

#02

TOMORROW NOW

04.2022

FOREWORD

Dear Reader,

what times these are right now. Globalisation, digitalisation and climate change are advancing and are in the process of fundamentally changing the economy and society and realigning our compass. At the same time, unforeseen events, such as the pandemic or the global consequences of the war in Ukraine, repeatedly force us to pause, improvise and redisposition. Economists have coined the term VUCA for this. The artificial word describes new ways of seeing and reacting under the conditions of volatility, uncertainty, complexity and ambiguity.

The VUCA world is both a challenge and an opportunity. The Greek philosopher Socrates aptly summed it up as follows: "If you want to move the world, you should first move yourself." At EDAG, we have translated this into a clear maxim for action: "re-inventing mobility - re-inventing ourselves".

The second issue of "tomorrow now" tells you in extracts about this new departure and the exciting projects associated with it. The EDAG Group magazine introduces you to our new "Energy Systems and Drive Train" business unit, reports on fascinating future-oriented lighthouse projects, newly bundled competences and people from the EDAG world who are committed to making our world smarter and thus more liveable. Socrates would probably take great pleasure in this.

We hope you enjoy reading this issue and that you will remain confident and face the opportunities with us.

Cosimo De Carlo
CEO of the EDAG Group



TABLE OF CONTENT

SHORT NEWS	4
Short facts all over the EDAG World.	
THE NEXT ENERGY BOOST	8
EDAG is now bundling its competences in a new business unit: „Energy Systems and Drivetrain“	
II INNOVATIONS	
CAMPUS FREE CITY PROJECT WITH EDAG CITYBOTS	12
The success story of the „EDAG CityBot“ mobility concept continues.	
LANE CHARGE	14
Charging 2.0 – How inductive charging is promoting emobility.	
THE VR PAINTSHOP	16
Good paint is not down to good luck.	
DIFOREM	19
Artificial intelligence assists automated driving.	
III COMPETENCES & PROJECTS	
IMPROVED EFFICIENCY WITH EDGE COMPUTING AND ARTIFICIAL INTELLIGENCE	22
In cooperation with Dell Technologies, we developed an edge computing solution which in practical use more than proved its worth.	
ENERGY MANAGEMENT 4.0	26
How the e-car generates its own electricity for free.	
FROM TRUCKS TO COMBINE HARVESTERS	28
How edag is advancing the automation of commercial vehicles.	
THE 5 PHASES OF THE SMART FACTORY	30
How smart would you like it?	
IV EDAG WORLD	
HOW MOBILITY DATA GENERATES BUSINESS MODELS	34
Using vehicle and traffic infrastructure data opens up numerous opportunities.	
EDAG EMPLOYEE STORIES	36
We make a difference. We share your values. Find out who is EDAG.	
EDAG INTERNATIONAL // EDAG MALAYSIA	40
Heading for new dimensions in dynamic apac markets with software and mobility IT.	

SHORT NEWS



THE NEXT ENERGY BOOST

NEW FORMS OF ENERGY AND DRIVE ARE INCREASINGLY BECOMING THE FOCUS OF MOBILITY AND INFRASTRUCTURE DEVELOPERS. EDAG IS NOW BUNDLING ITS COMPETENCES IN A NEW BUSINESS UNIT: „ENERGY SYSTEMS AND DRIVETRAIN“



Roberto Diesel
Project Director

Green electricity, e-mobility, hydrogen and fuel cells: these are the buzzwords on the way to new mobility and new, smart production methods. One thing is certain: The energy infrastructure is the key to a sustainable future for our industrial society and reliable living and mobility habits.

This involves the most sustainable possible generation of energy, its storage and availability, the corresponding, efficient infrastructure and distribution structure, and the supply of all essential energy consumers. EDAG is now repositioning itself in this field with its „Energy Systems and Drivetrain“ division.

In mobility and logistics, our focus is on all modes of transport, from cars and two-wheelers to commercial vehicles and work machines to buses, ships, trains and aircraft. We think of energy use in all dimensions, be it in the further development of battery-electric e-mobility, in fuel cell and hydrogen drives as well as in industrial use and sustainable building supply.

Why did we create the new division? To put it in a nutshell: Because we can and because we want to bundle the EDAG competences developed over 20 years in this crucial future field and thus make them even better and more effective. In the field of energy and drives, we are also

following the 360° approach to vehicle development and production solutions that is typical of EDAG. In doing so, we occupy three main playing fields.

Firstly: concepts and development, for example of electric motors and HV batteries, fuel cell and hydrogen drives, functional safety or component and system design. For example, our holistic perspective on Energy Management 4.0.

Secondly: Testing, validation and commissioning, for example in thermal control, homologation, crash and safety systems, vehicles, tank and supply systems or the safe handling of hydrogen.

Thirdly, industrialisation, for example in the upscaling of new production technology from laboratory to large-scale production, in small-scale toolmaking and the production of exclusive parts for fuel cell vehicles, or in the creation of hydrogen-focused production facilities. One such concrete modular, scalable and safe solution is Scalebat, the innovative battery housing for traction batteries in electric vehicles.

Another example comes from the series development and production of fuel cell vehicles. In our fuel cell project, we are working together with Daimler AG in Bremen on a corresponding SUV - from the initial idea, through development and prototypes, small series toolmaking and production of fuel cell-specific vehicle parts, to testing and validation.

This is a task that is as demanding as it is appealing, and at the same time it highlights the capabilities of the new EDAG division. Here, we are realising the development and integration of the new EE architecture into the fuel cell vehicle, with particular emphasis on durability and operational stability, taking responsibility for safety and the vehicle as a whole, as well as for the procurement and quality of exclusive fuel cell vehicle parts. At the same time, we are laying the foundations for the establishment of a new production facility in Bremen.

“Energy Systems and Drivetrain“ also has an exciting field of activity in the area of research for batteries and high-pressure hydrogen storage. The H2Hybat project is dedicated to a hybrid storage unit that enables flexible use of the battery for daily journeys as well as rapid H2 refuelling for

WE THINK OF ENERGY
USE IN ALL DIMENSIONS.
**WE CAN DO MUCH
MORE. THE FUTURE
HAS BEGUN.**

long-distance journeys. H2Hybat is characterised by safe storage in the vehicle floor, crash safety and integrated emergency management as well as sustainability through reusability.

The examples and our solution approaches confirm that we are now taking the right next step with „Energy Systems and Drivetrain“. We have already achieved a lot with our customers. But together we can do much more. The future has begun.

Do you have a specific project or would you like to know more about „Energy Systems and Drivetrain“? Feel free to contact Roberto Diesel, Project Director, or download our free white paper „Energy Management 4.0 - Evolutionary stages for electric vehicles“.

we are delighted that, with the „Campus FreeCity“ project, we will reach the next milestone in its technical further development and practical use,” explains Cosimo De Carlo, CEO of the EDAG Group. In the course of the project, the EDAG Group will for the first time ever network two additional intelligent, modular robot vehicles – the „EDAG CityBots“. These are two interchangeable transport and conveyance modules, developed and produced by the globally operating engineering service provider. This means that the EDAG Group is providing the complex core of the real lab installation.

„We can put our skills in the development of autonomous vehicles, AI solutions, software and digitalisation and classic vehicle engineering to optimum use in the project. A fascinating project and one in which our project management team in Fulda will be involving our EDAG specialists worldwide. Apart from the technical challenge, what particularly motivates us is the fact that we will be making a sociopolitical contribution with this funded project, to make our cities quieter, cleaner,

more life enhancing and smarter in the future,” adds Cosimo De Carlo.

Using „EDAG CityBot“ vehicles developed by the EDAG Group, the project is carrying out laboratory-scale research into the challenges posed by and possible solutions for our previously uncoordinated urban transport. Urban transport is characterised by high traffic density, congestion, local emissions and the use of large areas of land. Its transport potential is neither coordinated nor fully exploited.

The interdisciplinary „Campus FreeCity“ project is researching the challenges posed by and possible solutions for inner-city traffic problems using two „EDAG CityBot“ vehicles which, in the course of the project, will be developed for the transport of passengers and goods, then implemented, operated and scientifically analysed in the laboratory. The laboratory development enables various topics relevant to future mobility and logistics systems be explored under realistic conditions. These include networked, automated driving functions, networking and

data exchange, human-machine communication, acceptance and trust, integrated order management and the identification and realisation of economic and technical optimisation potentials in operation.

