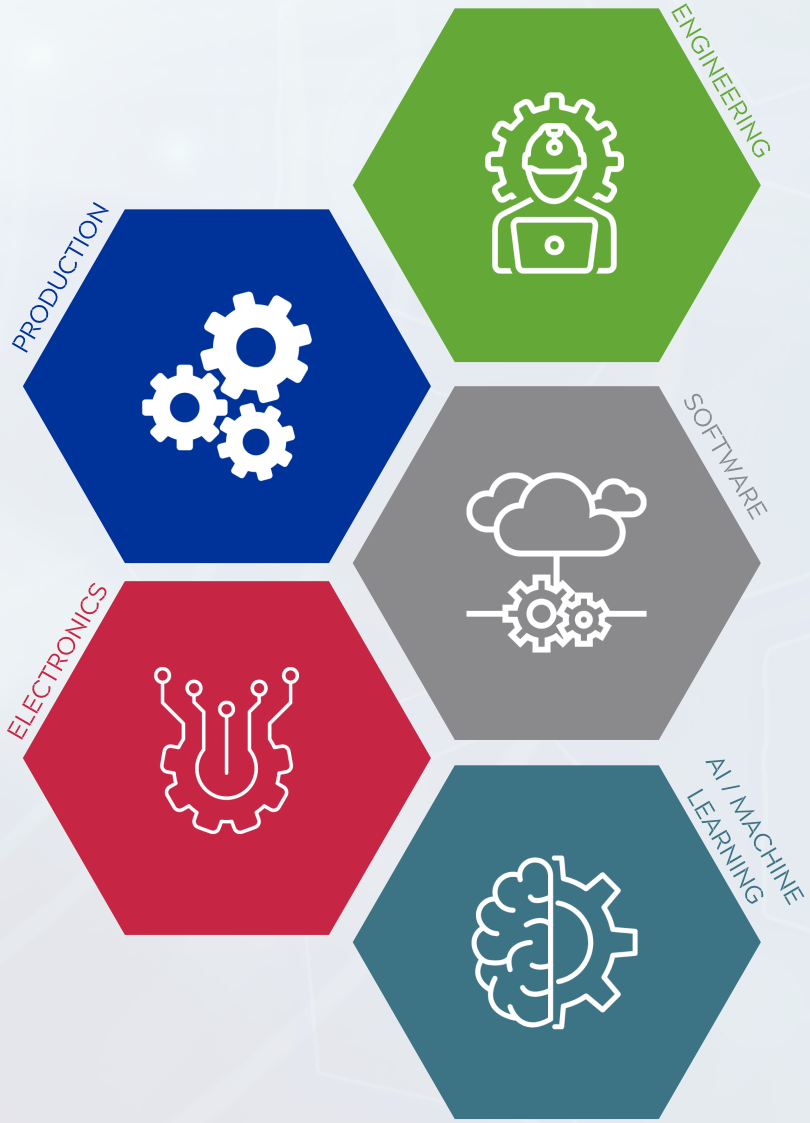
Interreg
Austria–Hungary
European Union – European Regional Development Fund

IMPROVE!

DIGITALIZATION SERVICE PORTFOLIO



ABOUT

With this document, the aim is to help companies understanding how they can benefit from digitalization services of digital innovation hubs (DIHs) and what values DIHs can bring to them.

For this purpose case studies will be collected by DIH members of the Improve! project.

Each DIHs brings business case studies to explain the application of digitalization carried out by partner organizations.

It is vital that companies are helped by the project to understand why and how services create value and finally profit.

The IMPROVE! network is based on the specification of each DIH and the partners collect case studies derive from these special profiles and have been proved to be implemented successfully in the case of SMEs.

The collected case studies are belonging at least one of the following categories:

PRODUCTION

DEFINITION

Production is the process of combining inputs (tangible or intangible) and transforming them into a consumable output with the purpose of satisfying customer needs, and by that, creating revenue. We provide services to facilitate or develop production possibilities of SMEs. Including: 3D scanning; 3D modelling; 3D printing alloys; 3D printing ink jet; 3D printing polymer; Prototyping, reverse engineering; 3D animation; SCADA/ MESS; Product Development.

BUSINESS CASES

1. Re-Design and topology optimization of a structural component for a solar panel motor
2. Robot-based 3d Ink Jet printing
3. Human-Robot Collaboration
4. Development of a straightening process
5. From idea to prototype production
6. Business animation with CGI

PRODUCTION

ENGINEERING

AI / MACHINE LEARNING

#1 RE-DESIGN AND TOPOLOGY OPTIMIZATION OF A STRUCTURAL COMPONENT FOR A SOLAR PANEL MOTOR

The idea of the NEOSAT platform is to define satellite components that are required for different missions and the European space industry should use this set of parts to reduce costs for development and qualification. Large system integrators such as Airbus Defence & Space or Thales Alenia Space are part of this platform and in the frame of a ESA funded project one components should be selected and optimized for additive manufacturing. It was a feasibility study to clarify the question if additive manufacturing could be an alternative to conventional machining in terms of lead time, costs and other aspects. In total 12 brackets out of two different Aluminium alloys were manufactured and tested. The test campaign was successful except of the random vibration test(simulation of the rocket launch).

