

AI & Mechatronics Engineering 2-week Training Program Proposal

S Z E X GEC Academy

I. Program Basic Information

- Theme: AI and Mechatronics Engineering in Machine Design
- Purpose: Help participants develop and build complex and powerful mechatronic systems with high social/economic relevance.
- Duration: 2 weeks
- Program hours: 30 hours academic course & 2 company/factory visits & lab work/visits
- Program Date (tentative):
 - Option 1: July 14th to July 28th, 2024
 - Option 2: July 21st to August 4th, 2024
- Location: S Z E , Hungary
- Estimated program size: about 20 participants
- Participants: Undergraduates students from Chinese Universities major in Mechanical Engineering, Electrical Engineering, Industry Design, etc.

II. Program Content (only for reference)

Intelligent Machine Design aims to enable students to develop and build complex and powerful mechatronic systems with high social/economic relevance. Students learn to develop product ideas independently and to transfer them step-by-step into near-series product prototypes. After completing the module series, students are able to start mechatronic systems and projects of any complexity and to develop and successfully realize their own project ideas, which solve e.g. social, economic, or ecological problems. Particular focus is placed on the development of multi-disciplinary design and integration skills and their use in an interdisciplinary team.

Module 1 Mechatronics Fundamentals

The focus of this module is the independent development, integration, build-up, and evaluation of mechatronic systems based on analog circuits (amplifiers, filters, MOSFETs), microcontroller programming (state machines, timers, interrupts), Digital communication (SPI, I2C), actuators (servos, stepper motors, DC motors), sensors (infrared, encoders) and machine elements (bearings, springs, dampers, couplings, transmission) as well as “fast prototyping techniques” (3D printing, laser cutter).

After completing the module, students are able to independently develop, build and test mechatronic systems. In doing so, the students can predict the characteristics and interactions of the various mechatronic components and software aspects as well as adapt them accordingly for the development and integration of the required systems.

Module 2 Basic System Design

The focus of this module is the further development and deepening of both practical and theoretical skills in the areas of system development, design, and planning as well as practical construction and commissioning of mechatronic systems. In particular, teamwork and problem-solving skills in the context of an interdisciplinary problems are the focus here. The complexity of the targeted mechatronic systems is oriented towards mobile/wheel-based robot platforms that fulfill a defined range of tasks. Based on these requirements, the students must independently develop (design,

component selection), build (production, assembly, soldering), program (microcontroller), commission (evaluation of system behavior, error analysis), and finally present a fully functional system.

After completing this module, students will have in-depth practical knowledge and skills in the development of mechatronic systems. Students are able to develop and commission an autonomous wheel-based mobile platform, which fulfills a defined spectrum of tasks. Furthermore, they have further developed their skills regarding problem-solving and teamwork in the context of an interdisciplinary problem.

Module 3 Product Prototype Development

This module will help the students learn what they need to know to participate in building market-ready mechatronic systems. They will be taught how to go from theoretical knowledge to industrial applications, and how to take theory and apply it in practice. They will learn and apply a wide range of skills for building new tools, systems, and products. From specification to designs, business cases to product requirements, and ideas to production. By joining this course, the students will enhance their robotic and mechatronic skills with hands-on learning.

Students will get to see concepts realized, interact with key mechatronics ideas, and solve challenging problems in a team. After successful completion of the course, students have gained in-depth practical knowledge and Skills about systems design and are able to develop complex mechatronic systems and product prototypes. In addition, students have developed and advanced skills in problem-solving, teamwork, and time management. Hence, they are capable of designing market-ready products.

**The above information is cited from a past program we cooperated with a Germany University. We are not looking for exact same topic and contents, but for reference.*

III. Program Plan (tentative)

	Time	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Week 1	9 am-12 pm	Arrival & Check-in	Opening Ceremony	Lecture	Lecture	Lecture	Company Visit	Company Visit
	12 pm-1 pm		Lunch	Lunch	Lunch	Lunch		
	1 pm-5 pm		Ice Breaking	Workshop	Lecture	Lecture	Cultural Event	Cultural Event
	5 pm-6 pm		Campus Tour	Dinner	Dinner	Dinner		
	Time	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14
Week 2	9 am-12 pm	Lecture	Lecture	Lecture	Lecture	Presentation	Closing Ceremony	Departure
	12 pm-1 pm	Lunch	Lunch	Lunch	Lunch			
	1 pm-5 pm	Lab Visit	Lab Visit	Lab Visit	Seminar			
	5 pm-6 pm	Dinner	Dinner	Dinner	Dinner			

IV. Training Faculty

The training will be taught by a team of Mechatronics Engineering experts and researchers from SZ E , Faculty of Electronic Engineering and Informatics.

V. Recruitment

Participants will be recruited from GEC's partner universities across CHINA. All members should be proficient in English.

VI. Program Outcome

- Transcript issued by college or university
- Certificate of program completion issued by college or university
- Reference letter for outstanding participants