„This project is examining a completely new type of mobility and logistics system, and is therefore making a definite contribution to the transformation of transport. In the long term, it offers an all-round, sustainable approach to solving inner-city traffic problems,” says Michael Kadow, CEO of HOLM GmbH, adding: „We are therefore proud to be coordinating this process, and to be promoting groundbreaking industrial research and development in cooperation with our project partners. As a development and networking platform, we also see this project as a chance to increase awareness for new, intelligent and networked mobility concepts.“



NEW SOLUTIONS FOR URBAN TRAFFIC PROBLEMS

The success story of the „EDAG CityBot“ mobility concept continues. Within the context of the „Campus FreeCity“ project sponsored by BMVI, development is to continue of the vision of a multifunctional, autonomous fleet of robots for a first practical application in a physical environment. The funding decision was officially handed over by Dr. Michael Güntner, state secretary at BMVI, on 24 November 2021. The project, which is scheduled to run until May 2024, is being sponsored to the tune of € 11 million by BMVI within the scope of the action plan „Digitalisation and Artificial Intelligence in Mobility“.

House of Logistics and Mobility (HOLM) GmbH, the consortium leader, is in charge of the overall project management, and acting as the content-related and organisational interface of the consortium. Besides HOLM GmbH and EDAG Engineering GmbH, other project partners are EintrachtTech GmbH, T-Systems International GmbH, COMPREDICT GmbH, DEKRA Automobil GmbH, the University of Fulda, and the Technical University of Darmstadt.

„In 2019, with the CityBot mobility concept developed by EDAG, we presented a concept for making urban mobility more connected, more efficient and more sustainable. Following the presentation of the first fully automated AI technology carrier in 2020,

PROJECT PARTNERS

EINTRACHTTECH GMBH

from Frankfurt am Main is providing the spatial infrastructure for the real lab at the Deutsche Bank Park site, and, in cooperation with the other partners, is working on relevant use cases to develop the user requirements and underlying user journeys, taking the scaling in the urban area into account.

T-SYSTEMS INTERNATIONAL GMBH

from Frankfurt am Main has taken on the research into technical approaches, process and operational procedures for remote operation and the technical supervision of automated vehicles.

COMPREDICT GMBH

from Darmstadt is responsible for the measurements needed to train the virtual sensors and predict component breakdowns.

DEKRA AUTOMOBIL GMBH

from Klettwitz analyses future requirements for the approval of new mobility concepts, incorporates new findings into the new and further development of regulations, and develops the test procedures required to secure safe operation.

THE UNIVERSITY OF FULDA

is responsible for supply chain modelling, the process model, and for the co-development of planning algorithms.

THE TECHNICAL UNIVERSITY OF DARMSTADT

is responsible for the scientific guidance and identification of further efficiency potentials with regard to the design and operation of the drivetrain for the CityBots.

In addition to the consortium, **FES FRANKFURTER ENTSORGUNGS- UND SERVICE GMBH** has also joined the project as an associated project partner.

Charging sockets covered with snow, dirty charging cables and the need to search for a suitable charging station. People are still very wary of eMobility. The various market players have therefore been accelerating their research and development activities in recent years. Within the context of the „Lane Charge“ re-search project, EDAG, the world’s largest independent engineering service provider in the automotive industry, has developed and applied for a patent on a process for the inductive charging of electric cars.

The inductive charging of electric cars involves embedding a transmitter coil in the road and integrating a receiver coil in the vehicle. To charge, the driver drives his vehicle over the transmitter coil, and the charging process can automatically begin. As with the wireless charging of smartphones, energy is fed into the battery via an air gap. The challenges with the automobile are the larger air gap and the higher power needing to be transferred.

With the help of the EDAG circuit innovation, eCars can be charged in a way that is both technically simple and resource-saving. Unlike previous attempts to find solutions, the charging intelligence here is in the vehicle, and no longer in the road. The technology embedded in the road is simpler and robust than it was in the past. This makes installation in the road less expensive, and makes it easier for energy providers and road operators to rapidly expand the inductive charging infrastructure. If the charging power needs to be regulated, this is done in the vehicle, and is based on the individual energy requirements of the vehicle concerned. In this way, a single electronic component in the road can supply several transmitter coils, with each vehicle controlling the energy intake from its transmitter coil itself – a material contribution to the conservation of resources and cost reduction on the infrastructure side.

Jochen Rohm, Embedded Systems Development Engineer at EDAG, explains the advantages of this new process: „With previous inductive methods, it was also possible for several transmitter coils to be connected to power electronics in the road. They could not, however, be controlled individually; on the contrary, the power transferred via all the transmitter coils was geared to the vehicle with the lowest charge requirements. The drawbacks of this method are obvious: as every vehicle has its own charge requirements, only one vehicle received the optimum charging power. What is more, real-time communication was essential for regulation, usually via WLAN. With our technology, we are now reversing the roles. The charging intelligence installed in the vehicle decides autonomously and individually how much energy it takes from the transmitter coil. As a result, many vehicles with different charge requirements can be optimally charged on just one roadside power electronics unit, without any need for real-time communication.“ EDAG has applied for a patent on this new process.

Within the context of the „LaneCharge“ project, we are working on and implementing a concept for an overall charging system for eTaxis in cooperation with the Hanover University of Applied Sciences, the Technical University of Braunschweig and Sumida Components & Modules. EDAG is responsible here for the development of the power electronics, and for the integration of the individual modules in the vehicle. In the next stage, initial tests are scheduled at the Hanover University of Applied Sciences. The process will go into operation at the taxi stand outside the train station in Hanover in 2023.

The „LaneCharge“ research project is being funded to the tune of € 2.77 million within the scope of the Electromobility Funding Directive of the Federal Ministry of Transport and Digital Infrastructure (BMVI). The directive is being coordinated by NOW GmbH, and implemented by project sponsor Jülich (PtJ).

A MATERIAL CONTRIBUTION TO THE CONVERSATION OF RESOURCES AND COST REDUCTION ON THE INFRASTRUCTURE SIDE.



Sponsored by:



Coordinated by:



Project promoter:



“AN INNOVATIVE PROCESS FOR THE INDUCTIVE CHARGING OF E-CARS”

THE VR PAINTSHOP – GOOD PAINT IS NOT DOWN TO GOOD LUCK



„HAVE FUN PAINTING AND DOING BATTLE
IN THE VIRTUAL SPRAYING BOOTH“

It is believed that the Chinese discovered the technique of lacquering 7,500 years ago. In fact, the oldest surviving recipe for a lacquer dates from the 12th century, and was composed of linseed oil to act as the bonding agent and sandarac as the pigment.

Paints and varnishes have always fascinated the human race. They were used to embellish people themselves or their surroundings. As a result of the industrial revolution and the invention of the car, paints and varnishes experienced a veritable boom, and new large markets were created for them. Spray guns were used instead of brushes, which significantly reduced drying and painting times and also greatly improved the quality of the paint finish.

THE VR PAINTSHOP – A MULTIFACETED AND PLAYFUL APPROACH TO VIRTUAL REALITY

Lacquers and paints are of great importance in our modern world. No matter what we consider, everyday objects, aircraft, ships or cars: they would be hard to imagine without some kind of colour.

Then as now, painting is expensive and harmful to the environment. Having said that, particularly in the automotive industry, a superior paint job can turn a vehicle into a unique and individual item. We have tried to achieve a balance, and combine sustainability, economic viability and design.

How? Put on a pair of VR glasses and experience painting from a virtual perspective.

Virtual reality and its efficient use in production engineering is just one of many major technological trends. In the painting process, material, technology and design come together.

The visualisation specialists among our FEYNSINN digitalisation experts have developed the virtual training tool for car body painters: the VR Paintshop. Using VR glasses and a real paint sprayer, it is possible to train, test and experience the painting process in the virtual spraying booth. The integrated feedback system also generates a high degree of realism. This means the paint job can be completed very quickly.

This gives real-time feedback on all relevant parameters: Paint thickness, Spray angle, Speed, Distance.

Compared to conventional training methods, gamification is used here. The user is constantly motivated and stimulated with high scores and challenges - until the perfect result is achieved.

THE SHINE HAS BY NO MEANS WORN OFF

For some time now, the subject of „paint-work“ has no longer been the sole concern of car body painters and paint specialists. The paint finish has become a high-tech product. With the simulation tool derived from the VR Paintshop by FEYNSINN, it is possible to reproduce the topcoat finish for exterior and interior coating in order to optimise possible implementation.

The application can be integrated into new and existing paint shops, and coupled with existing handling systems. Even variable speeds in different stations are no problem.