PRODUCTION

SOFTWARE

AI / MACHINE LEARNING

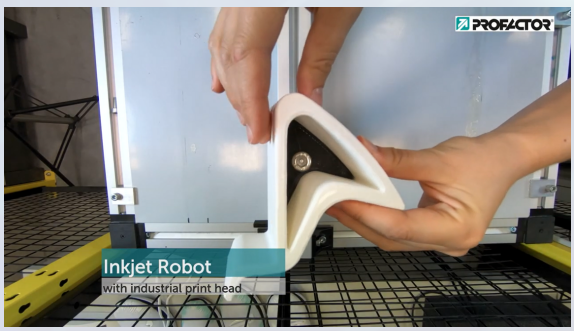
#2 ROBOT BASED 3D INK JET PRINITING

Addmanu is a national flagship project for research, development, and the establishment of additive manufacturing. Four topics are defined as key technologies for additive manufacturing: lithograph- based manufacturing (LBF), Fused Deposition Modelling (FDM), selective laser welding (SLM), and inkjet printing. These have from today's perspective the highest potential for applications and further developments. The most important families of engineering materials, i.e. ceramics, polymers, and metals, are included. New materials and hybrid material systems are of particular importance.

The innovation potential of additive manufacturing is primarily determined by the creativity of the designers and the use of state-of-the-art design software for lightweight construction and material efficiency.

The coupling of topology and design optimization and additions to extremely filigree grid structures are intended to create new solutions and open up new areas of application. Simulation- and model-supported process development for the processes enable further developments for inline process assurance.

The aspects and studies relevant for industrial implementation are dealt with in our own work packages and prepared for the mechanical engineering, toolmaking, automotive, semiconductor and refractory industries, as well as for the aerospace industry.



PRODUCTION

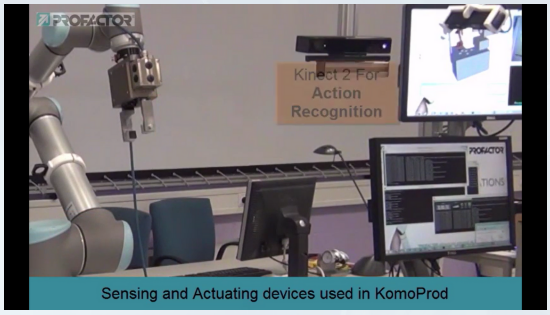
ENGINEERING

AI / MACHINE LEARNING

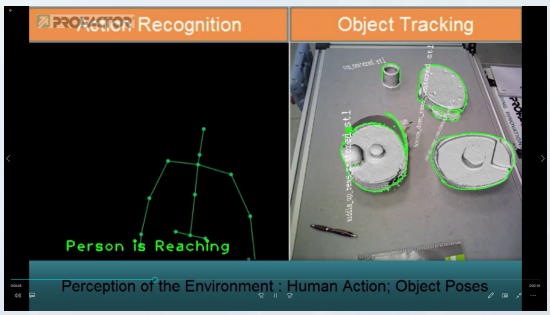
#3 HUMAN ROBOT COLLABORATION

Cobots, or collaborative robots, are robots that work with people in a shared workspace. Using them contributes to increasing productivity in manufacturing. IMPROVE! could support more applications of robot systems, in particular, fostering the change from traditional robots to new ones. Many companies have no experience with cobots and are unable to estimate their technological characteristics and potential due to a lack of know-how.

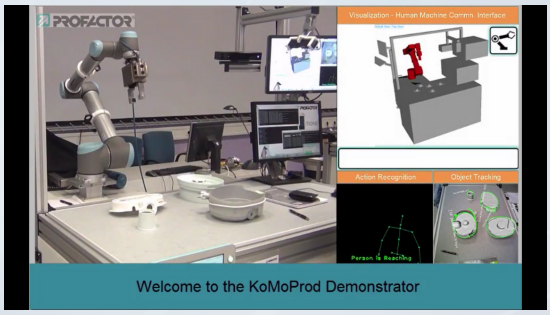
Thus, cooperative technology transfer and innovation processes could be organised. For instance, several companies with the same interests joined forces with a technology provider to estimate the use, definition and possibilities of implementation, and to evaluate them through pilot installations. Important is a neutral consultancy and a common procedure, including implementation and verification possibilities.
Understandable demo cases will demonstrate the advantages of cobots. Stakeholders will get experiences, see and feel how cobot systems work.



