changes

THE MITSUBISHI ELECTRIC MAGAZINE

Theme

Orientation

Knowing where we've come from, where we're headed and how to get there

No.7

Facets of light / Blind football / Inspiration / Gateways / Home / Artificial Intelligence / Values and norms / Monarch butterflies

Yokoso irasshaimase – welcome!

The seventh edition of our magazine is all about orientation. Right from the start: we hope this intro will set you up for what is in store, providing a bit of orientation before we embark on our journey.

First we will turn to light, then delve into the shadows. Then it is off to the stadium, where things are hotting up on the blind football front.

We will reveal how the players get their bearings on the pitch. Then, to give you a sneak peek at the future, we have paid a visit to Mitsubishi Electric's research centre. We will give you a preview of tomorrow today with more on autonomous vehicles and artificial intelligence. We have also asked one of our designers where he draws his inspiration from and how he defines good design. Next we will explore the German concept of Heimat, a core concept for many of us, even if there is no equivalent in English. Then we will reveal what the monarch butterfly on the cover has to do with the theme of this issue.

You can expect all that and more – happy reading!

The changes editorial team

Why is it called orientation, anyway?

“Orientation” comes from the Latin word for east, “oriens”. Interestingly, in the Middle Ages, it had nothing to do with “orienting oneself”, but rather orienting things – namely towards the east. For instance, until the Council of Trent (1545 to 1563), the chancel of every church had to be oriented toward the east, facing Jerusalem and the rising sun to symbolise the resurrection of Jesus Christ. The “orient” was, by the way, always located at the top of old maps, with the holy city of Jerusalem in the centre. It was not until the advent of the compass that maps began to be arranged in the way we are familiar with today.

Polarised light not only lights up (as pictured) crystals, but also helps animals navigate based on the position of the sun in the sky even when it's cloudy.

Towards the light

Few things are as important as light when it comes to orientation. The sun, for instance, reveals the east to us each morning. At noon it shows us the south and in the evening it sets in the west. North is revealed by Polaris, the North Star, whose light travels 430 years through space before reaching Earth. Even birds recognise this fixed star and use it to orient themselves during migration.

For centuries, seamen used the light of the sun and the stars to navigate the seven seas. Later they were guided by the light of lighthouses and buoys as they made their way safely back to port.

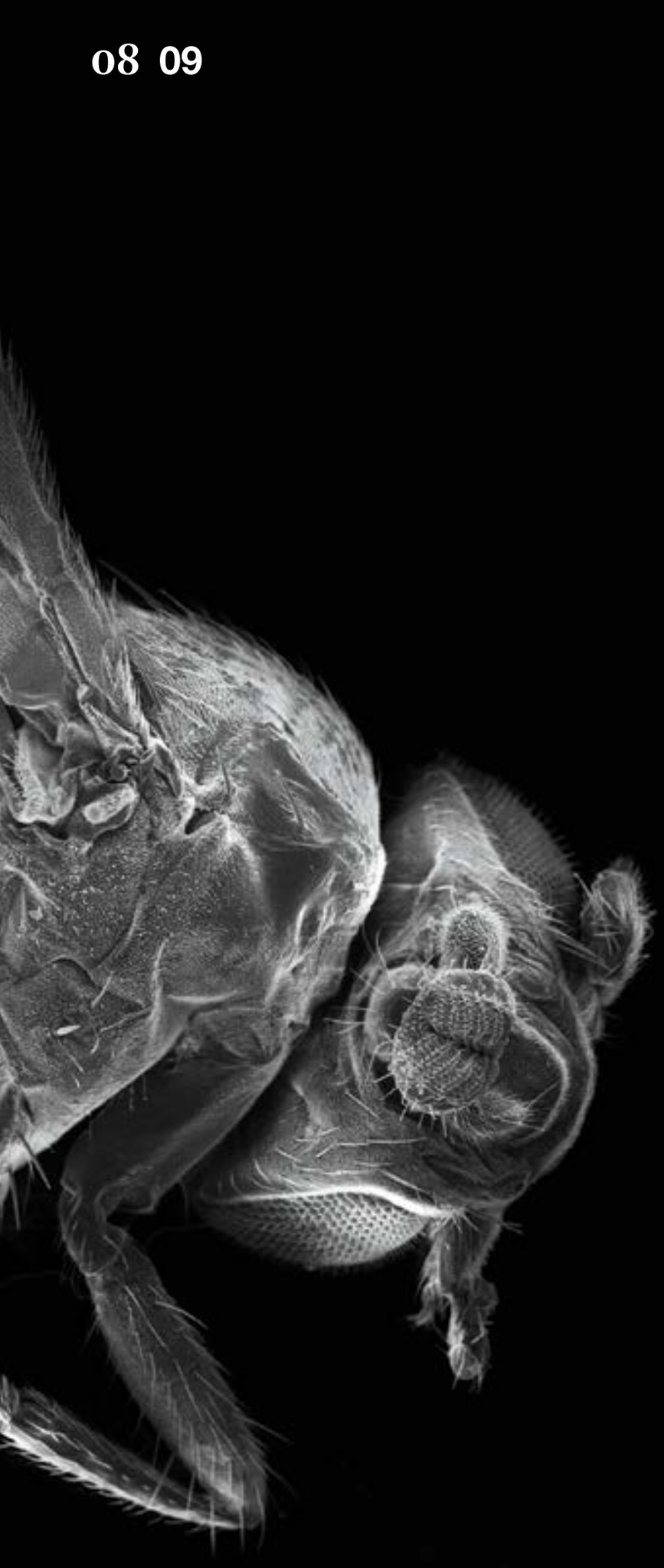
Interestingly, light itself is not visible. Only when it hits an object and is reflected do we see it. Leaves, for instance, reflect a lot of green light, whereas ketchup reflects a lot of red. The reflected light passes through our pupils to reach the retina, where our optical nerve is stimulated. It sends signals to the brain, which conjures up an image of the world around us.
Even in the blackness of the new moon we are still able to orient ourselves on those darkest nights. But of course we also orient ourselves using our senses of hearing and touch – the eyes just make it much easier for us to perceive our surroundings, know where we are and what is going on around us. Even single-cell organisms such as euglena use light to navigate in order to optimise their ability to produce sugars through photosynthesis.

Light also helps in matters of love. The romance of candlelight is to humans as luciferin is to the female firefly, with her tail aglow as she works to attract a male mate. But turning towards the light does not always have a happy ending. When a deep sea fish takes a shine to an irresistible glow in the depths, it may soon end up in the jaws of an anglerfish, which attracts its pray using bioluminescent bacteria in the tip of its lure.

And humans, too, should beware: it is said that people who survive near death experiences see a bright light in the moments leading up to death – though neuroscientists attribute this to a loss of core brain functions. <<

Dutch social design lab Studio Roosegaarde set about making it easier for cyclists to orient themselves in the dark. They found a solution in phosphorescent stones that are laid into the surface bike path. During the day they absorb sunlight and slowly emit it at night so that cyclists can make their way home safely even in areas where there are no street lights.

The sun sends more than sunlight to Earth: it also sends solar wind, a stream of electrically charged particles. When they hit the atmosphere, they ionise atoms of nitrogen and oxygen. When these deionise just moments later, auroras light up the skies. The Inuit believed auroras were a bridge to the beyond, lit by the torches of the dead as they began their journey through the afterlife.



The larvae of Drosophila melanogaster, better known as the fruit fly, orient themselves away from the light – even though they have no eyes. Light-sensitive nerve cells below the surface of their bodies do the "seeing". If it becomes too bright, the larvae quickly seek out a new dark place to hide. Staying out of the sunlight not only prevents them from drying out, but also keeps them safely out of sight of potential predators as well.

Marine luminescence is a natural phenomenon that occurs all over the planet. If things go according to plan for French start-up company 'Glowee', we will soon be able to enjoy the glow of marine luminescence from the comfort of home with bioluminescent lighting systems they hope will replace the need for electric lights.

How were the Vikings able to navigate to Greenland and North America? According to the Sigurd saga, they did so with the help of a "sólarsteinn", a solar stone, which was presumably made of calcite. The stone enabled them to identify the position of the sun in the sky – even when it was cloudy.

Calcite breaks light into two beams. If you look through a solar stone, you see everything double – including the sunlight. If you turn the stone, you will eventually reach a position where both beams are equally bright. Then you know the stone is directed exactly towards the sun. Researchers have been able to use the effect as late as 40 minutes after sundown.

Imagine standing with both eyes closed in a room that is completely dark. Now you spin around a few times. You are completely disoriented. Would you be bold enough to bolt off without knowing were you where? Knowing seven other people are there with you? Three of whom have the same goal as you, namely to kick a ball into the opposing team's goal? Where is the ball? Where is the goal? Is the path from here to there free? Where are my opponents? How do I know who is on my team? Those are just a few of the challenges blind footballers face – and conquer. Want to know how?

Read more here …

Voy!

I'm coming!

When Borussia Dortmund's blind football team comes on to the pitch, there are no singing fans, no rhythmic clapping, no shouts and cheers coming from the south bank, where spectators are singing the "Heja BVB" anthem.