BRIGHT PAINT COLOURS TURN GREEN

It is now possible to spray and paint without paint mist, fumes and dirty hands, making it a clean matter for both the painter and the environment.

The absolute paint application is taken into account in the training simulation, and indicated by different colours. As a result, no paint is wasted, and reworking is only carried out where necessary. This is economical, and ensures consistently high quality.

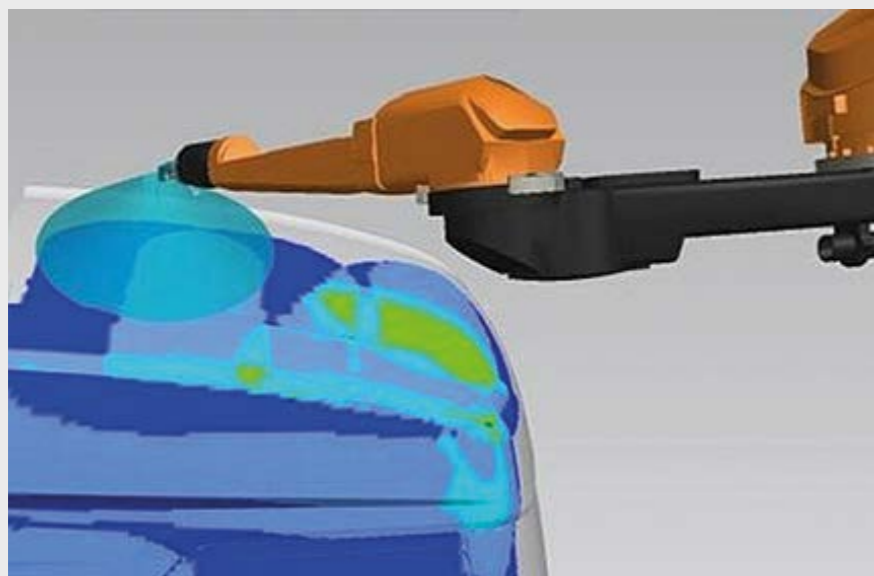
With the simulation of painting processes and FEYNSINN's VR training tool, applications have been developed that are already being used successfully by inter-

national OEMs, BMW for instance. Our customers are particularly enthusiastic about the possibility of individualising the VR Paintshop. For example, customers' own components can be integrated, and even processes such as the painting of both sides are possible. The customer's own types of paint can also be integrated. There are almost no limits to the individual adjustments that can be made for customers.

However, EDAG Production Solutions and FEYNSINN support not only OEMs in the individualisation of their application requirements, but also companies from a wide range of other industries and sectors. They adapt the VR Paintshop to the special wishes of the customers. For example, there was an inquiry from a shipbuilder who wanted a flashlight on the paint spray gun to make it easier to paint tanks better from the inside. We have also received enquiries relating to painting wind turbines or applying aggressive cleaning agents, where the wrong dosage can quickly become a problem since overdosing can be harmful to health or attack the material of the component. Generally speaking, there are no limits to the possible range of applications for spraying substances.

The basis for all types of individualisation is the combination of VR Paintshop technology and the gaming technology used. FEYNSINN offers a complete package, which even includes the software, VR hardware and paint spray gun, laptop, case and of course support, installation and maintenance. And it still costs far less than many a competitor's product.

Would you like to try out our virtual spraying booth for yourself, or are you facing the challenge of making your paint shop more advanced and ecological? Or do you have an application that calls for special individualisation? Christoph Huber, Project Manager for Visualisation, is one of our virtual engineering experts, and will be glad to help you with any suggestions or queries you might have.



„MONITORING THE COATS/LAYERS OF PAINT BY COLOUR FEEDBACK“



Christoph Huber
Project Leader Interactive Media, FEYNSINN

ARTIFICIAL INTELLIGENCE ASSISTS AUTOMATED DRIVING: „DIFOREM“

DIFOREM (DIRT & FOG REMOVAL) RECONSTRUCTS IMAGE ERRORS CAUSED BY CAMERA LENS DEFECTS, DIRT OR FOGGING WITH THE HELP OF NEURAL NETWORKS IN REAL TIME.

The human driver quite naturally keeps an eye on the vehicle's environment. Applying his experience and intuition, he compensates for disturbances in optical perception, for instance when trees temporarily conceal objects such as traffic signs. Technical systems for automated driving must reproduce these abilities in order to achieve the required high quality and availability of image data of the vehicle environment.

DiFoRem is a software solution that uses artificial intelligence to support assisted and automated driving, even when visibility is poor. To do this, neural networks are used to detect and reconstruct image errors in the individual frames of a video data stream in real time. The data stream with the individual reconstructed images can then be used by other assistance systems or for automated driving, in this way providing a crucial advantage in terms of ADAS function availability and reliability: even with a dirty or fogged lens, objects can be detected and classified effectively.

Our solution: the network architecture selected analyses information on objects and scenarios that have been previously seen, and recognises significant relationships through abstraction. This enables the software to reconstruct hidden objects

in a single image on the basis of empirical values from previous images. The neural network acquires this ability as a result of the training process, by analysing millions of different individual images. The correctness of the abstraction is constantly checked during the training process.

In this way, DiFoRem increases the availability and robustness of camera-based signals, thus improving the incoming data quality for state if the art driver assistance systems or automated driving functions.

Code optimisation, a basic requirement for porting to embedded systems, is currently being carried out. To this end, we explore the real-time capability of different manufacturers' FPGAs. In the next step towards vehicle application, objective quality measures for the reconstruction need to be developed. These measures reflect the specific requirements of the assistance and driving functions used, and will be included in future development specifications for the reconstruction software.



Whether for planned maintenance or due to unplanned downtime - if the assembly lines are at a standstill and no cars can be produced, the company loses money. Predictive maintenance promises a solution: this is a method that helps to optimise maintenance intervals and detect incipient problems in good time, long before the machinery breaks down. One of the major vehicle manufacturers was interested in this concept as a means of further improving efficiency, and awarded EDAG a contract for its implementation. High-performance hardware was needed to be able to process large quantities of data with intelligent software; not, however, in the computer centre, but close to the machinery, in the network periphery. In cooperation with Dell Technologies, we developed an edge computing solution which in practical use more than proved its worth.

Time is money – this is particularly true in the automotive industry. Normally, the belts here run at full capacity, so it is not easy to make up for any disruptions in production. Accordingly, overall equipment effectiveness (OEE) depends to a high degree on the smooth running of the production plant. It is not simply a matter of avoiding unplanned downtimes; maintenance and optimisation work should also be carried out as infrequently as possible. But until recently, one of EDAG’s major customers premises performed this work at fixed time intervals.

Predictive maintenance promises appreciable improvements in this area. Maintenance intervals are measured not by operating hours, but according to „equipment health“. Provided that wear parts and materials are in good condition, there is no need to stop the machinery unnecessarily. To this end, it is necessary to collect extensive quantities of data that will show whether all relevant parameters are within the normal range. In this way, incipient problems can also be detected in good time.

Bearing damage in the power unit, for example, is indicated long before a breakdown by the way the power consumption creeps up. If this is noticed in time, thorough preparations can be made, and the part replaced in very little time, whereas if the machine suddenly stops, first of all, the reason needs to be found, and then there is no guarantee that a replacement unit and the required service personnel will be available at that precise moment.

The implementation of predictive maintenance places high demands on computing power and storage volume: large quantities of data from countless sensors and actuators provides information not only about the status of machines and systems, but also about the environment,

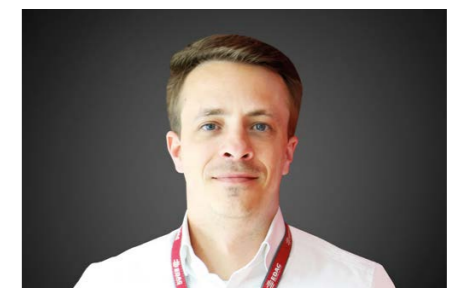
for instance temperature and humidity. This flood of data has to be analysed by means of artificial intelligence, to find repetitive patterns and detect constant changes.

„Using intelligent technologies, our customer wanted to optimise the maintenance of its production facilities, and become considerably more efficient in terms of cost, quality and time,“ explains Mark Kramer, Head of Production IT (Smart Factory Solutions) at EDAG Production Solutions GmbH &Co. KG. Working for the engineering service provider, he is responsible for consulting, planning and implementing production IT. This includes the development of cyber-physical systems, manufacturing execution systems such

as MES, big data solutions for production optimisation, quality management, real time information systems and predictive maintenance.