Sensing and Actuating devices used in KomoProd

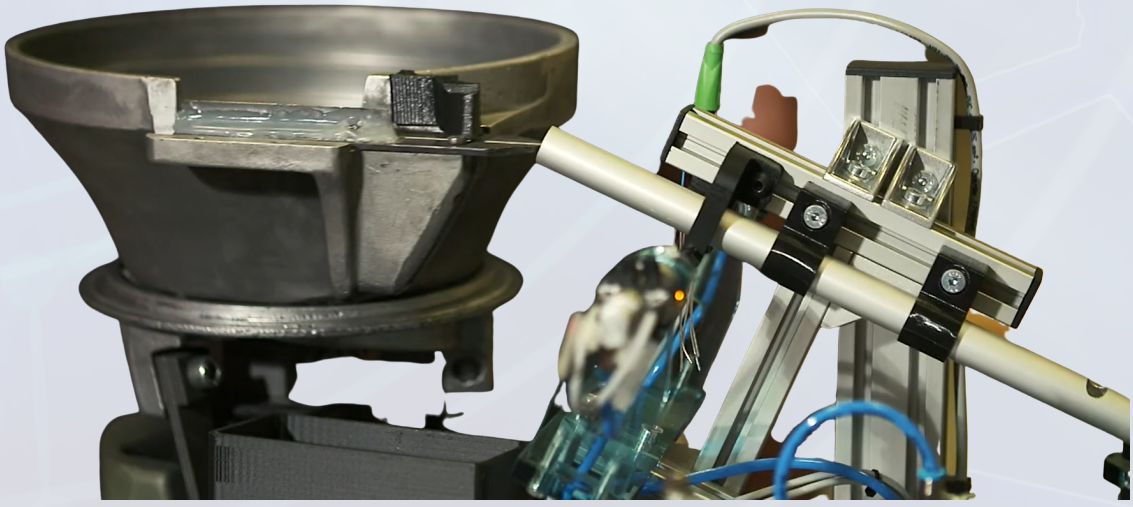


Perception of the Environment : Human Action; Object Poses


Welcome to the KoMoProd Demonstrator

#4 DEVELOPMENT OF A STRAIGHTENING PROCESS

In the first step, the straightening process was developed. Initially, a roll straightening process was used before concentrating on a process using two dies. The tool was produced with a 3D printer directly at CAMPUS 02 and required some optimization before satisfactory results could be achieved. However, as the straightening process was repeated and refined, there was a steady approach to and solution to the problem.
In a second step, the handling of the wire nails was investigated and the sub-process steps for separation, transport, and transfer to the straightening process were developed. After appropriate verification of the partial process steps, these were combined in a first prototype and this was supplemented by appropriate sensor technology for process monitoring. The control of the corresponding actuators and the evaluation of the sensors is done by a programmable logic controller.
At the end of the project, the prototype was validated and optimization of the throughout quality and process stability was carried out by fine adjustment of the subcomponents.
As a result, the developed prototype which is based on a vibratory feeder and die leveller with roller geometry can already be used for initial tests in the company.



PRODUCTION

ENGINEERING

#5 FROM IDEA TO PROTOTYPE PRODUCTION

The developed product consists of several components (adapter, ergonomic mask and silicone padding for comfort). The design of these components had to take into account the manufacturing technology and dimensions of the bottles.
We have created a functional adaptor, in which the used raw material and its mechanical properties (e.g. flexibility) are key. The mask and the attaching silicone part have different material properties, which have been tested and implemented in different versions to find the most suitable.

PRODUCTION

ENGINEERING

SOFTWARE

#6 BUSINESS ANIMATION WITH CGI

Our basic concept is that we have developed a 3D character (Cinema 4D and SolidWorks software) and then produced a storyboard. We then turned the scenes into a professional film style and coordinated our character with the real video in the form of animations, using innovative technologies and film solutions that are also used in Hollywood. The character we design for the project does not only appear in our promotional film, but also in a stand-alone 3D printed form as a firm mascot. It is an integral part of any further promotion project, our corporate image.

Opportunities:
The experience gained from the project can subsequently be applied to a number of product visualization and business animations for marketing, advertising, training, research, etc. purposes in all kinds of businesses e.g. production, architecture, health, etc.

ENGINEERING

DEFINITION

Engineering is the field where the design and construction of machines, equipment, buildings, roads etc. is supported by the application of scientific knowledge and empirical evidence. We offer our help in connection with Topology optimization; CAD; Collaborative robotics; Business model; Mechatronic Engineering, simulation systems

BUSINESS CASES

1. Digitalization in Marketing, Store-Design
2. Quality Control and inspection using robots
3. Digital Marketing, Social Media Marketing

#1 DIGITALIZATION IN MARKETING, STORE-DESIGN

Eye-tracking can be used to analyze the visual attention of subjects in a more detailed way. There are **mobile eye-tracking glasses** (as you see on the picture below) that can be used to analyse the real environment, such as the usage of mobile applications, commercials or other marketing materials.

Furthermore, many studies are conducted to discuss the optimal shelf height for product placements. For example, this best-practice example shows a study that was conducted in a shopping centre in 5 retail stores to find out which products can be seen well or less well by the respondents.