Instead the atmosphere is more like what you would find at Centre Court at Wimbledon: only when a goal is scored will you hear the clapping and cheering. That is just one of the many small differences between blind football and sighted football, though it is surely a significant one.

Those who cannot see where the opposing goal is, or where their teammates are, or where their opponents are, have no choice but to rely entirely on their sense of hearing. Even more so than "regular" football, blind football is a team sport that relies on the communication and cooperation of its players.

The teams consist not just of blind footballers, but three sighted teammates as well. That includes the goalkeeper, the coach at the sidelines and the goal guide behind the opposing team's goal. The callers give the players on the field tips and instructions, but we will learn more about that shortly.
All that close teamwork, both sighted and blind, is what makes blind football something truly special for Hasan Caglikalp: "Personally, I really get a lot from the sport", he says: "You're just a team – whether you win or lose, we're like one big family."

A German summer's fairy tale – in the world of blind football as well.
Caglikalp has been a German blind footballer right from the start. It is people like him we have to thank for the fact that an organised blind football league even exists. When the blind football Bundesliga kicked off its 12th season on 11 May, he was back out on the pitch. At over 50, he is now the oldest player in the league. He has been in the game since 2006, the year of the Sommermärchen, "a summer's fairy tale" as it is called in Germany, when Germany hosted the World Cup. Before his football career, he was a successful goalball player and decorated German champion. The football euphoria that swept the nation in 2006 hit him and a few of his goalball-playing friends just as hard as it hit everyone else.

"Blind football is even more of a team sport than 'normal' football – it relies on the communication and cooperation between the players."

That year blind and sighted footballers throughout Germany came together to play football and pursue their passion for the game. Hasan Caglikalp puts his motivation at the time like this: "I always had an affinity for sports and for football. When I was at school I played around on the cinder pitch and then went on to become a successful goalball player. As a sports official and coach,

Things really get tough.
From tempo to physical strength – blind football is in a league of its own.

I just wanted to give football a try and was able to get some other goalballers on board. For me, high-performance sports begin with football – my colleagues and I just wanted to dare to take the next step at that point."

In fact, blind football is in many respects a true example of peak performance. If you think of blind football as a bunch of visually impaired people carefully feeling their around the pitch with canes for the blind, you have got it all wrong: blind football is a really tough sport.

A big display on a small pitch.

On a small 20- by 40-metre pitch, two teams with four blind players each take up their positions. The long sides are formed by boarding. They are intended to prevent the ball going out of play but can also be used actively during the game.

There is no offside and that also makes the game quick. They play with hockey goals that are approximately 3.6 metres wide and 2.1 metres tall. A match consists of two halves of 20 minutes with a ten-minute break in between.

There is a sound system in the ball so that players can hear it and locate it acoustically on the field.
The sound system also makes the ball heavier, which is a welcome side effect, as it means the ball does not bounce as high and is easier to control.

When two players are battling for the ball, things can get rough. That is why the players wear head guards to minimise the risk of getting injured in a collision. The players also wear total light blackout eyeshades to ensure fair play if certain players have any remaining vision, which makes all players equal on the pitch.

Another precautionary measure is that players must shout 'Voy!' when going in for a tackle. Voy! is Spanish and means "I am coming!" The call helps players avoid collisions. If an opponent closes in on the player with the ball, he has to shout 'Voy!' to alert him as soon as he comes within three to five metres of the ball. Violations are treated as fouls.

The sport is quite demanding.

Not only do the footballers have to know how to take a hit; they have to have a whole lot of other skills as well: "As a player you have to have excellent orientation skills – you have to be quick and have an inner compass to be able to constantly keep track of not just where you are on the pitch, but where your teammates and opponents are, as well as the ball and the goal. At the same time, you have to be able to imagine how the rest of the game is going to play out and pay attention to your team, the callers and when your opponents shout 'Voy!'", says Caglikalp of the demands made on the players.

Goal of the month for August 2018 also shows that blind football is gaining acceptance as a high-performance sport. Goalkeeper Serdal Celebi of FC St. Pauli had lost his sight in an accident. He managed to dribble his way past his MTV Stuttgart opponent and then sidestep

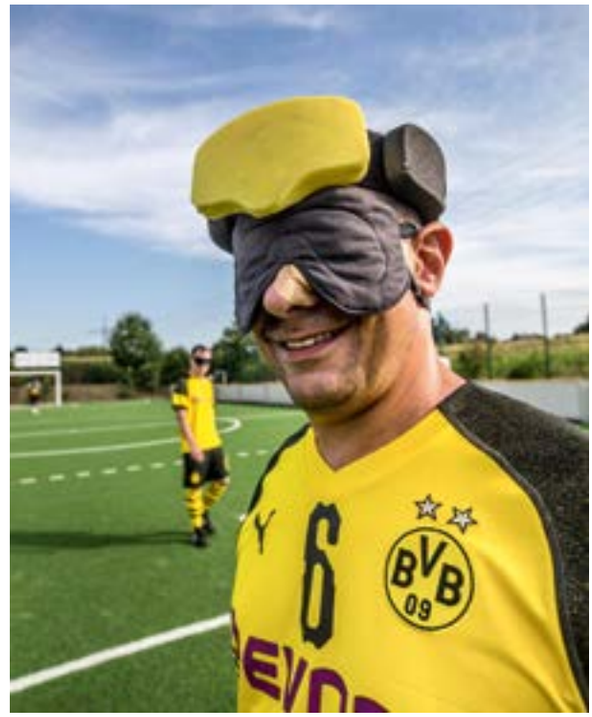
The blind football Bundesliga

The league was founded in 2008 and remains the only organised nationwide blind football competition. It receives financial support from the Sepp Herberger Foundation of the German Football League, the National Paralympic Committee Germany and the German Association for the Blind and Visually Impaired.

The teams for the 2019 season

MTV Stuttgart (German Champions in 2018)
FC St. Pauli
FC Schalke 04
Borussia Dortmund
SFBG Blista Marburg
PSV Cologne & FC Viktoria Berlin
(playing as one joint team)

You' ll find more information at:
www.blinden-fussball.de



Hasan Caglikalp
An old hand at the game for Dortmund since 2006. The glasses make for a level playing field and the head guards keep everyone safe.

the goalkeeper as he delivered a spectacular ball into the top left-hand corner of the goal. Celebi dedicated the goal to all blind footballers, as across all teams they form one big family. <<

How do players orient themselves on the pitch?

changes:
The pitch has markings for the penalty box, six- and eight-metre lines, a centre line and the centre circle, which serves as an orientation point for the sighted players. How do players orient themselves on the pitch?

Hasan Caglikalp:
Mostly it is all played by ear. The ball rattles so you always know where the player with the ball is on the pitch. As an experienced player, you develop a kind of inner compass that gives you a rough idea of where you and the other players are. The acoustic panels in the playing area help out as well. The most important element is the callers – they are the ones who supply us with all the information we need.

changes:
Can you explain how the callers are involved?

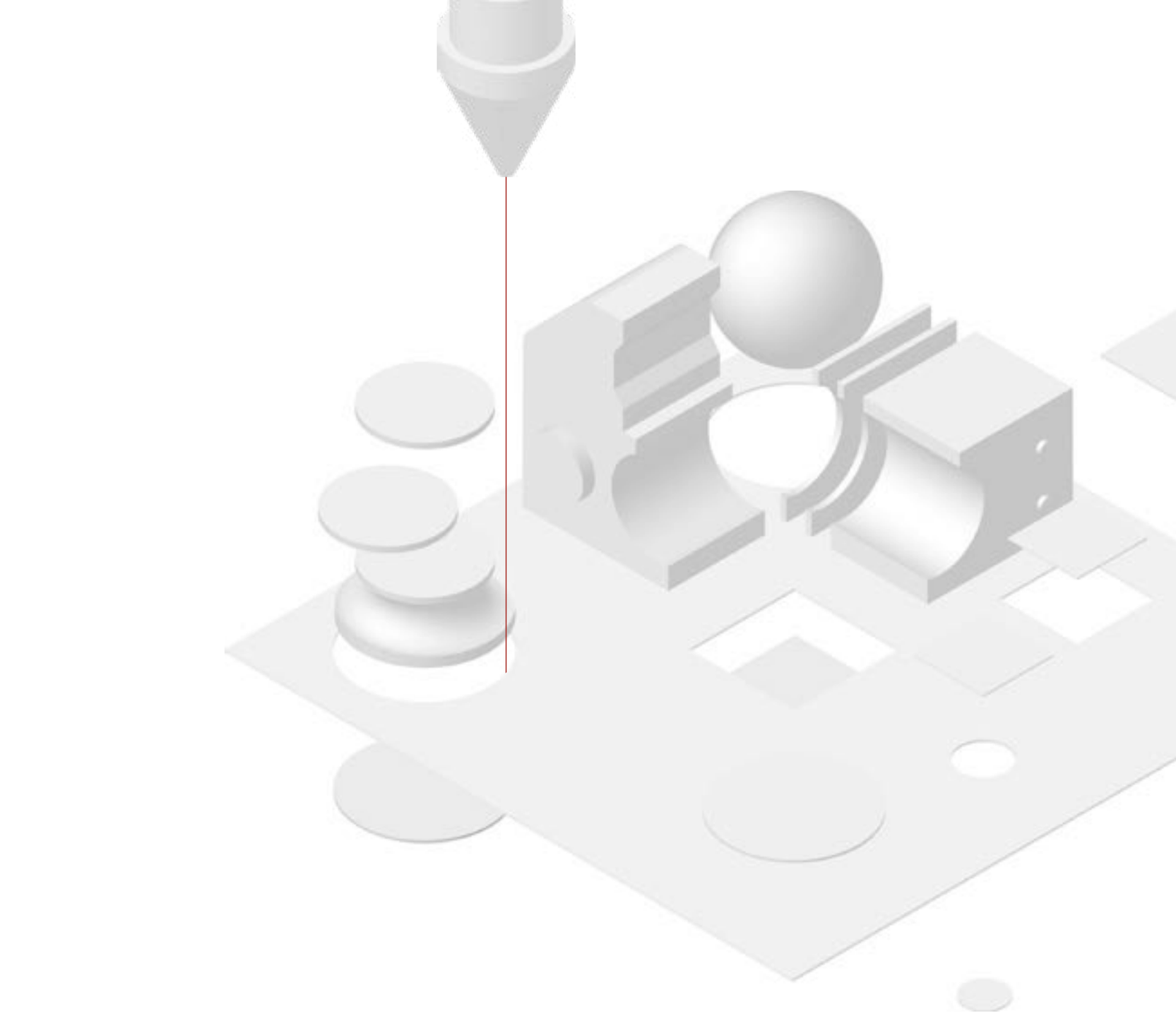
Hasan Caglikalp:
Every team has three sighted players who give us tips and directions. That includes the goal guide, who stands behind the opposing team's goal, the coach standing at the centre line for the players in midfield, and our own goalkeeper as defence. Each is responsible for a third of the pitch and can only give directions when the ball is in their zone, otherwise it is a foul.