The first step was to decide what data was needed, how to acquire it, and then to understand what influence it has and how the different data interacts. In cooperation with technical experts, the EDAG engineers developed pertinent hypotheses which were then validated and became part of the data evaluation, is how Jacek Burger, project leader for embedded systems & artificial intelligence and software development expert at EDAG Engineering GmbH, describes the process for arriving at the AI models.

Mark Kramer
Head of Production IT
Smart Factory Solutions



The size of the database and the intelligence and performance of the analysis algorithm are key factors in the quality of the knowledge gained. Accordingly, it is important to install powerful hardware. EDAG decided to employ an edge computing solution, i.e. a high performance IT infrastructure at the „edge“ of the company. Such decentralised data processing in the periphery of the network and close to the data sources is characterised by lower latency periods, and also reduces the risk of disruptions in data communication.

The necessary infrastructure was a joint development by EDAG and Dell Technologies. The IT manufacturer offers an extensive portfolio of products and solutions for edge computing, which covers virtually any application. In addition to its storage and server hardware, Dell Technologies also has the expertise to provide and manage the IT infrastructure in accordance with individual user requirements: at the edge, but also in the computer centre or a hybrid cloud environment.

The edge solution is required to fit seamlessly into the corporate IT system - not act like a foreign body and increase complexity, which would be contrary to the goal of improving efficiency. Finally, the predictive maintenance solution was interfaced with all other systems, including logistics, PLP (product longevity program), MES (manufacturing execution system) and ERP (enterprise resource planning). „The challenges in this project were demanding, as the underlying software had to be individually developed. The customer's systems and infrastructure are very specialised, so wide-ranging expertise was required to coordinate the AI system and the hardware,“ expounded Kramer.

The pilot project did indeed achieve all the goals that the customer had expected from predictive maintenance. The planning of maintenance and service intervals was improved, and the use of service personnel reduced. There have since been fewer unplanned machine breakdowns, spare parts management has been optimised, and the analysis of the data col-

lected has improved the understanding of the machines. As a result of the reduced downtimes, overall equipment effectiveness (OEE) rose by 2 percent.

„Although this might sound insignificant at first, such an improvement in OEE is outstanding in the automotive sector, which has already trimmed its processes to achieve maximum efficiency. Originally, we assumed the figure would be lower, so the customer is really very happy indeed,“ sums up Mark Kramer. The solution developed in the pilot project is now being rolled out to the customer's other plants and factories worldwide. At the same time, the practical experience gained is being channelled into the further development of the data analytics cluster.

If you, too, are interested in innovative solutions such as edge computing, artificial intelligence and machine learning, and in increasing the efficiency of your plant with intelligent applications, Mark Kramer will be happy to answer any questions you might have.



„TOP EMPLOYER“ AWARD IN THE CATEGORY „AUTOMOBILE“ FOR THE 14TH TIME!

EDAG Engineering GmbH received the „Top Employer“ award for outstanding human resource management on January 20, 2022. The independent jury of the Top Employers Institute testified once again to the outstanding working conditions offered by the world's largest independent engineering service provider in the mobility industry, and recognized its employee orientation. The Top Employers Institute has an extensive validation process for examining companies which, among other things, reviews people strategy, work environment, talent acquisition, learning, well-being, diversity and inclusion.

„An excellent calling card, and one we are delighted with. Again, this award is a visible and transparent acknowledgement of our continuous work and excellence in human resource management. Our high HR development score shows that our internal job portal gives employees the opportunity to take their next career step with us. In addition, we have introduced a new People Review to identify

and promote potential employees, and use modern Microsoft 365 functions such as Teams, Planner and Forms to make our daily work easier. These permanent investments in HR development and new working environments are extremely important to us, to ensure that we maintain a consistently high level of attractiveness as an employer. We offer an environment of encouragement and development for potential applicants, but especially for our employees,“ emphasizes Holger Merz, CFO of the EDAG Group.

Throughout Germany, a large number of well-known companies took part in this year's Top Employer competition – including 115 certified employers in the category „Automobile“. The competing companies are put through a uniform validation process. Diversity, talent strategy, apprenticeships, training, development and corporate culture, but also processes such as onboarding, are all subjected to close scrutiny.

„The annual objective assessment of our human resources management is particularly valuable for us,“ explains Wolfgang Fries, Head of Global Recruiting and HR Business Partner. This certification shows that we offer an outstanding working and development environment, while at the same time giving us the opportunity to uncover potential fields of development. So we continue to take on the challenges of the changing world of work, and are working on ensuring our employees a superlative environment not just now, but also in the future.“

As an engineering partner for complete vehicles and production plants, EDAG offers engineers a wealth of prospects for their professional and personal development. Numerous innovative projects at national and international locations makes EDAG one of the most attractive employers in the mobility sector for both career starters and people with experience.

In the past, energy management in vehicles was mostly about dealing with electricity consumers as efficiently as possible. Today's electric cars are radically changing that. AI enables them to find out for themselves when the driver(s) will need how much power in the battery and, at the other times, to earn money independently as participants in an electricity network („grid“) with the battery capacity. The networking of a vehicle with the manufacturer makes it possible to collect empirical data on the energy flows in the vehicle. The OEM can then optimise energy management and feed it back into the vehicle via software updates. Even more is possible.

Energy management has changed a lot over the years. In the early days of the automobile, batteries were only important for starting the exterior lighting, but since the turn of the millennium at the latest, the multitude of electrical consumers has made energy management necessary. The electric car brought new momentum to this topic. And the next major leaps in energy management are already on the horizon.

Experts distinguish between four different evolutionary stages:

ENERGY MANAGEMENT 1.0 (FROM 2000) - ONLY SMALL CONSUMERS

The vehicle must regulate the consumption of the low-voltage (LV) devices in the on-board network. This includes, for example, the radio central locking system, navigation system, (parking) heater, entertainment systems and many other small consumers.

ENERGY MANAGEMENT 2.0 (FROM APPROX. 2012) - INCLUDING ELECTRIC DRIVE SYSTEMS

With the introduction of high-voltage (HV) systems for electric drive in hybrid and electric vehicles, vehicle developers need to develop and implement new energy strategies (within physical limits and known historical measurement data). Particular focus is on:

- the control of currents on the consumer side
- power management within the battery (for high power requirements)
- charge current management (also under thermal aspects)

This form of energy management is currently state of the art.

ENERGY MANAGEMENT 3.0 (FROM 2020) - NETWORKED VEHICLES

From around 2020, cars will no longer be solitary vehicles, but rolling networked computers that exchange data intensively (in both directions) through a permanent cloud connection. This includes:

- Data exchange on the ageing behaviour of batteries
- Software updates for an optimised operating strategy for battery utilisation
- Automatic navigation to available charging stations
- Externally controlled, intelligent charging management to support smart buildings, smart grids and decentralised energy storage.

Although energy management is already highly networked in this context, it is often determined by manufacturers' specifications and optimisations.

ENERGY MANAGEMENT 4.0 (FROM APPROX. 2025) - ACTIVELY CONTROLLING VEHICLES

In the fourth stage, it is no longer the manufacturer's operating strategy (which may be adapted by current data and fed back in the form of software updates) that determines energy management, but the vehicle itself. The vehicle itself uses empirical data from the individual past, such as

- the battery status and charge level
- the driver's usage behaviour (including evaluation of his schedule)
- Price signals from local energy suppliers
- Calendar, weather and traffic data

The focus is on the most important resource of an electric car: its battery. With current capacities of 50 to 120 kWh, it has a much larger storage capacity than, for example, the electricity storage of a house solar system (usually 6 to 8 kWh). However, drivers only use their cars for a few hours a day, and the rest of the time they sit around unused.

THE VEHICLE BECOMES AN ELECTRICITY BROKER

An active vehicle therefore connects its energy management to local energy grids to actively buy, store and later offer electricity again (without manual „permission“ from the owner and taking into account the cyclability of the energy storage). It can establish the necessary contracts itself on a daily basis via smart contracts and takes into account the most likely usage scenario of the vehicle via artificial intelligence and neural networks. To do this, it also draws on information from other platforms and from the internet.

For example, it can store the excess cheap wind power in the battery on a stormy night and offer it again at a high price in the morning from 6:00 a.m., when the population needs the power for breakfast - but only enough so that the driver can also safely make his way to the office and the appointments in his diary from 7:30 a.m. onwards.

In the best case, the user hardly has to worry about the energy management of his vehicle and can watch as the car itself earns the money for the electricity it needs for its journeys. In the process, the user can specify what kind of electricity (only sustainably produced) the vehicle is allowed to trade.