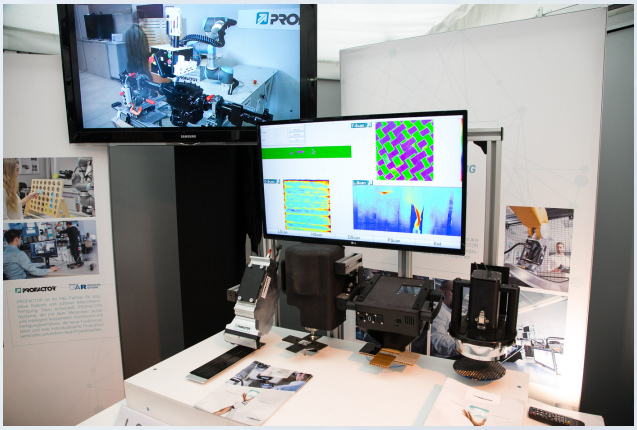
Both people with and without wheelchairs were analysed to find differences and similarities in optimal shelf heights. It was found out that wheelchair users especially look at lower shelf heights compared to people without wheelchairs. Furthermore, it was found that all test persons prefer wide aisles, as this way much more products can be seen.

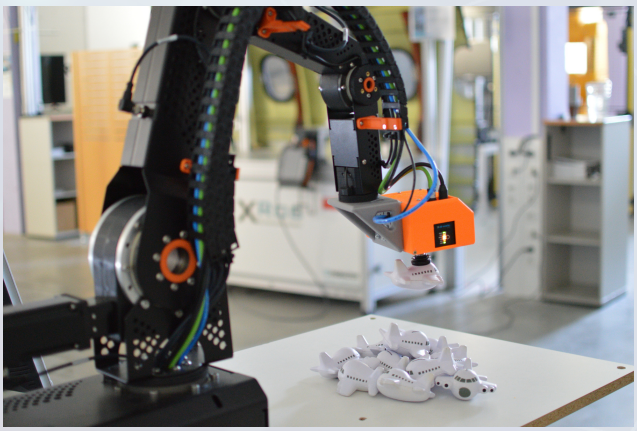
#2 QUALITY CONTROL AND INSPECTION USING ROBOTS

SPIRIT aims to develop an “inspection skill” for robots that takes the step from programming of complex inspection tasks to configuring such tasks. This will substantially reduce the engineering costs when setting up inspection robots in industrial environments. The main result will be a software framework that consists of two parts.

The “offline framework” handles the model-based automatic coverage planning for complex parts and various image-based inspection processes as well as the automatic robot program generation. It will include a generic interface to allow the easy exchange of process models (for different inspection technologies), of the CAD model of the part (for a different type of product to be inspected) or of the work-cell model (for a different kinematic structure).

The generic “online framework” deals with sensor data mapping to transfer 2D image data to the 3D object model. It will provide the backbone for the real-time execution of the actual inspection process, including the synchronization of data acquisition and robot motion.





#3 DIGITAL MARKETING, SOCIAL MEDIA MARKETING

Social Media Marketing is very important in today's society, not only for the general public but also for companies. For the Interreg Slovenia/Austria Project »Start-Circles«, the project team compiled a web film to introduce the project. Within the web film, the aim and the objectives of the project were closely described, also the contact details for further information were given. The video reached a lot of people from the target group.

ELECTORNICS

DEFINITION

Electronics is the branch of science that concerns itself with electricity, or more precisely, electric current, focusing on its utilization for technologies designed especially, but not exclusively, for manufacturing electronic equipment. Our services in this field are the following: Electronics development; Industrial measurement technology and measurement automation; Sensors/ actuators; IoT.

