



**VOLKSWAGEN**  
GROUP ACADEMY



# CASE STUDY

**Subject area:**  
Software Development

**Industry:**  
Automotive

**Language:**  
German

In response to the increasing demand for software development skills of the largest car manufacturer in central Germany, more than 100 employees were **trained in programming** in a "**Coding Camp**" together with University4Industry. By means of self-learning and project phases, both theoretical knowledge and practical skills were successfully imparted, thus enabling the employees to **realize company-specific projects**.

# STARTING POSITION



# PROJECT GOAL

The challenges in the automotive industry with regard to decarbonization and digitalization are also **changing the job profiles of employees**. Tasks that are important today will no longer exist in this form in a few years and new skills for other use cases will be needed. Above all, **software development skills** are increasingly needed for projects such as autonomous driving or the development of intelligent products.

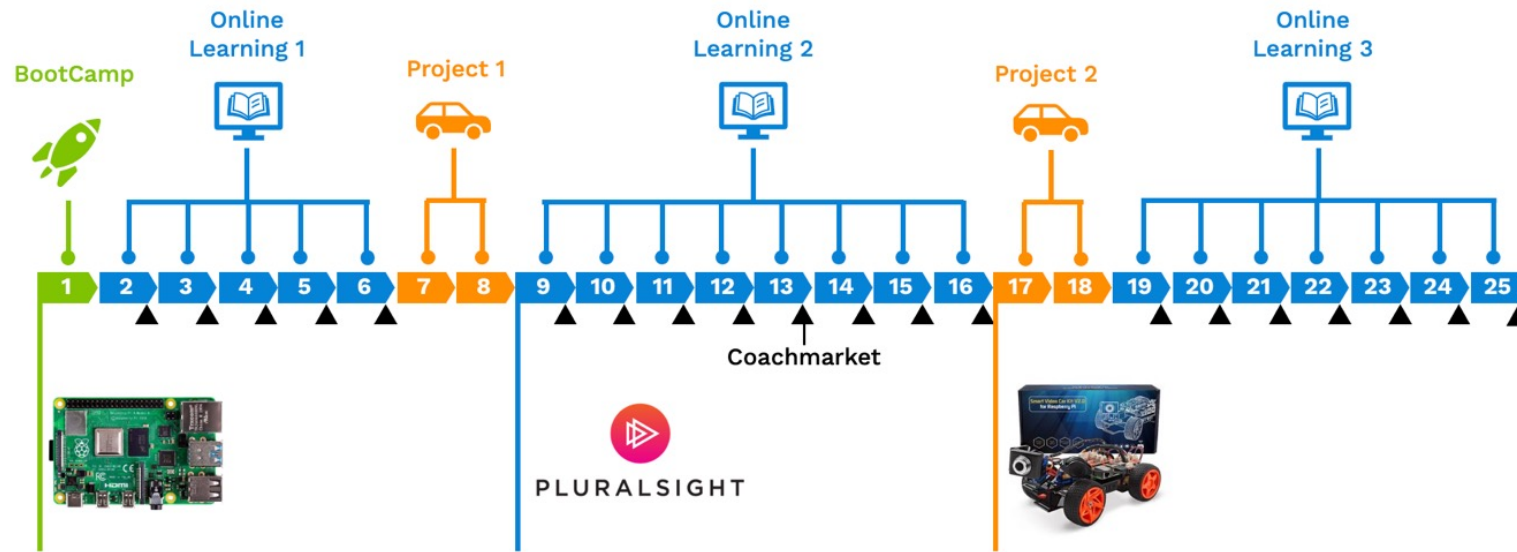
Since [studies](#) show that **reskilling** an internal employee is **less than two-thirds of the cost** of hiring a new employee, an internal training program should be developed. The increasing demand for employees with software development skills in **all departments of the company** required a scalable and **digital training offer** that could be integrated into the employees' daily work.

The aim of the "Coding Camp" project was to make employees **"fit for the future"** by equipping them with software development skills and by making them enthusiastic about and qualified for programming. This is to ensure that employees are best prepared for the changes in their profession and that the **company remains future-proof through staff with software development skills**.