Not only vehicle users and energy suppliers benefit from this networking, but also the OEM to whom the vehicle fleet supplies data. It can itself act as a data provider for energy decisions and offer this as a service.

Ultimately, the vehicle merges with its environment as part of a comprehensive energy network and becomes an important part of the energy supply.

GENERAL TECHNICAL CONDITIONS FOR ENERGY MANAGEMENT 4.0

In order to be able to implement Energy Management 4.0, numerous technical developments and a comprehensive energy end-to-end system approach in electronics development („E4“ for short) are necessary. This includes:

- an electrical/electronic architecture that provides for a central control unit, which can also be a domain or high-performance computer
- compatibility with AUTOSAR Classic and AUTOSAR Adaptive
- sophisticated fault management in the event of a loss of connectivity to the cloud or failure of individual components in the vehicle
- advanced battery management for high currents depending on ageing and thermal management
- an interdisciplinary development approach for energy management across all areas of a vehicle



Benjamin Mangold
Manager Electric Drive
and Energy Systems

Peter Weismüller
Project Manager
Embedded Systems



They weigh several tonnes. Skillfully steering them across the fields requires years of experience: without combine harvesters, agriculture would not exist in its current form. But can even huge vehicles like these be operated without a driver? Autonomous driving on public roads is still prohibited by law - but technologically possible. Adapting and further developing this technology for the commercial vehicle sector promises a wide range of advantages. In this context, EDAG is helping to drive decisive steps forward.

Today, vehicles park themselves, keep in lane or maintain the necessary safety distance. This shows that much is technically possible - including fully autonomous driving. However, the legal framework for this is currently lacking. Vehicles are not yet allowed to drive fully autonomously on public roads. Even with the active support of comfort and safety systems, responsibility must remain with the driver.

If we make the leap to the commercial vehicle sector, many fields of application for autonomous driving in the non-public sector will also become apparent here. Driverless operation saves costs and increases accuracy and availability. People can also be assisted and protected in high-risk tasks, such as mining, the removal of contaminated materials or off-road.

AUTOMATION IN THE COMMERCIAL VEHICLE SECTOR - A CHALLENGE?

At EDAG, we look back on a wide range of customer projects in the field of automated driving - both in system design at vehicle level, and also in the development of control units. We have realised several value-added practical applications with environment recognition and sensor data fusion for automotive customers and developed the necessary algorithms ourselves.

How can we use this experience? To do this, we often use existing solutions in a „misappropriated“ way. One approach, for example, is to integrate a central gateway into the electrical/electronic vehicle architecture. This collects the existing vehicle functions and enables a targeted modification. Functional safety and protection against manipulation (security) are fundamental here in order to protect the environment, data and people.

EDAG has developed a system and software platform. This is based on embedded universal control units and enables autonomous driving even for larger vehicle fleets of up to 500 series production vehicles. In order to respond to the different requirements of our customers, we have set up the platform generically.

Let's take a look at selected functions that our generic platform includes - because driverless operation of mostly large machines in the commercial vehicle sector brings further legal and technical challenges.

OPTIMALLY PLANNED: IT ALL COMES DOWN TO PATH PLANNING

Path planning is crucial in order to move the vehicles safely along the intended route. There are two options, depending on the application: a live calculation of the route or virtual planning by means of a map stored in the control unit or in a control centre.

In driverless operation, the vehicle must reliably determine the respective actual position. In the outdoor sector, this is done via a Global Navigation Satellite System (GNSS), such as GPS or Galileo. In addition, there are correction systems that are also based on satellites or installed reference stations. However, since there can still be deviations between the actual and target position, many use supplementary infrastructure measures for localisation. These can be RFID transponders on roads or ultrawideband reference transmitters on objects, for example.

KEEPING AN EYE ON THE SURROUNDINGS: RELIABLE ENVIRONMENT DETECTION

Sensor technology faces a variety of challenges, especially in the outdoor sector. Ambient conditions change, for example due to dust, rain or fog. Even the nature of the detected surface is not constantly the same. How can errors be avoided?

The use of redundant systems based on different technologies offers a reliable solution. The raw data is evaluated and fused into an intelligent logic. How many different technologies are used differs depending on the application - costs and benefits must be considered individually here.

STEADY ON THE PREDEFINED PATH: THE PATH CONTROL STRATEGIES DO THE TRICK

Even in the event of external disturbances, a vehicle must follow the path and not suddenly lose it. For this purpose, path control strategies are used to ensure that the vehicle stays on the defined path. A central vehicle control unit (VCU) takes over the longitudinal and lateral controls. It also controls the steering, acceleration, deceleration or switching of other functions such as lights and turn signals.

Sensors monitor the path control. Various sensor data, such as the lateral deviation of the vehicle from the defined path or possible misalignments, are constantly recorded and transmitted to the VCU. There, the data is processed, filtered and converted into a uniform format - thus it can be determined whether the vehicle deviates from the specified setpoint. In short: It is monitored in real time whether the vehicle is still on the previously defined path.

AUTOMATIC EMERGENCY STOP FUNCTION INCREASES SAFETY

As mentioned, safety is always the top priority in autonomous driving. The localisation of the vehicle must therefore function reliably. The data from the self-localisation are therefore constantly compared with those from the trajectory and control deviations are detected. If the distance between the vehicle's own position and the reference track exceeds a previously defined threshold value, an emergency stop function can be activated. This increases the safety level enormously.

CUSTOMER REQUIREMENTS IN VIEW: INDIVIDUAL SYSTEM SPECIFICATIONS

We develop the underlying system to further advance autonomous driving - but individual customer requirements take centre stage. That's why we work with our customers right from the start of the development process and record their requirements. Together we analyse the dangers and risks and can thus define the safety level of the system. Only then do we begin with the customer-specific application development.

Our embedded systems make a future-proof contribution to vehicle automation. Since the projects are scalable, they range from prototypes and showcase scenarios to productive solutions. Quality and safety are our top priorities. Our systems are as generic as possible and as application- and customer-specific as necessary. We develop automation systems holistically and integrate them into our customers' vehicle fleets.

EDAG HAS DEVELOPED A SYSTEM AND SOFTWARE PLATFORM (...) FOR LARGER VEHICLE FLEETS OF UP TO 500 SERIES PRODUCTION VEHICLES.

Back in 2011, the German Federal Government launched a project called „Future Project Industry 4.0“, which was aimed at preparing industrial production for the future and giving companies the opportunity to play an active part in the fourth industrial revolution and add weight to establishing and promoting digitalisation in industry.

The intention behind Industry 4.0, or the 4th Industrial Revolution, was to replace outdated production methods with intelligent, networked production systems, in this way bringing about the intelligent fusion of manufacturing, product and IT. This enables companies to react flexibly to rapidly changing conditions and customer requirements, and to adapt and optimise

their products and processes accordingly. consumer tests (e.g. NCAP) and homologation, OEMs are having to bow to this pressure and incorporate more and more functions in the vehicle. Especially in the area of driver assistance systems and autonomous driving, this leads to extremely complex task in terms of die computing power.

For the vehicle manufacturers, implementation of the development plans is always to the fore, and the focus is clearly on functionality – „make it work“ is the motto here. Large development teams work independently of one another on highly complex tasks such as road sign and object recognition, etc., sometimes for several years.

Finally, all the functions have to be incorporated into the vehicle – and then comes the realisation that there is not enough computing power for all the functions to be carried out at the same time. As start of production approaches, OEMs see that time is running out, and they find themselves under more and more pressure. If they have not already done so, now is the time to reduce algorithms, recognise optimisation potential, and then optimise to solve the problem.

WHAT ARE THE ADVANTAGES OF THE SMART FACTORY?

In all industries, the Smart Factory is the answer to the ever-increasing requirements and challenges confronting the manufacturing industry. Individualised customer requirements call for a high degree of planning accuracy and use of resources. Efficiency, productivity and quality are all expected to increase, though at the same time, costs are to be cut to a minimum. These targets are very difficult to achieve. Not for die Smart Factory, though.

Intelligent manufacturing can meet all these requirements, and has many more advantages over conventional production methods, including the following:

- Reduced production costs
- Increased efficiency
- Quality assurance
- Fast reaction of production to changing or fluctuating market requirements
- Shorter delivery periods
- Transparent, automated order and supply chains
- Reduced time to market of new products
- Costs are already reduced in the planning and conception phase
- Later investments in hardware
- Optimised, agile, lean and accelerated processes
- Increased productivity along with reduced production time
- Production of individualised products in extremely small quantities at competitive prices
- Quick adaptation to new products and processes

Andreas Friedrich
Head of Smart Factory
Manufacturing Solutions



THE 5 PHASES OF THE SMART FACTORY – THE PRODUCTION DEVELOPMENT PROCESS AT EDAG PRODUCTION SOLUTIONS.