BUSINESS CASES

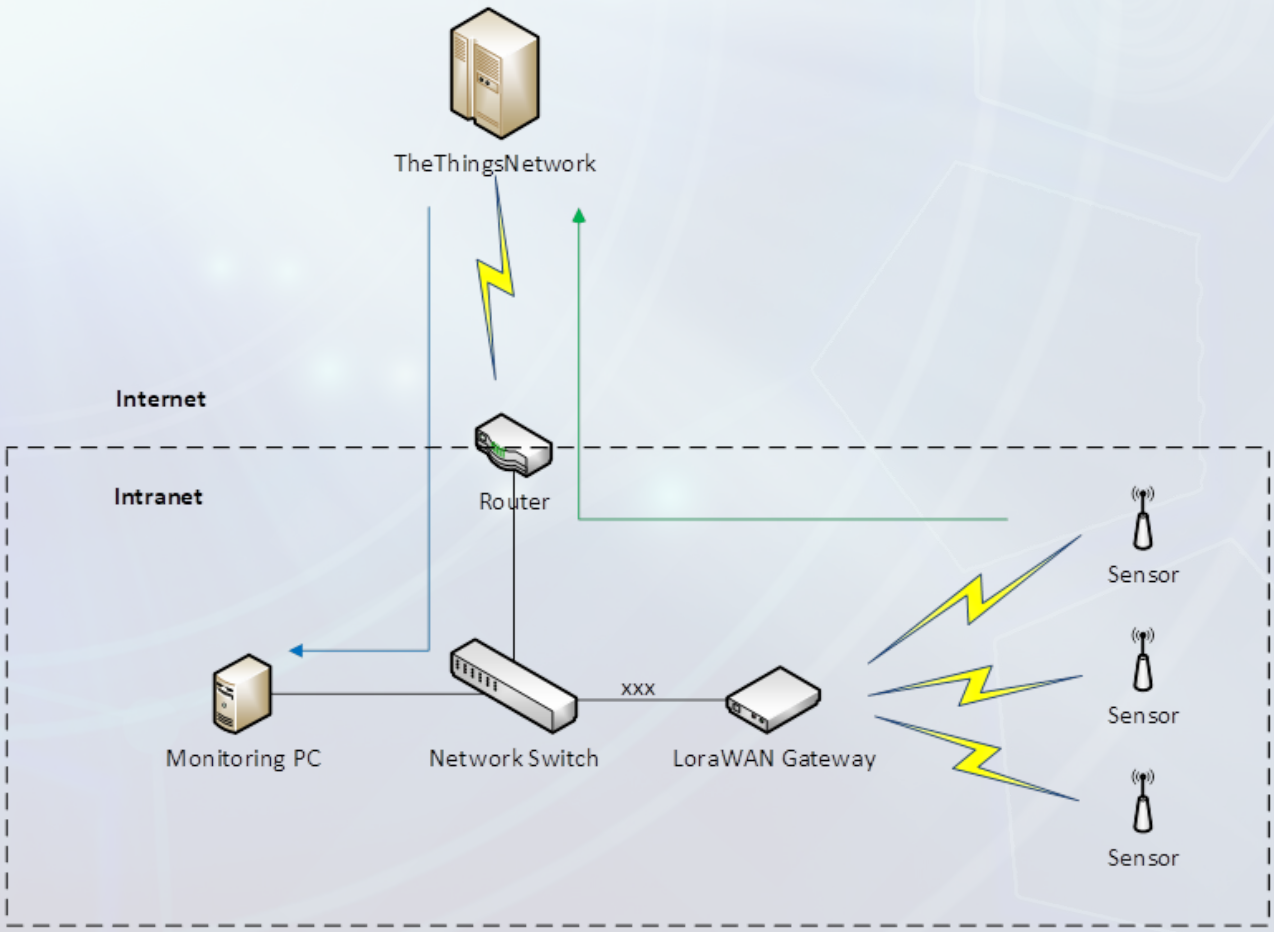
1. LoRaWAN

#1 LORAWAN

Besides the costs for the sensors, the solution is free of charge and can be implemented immediately. The temperature sensors are battery-operated. With measuring every 20 minutes, the battery lasts for 10 years.
The LoRaWAN gateway sends the sensor data to TheThingsNetwork and the PRTG tool retrieves the information for documentation and alerting. Alerts can be set within the PRTG tool very flexibly. The usage of PRTG is not mandatory, all other tools with the capability to retrieve information from REST interfaces can be used as well.

Components:

- LoRaWAN Gateway: LG308 LoRaWAN Gateway - 10+1 Channels (€160,-)
- LoRaWAN Sensor: LHT65 (€30,-)
- PRTG monitoring tool (freeware up to 100 sensors)
- TTN (TheThingsNetwork) system



SOFTWARE

DEFINITION

Software is the aggregation of instructions and programs that instruct the computer to do specific tasks. The concept refers to all functional elements of a certain device that have no physical appearance. We are competent in AR; VR System - Assembly Eye; Cloud - Microsoft Azure; Payment systems; Usability testing; Eye-tracking; Emotional Analysis, Digital marketing; Smart digital service; Innovation tool, models, integration.