changes:
How do you know if the person approaching you is an opponent or a teammate?

Hasan Caglikalp:
The callers pay attention to that as well. You're familiar with your own teammates' gait and you recognise their voices. But opponents also have to make themselves known by shouting 'voy!' whenever they approach the player with the ball. So we're always communicating with one another.

changes:
Is that why people are so quiet in the stands?

Hasan Caglikalp:
Yes, of course, otherwise we would not be able to hear the ball or the callers. But of course it is fine to cheer when a goal is scored.



Fill the blank page

An interview with designer Naoya Tsukamoto

Every design process begins with a single task. The designer starts with a blank sheet of paper with a sharpened pencil or a few bright Copic markers next to it. It will be the first sheet of paper among many. Sheet after sheet will follow, all of which are waiting to be filled with marks. But how are the ideas for those marks generated in the mind of the designer and how do they get from the designer's mind on to paper? What inspires designers? How do they orient themselves? We asked Naoya Tsukamoto, Senior Designer at Mitsubishi Electric's Industrial Design Center.

“I actually draw a large part of my inspiration from manga, anime and video games, as those are things I’ve been seeing since I was a child.”

changes:
How do you approach designing new products?

Naoya Tsukamoto:
I imagine what it would be like to be the very first user of the product. What would be my expectations, where would I look for certain elements, and so on. I don’t make the designs for myself, you know, they’re supposed to help the user.

changes:
What makes for good design, in your view?

Naoya Tsukamoto
It should be iconic and stand on its own on its own, it should be pared down to its essentials, and yeah, it should have an element of mystery.

changes:
In your experience, what are the biggest challenges when it comes to product design?

Naoya Tsukamoto:
That is easy: there is never enough time.

changes:
What influences your work? Where do you draw your inspiration?

Naoya Tsukamoto:
My background in automotive engineering definitely influences my work in the field of industrial design. I actually draw a large part of my inspiration from manga, anime and video games, as those are things I’ve been seeing since I was a child.

changes:
What are the most important trends the future holds in store for us in the field of industrial design?

Naoya Tsukamoto:
For one thing I do not think there will be any way to get around the user in the future if the aim is to produce good design.

We will be taking the user into consideration and involving the user in the process even more than we do today. One point, which is more related to manufacturing, is certainly the transition away from elaborate injection moulding techniques to CNC and 3D printing, which make our designs come to life in a tangible way much earlier in the design process.

changes:
What are your personal top three product designs?

Naoya Tsukamoto:
That’s a tough question (…) – if we are talking about cars, then definitely the Ferrari Testarossa. I like Audemars Piguet Royal Oak, which really turned watch design on its head in its day. And the Aeron chair, which even made it into the Museum of Modern Art.

changes:
Which designer do you admire most personally?

Naoya Tsukamoto:
There are several, for instance automotive designers Giorgetto Giugiaro or Marcello Gandini, who designed the Lamborghini Miura and Countach; Philippe Starck; Gérald Genta with his watch designs – the Royal Oak is his design, by the way – or Luigi Colani. I admire them all. There’s no clear number one for me.

changes:
What product that you have designed or worked on might we recognise?

Naoya Tsukamoto:
For example, the wide EDM machine from the MV-S/R series, the MP series or the MX series, the EA-S series vertical eroding machine and the laser processing machines from the eX-F series.

changes:
Without getting into too much detail, what are you working on now?

Naoya Tsukamoto
Right now we’re working to develop a standardised, recognisable Mitsubishi Electric design language for the next generation of processing tools – it’s really quite an exciting task.

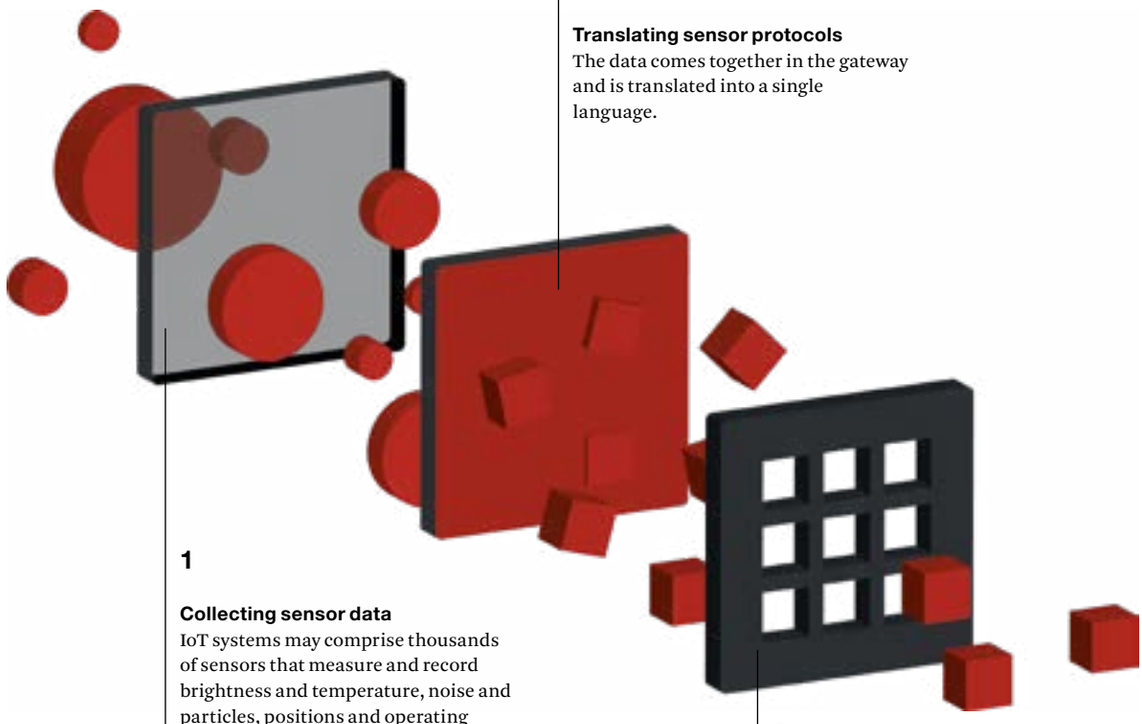
changes:
Mr. Tsukamoto, Thanks for your time. <<

How does a gateway work?

A wide array of devices communicate with one another on the Internet of Things (IoT). A gateway is a hardware or software component that connects a diverse range of technical systems.

That includes controllers, sensors and intelligent devices on the one hand and an IoT platform (cloud) on the other. An example from the private sector is intelligent home automation that links lighting, heating, roller shutters, energy management and security systems. In contrast to conventional gateways, IoT gateways include a lot of other functions in addition to simply transferring data. As fully-fledged computing platforms, they can also independently control individual components or control the flow of data.

That is why IoT gateways are also called intelligent gateways. Decentralised data processing through the IoT gateway at the edge of a network is also known as edge computing because the data processing does not occur in the cloud or on an IoT platform as it does in what is referred to as cloud computing. <<



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Collecting sensor data
IoT systems may comprise thousands of sensors that measure and record brightness and temperature, noise and particles, positions and operating states of machines and systems. This data is then transferred to the gateway.

2

Translating sensor protocols
The data comes together in the gateway and is translated into a single language.

3

Data filtering and processing
The IoT gateway analyses data locally on board, filters out irrelevant routine data and provides control commands independently (edge computing).