Years of production engineering know-how and a high degree of process reliability are our hallmark. Also, we have repeatedly optimised not only our technical processes, but also our tried and tested project management process, and over the years, have taken the countless standards and regulations for manufacturing processes and filtered out an essence that, in our view, combines the best standards from them all.

This has resulted in a standardised process model which provides transparent development steps that can be used to implement all Smart Factory projects and also the individual elements within the intelligent factory.

Our „5 phases of the Smart Factory“ is therefore a standardized production development process that can be scaled and extended to include other subject areas, to guarantee our customers absolute transparency and safety in every phase.

The input and know-how of our customers are essential if the 5 Phase Model is to be successfully implemented. When it comes to your product and your manufacturing processes, you are the experts, and we need your knowledge so that we can combine it with our own expertise in the design of production facilities, in order to pave the way to an efficient Smart Factory.

The milestones in our process model are:

- Phase 1: The smart vision
Taking the customer’s strategy as our basis, we develop an initial target definition.
- Phase 2: Analysis
The customer’s requirements are defined, initial ideas and possible solutions are shown and discussed, and potential identified.
- Phase 3: The concept
At the end of the conception phase, concrete processes for the ideal approach are presented and validated; this process also includes a cost-benefit and feasibility analysis.
- Phase 4: System development
The Smart Factory, with all elements from the concept, is constructed virtually - i.e. without hardware - and the cost-benefit analysis is again validated virtually.
- Phase 5: Manufacturing the system
Your Smart Factory is now physically constructed and handed over to you after the smart ramp-up and performance verification.

The digitalization of traffic in Germany is continually gathering pace. Using vehicle and traffic infrastructure data opens up numerous opportunities, for example in the development of smart cities or new business models. But for this to happen, we need unhindered communication by means of open standards – and the corresponding publicly-owned platforms.

The car of the future is electric, digital and not just a means of transport, but also part of the grid, the electric power supply. Because the energy transition, with many thousands of decentralized supply points, is making it increasingly difficult for grid operators to ensure grid stability. Electric-

ty storage systems that absorb or release energy as required are therefore becoming an increasingly important stabilizing factor. And why go to the enormous expense of setting up large storage systems when the same effect can be achieved locally, using small storage systems that are already available – namely the batteries in electric cars? This is at least the idea behind the concept of bidirectional charging already being practiced in Japan and California, for example.

German vehicle manufacturers will also be making use of the technology in the future. VW, for instance, has announced that all ID models with a 77-kWh battery will be using this technology, initially to ensure the supply from the home energy system, then later to enable energy to

be fed back into the public power grids [Source: Volkswagen]. However, this is expected to take about two years. BMW is testing the technology as part of a pilot project involving specially equipped versions of the i3 [Source: BMW], while in Japan, Mercedes, with its EQS and CHAdeMO, the Japanese charging standard, is able to charge bidirectionally into the home supply (V2H, "vehicle-to-home") and into the public grid (V2G, "vehicle-to-grid") [Source: Daimler]. In this country too, there are already startups offering car owners the opportunity to earn money with this type of business model. Up to € 1,000 a year can be earned for contributing to the stabilization of the power grid.

One reason why progress is not faster is the lack of standardization: the ISO 15118-20 standard is to regulate the communication for bidirectional charging – but the standard is still under discussion.

LANGUAGE CONFUSION INSTEAD OF UNIFORM DATA BASIS

The situation in the traffic flow is even more complex. The needs of municipal, state and private service companies that construct, operate and maintain traffic routes, of the providers of traffic infrastructure - for instance smart traffic lights and lamp posts, and last but not least of the vehicle manufacturers with their brand-specific on-board units (OBU) all have to be reconciled. Not even for the wireless data transmission has a standard platform been found: in Europe and other markets, when it comes to car-to-anything communication (C2X), the two standards pWLAN (WLAN in accordance with IEEE 802.11p) and LTE/5G compete with one another.

Hence there are numerous manufacturer-specific protocols, platforms and interfaces standing in the way of rapid digitalization. Moreover, there is a risk that sheer market power will ultimately prevail - and that American IT groups will as a result not only determine further developments, but also seize the added value generated. With services such as autonomous driving, map services and software platforms, as central communication and infotainment hubs for instance, Google, Amazon, Microsoft & Co. are already encroaching on the domains of the OEMs and offering their services as cooperation partners. And there is no end in sight.

CHALLENGE OF THE SMART CITY

For the challenges of a future-proof traffic development, it is essential that all the players involved cooperate and create as comprehensive a data basis as possible. Only in this way can traffic be controlled and traffic information supplied by a single provider. Parking status, air quality data, new roadblocks and any that have been removed, congestion and public transport news are just some of the factors influencing how people get from A to B.

Moreover, the quality of strategic traffic planning and operational traffic management can be improved with the corresponding data if, by means of simulation for example, the effects of traffic light controls, new cycle lanes or rerouting are estimated in advance and optimized to meet the required goal. Ideally, municipalities might offer this data to citizens as a transparent, GDPR-compliant service of their smart city.

COVETED MOBILITY DATA

European automobile manufacturers are indeed in the development phase of uniform data standards and interoperable systems. But there are attempts on the part of the municipalities and other players to consolidate the valuable vehicle and traffic data and utilize it locally. With GAIA-X, the intention is to create a data infrastructure at EU level that will secure the digital sovereignty of European states and the companies based here, and can serve as the basis for a transparent digital ecosystem that will respect the privacy of citizens.

More than 850 members and 425 organizations have come together in the German GAIA-X hub. The Federal Ministry of Economics is funding this initiative in 65 different projects. In Germany, GAIA-X

Nikolai Pappert
Business Development
Manager Smart Cities



HOW MOBILITY DATA GENERATES BUSINESS MODELS



covers ten different domains including the smart city/smart region, to improve the infrastructure by providing data platforms for towns and rural districts.

In addition, the Federal Ministry of the Interior (BMI) is sponsoring this area to the tune of € 850 million euros in 73 projects with the "Smart Cities Made in Germany" program. The aim is to modernize the infrastructure and digitalize the public arena on the basis of the Smart City Charter. Among other things, this recommends that data should remain under the sovereignty of the town collecting and generating it. A further aspect is the use of open source software to avoid vendor lock-ins and ensure access to the source code.

STRONG PARTNERS REQUIRED

The municipalities, however, need not just a good technical basis, but also access to the other players, for instance the automotive OEMs and providers of smart transport infrastructures. The list of questions to be clarified is long: functionality, serviceability, data protection (GDPR), data security and the relevant legal conditions pose enormous challenges for cities and local authorities, as well as for vehicle manufacturers.

As an independent and innovative partner to the mobility industry, EDAG can assist local authorities and cities with the conception and implementation of holistic smart city solutions and data platforms. One example of this is EDAG's involvement in the "Campus FreeCity real lab for the research of a networked fleet of modular robot vehicles" project sponsored by BMVI. The CityBot mobility concept developed by EDAG plays an important role in this project. A further project is the visualization of the smart city data platform for the city of Paderborn, which offers innovative services based on urban data.

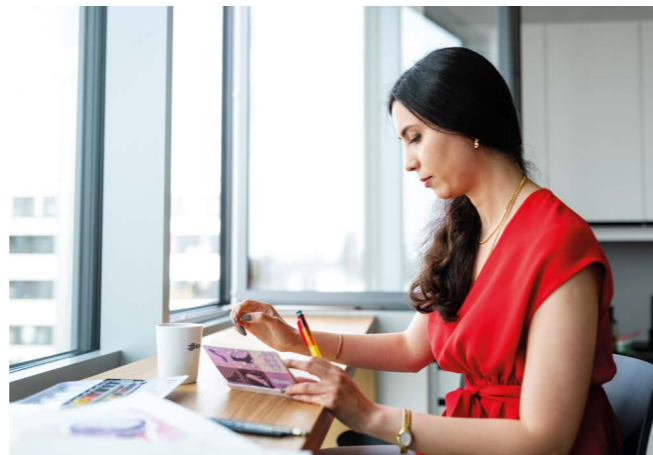
But for OEMs too, EDAG as your project partner can facilitate and accelerate collaboration with municipalities. As engineering specialists, we see ourselves as mediators and moderators who have insight into both areas. EDAG provides the know-how needed to push development ahead, both for smart cities and for vehicle manufacturers. For example, the ecosystem consisting of the hardware and software developed for the CityBot can be transferred to other vehicles at any time.