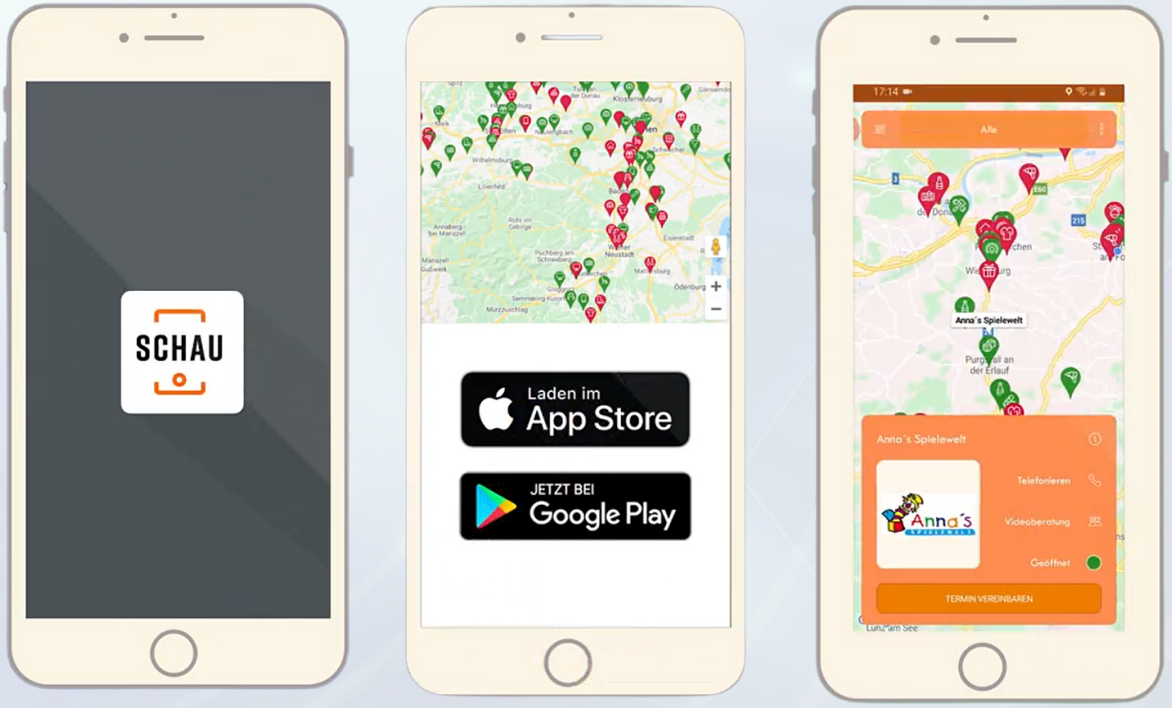
BUSINESS CASES

1. COVID-19 Project for Digitalization in Retail
2. Optimization of sales tours for bakers that bring food directly to companies
3. E-Bike Rental and charge options over a mobile app (android and IOS)
4. Cognitive and Physical worker Assistance in production
5. Digital refrigerator (+network)

#1 COVID-19 PROJECT FOR DIGITALIZATION IN RETAIL

At the beginning of the COVID-19 crisis, an idea was born to support brick-and-mortar retail. The focus is that the seller can get in touch with his customers even though they are not allowed to enter the store.

A first concept would be quickly devised. A web application and mobile applications for iOS and Android were specified. After that, the project was implemented. The focus of the project was on rapid implementation. It was therefore strongly built on a cross-platform approach and a high code coverage between the different platforms was achieved. The project is constantly being developed.



#2 OPTIMIZATION OF SALES TOURS FOR BAKERS THAT BRING FOOD DIRECTLY TO COMPANIES

The focus of the application is on supporting the driver who drives directly to the customer and sells the products directly there. The aim is to supply not only company employees, but private customers as well. A specification was worked out during the workshops. This specification is currently being implemented and the result (i.e. the source code) is put on GitHub open source.

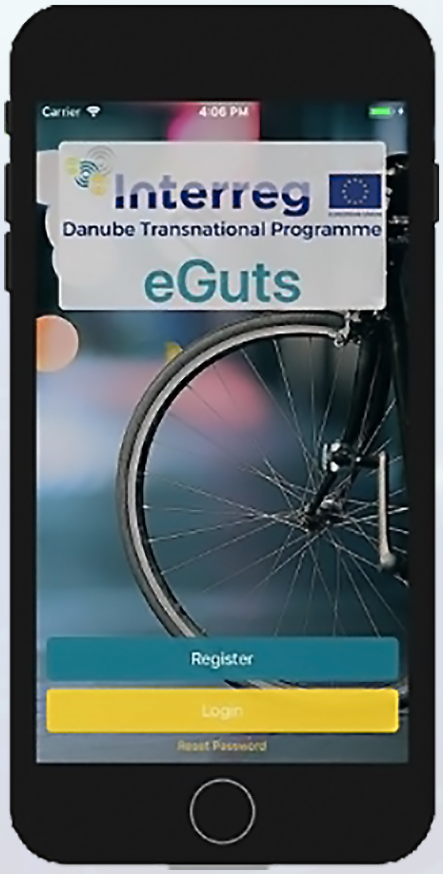
AI / MACHINE LEARNING

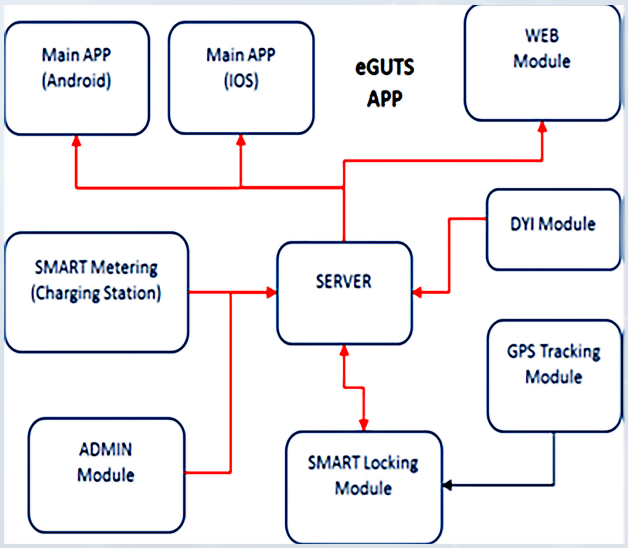
#3 E-BIKE RENTAL AND CHARGE OPTIONS OVER A MOBILE APP (ANDROID AND IOS)

eGUTS APP will serve for ordering and renting electric eBikes, searching for sites, where bikes and stations (total number of charging slots, number of free slots and battery charge status) are located and can be recharged.
The app has to fulfil several criteria in terms of rental, such as:

- users to be able to rent the e-bike in a few clicks - develop the app to rent an e-bike from many pick-up locations, in cities across Europe and beyond
- unlocking the rented bike once was found at the pick-up location, tap “Unlock” and the app will open the bike’s electronic lock
- lock and unlock the e-bike as many times as needed
- return the rental bike to the drop-off location, lock it and end your rental with the app.

The eGUTS APP has to provide the function by which the user has to be able to access sites, reservations, and other content also through mobile apps for Android and iOS platforms.



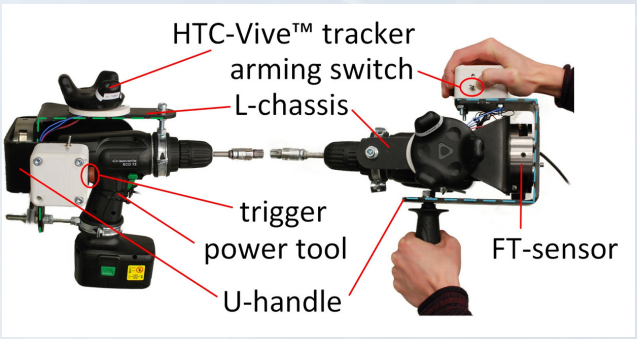


ENGINEERING

AI / MACHINE LEARNING

#4 COGNITIVE AND PHYSICAL WORKER ASSISTANCE IN PRODUCTION

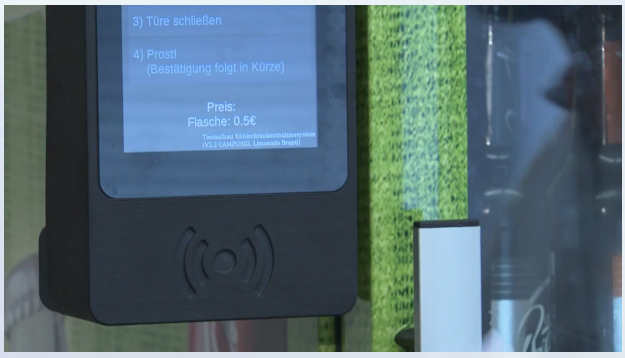
The flagship project MMAssist II (Assistance Systems in Production in the Context of Man-Machine Cooperation) started on May 1, 2017.
The goal of MMAssist II is fundamental research and characterization of assistance in a production context. Based on this, optimized assistance systems for future working places focusing on the human worker („Human-Centered Workplace“) will be developed, implemented, and evaluated in an industrial environment. The basis for the implementation is so-called „Assistance Units“ - which are modular components for assistance systems. Assistance Units are defined in a way that they can be applied to different application con-texts. The partners will implement a software framework with which Assistance Units can be dynamically configured to act as an assistance system for a given application.
In MMAssist both cognitive and physical assistance systems are investigated, developed, demonstrated in prototypes, and above all, evaluated by the end-users.

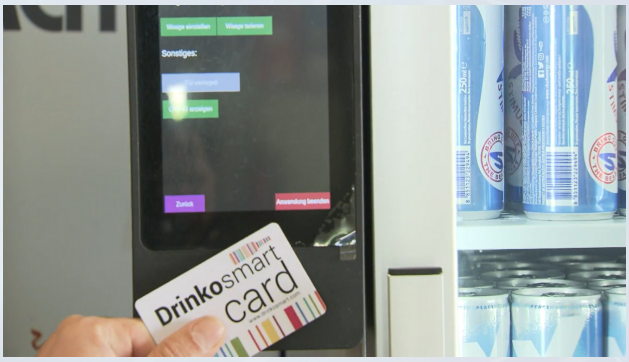


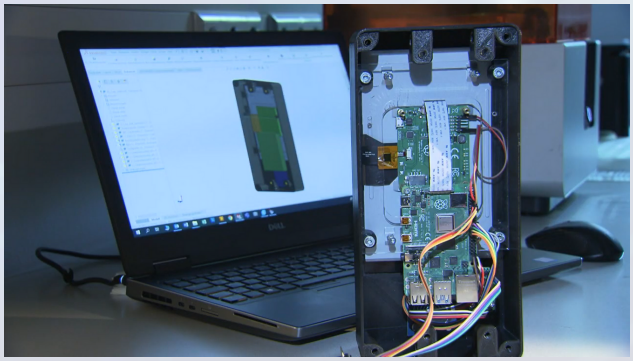
#5 DIGITAL REFRIGERATOR (+NETWORK)

On the one hand, commercially available vending machines are too expensive for offices and only when they are used frequently, profitable. On the other hand, classic refrigerators did not previously offer any control options for removal and filling. Through the expertise of FH CAMPUS 02, a vision turned from a white sheet of paper into a functional prototype, which is flexible and easy to assemble.