The training program aimed to equip employees with the following skills:

1. Working with the **Python** programming language
2. **Developing software** in a structured way
3. Applying **agile working methods**
4. Building **data analysis skills**
5. Using **machine learning** in data analysis

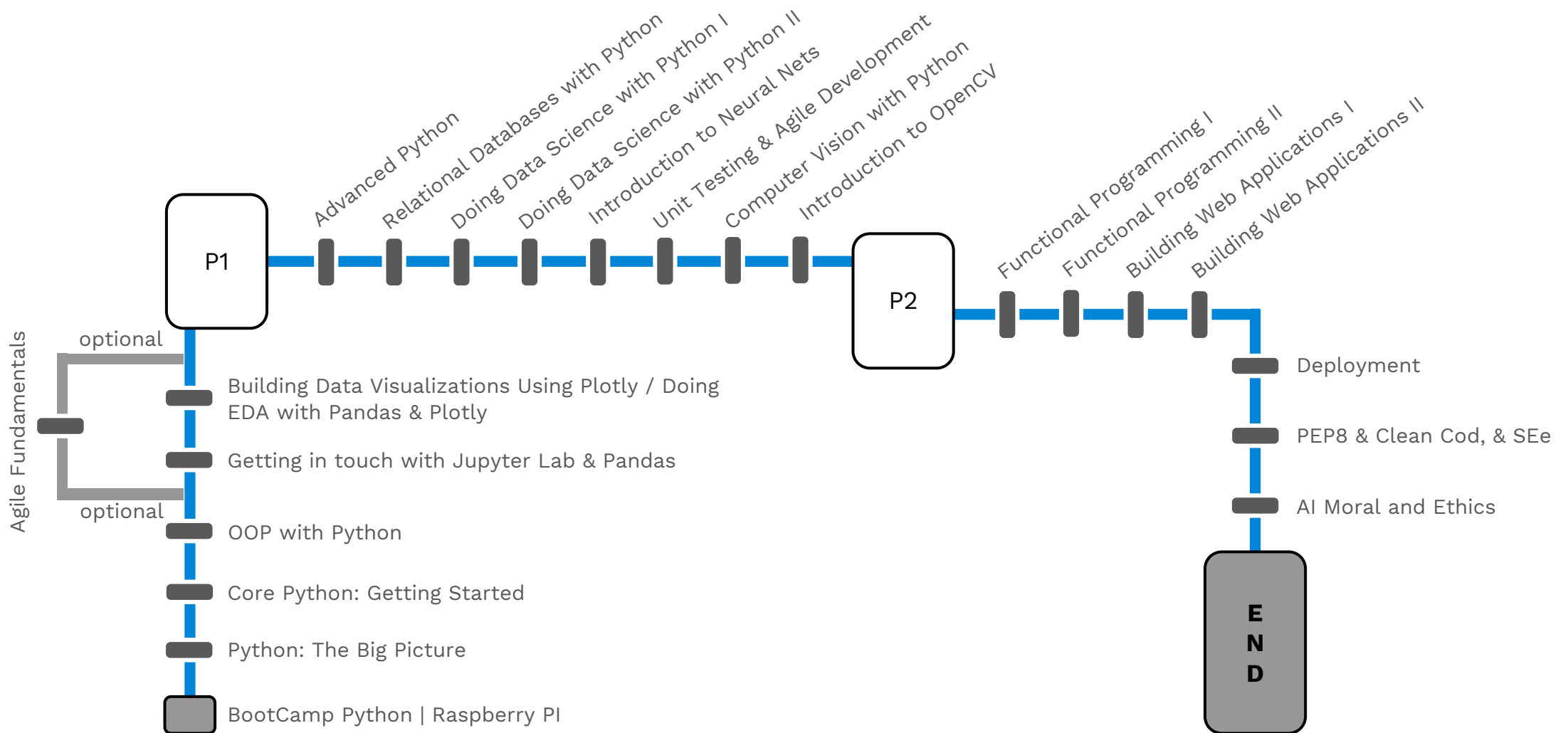
# PROJECT SCOPE & DURATION



A duration of 25 weeks was set for the training program. These were divided into one boot camp week, three self-learning phases, and two project phases.

The boot camp took up the learners' full working time for one week. The project phases, which lasted two weeks each, also required full-time work on the tasks. For the self-learning phases, four working hours per week - which could be flexibly **integrated into the daily work routine** - were planned. In addition, there was a so-called **coach market** on Fridays during the self-study phases, where important topics of the week were summarized and consolidated by means of exercises. Open questions could be clarified with the trainers. The coach market was conceptualized by University4Industry in the form of an "**embedded trainer team**" and implemented organizationally in order to keep the effort for the trainers and the client to a minimum.

