



ERASMUS+ PROGRAMME 2014-2020
Mobility of Individuals – Mobility of VET learners

Robotics

Description and Goals

Experiencing professional training in Germany, thus getting to know its culture and regional differences and specialties paired with the latest developments in the education and labour market in the engineering sector are the essence of this training programme.

In this exiting training course the participants will learn how to plan, to design, and to construct a robot, for example a bug robot or a small battle bot.

The learners will acquire knowledge about the history of and the requirements on robotics, the digital logic, and control loops. All topics will be supported by practical exercises. The learners will also program the robot's logic, using simple commands of the programming language C. The learners will work in teams to create all the parts of a robot – each team a specific part.

At the end of the training course the participants will assemble the parts to a functional robot – this is a personal as well as collective success for everyone!

Furthermore, for the learners will be provided with a hardware package with a microcontroller, LEDs, transistors, and more to enable them continuing experiments after the mobility period.

Given the wide range of topics a robot can be used for, the focus can be shifted according to the target group.

In addition to the technical content of the programme the learners will get the chance to improve their language and soft skills and experience Dresden through cultural visits and other free time activities.

Target group

VET Learners of public or private schools training in the field of engineering who would like to expand their skill set by discovering relevant aspects and approaches of training in that field in Germany as well as German culture.

The intensity and complexity of the units can be varied according to the previous knowledge and qualification of the participants. Depending on the knowledge level special topics will be refreshed by the trainer to ensure a successful participation.

Learning outcomes

Professional Competences

Unit 1: History of and requirements on robotics

- Acquiring knowledge about development of robotics and microelectronics

General Information

Place
WBS TRAINING AG
Dresden (other places on request and availability)

Duration
2 weeks, lessons from Monday – Friday 9.00 – 14.30 (longer hours are possible on request)

Number of participants
14-20

Training Language
English or German (level A2 required)

Contact

For further information on the training programme and for support with the project application, please feel free to contact:

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- Learning about the field of application of robotics – in the past and nowadays
- Classifying the formation and progress of robotics within the history
- Realising the need of development of specialised robotics for special scopes
- Knowing more detailed about special fields of application

Unit 2: Digital logic and control loops

- Defining the terms "binary", "analogue", "digital", and "digitalisation"
- Applying binary logic operators AND, OR, NAND, XOR, and INV
- Illustrating a logical task in a flow chart
- Simulating a circuit diagram by discrete components
- Defining the terms "control loop", "actuating variable", "disturbance", and "control deviation"
- Designing and creating simple control loops

Unit 3: Programming the microcontroller, constructing a robot

- Getting familiar with the *ATMega CPU* and *Arduino* experiment board
- Controlling of in- and outputs
- Programming the logic in programming language *C*
- Solving simple logic problems
- Constructing an autonomously operating and microcontroller controlled robot in team work

Personal Competences

Unit 4: Giving a presentation on a professional topic

- Researching information on the internet using filters, comparing sources and filing it in folders on the hard drive
- Defining the issues of a complex professional task and their solutions
- Preparing a presentation about the project work in MS PowerPoint
- Presenting the work results in English/German using adequate terminology

Unit 5: Working in a team confidently and self-responsibly

- Setting work priorities and applying effective time management
- Sharing information with the team
- Listening to other team members' ideas and phrasing feedback adequately
- Assuming the own role and taking responsibility for own activities

Methods

The practical training course uses a learner-centred approach. After an introductory lecture by the trainer, the learners will mainly work in pairs or groups to fulfil various tasks assigned to them by the trainer and their work group members in order to simulate real work situations.

Project Funding

The costs for this training programme can be fully or partially (depending on the number of participants) covered by project funding from the Erasmus+ programme (Key Action 1: Mobility). Please contact your National Agency for information on funding details.



An essential element of the training is the project work, which the learners will carry out in groups, and which requires and improves skills such as autonomous work planning and team work. During the lessons the trainer as well as the learners will use different tools of visualization such as PowerPoint, pinboard, whiteboard and flipchart.

Other methods used in the training course will be:

- Brainstorming and mind mapping
- Interviews with classmates or clients/customers – field study
- Observing and describing
- Group discussions
- Presentation and demonstration

Assessment and Certification

In order to obtain reliable statements on whether all learning outcomes have successfully been achieved, a final assessment will be carried out. For this purpose, during the second week of their practical training, the learners will be assigned a practice-oriented task. This task will resemble a typical project work of the training field according to working life requirements. For the performance of this task, the learners will have to use their newly acquired knowledge, skills and competences. The participants will work in groups of 3 to 5 learners to complete their project work and will be supervised by their trainer. The actual assessment will take place on the last training day: The learners will give a presentation about their work, justifying the working progress and results.