A specially programmed, intuitive software helps the customer to enter access authorization and user information such as name and account number securely and in compliance with data protection regulations. A personalized magnetic card is used to open the refrigerator via an RFID reader. Thanks to a special sensor system including sophisticated algorithms, the type and number of bottles removed are automatically determined. The payment system is also innovative and practice-oriented: The payment data is sent directly to the card owner via SEPA direct debit. This is made possible by a SIM card that also networks all-refrigerators with each other and transmits information, for example, if a refrigerator is defective or needs to be refilled by the beverage supplier.







AI / MACHINE LEARNING

DEFINITION

Artificial Intelligence (AI) refers to systems that display intelligent behavior by analyzing their environment and taking actions with some degree of autonomy to achieve specific goals - as the European Commission summarized. These can be either software or hardware-based. Machine learning is the application of AI.

Services:

- Customer data analysis processes
- Unique algorithm solutions in data analysis
- Segmentation processes
- Data visualization

BUSINESS CASES

1. Online Market Research and Digital Marketing
2. Autonomous Transport Robot (ATR)

AI / MACHINE LEARNING

ENGINEERING

SOFTWARE

#1 ONLINE MARKET RESEARCH AND DIGITAL MARKETING

Smart home energy management systems can be used to track energy consumption in private households. For this purpose, customers receive mobile applications in which they can read their current consumption. In order for users to continue to use such apps and increase their intention to use them, the **user-friendliness** must be particularly high.

In this regard, **so-called usability tests** with eye-tracking can be carried out in order to be able to recognise which factors play a significant role in the use of such apps and which contents could still be improved. This best-practice example describes the results of such a study.

For smart home energy management systems, it is especially crucial that users can quickly switch between the individual time periods. This means that it should be possible to switch between daily, monthly and annual consumption without any problems. The choice of colours can also improve the usability of SHEMS. It is especially important that the contrast to the background is high enough so that all texts can be read easily. Customers also want forecasting functions to be able to predict their electricity costs.

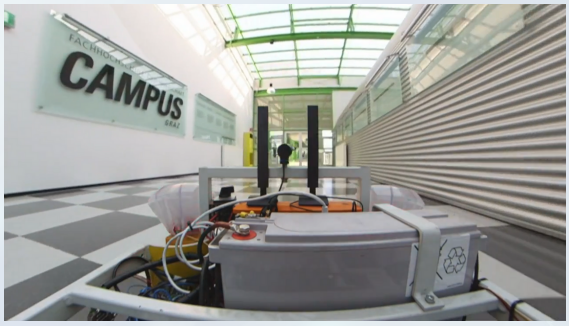
AI / MACHINE LEARNING

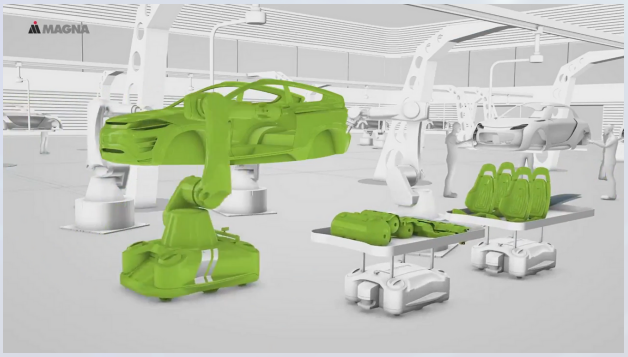
ENGINEERING

SOFTWARE

#2 AUTONOMOUS TRANSPORT ROBOT (ATR)

The Automation Department of CAMPUS 02 University of Applied Sciences developed a prototype to supply the production line with C-parts (screws, nuts, etc.) according to MAGNA's individual specifications. For this purpose, a concept for a driverless transport system (AGV) for several weight classes was designed, whereby the requirements particularly concerned the following partial aspects of energy-efficient drive including control and battery management, navigation via AR tags (Augmented Reality) as well as the possibility to control the AGV via app for Android smartphones. The ATR can be flexibly programmed and reprogrammed via a few fixed contact points. In addition, the autonomous transport system is swarmable, i.e. they communicate over a common server to always find the ideal and fastest path. In addition, an intelligent wireless call-off system for material requisition was developed, which sends an order information to the superior supply system when a button is pressed. To enable the AGV to differentiate between the different material containers, an automated container identification via RFID (Radio Frequency Identification) was tested. Empty containers should also be recognized during the changeover and an automated order should be generated.





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IMPROVE!

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