# PROJECT PHASES





BootCamp Python | Raspberry Pi

# PROJECT PHASES

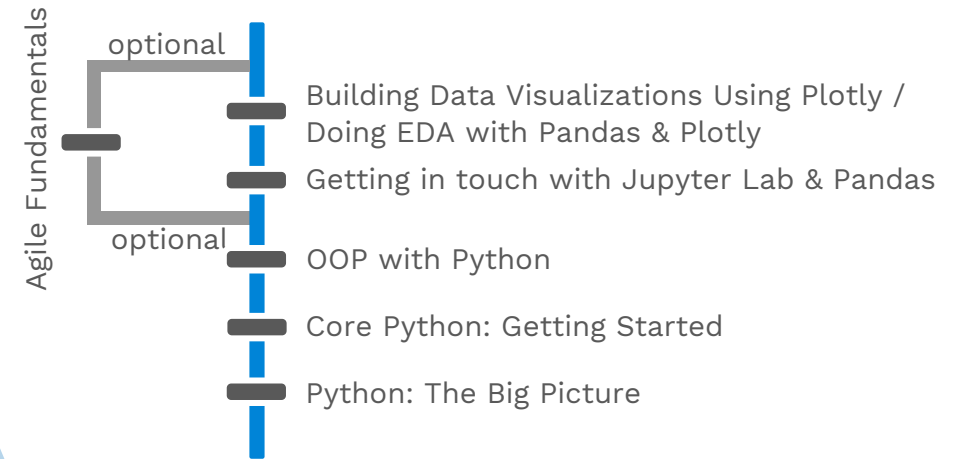
## Bootcamp

For one week, measured values such as temperature and humidity were recorded with the help of a Raspberry Pi and transferred to the cloud. The recorded data could then be analyzed.

### Learning objectives

- Set up the Raspberry Pi and development environment for the coming weeks.
- Basic features of development and the Python language

# PROJECT PHASES

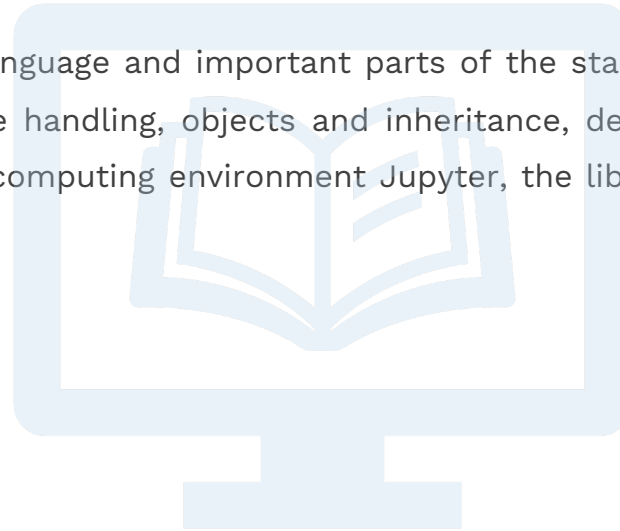


## Self-learning phase 1

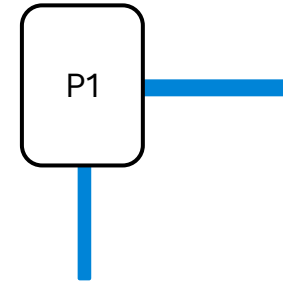
In four hours per week, the basics of the Python language and important parts of the standard libraries were learned. Topics were: Basic data types, control structures, functions, modularity, file handling, objects and inheritance, decorators, organization of the code. Furthermore, the first data sets were processed and the interactive computing environment Jupyter, the library Pandas as well as the visualization of data were dealt with in this context.