XS-5 series
IoT gateways aggregate data, translate between protocols and process data before potentially transferring it to the cloud (edge functionality).

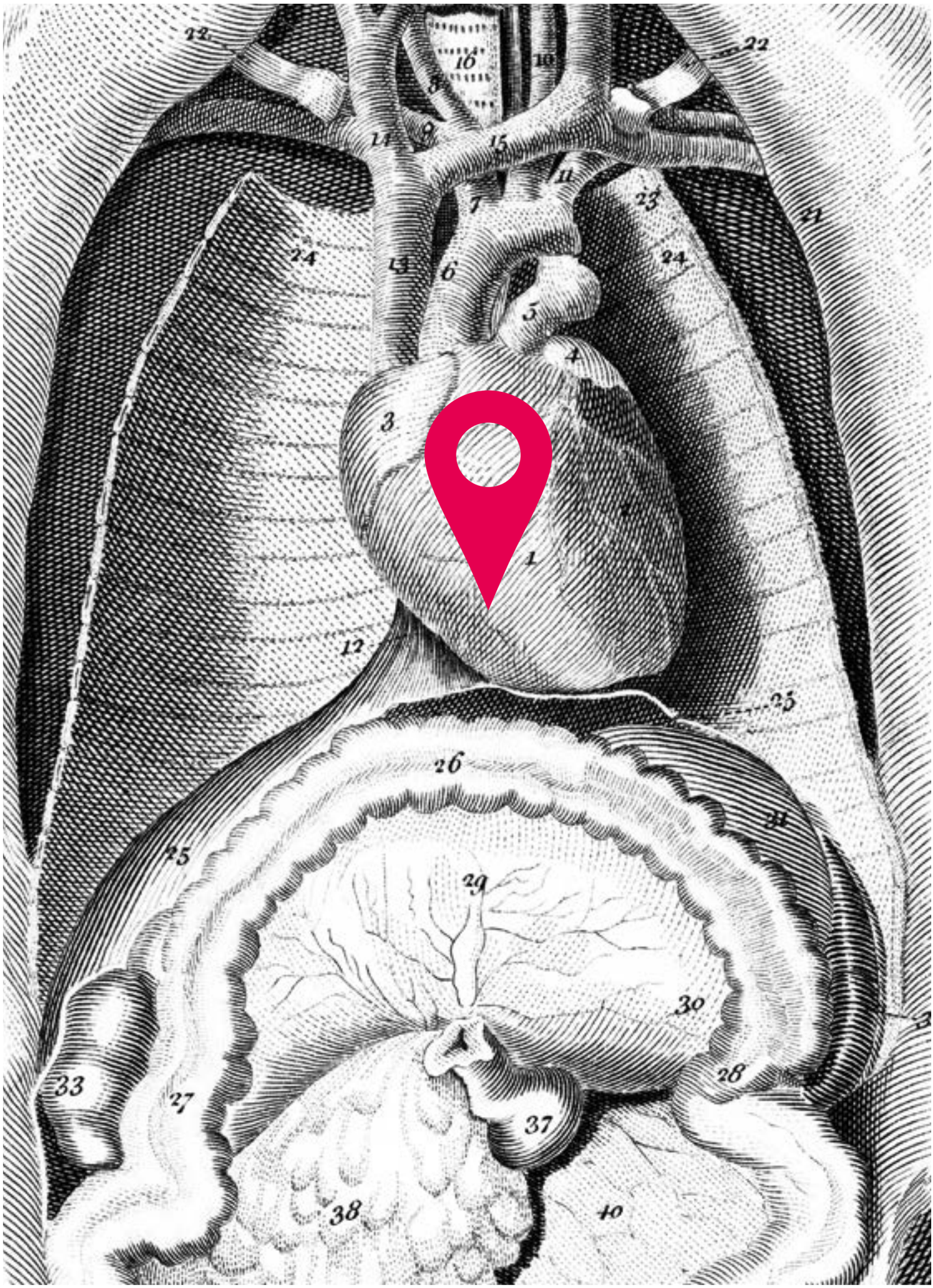
Award-winning: the XS-5 series IoT gateways

The XS-5 series Mitsubishi Electric communication gateways are IoT gateways for professional and industrial applications. As an interface, they convert a wide range of device protocols with a local network into a single language. In addition, they support special IoT applications and have a variety of security functions for secure data transfer between the IoT system and the cloud. The gateways have been designed for applications in factories and large buildings and facilities and are highly energy efficient.

In addition, they also perform infrastructural safety functions, such as remote sea level and river water level monitoring. They can also be used to forecast errors in solar and wind energy arrays.

By the way, it is not just what is inside our gateways that makes them outstanding – they also look great too. That is why they have received top marks from leading design authorities, winning the “Best of the Best” Red Dot Design Award in the product design category. <<

reddot award 2018
best of the best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Hei | mat

There is a place that is a fixed point in nearly every person's life: their Heimat, a German word that roughly translates as "home" or "homeland", but has connotations specific to German culture and society in ways that mean it has no exact equivalent in English.

Heimat is about more than Germany's typical wooden lattice fences or kitschy garden gnomes.

The concept of Heimat has not just social and cultural dimensions but temporal and emotional ones as well. Heimat gives people a sense of orientation – and it is en vogue again in Germany. But why?

Driving over the Elbe bridges in the heart of Hamburg; a glimpse of the Cologne Cathedral or the snow-covered Alps on the horizon; the smell of Mum's warm apple pie or tall pines swaying in the wind – those are just a few of the feelings that let people know they are home again, back in their Heimat. Heimat is about more than Germany's typical wooden lattice fences or kitschy garden gnomes: 92 per cent of Germans today have a positive association with the word. But what is with all this Heimat hype these past few years, anyway? Why have we all gone back to buying fruit and vegetables that are regionally sourced? Why are German dialects suddenly so sexy again? And why do we now have our own Heimat minister?

Heimat – everyone's personal safe haven.

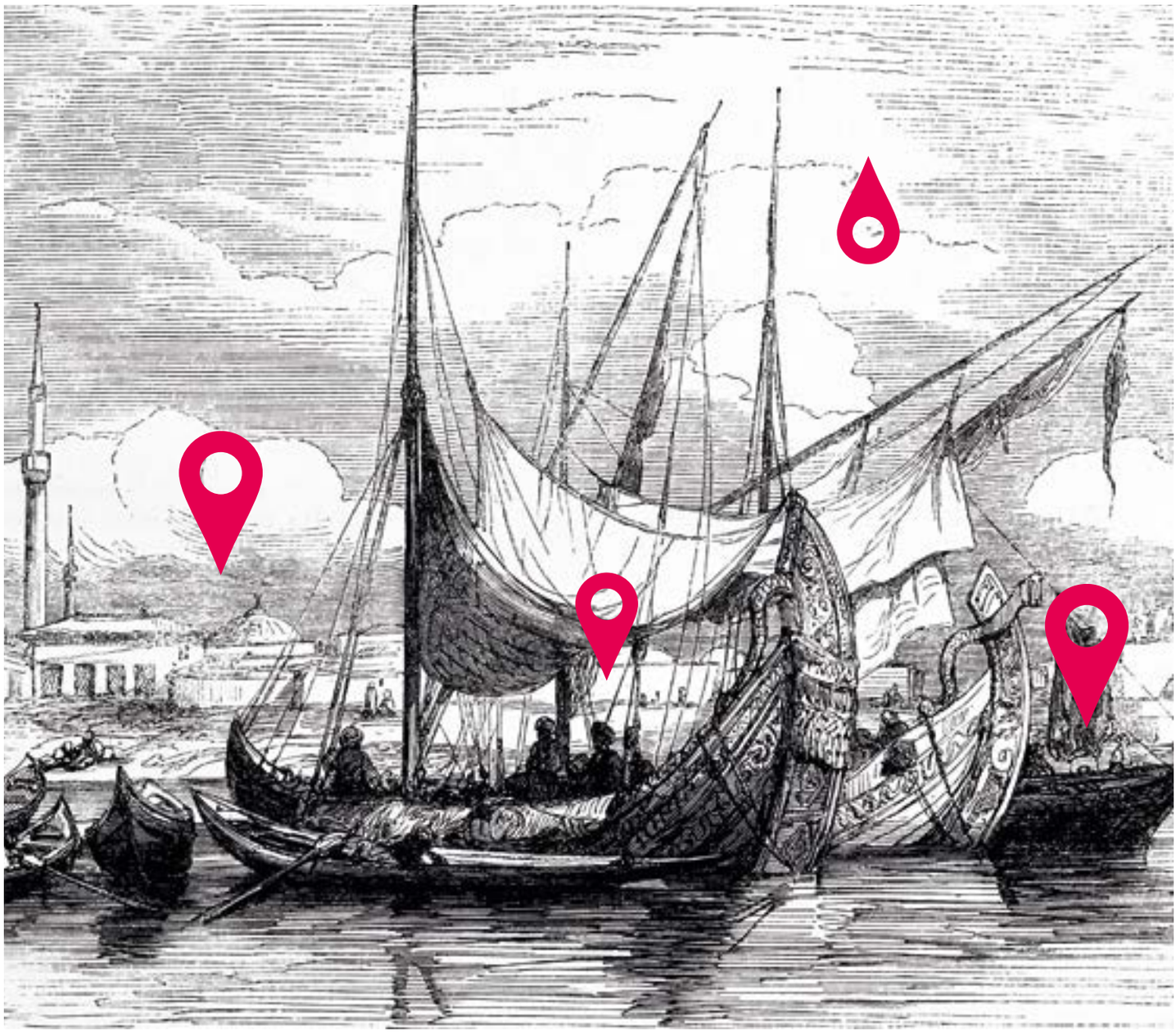
There are several reasons behind the German Heimat renaissance. On the one hand, we have more freedoms than ever before. There are fewer rules and boundaries for the individual. Established conventions may seem limiting. But at the same time they were like guard rails that gave people a sense of orientation. On the one hand it is good that we have tossed them aside, but on the other it is a source of stress and uncertainty for people.