One of Bahareh's stories is about a crayon. A sad, white crayon that is envious of the other crayons' pretty colours. Which at first doesn't know what it might be needed for and what it can do. But the hero sets off on a journey to find this out, and in the course of the story discovers its magic powers – and tasks that only it can do due to the very fact that it is a white crayon.

Bahareh says there is a great deal of herself in this children's story. After all, she wrote it herself. „I, too, had first of all to learn self-confidence.“

Bahareh is not just an author of children's books. In her day job as a project manager in the EDAG Group's test laboratory in Unterschleißheim, she checks whether and how the control units in a vehicle's camera sensor system communicate with each other. The 31 year-old development engineer explains that the subject of autonomous driving has always fascinated her. And working for the EDAG Group, this fascination flows into her daily work.

Bahareh's family comes from Iran. Her father had been working for a German company for a while when, in 1990, she was born in Hamburg. While she and her sister were still small, he returned to Teheran with the family, to take up a job as a mechanical engineer. Bahareh shared his enthusiasm for technology, and studied electrical engineering after school. For her thesis at the university, she developed a microchip for an implantable hearing aid, and published her scientific findings in three articles in a journal. After completing her degree, she worked for an oil company for two years. A good job. But life for a woman in Iran was not good – and she returned to her first home: Germany.



LOST IN TRANSLATION

Not an easy step to take, as anyone knows who, like her, has previously studied in another country and has to apply for recognition of their degree in Germany. And then there's the complex German language, the rules of which are just about incomprehensible if you haven't spoken it from an early age. When doing her Master's degree in automation and software technology in Stuttgart - recognition for her Iranian Bachelor's degree having in the meantime been gained - she hardly dared to speak a word to begin with. If a professor asked a question or other students were chatting in German. She was afraid of making mistakes. „I always knew the answer, but didn't dare to speak,“ relates Bahareh looking back on this time when she was often unhappy and full of doubt.

But at some point she realised that the most important thing is not the language, but self-confidence. She decided just to go ahead and say something. „Of course the sentences were not correct, but the others thought it was a good thing that I was joining in and speaking my mind.“ Like in the story of the white crayon.

PASSION WINS

Bahareh laughs a lot when recounting her story. „Life's too short to learn perfect German,“ she says with a twinkle in her eye. And it doesn't play a very important role in everyday life with the EDAG Group. Her team is international. It includes colleagues from Spain, Albania and India. „My colleagues say that when I tell them something, they can feel my motivation. That's why I can convince the others so well.“ Passion counts for more than perfect grammar.

LEARN SOMETHING NEW EVERY DAY

Bahareh joined the EDAG Group almost three years ago, after completing her Master's thesis with Bosch, where she was involved in the construction of an autonomous vehicle. Obviously, she had opportunities with the large corporation, but she decided in favour of EDAG. „This is where the interesting things are happening. We service providers do most of the development and testing,“ says Bahareh. Also, she enjoys the wide variety her work offers. „So far, there has not been a single day when I have not learnt something new,“ she says.

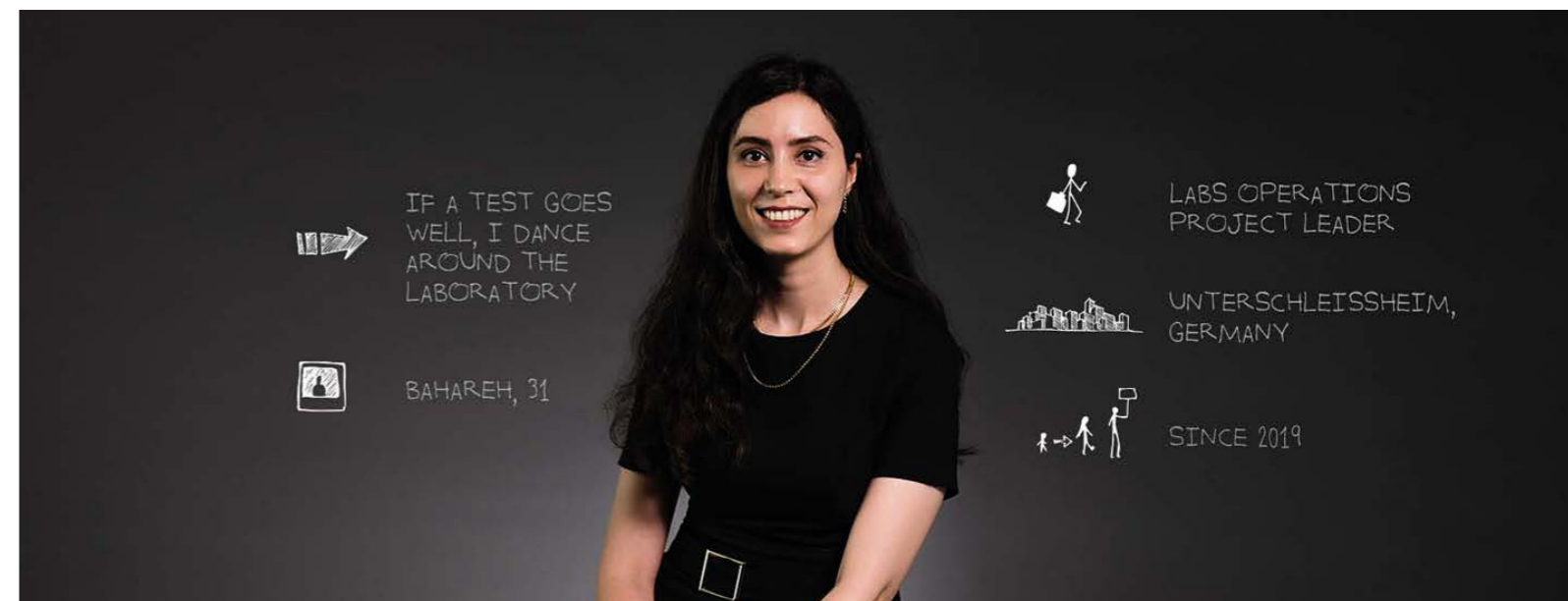
If a test proves successful, it can happen that Bahareh dances around the laboratory. Her colleagues know all about this. Here, she can be just as she is, she states. And the team is also there for each other

during difficult times. This became evident when Bahareh's mother fell ill and died. Bahareh went to Teheran for two months. „I was given the time I needed. Nobody said to me, 'Bahareh, you have to come back to work'. All they wanted to know was how I really was,“ she recalls. Any worry that her career might suffer on account of this time out of the office also vanished into thin air. Shortly after her return, Bahareh became a project leader.

GREAT AUTONOMOUS VISION

Her test team, says Bahareh, is like a family. Sometimes, her colleagues also benefit from Bahareh's second passion. She not only writes and illustrates books in her spare time: she is also a passionate cook. Persian dishes such as kufte, meatballs with nuts and plums. Or mirza ghasemi, a traditional dish of an aubergine dip with eggs. She leaves herself plenty of time for this, sometimes spending hours in the kitchen. „If I have been writing or cooking, I am a much happier person at work the next day.“

Her professional dream: to help to shape the smart city. In which cars and public transport are self-driving and everything is interconnected. And there should also be a smart café in this smart city. In which everything runs autonomously. And with the coffee, there will be napeloni, with Persian rose cream between layers of flaky pastry. Her favourite cake.



"What kind of an evening did I have yesterday? It was great. I went swimming, cycling and then running," says Nico with a beaming smile. It took him three hours. Couldn't he maybe scale things down a little? A jog around the park, a few press-ups and then out to the cinema or for something nice to eat? "Well, I do enjoy doing those things, too, but it would hardly be the ideal preparation for a triathlon." And when Nico says triathlon, he means the real thing: a 3.8 kilometre swim, a 180 kilometre bicycle ride and a 42.2 kilometre run – without a break. Preferably on Hawaii, where every year the world's best triathletes compete in the Ironman contest.

FABULOUS TIME TO ALI'I DRIVE

Last year, Nico reached the finish line in the legendary Ali'i Drive in Kona in a time of nine hours and nine minutes. A fabulous time for an amateur sportsman. Place 169 in the overall ranking, one hour and 17 minutes behind countryman and professional Patrick Lange, who, in his second Hawaiian success was awarded the laurel wreath after setting a new record.