### Learning objectives

- Apply Python basics and key concepts
- Create robust readable applications
- First steps in dealing with data sets



# PROJECT PHASES

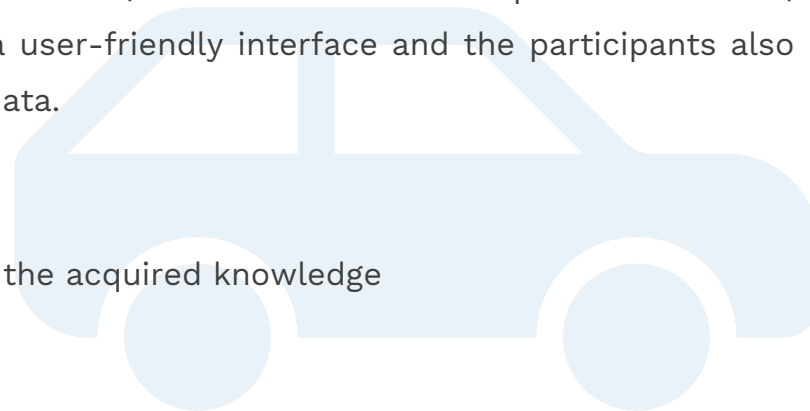


## Project phase 1

For a small model car with ultrasonic and infrared sensors, a software was developed in teamwork, which accomplishes selected tasks in the form of driving modes. The software was to have a user-friendly interface and the participants also had the opportunity to develop an app to control the software and visualize selected driving data.

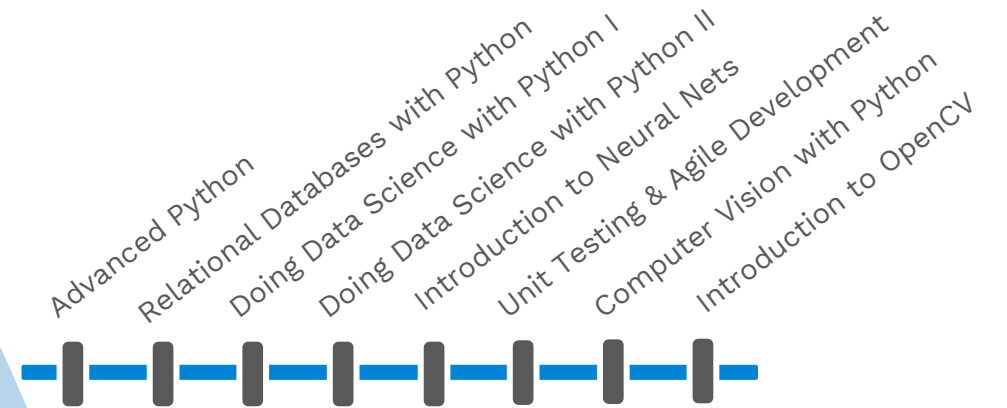
### Learning objectives

- Application development, deepening and applying the acquired knowledge
- First steps in agile working
- Installation of software on the Raspberry Pi
- Presentation of the results





# PROJECT PHASES

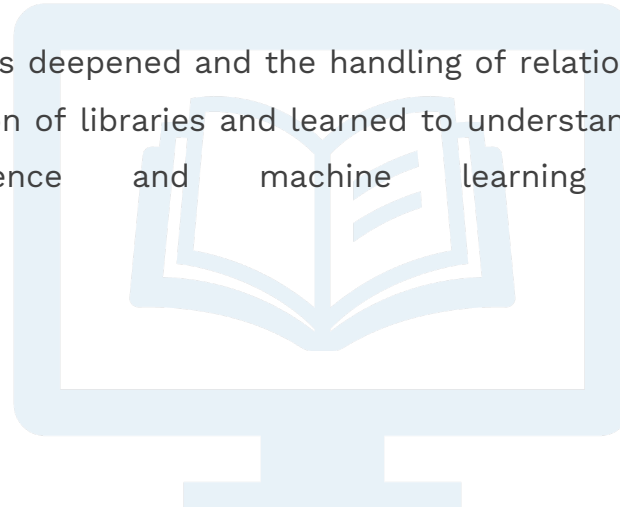


## Self-learning phase 2

In the second learning phase, Python knowledge was deepened and the handling of relational databases was learned. Furthermore, the learners dealt with agile working methods and the integration of libraries and learned to understand data processing pipelines. Additionally, they gained insights into unit testing, data science and machine learning with a focus on computer vision.