The main reason for the Heimat renaisssance as a point of orientation and safe haven in life may be the profound transformation society is undergoing in our time.

With globalisation, the financial crisis, digitalisation and climate change, we are living through a time of upheaval that calls everything that has been up to now – all we have achieved and all that has kept us safe – into question. When the world around us becomes more and more indifferent and fast-paced, we inevitably begin to grapple with questions of our identity, finding our place in the world and defining where and how we belong. In other words, we return to our roots.

Heimat is retro – in two ways.

It has been like this before. The word Heimat first became popular in the 19th century, when daily life was radically transformed by technology and industrialisation, urbanisation, mass migration and waves of



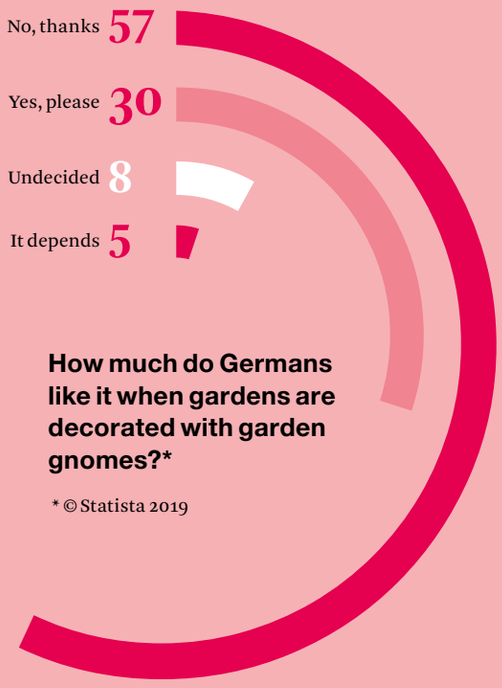
outward emigration that changed things so drastically that people felt alienated in their own country. Social scientist Ralf Dahrendorf describes the phenomenon as follows, and though his statement was made in reference to globalisation, the quote could just as easily be applied to the 19th century: “While certain economic activites require more and more space to unfold and are becoming detached from reality, people are searching for smaller and smaller spaces in which they can feel at home and develop a sense of belonging.”

The next big thing – the new love of Heimat

A lot of people in this situation are searching for a sense of emotional security. The bigger the changes, the more pronounced this deep-seated need becomes. In the face of insecurity and instability, we return to the familiar: something that once provided a sense of orientation. We look for an anchor, we reflect on our roots and find stability in our Heimat. Heimat is the small space in which we feel at home and as though we belong: a place we know we can always return to. It is the alternative to a threatening, globalised, mechanised world that has been robbed of reliability.

What is Heimat?

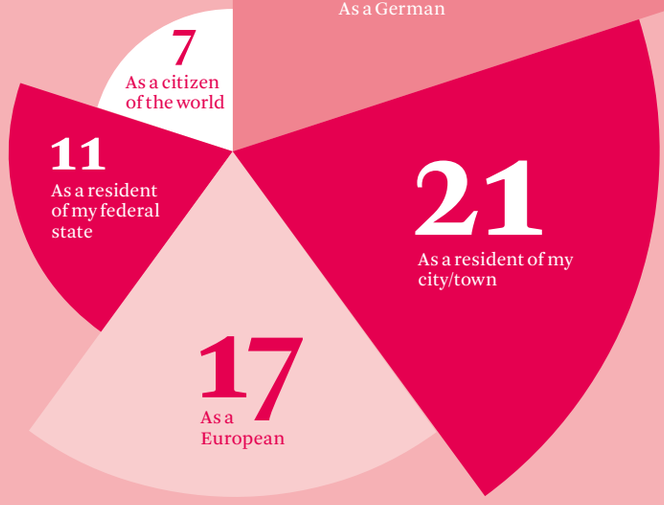
If you ask German people what they associate with Heimat, most people say family (45%), followed by the place they live (16%), the place they were born (15%) and Germany (14%). Only 6% name their friends and just 4% have no association with the term. That goes to show that Heimat does not even have to be associated with a place: home is where the heart is. What Heimat ultimately means to us is something we only discover when we leave it. The further away we go, the more we begin to miss it. That’s when a German’s “Heimatliebe” (a love of home) becomes “Heimweh” (homesickness). So it is good we have a safe haven to return to. <<



How much do Germans like it when gardens are decorated with garden gnomes?*

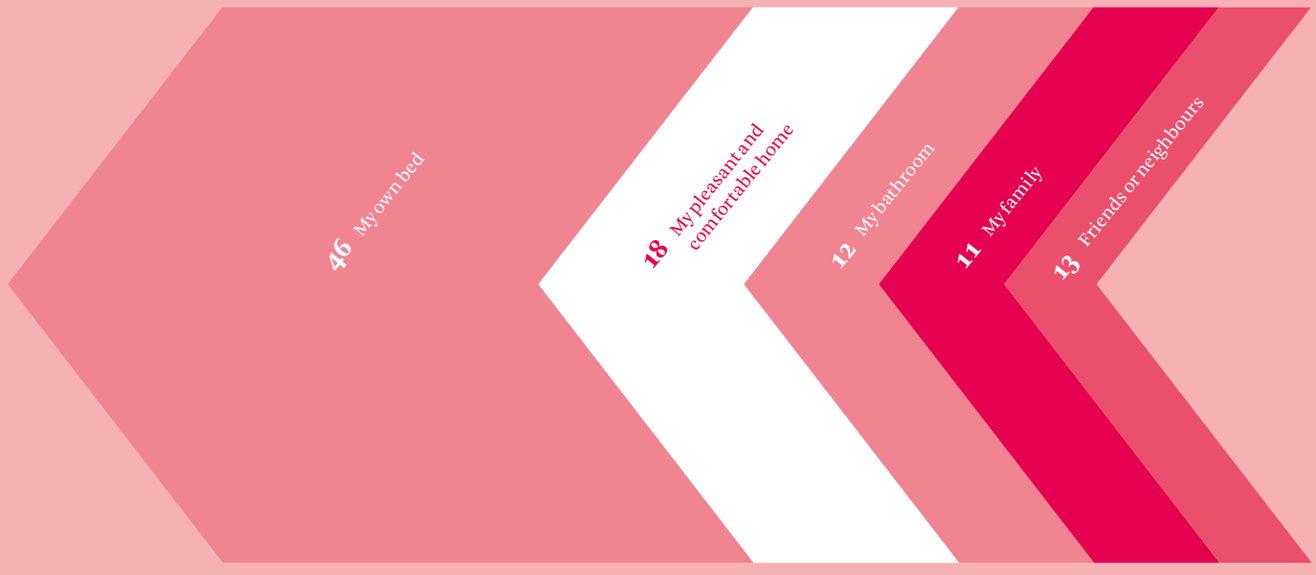
* © Statista 2019

World citizen, European or German – how would you describe yourself?*



* 1 per cent: "Not sure/no response", © Statista 2019

Homesickness: of 100 respondents who yearned for something they missed on their last trip away, the following things were named:*



* © 2018 Stiftung für Zukunftsfragen

Royal Heimat Germany's most common queens*

* (not actual royalty) Deutsche Königinnen e.V.

Mitsubishi Electric Maisart

AI never stops learning.

Maisart

Maisart pattern recognition in the MELIPC industrial PC enables local real time edge-based data analysis without server support or network load.

Maisart allows the high-precision eroding machines from the SV-P series to work up to 30% faster using proprietary AI technology.

What is artifical intelligence?

In Stanley Kubrick's film "2001: A Space Odyssey" there is already artifical intelligence that foresees AI abilities like error detection, control, speech recognition and speech output. In 1997 chess computer Deep Blue beat world champion Garry Kasparov. Artificially intelligent AlphaGo beat the Korean Lee Sedol, one of the best players in the world 4:1 in 2016 at the board game Go, which is significantly more complicated than chess. Just a year later, AlphaGo lost to its sucessor program AlphaGo Zero, which beat its predecessor by 100:0. But in spite of all these advances, to this day we have not even come close to recreating the human mind in the form of a thinking machine.

Artificial Intelligence, or AI for short, is a field of research in computer science that attempts to engineer computer programs with human-like perceptive abilities and behaviour. Relevant issues include the automation of intelligent behaviour and machine learning. AI is the attempt to engineer human decision-making structures in the form of algorithms that enable computers to solve problems independently.