To assess the work results, the trainer will work with standardised assessment sheets, which cover assessment criteria such as:

- Effective teamwork
- Correctness of work results
- Structure of the presentation as well as the quality and creativity of visualization

Upon successful completion of the mobility, the learners will receive a certificate by WBS TRAINING, supplemented by the description of learning outcomes according to the European Credit System for Vocational Education and Training (ECVET) principles. ECVET facilitates the transfer and recognition of learning outcomes acquired in another country and supports transparency of qualifications. WBS TRAINING also supports the sending organization in issuing the Europass mobility.

Beside the learning effects, each participant takes a ATMEGA Learning SET home to be able continue the learning process at home. With this set he or she will be able to reproduce and expand the circuits made during the course.

Cultural Programme

Dresden offers a wide variety of cultural, free time and physical activities. With plenty of museums, such as the famous *Historic Green Vault*, the *Old Masters Picture Gallery*, the *Technical Museum*, or the *German Museum of Hygiene*, everyone's taste can be met. Parks and gardens with the option to relax, to work out or to play a ball game, picturesque viewpoints, and many other places of interest just wait to be discovered. Not to forget the city Dresden itself: More than 800 years

Accommodation and Subsistence

Accommodation, subsistence, public transport tickets and cultural programme can be organised according to your wishes.

Please see financial offer for further details of the included services.



Programme Proposal Robotics

Date	Programme
Sunday	Arrival in Dresden
Monday	<p>09:00 – 09:30 Introduction</p> <ul style="list-style-type: none"> - Presentation of the host organisation - Clarification of organisational issues - Introduction of the project and the tasks for the following weeks - Introduction to the Training Course - Meeting your trainer <p>09:30 – 14:30 The history of robotics</p> <ul style="list-style-type: none"> - The development of robotics and microelectronics - Fields of application in the past and today <p>Afternoon: Guided tour in the old town of Dresden</p> <ul style="list-style-type: none"> - Experiencing historic buildings and sights as well as further possibilities for free time activities
Tuesday	<p>09:00 – 14:30 What do we need robotics for?</p> <ul style="list-style-type: none"> - The role of robotics in modern industries and the need of development of specialised robots - Examples of highly specialised robots and their fields of application
Wednesday	<p>09:00 – 14:30 Digital Logic I</p> <ul style="list-style-type: none"> - Defining the terms “binary”, “analogue”, “digital”, and “digitalisation” - Binary logic operators AND, OR, NAND, XOR, and INV
Thursday	<p>09:00 – 14:30 Digital Logic II</p> <ul style="list-style-type: none"> - Illustrating a logical task in a flow chart - Simulating a circuit diagram by discrete components
Friday	<p>09:00 – 14:30 Control Loops</p> <ul style="list-style-type: none"> - Defining the terms “control loop”, “actuating variable”, “disturbance”, and “control deviation” - Designing and creating simple control loops <p>Afternoon: Dresden Technical Collections</p> <ul style="list-style-type: none"> - Discovering mathematics and scientific processes in two hands-on exhibitions - Exploring some of the most famous inventions and machines produced during GDR: cameras, household appliances, radios and television sets, scientific equipment, etc. - Enjoying the view over Dresden from the 48-meter-tall Ernemann Tower
Saturday	Cultural activities and free time
Sunday	



Date	Programme
Monday	09:00 – 14:30 Programming the microcontroller I <ul style="list-style-type: none"> - Getting familiar with the ATmega CPU and Arduino experiment board - Controlling of in- and outputs
Tuesday	09:00 – 14:30 Programming the microcontroller II <ul style="list-style-type: none"> - Programming the logic in programming language C - Solving of simple logic problems Afternoon Panometer Dresden <ul style="list-style-type: none"> - Revisiting the 18th century in a 360° panorama picture: architecture, political and everyday life in Dresden in the period 1695-1760
Wednesday	09:00 – 14:30 Constructing an own robot I <ul style="list-style-type: none"> - Constructing an autonomously operating and micro controller controlled robot in team work
Thursday	09:00 – 14:30 Constructing an own robot II <ul style="list-style-type: none"> - Constructing an autonomously operating and micro controller controlled robot in team work Afternoon Dresden State Art Collections (Staatliche Kunstsammlung Dresden) <ul style="list-style-type: none"> - Exploring world famous paintings and art collections in one of the foremost museums of the world - Discover a total of 14 museums with an exceptionally wide thematic diversity
Friday	09:00 – 12:30 Preparation of the final presentations on the project: <ul style="list-style-type: none"> - Preparing a presentation about the project work in MS PowerPoint 12:30 – 14:30 Presentations, assessments, and farewell <ul style="list-style-type: none"> - Giving final presentations about the project work - Assessment of the newly acquired skills and knowledge - Evaluation of the project and handing out certificates
Saturday	

*Cultural Programme

*Field trips

*Please note, that extra sightseeing and excursions on weekend are not included in the price of the programme

Last update: 13 January 2017