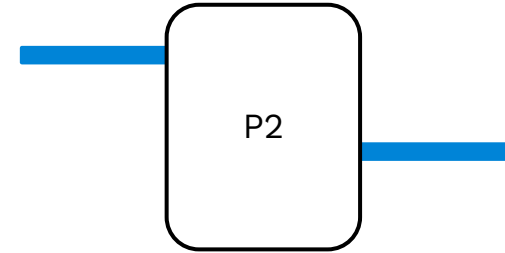
### Learning objectives

- Deepen and apply Python knowledge
- Agile way of working
- Unit Testing
- Overview of the area of data science and computer vision and the libraries NumPy, Pandas, Scikit-Learn, OpenCV, Tensorflow





# PROJECT PHASES

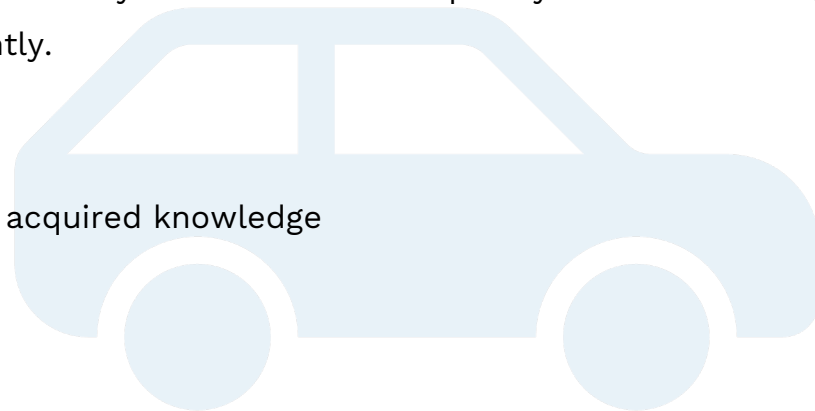


## Project phase 2

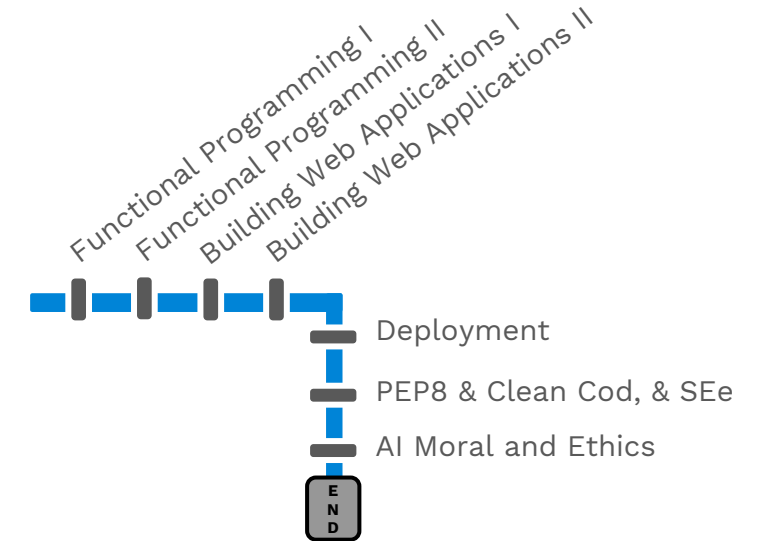
In the second phase of the project, a camera was already built onto the Raspberry Pi Car and integrated into the car's software. Using the camera, the car could now follow a lane independently.

### Learning objectives

- Creating applications, deepening and applying the acquired knowledge
- Working in an agile way
- Integration of OpenCV and Tensorflow



# PROJECT PHASES

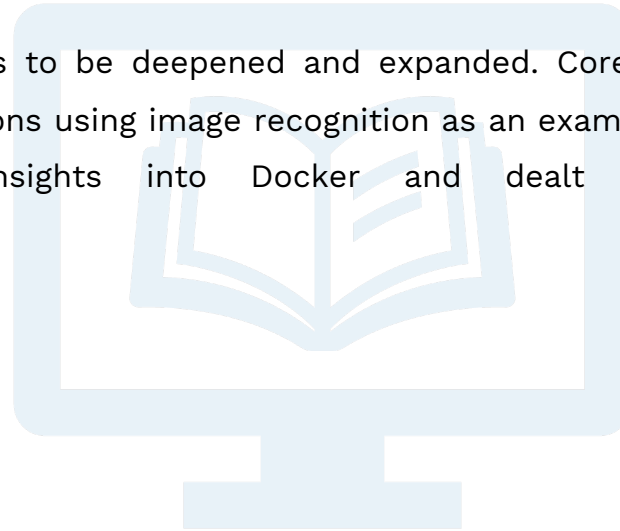


## Self-learning phase 3

In this phase, the acquired Python knowledge was to be deepened and expanded. Core topics were: Functional Programming, Best Coding Practices and Clean Code. Creating simple applications using image recognition as an example was also part of this self-study phase. At the end of the training, the participants gained insights into Docker and dealt with moral aspects of artificial intelligence.