However, machines that react intelligently and behave like humans remain a thing of the future. For instance, small children only need exposure to just a few cats to develop a concept for "cat" – whether it is a stuffed animal, a drawing or a live animal.

In contrast, a computer needs hundreds or even thousands of attempts to develop a similar cat-differentiation concept. At the same time, there are already a broad range of applications that put AI to use.

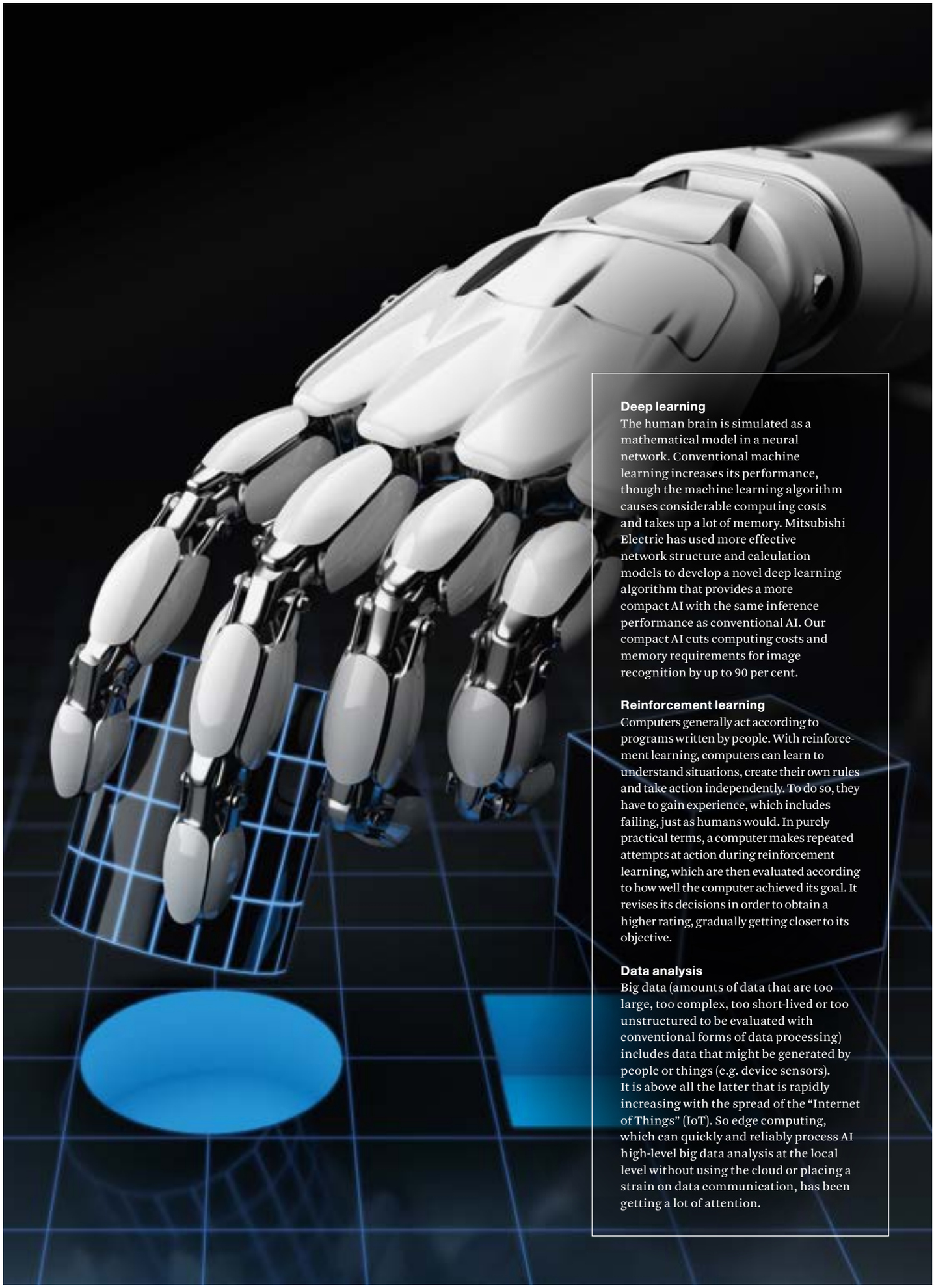
Mitsubishi Electric's AI solutions

Artificial intelligence is used in a wide range of Mitsubishi Electric products. The entire bandwidth of AI technologies is bundled under Mitsubishi Electric's Maisart umbrella. In keeping with the company's "Original AI technology makes everything smart" philosophy, Mitsubishi Electric uses its own AI solutions and edge computing to create products that are intelligent, more secure, more user-friendly and convenient for everyday use. Mitsubishi Electric's AI-related activities are focused on:

- compact deep learning algorithms
- efficient reinforcement learning and
- high-performance big data time series analysis.

The goal of Mitsubishi Electric's development work is to develop AI systems at a significantly lower cost and with fewer server and network requirements than conventional systems, which rely on servers that collect enormous amounts of data. (See the info box to the right.)

A welcome side effect: the result is a highly secure computing environment that eliminates the need to upload confidential information to servers and works without a network connection. <<



Deep learning
The human brain is simulated as a mathematical model in a neural network. Conventional machine learning increases its performance, though the machine learning algorithm causes considerable computing costs and takes up a lot of memory. Mitsubishi Electric has used more effective network structure and calculation models to develop a novel deep learning algorithm that provides a more compact AI with the same inference performance as conventional AI. Our compact AI cuts computing costs and memory requirements for image recognition by up to 90 per cent.

Reinforcement learning
Computers generally act according to programs written by people. With reinforcement learning, computers can learn to understand situations, create their own rules and take action independently. To do so, they have to gain experience, which includes failing, just as humans would. In purely practical terms, a computer makes repeated attempts at action during reinforcement learning, which are then evaluated according to how well the computer achieved its goal. It revises its decisions in order to obtain a higher rating, gradually getting closer to its objective.

Data analysis
Big data (amounts of data that are too large, too complex, too short-lived or too unstructured to be evaluated with conventional forms of data processing) includes data that might be generated by people or things (e.g. device sensors). It is above all the latter that is rapidly increasing with the spread of the "Internet of Things" (IoT). So edge computing, which can quickly and reliably process AI high-level big data analysis at the local level without using the cloud or placing a strain on data communication, has been getting a lot of attention.

Norms and values turned on their heads

JP

When in Rome, do as the Romans do

It is usually a good idea to stick to what you know. The values and norms we are socialised with provide support and orientation in our lives. But one trip to Japan is all it might take to turn your sense of values and norms on its head …

One of the sentences we hear all the time from our parents as we are growing up is: “Stop sniffing and blow your nose!” In Japan it is the other way around. Here they say: “Put away that handkerchief and sniffle like everyone else!”

The Japanese think blowing your nose in public is inconsiderate – after all, that is how germs are spread. That is why it is important in Japan to excuse yourself in order to blow your nose where no one can see or hear you. You should not sneeze in Japan either, if you can help it. If you have a cold, you wear a face mask out of politeness and respect to make sure no one else catches your bug. Another typical parental command at the dinner table is: “Stop slurping!” But if you do not slurp your soup in Japan, people are likely to think you do not think your soup is very tasty. Slurping is a welcome mealtime noise that sends your compliments to the chef.

DE

And should you rub your disposable wooden chopsticks together loudly and visibly before a meal to remove any splinters, you have just committed the next faux pas. You should only do that to draw attention to how cheap you think the chopsticks are. Burping is also looked down upon in Japan. When you go to pay the bill at a restaurant, there is another important cultural difference to be aware of: if you have been given good service in Germany and fail to leave a tip, you will quickly be seen as a rude pennypincher. In the land of the rising sun, however, the mood will quickly darken if you tip your waiter as you would in Western Europe to thank them for a job well done. Tipping is seen as an insult in Japan and is totally unwelcome.
In Japan, attentiveness, friendliness and good service are taken as read and require no further thanks. Waiters (and taxi drivers) are even said to have chased

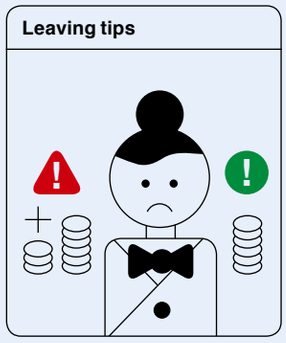
patrons down the street to return a tip. And speaking of taxis: though you are used to opening the door yourself when you take a taxi in Germany as most drivers would never dream of hopping out to hold the door open for you, do not try to open the door when you are in Tokyo.
In Japan the doors open all by themselves. They are powered by electric motors. And if you decide to take the metro instead of a taxi back to your hotel after dinner, brace yourself for yet another cultural difference: you should never use your time on the train to make phone calls, which is often tolerated in Germany, and you should not speak loudly or about intimate subjects.
On Japanese public transport, but also in public in Japan more generally, loud phone calls are frowned upon. What is more: believe it or not, the metro is a prime napping area! For the Japanese, it is completely normal to close their eyes and nod off on the train. Working people are on their feet early and work long hours. That is why signs on public transport ask the travelling public to put their mobiles on silent and refrain from phone calls on the go. The same goes for loud conversation and laughing.

