronic systems designed by the project partners.

Task 1. Discussion of the 4 curricula existent in the consortium. Responsible partners: all universities from the consortium involved.

Task 2. Proposal of 8 courses/lectures/modules for 4 years. Responsible partner: UTCN - Romania. For each course proposed will be realized an associated curriculum.

Task 3. Validation of the new curricula with partners. Responsible partner: STU - Slovakia.

Task 4. Validation of the curricula with the private sector/trainers. Responsible partner: UPT - Romania.

Task 5. Proposal of the curricula to the decision makers, in order to be accredited. Responsible partners: all universities from the consortium involved.

The MIND strategy of acquiring knowledge and skills in mechatronics in this project promotes active learning through practical problem solving and not the classical memorizing of knowledge. The concept of the MIND Curriculum in mechatronics with focus on Industry 4.0 needs is based on a new collaborative environment which includes the educational content of the educational platform and a toolkit containing the elements needed to apply the learning by doing concept. The modular concept of mechatronics curriculum is consistently aligned with the educational path of the mechatronics training.

Developing a curriculum for mechatronics has to take into account the current industry standards and the future trends, namely industry 4.0; it has to be student centered, with the emphasis of what they learn in a problem based learning; it is important to take into account an integrated approach, to blur the lines between different disciplines, as real-life scenarios are not solved by using only one field. Also, it is important that students are taught to solve problems

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that are related more to the community needs and less didactic centered. The curriculum must allow the students to choose their own subject that are most relevant to their personal growth and career choosing. Ideally, an apprenticeship-based curriculum might enable the previously stated points.

The proposed syllabuses covers the main aspects of industry 4.0: PLC based projects that enable understanding of automatization technologies, computer vision technology which paves the future for fully autonomous artificial intelligence agents, the internet of things which allows ad hoc networking between smart equipment, virtual reality that empowers the individual to innovate and learn in a new way, smart manufacturing and implementation of new manufacturing technologies which provide the tools for developing of smart eco-aware products, and digitalization, all these thematic constitutes a solid ground for teaching the main aspects of industry 4.0.

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