### Learning objectives

- Creation of small applications
- Containerization with Docker



# SUCCESS STORY

 440 h  
Content

 >110  
Participants

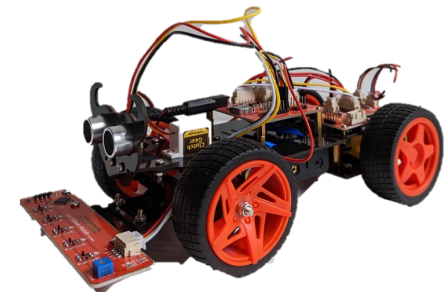
 6  
Rounds

 25  
Weeks

Over 110 employees of the car manufacturer successfully acquired software development skills and were thus ideally prepared for the coming changes in the industry with regard to digitalization and decarbonization.

The mixture of self-learning and project phases enabled the participants to apply what they had learned in a **practical way** and to **relate it to their company** and everyday work. The regular **live sessions** gave the participants the opportunity to discuss the topics they had worked on with experts and colleagues and to deal with them in detail. With the project of the **self-driving Pi-Car**, which was continuously worked on during the training, the participants had a motivating goal and were able to solve a challenge relevant to the company.

Due to its success, the program will be held for the sixth time in 2023.



# PARTICIPANT FEEDBACK



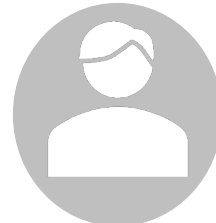
*"Online learning and working in a group worked perfectly, even without Corona I would do the training in this format."*



*"Committed and professionally competent trainer team. Very good appointment organization."*



*"Great support in implementing the Python skills learnt in everyday work."*



*"Great format, especially the playful reference to concrete applications is great."*



*"You got a broad overview of a very wide subject area and were always encouraged to do your own digging."*

# COLLABORATION



**Grace Looby-Weller**  
**Learning Consultant**  
**Volkswagen AG**

“We have been working closely with University4Industry since 2021. From the start, we recognized the ability of the team from U4I to understand our needs and provide us with workable far reaching learning solutions. With the digital transformation, we as a group are faced with the challenge of driving forward the digitalization of internal tools and processes but also developing digital products and services for our digital-ready customers. Our cooperation with U4I has been a huge bonus to us during this transformation journey.

With the support of U4I, we have developed customer-specific learning content and learning paths to up-skill and re-skill our workforce in the various areas of software development. Through live-on-line learning sessions, practical hands-on projects and self-learning content the trainer teams have been accompanying our students on their software development learning journeys. At all times the trainers offer a wide-reaching knowledge base, professional work ethic, and a positive learning environment for our students.

Our camps are very well received with very positive feedback. We have seen our students take their new-found skills directly into the workplace and actively use them to drive digitization within the group.”

# UNSER KUNDE



## VOLKSWAGEN

GROUP ACADEMY

The German automotive industry faces enormous challenges in the coming years. This is because digitalization, electromobility and autonomous driving are changing the entire market. To remain competitive, German manufacturers must not only shine with their world-renowned engineering skills but also with new technological know-how. The largest car manufacturer in central Germany is committed to devoting its full efforts to zero-emission cars and e-mobility. In addition, the focus is on becoming one of the leading suppliers of software for the automotive industry. The client is addressing the problem of a lack of qualified software developers through a long-term re-skilling and upskilling of employees.



Since the founding of University4Industry (U4I) in 2015, it is Jan Veira and Dr. Wolfgang Huhns mission to efficiently empower companies and their employees for the challenges of the future. Their comprehensive support of leading companies has proven that reskilling and upskilling are only successful through company-specific competence building. The expertise of the established B2B company with its headquarters in Munich is built on a team of 40 people, more than 1,000 experts, and over 120 partner institutions and is constantly growing. Following the motto "Learn in order to act", U4I supports 4 out of 5 German automotive manufacturers, 7 out of 15 DAX companies as well as 3 of the 5 largest German mechanical and plant engineering companies today and aims to be the leading partner for company-specific competence building.

CONTACT US IF YOU ARE INTERESTED IN UP- AND RESKILLING OF EMPLOYEES.



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