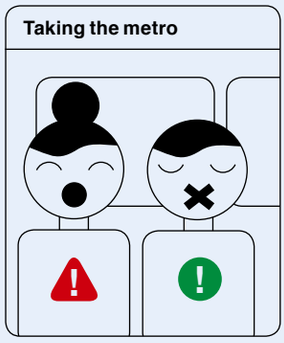
If you are hungry or thirsty after a long trip, you will find plenty of snacks and beverages in Japan's train stations. But remember two things: never count your change – you might as well just accuse the cashier of scamming you directly. And never eat or drink while walking. That is considered improper, as eating is highly important in Japanese culture.

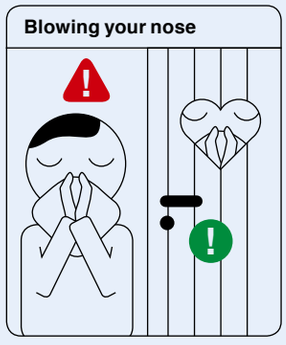
There is no such thing as the academic quarter in Japan.

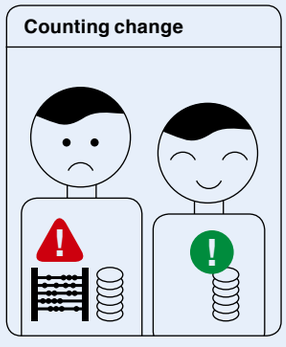
Recall the sentence "Be sure to be on time!" from your youth? You may have intuited by now that it works a bit differently in Japan. There is no such thing as the academic quarter (being 15 minutes late) in Japan. It is barely acceptable to show up on the dot at the arranged time. It is better to turn up five to ten minutes early, or better still half an hour.

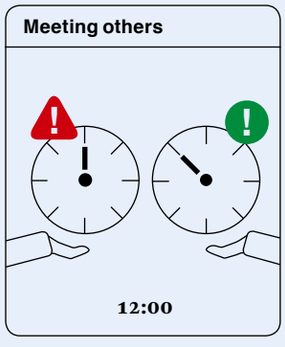
You should also strike the word "no" from your vocabulary during your stay. We have now arrived at the issue of direct communication, which we are used to in Germany, and the indirect communication of reading between the lines, which is preferred in Japan. But that is a long and very different story. Perhaps we will get to it in the next issue … <<

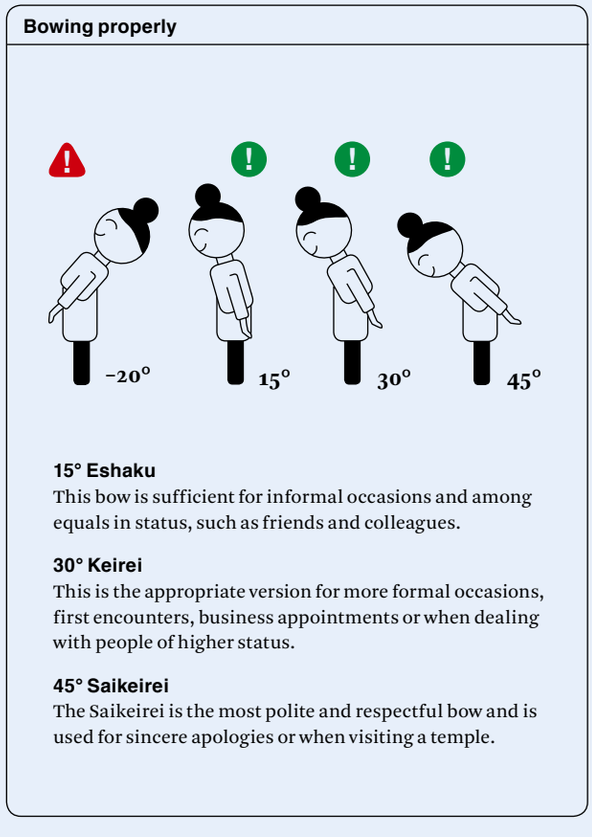












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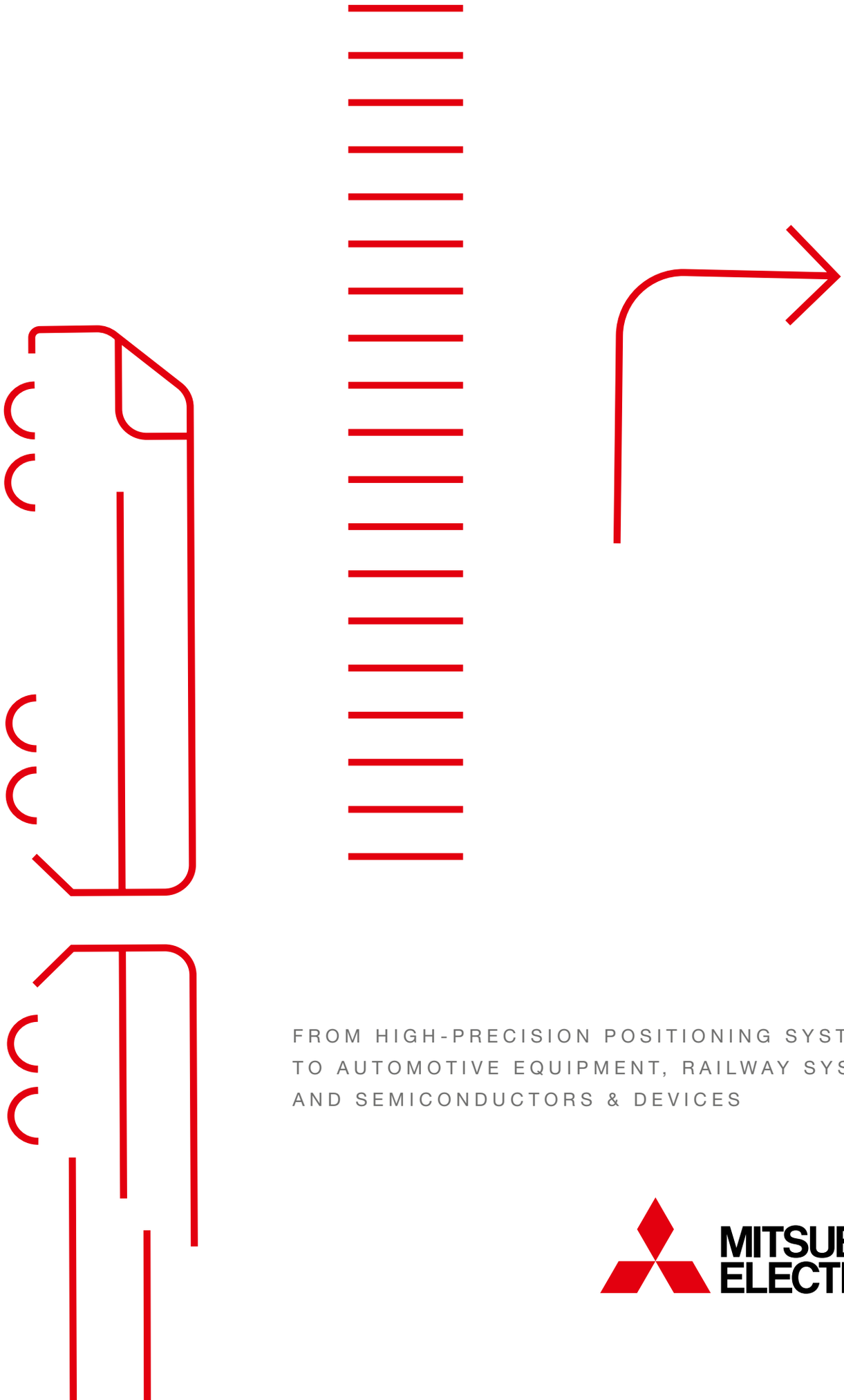

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Southward bound

Monarch butterflies flutter to Canada and 4,000 km back

The monarch butterfly, whose magnificent wings are featured on the cover of this issue, weighs less than a gram. That does not stop it from flying up to 4,000 kilometres across North America to reach its winter habitat in Mexico. In the spring several hundred million individuals then make their way back. On the way, around the beginning of April, the females lay their first eggs along the Rio Grande before dying shortly thereafter.

The first of three generations of monarchs develops from those eggs. Each generation lives for about two months as they continue their trek northwards to reach their summer habitat between the Great Lakes and Newfoundland.

In September, it is the fourth generation, the Methuselah generation as it is called, that lives for up to eight months and makes the journey back.

How the monarchs are able to orient themselves along the way has largely been explained by science: the butterflies are able to navigate using the position of the sun and their internal clock to differentiate between north and south. It even works when it is cloudy, as their compound eyes can still perceive the polarised light of the sun as a ring-shaped halo on the horizon.

In addition, they can presumably orient themselves using the Earth's magnetic field. An unsolved mystery remains as to how the insects make their way northwards and back to their winter habitat, which is just several hectares in size, although those particular individuals have never been there before. Presumably the target information is somehow passed on from generation to generation across all stages of development (egg-caterpillar-pupa-butterfly). And even if science has yet to deliver an answer: that will not stop the butterfies from finding their way. <<

Home at last
In mid-November the monarchs reach their winter habitat in the highlands of Michoacán, which is approximately 120 km east of Mexico City. It is here in the pine and fir forests of Oyamel that the eastern population of monarchs, with more than 100 million individuals, hibernates on just a few hectares of forest – that is precision landing.