In order to be able to keep up so impressively with the top-ranking super athletes, Nico needs to train for 12 to 18 hours a week – in his spare time, it should be noted. Because unlike Patrick Lange, Jan Frodeno, Faris Al-Sultan & Co., full professionals who push themselves to their limits, Nico also has a demanding full-time job to do in addition to the triathlon.



CAME TO STAY

Let's look back. In 2006, after finishing secondary school at home in Sindelfingen, Nico began an technical product designer's apprenticeship at EDAG. He came to stay. Today, he is a project coordinator in car body development, where, with his team, he carries out CAD design work for customers such as Daimler. EDAG's CAD engineers in Sindelfingen focus on parts and components for body in white assembly.

"Even as a child, I had an affinity for technology, always enjoyed tinkering and making things, and in fact I still make all my furniture myself," reports Nico. He also tackled the job of converting a VW minibus into a sport and travel mobile himself. "I just like pottering about and working things out for myself."

SHIFTING THE LIMITS OF WHAT CAN BE EXPECTED

It stands to reason, then, that he also produces made to measure parts for his triathlon bike wherever possible. Just recently (after training!) he designed a food box with a mount for his bike in CAD and then, in a 3D printing process, produced it to meet his requirements. "What I do is follow my curiosity, always trying to shift the limits of what we can expect just that bit further," states Nico. "That's also what I like so much about EDAG. In our projects, we have to pay attention to a great many elaborate details. We handle extremely sophisticated precision technology. And we are talking about projects the size of a car here, not Swiss watch dimensions.

But how do this enthusiasm for his job and passion for the triathlon go together? Is it at all possible to stay at the top of every field without somewhere along the way encountering "the man with the hammer" so feared by marathon runners? "In a triathlon, just like in any other challenging project, there are always those phases where you ask yourself: Why are you doing this? Are you even going to make it?" as Nico knows from experience. "Negative thoughts like this will get you nowhere. On the contrary; you have to set yourself positive targets and listen to your gut feeling, to find out what strengths you need to mobilise and how to pace yourself most effectively."

NO TO LIFE IN A TUNNEL

Triathletes are absolutely mad, and can think of nothing beyond their training, perfecting their performance and remaining focussed. This is a common cliché, but one that has nothing to do with Nico: "Life in that kind of tunnel would be no good for me. I want to enjoy my sport. My limits are set by the way my body feels."

If you are already working 50 hours a week during the peak phase of a project, your body cannot cope with the strain of extreme sport. "At such times, I never push myself, and would certainly never put my health at risk," explains Nico. "For me, it is basically a question of finding a fun way to achieve my targets while pushing myself to the utmost – but always within the bounds of what is actually possible here and now."

NO DESIRE TO BE DEPENDENT

That's why he doesn't want to be marketed as an athlete. "I'm not interested in professional sponsoring. I have no desire to be dependent, and will always prefer to be free to do what I want. By that I mean being involved in a sport that satisfies me and helps me be at one with nature," says Nico with great firmness.

And speaking of clichés, it is not enough to say that triathletes are just mad: they are mad loners who are quite prepared to use their elbows at the transition areas and the finish line. For me, it is all about team play – in sport and at work," counters Nico. "At the end of the day, even individual records always have many fathers – mothers, too." Recently, he and some sporting friends spent four days running over the Alps from Oberstdorf to Meran. Each carrying a light rucksack weighing just two kilos. "Doing something like that, you have to be able to rely on one another, with everyone accepting responsibility for the group. You can't do it alone. Consideration creates community spirit. And that can move mountains," says Nico.

He also profits from such experiences in his project work. "Only by working together can we achieve success. That is my mantra. If we each give our best, then things work out right," as Nico knows. "If you are crossing the Alps and climbing to the pass proves difficult, putting the pressure on will do no good at all. What we have to do is work together to find a way to solve the task. Once you've done that, then giving it all you've got is fun and extremely fulfilling." As an Ironman, he knows that the reward for the effort involved comes at the finish. Even if you don't get a place on the winner's rostrum.



25 YEARS EDAG MALAYSIA

What began in 1996 with a small office in Shah Alam, the capital of the Malaysian state of Selangor, southwest of the state capital Kuala Lumpur, is now an important development location for EDAG. In its anniversary year, EDAG Malaysia is now expanding its local service portfolio with a new software and mobility IT delivery centre. „Our offerings are aimed at regional and international OEMs as well as start-up and tech companies,“ explains Cosimo De Carlo, CEO of the EDAG Group.

„The competence and experience of the EDAG Group’s global engineering network will flow into the new department,“ says Thomas Föller, Managing Director EDAG Malaysia. The new department works together with all units of the EDAG Group, is closely linked to the group’s IT and bundles a wide range of competences and a wide variety of EDAG resources from vehicle, mobility and software development for the local customers.

In addition to the technical know-how, the location in Malaysia offers further advantages: Thomas Föller refers to the World Bank, which counts the South-East Asian country as one of the most open economies in the world with a modern infrastructure and a high trade balance ratio.

In addition, many highly talented and educated, multilingual engineers are available on the market in the highly developed Southeast Asian country. „As Asia’s leading technology partner for CAE services and an attractive employer, EDAG Malaysia works very closely with automotive R&D centres in the region, in China as well as in Thailand and Vietnam.“



EDAG MALAYSIA EXPANDS ITS ELECTRICS/ELECTRONICS COMPETENCES

With a range of customised electrics/electronics services, EDAG Malaysia is now moving even closer to its customers in the Asia-Pacific region. „With the newly created E/E Department in Malaysia, we are expanding our comprehensive commitment in the Asia-Pacific region. We will mainly benefit from regional and international OEMs, but also start-up and tech companies,“ explains Cosimo De Carlo, CEO of the EDAG Group.

On the occasion of the 25th anniversary of the site in Shah Alam, the capital of the Malaysian state of Selangor, southwest of the state capital Kuala Lumpur, the mobility development service provider is expanding its range of services in three fields: simulation, vehicle safety and project management.

The new E/E department is another milestone in the integrated development and optimisation of vehicles, production plants, derivatives and modules. The competence and experience of the EDAG Group’s global engineering network will be incorporated here,“ explains Thomas Föller, Managing Director of EDAG Malaysia.

To this end, the new business unit cooperates with all of the EDAG Group’s E/E units, is closely linked to the Group’s IT, and bundles a wide range of competencies and a wide variety of EDAG resources from vehicle, mobility and software development for the local customers.

EDAG MALAYSIA EXTENDS A WARM WELCOME TO ITS NEW E/E ENGINEERS!

In January 2022, a new group of engineers joined the company to strengthen the existing Embedded Systems, Mobility IT, I&V and CAE teams. E/E Malaysia is making good progress with its growth strategy of building up a competent software development and testing organization at the Shah Alam/Selangor site. Our Malaysian colleagues are working in close cooperation with our German teams on the development and implementation of customer projects.

OUTLOOK

UPCOMING EXHIBITIONS AND EVENTS

IMPRINT

Do you have any questions or suggestions regarding our Customer Magazine?

Then please contact us:

EDAG Engineering GmbH · Dept. Marketing
Reesbergstraße 1 · 36039 Fulda

Contacts

Christoph Horvath · Press Spokesman for EDAG Engineering GmbH
+49 661 6000-570 · presse@edag.com

Issued by

EDAG Engineering GmbH
Kreuzberger Ring 40 · 65205 Wiesbaden

Pictures: EDAG Group, Adobe Stock, Synektar © 2022

This product is made of FSC® certified and other controlled materials.

© 2022 EDAG Engineering GmbH, Wiesbaden
All rights reserved.

The work including its parts is protected by copyright. Any use is prohibited without the consent of the publisher and the author. This applies, in particular, to electronic or other forms of duplication, translation, distribution and public disclosure.

We strive for the utmost accuracy in all details; however, we can assume no liability for correctness. The enforcement of claims for consequential damages is excluded.

YOUR GLOBAL MOBILITY ENGINEERING EXPERTS

EDAG is an independent engineering service provider working for the global mobility industry. The company has a global network of some 60 branches at the world's major automobile centres to serve leading national and international vehicle manufacturers and technologically discerning automotive suppliers.

In addition, EDAG also offers engineering services in the vehicle engineering, electrics/electronics and production solutions segments. This extensive competence enables EDAG to provide its customers with allround support, from the original idea to design, through to product development, prototype construction and even turn-key production systems. As an innovative technological leader, the company also has competence centres for ground-breaking future technologies for the automotive industry: sustainable vehicle development, safe mobility, digitalisation and drive and storage technologies.