Mitsubishi Electric's NaturRaum
Flowering annuals and perennials bloom throughout the year, providing a rich source of food for butterflies, bees and bumblebees.

Big commitment to little living creatures

Though hundreds of millions of monarch butterflies migrate each year, the species faces many threats. The decline in insects is a global issue – Ratingen, where Mitsubishi Electric is based, is no exception.

Knowing that small changes can make a big difference for bees, butterflies and other insects, the landscaping at Mitsubishi Electric headquarters has recently been transformed into an inviting habitat for plants, insects, birds and reptiles right here in Ratingen, Germany.

The NaturRaum project, a mix of flowering perennials and scattered fruit trees, has been created in collaboration with the Nature and Biodiversity Conservation Union Germany. A long dry wall provides ample habitat for lizards and other warmth-loving animals, which can take shelter in all the nooks and crannies between the stones. A small brook meanders through the land-scaping, providing refuge for other insects and animals. In total, 12 fruit trees, 4 multi-variety fruit trees, 6 berry bushes, 6 lavender hedges, 18 different herbs and 2,115 flowering perennials were planted. The space has been transformed into an oasis for flora and fauna, which we hope will continue to grow and flourish.

You will find more information at:
www.nabu.de and www.deutschland-summt.de <<

Electric planet

Mitsubishi Electric is one of the world's leading producers of electronic products and components for use in both industrial applications and daily life. Our products help build a more sustainable society that is more modern, fair, prosperous and environmentally aware in the face of global warming, dwindling resources and energy scarcity.

A safer drive

Cyber Defence Technology for Connected Cars

Autonomous driving is connected driving. Most modern vehicles have a component called a main unit. It is a powerful computer that controls a wide range of processes, such as advanced driver assistance systems. In networked and autonomous driving, the main unit communicates via the Internet with other vehicles and databases. That makes them susceptible to cyber attacks or malicious remote control.

That is why Mitsubishi Electric has developed Cyber Defence Technology for Connected Cars. The multi-layered security technology blocks potential corrupt attempts to access the vehicle from outside. It ensures the main unit boots up safely and guarantees the integrity of the software for all vehicle systems – at maximum speeds and with minimal processor loads. <<

Navigating safely

Dynamic mapping with artificial intelligence

Autonomous driving requires highly precise map data. One of the biggest challenges is ensuring those maps are always up to date. The Mobile Mapping System and automated mapping technology are Mitsubishi Electric's answer to the problem.

The Mobile Mapping System is mounted on to the tops of vehicles that drive along set routes daily, such as delivery vehicles. A combination of sensors, cameras and lasers collects data along the route in real time (see photo below). This data is then integrated into dynamic maps. Dynamic means that using artificial intellgence, only new information and changes are applied and

updated, such as new traffic signs or road markings. With the Quasi-Zenith Satellite System and the Centimeter Level Augmentation Service, which augments atmospheric signal interference, Mitsubishi Electric also provides highly precise position data to bring us all one step closer to a steering-wheel-free future. <<

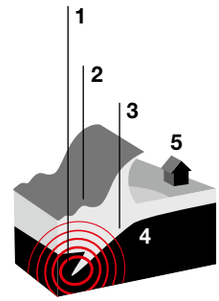
A safer life

Mitsubishi Electric improves early tsunami detection

When a tsunami comes barrelling towards the coast, every second counts when it comes to bringing people to safety and saving lives. Experts estimate that ten minutes of advance warning are enough. That means the wave has to be detected when it is just ten minutes away from the shoreline at the latest. But a reliable early detection system for tsunamis has proved to be elusive up to now. Using high frequency radar, ocean currents can be measured up to 50 kilometres away from the coast. Mitsubishi Electric has further refined this system to reliably detect multi-wave tsunami fronts by measuring the speed of the ocean surface and estimating sea level within a range of accuracy of 25 centimetres. Even the direction of the wave can be reliably determined. Two features make the system particularly precise: first, the measurement method is focused on wavefronts with high current velocity as are typical of tsunamis. It also uses a proprietary algorithm to estimate the properties and height of the tsunami based on Doppler velocities of the wavefront data collected. That is why the error rate is less than 0.1 per cent.

Quick and precise
The speed and direction of a wave can now be reliably detected.

What does that mean in practice?
The speed of a tsunami depends on the depth and shape of the sea-floor. Let us assume the ocean is 300 metres deep 50 kilometres from the coast and the tsunami is travelling at a speed of 100 km/h . The detected wave would need more than 30 minutes to reach the coast (it continues to slow down as the height of the wave rises) – enough time for people to seek shelter in reinforced buildings or bring themselves to safety on higher ground, provided the alarms are sounded and all evacuation plans are set in motion. <<



1
Undersea seismic activity, such as a seaquake or underwater avalanche, causes huge amounts of water to be displaced at the epicentre.

2
Then shockwaves spread out travelling hundreds of kilometres per hour. At that point they are perhaps 30 cm high.

3
50 km from shore, Mitsubishi Electric's high frequency radar system recognises patterns that are typical of tsunamis and triggers an alarm.

4
In shallower waters, the waves begin to slow down. They begin to overlap and rise to dangerous heights.

5
They ultimately reach the coast, where people have brought themselves to safety thanks to the early warning system.

Forty years of Mitsubishi Electric in Germany

We strive to be a good business partner, employer, corporate citizen and much more

40 years ago, the German branch of Mitsubishi Electric was founded in Düsseldorf. Steady growth made expanding to the neighbouring city of Ratingen necessary as early as 1985. All operating divisions have been located under one roof at our German headquarters there since 2015. Today, Mitsubishi Electric has a total of 14 locations in Germany, from the North Sea to the Alps. Every day, we work hard to enrich the lives of our customers with our products and services at work, at home and on the road. <<

Smart.

The changes.AWARD – Mitsubishi Electric's competition for pupils

In our next changes.AWARD competition, it is all about the topic "Wanted: Environmental Heroes". With the guidance of our coaches and mentors, pupils develop clever business ideas and stand a chance to win a trip to Tokyo. You will find more at: www.changes-award.de <<

Exciting.

Our travel tip for Tokyo: Mitsubishi Electric: Touch of Advancement METoA

In the heart of Tokyo's impressive Ginza district, you can catch a glimpse of tomorrow today: METoA provides information on a range of current issues and invites you to get involved with interactive installations. After your visit, treat yourself to a delicious snack and beverage in our bistro. Pay us a visit when you're in Tokyo! Visiting is free of charge. www.metoa.jp/en <<

Nice.

Mitsubishi Electric LES supports the hospice movement with a 10,000-euro donation.

Hospices depend on the generosity of donors to help the dying and their families. We want to honour their work because social engagement is a core value at Mitsubishi Electric, where we live according to our motto and logo Changes for the Better – outside the business world as well. <<

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(Dis)orientation in numbers

2,843

Kilometres: When, on a runway where several flights were preparing to depart, Christopher Paetkau asked whether this was the flight to Iqaluit (western Canada), the flight attendant thought he was joking and answered “yes”. It was not until the stopover in Hudson Bay that it became clear he had mistakenly boarded the plane to Inuvik in eastern Canada. Paetkau was able to laugh it off.

5

Bullseye Biathlete Andreas Birnbacher had to do a penalty loop in 2013 after mistakenly hitting the neighbouring target. But he was not alone: it had already happened to Magdalena Neuner as well.

711

Kilometres: Bordeaux rather than Oporto – that is what a woman from Saxony got when she tried to book a flight to Oporto – and was completely misunderstood. The District Court of Bad Cannstadt ruled in 2012 that customers are responsible for correct pronunciation and released the tour operator from any claims for compensation.

556

Kilometres: The employees at the reception desk of a travel company based in Duisburg were shocked when a woman tried to check into her room. The problem: instead of travelling to the address of her hotel on the German island of Rügen, she had entered the address of the tour operator in her navigation system.

39

It took days for a woman to find her car again after parking it in a hurry in a private Munich underground garage.

7,557

Kilometres: In 1992 three shipping containers with nearly 30,000 rubber ducks were lost in the North Pacific. They have since been dubbed the “friendly floaters” by oceanographers, who have used them to gain a better understanding of ocean currents. The first rubber ducks reached Alaska after eight months. Having travelled 27,000 km, a duck washed up on the coast of England in 2007, nearly 7,557 km away from its intended port in Tacoma, Washington.

0.54

Metres was the difference in height between the two ends of a new bridge over the Upper Rhine between Germany and Switzerland. The reason: in Switzerland, the height above sea level is measured from the Mediterranean (-27 cm). A failure to correct the drawings at the planning stage led to a doubling of the deviation.

17,034

Kilometres: This is also said to have happened – pay attention to the IATA code on the ticket: SYD takes you to Kingsford Smith International Airport in Sydney, Australia. The code YQY also leads to Sydney. You will be warmly greeted at J.A. Douglas McCurdy Airport – 17,034 km away from Australia in Nova Scotia, Canada.