



# ELECTRONICS IN CHALLENGING TIMES

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- > Industry and product news



# The Future with Sensors, RF, and 5G

The Internet of Things (IoT) is loaded with billions of sensors, and it is likely that you have deployed a few of them yourself. Elektor's editorial and engineering teams are keenly aware of the importance of sensor and measurement technologies, which is why we developed a free webinar titled "Sensors and Measurement: The Future with Sensors, RF, and 5G."

Watch Now



As an electronics designer, you likely work with sensor technology and measurement tools on a regular basis. Technicians use temperature sensors to monitor industrial applications. Engineers implement proximity sensors in countless aerospace systems as well as industrial automation facilities. Designers incorporate RF sensors in many military and surveillance applications. And those are only a few examples. Several others

will likely come to mind in the next few minutes. In Elektor's "Sensors and Measurement" webinar, Elektor Labs Technical Manager Clemens Valens moderates an informative discussion about sensor technology, RF solutions, and 5G with industry thought leaders, including engineer/author Robert Lacoste and engineer/journalist Stuart Cording. The experts cover:

- How are sensors currently used?
- How will sensors be deployed in future IoT applications?
- What is 5G? Why is it important?
- What are the difficulties associated with 5G?
- And more

## The Speakers



**Clemens Valens** is the Technical Manager of Elektor Labs. He holds a BSc in Electronics and an MSc in Electronics and Information Technology. Valens started

working for Elektor in 2008 as editor in chief of Elektor France, and he has also worked as an editor for Elektor UK/US and ElektorMagazine.com. He currently produces engineering tutorials and product reviews at Elektor.tv. In recent videos, Clemens covered the following topics and more: Arduino compiler optimizations, GitHub essentials, home automation, getting started with KiCad EDA, and several informative product reviews.



**Robert Lacoste** is the Founder and CEO of Alciom, a France-based consulting and design house specialized in mixed-signal electronics: wireless and microwaves, antennas

design and optimization, high-speed signal processing, analog front-ends, sensors, and more. He graduated from Paris's Ecole Polytechnique and ENSEEIHT engineering school, and he has 30 years of experience in electronics, real-time systems, and telecommunications. Lacoste's books, *The Darker Side: Practical Applications for Electronic Design Concepts* (in English) and *Percer les mystères de l'électronique* (in French), are available in the Elektor Store.



**Stuart Cording** is an engineer and journalist with more than 25 years of experience in the electronics industry. He has held positions at National

Semiconductor, Texas Instruments, Microchip Technology, Atmel, iSYSTEM, and Publitek. Cording's article, "Beyond the Razzle-Dazzle: 5G in Industrial Automation," appears in Elektor Industry 2/2020.



By **C. J. Abate**

Content Director, *Elektor*



## Electronics Innovation in Turbulent Times

Since late last year, COVID-19 has dramatically impacted the electronics industry. Many manufacturers have scaled back production. Countless supply chains have been disrupted. Widespread shutdowns and government interventions have created logistics problems for both large electronic component distributors and small online kit suppliers. Social distancing regulations have created new challenges for engineers, developers, and researchers used to working alongside their colleagues. Engineering students have had to leave their electronics labs and work remotely with their teachers and professors. These are turbulent times to say the least.

As I write this, the COVID-19 crisis continues to foster uncertainty in the global electronics industry and beyond, which is why we are presenting you with this freely available COVID-19-focused edition of *Elektor Industry* magazine. In addition to reviewing the effects of the crisis, we highlight some of the positive industry-specific develop-

ments and innovations that have emerged over the past few months. We also provide business insights from executives and engineers such as Raspberry Pi Founder Eben Upton and krtkl CEO Ryan Cousins.

Looking for an overview of how the crisis has unfolded? In "Industry and Community Respond to Coronavirus," Stuart Cording offers some context and describes how the electronics industry and community have responded to various challenges. Curious about new electronics products and "social impact" projects? Wondering about electronica 2020? We have you covered.

I hope you find this free edition of *Elektor Industry* useful and informative. Next month, we will focus on the topic of Embedded Development. Please visit our [Elektor Helps page](#) to learn more about the various ways we are working to help engineers, makers, and electronics industry companies. Best wishes!

## The Elektor investment program



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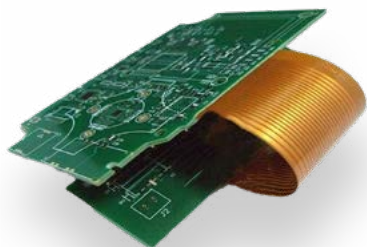


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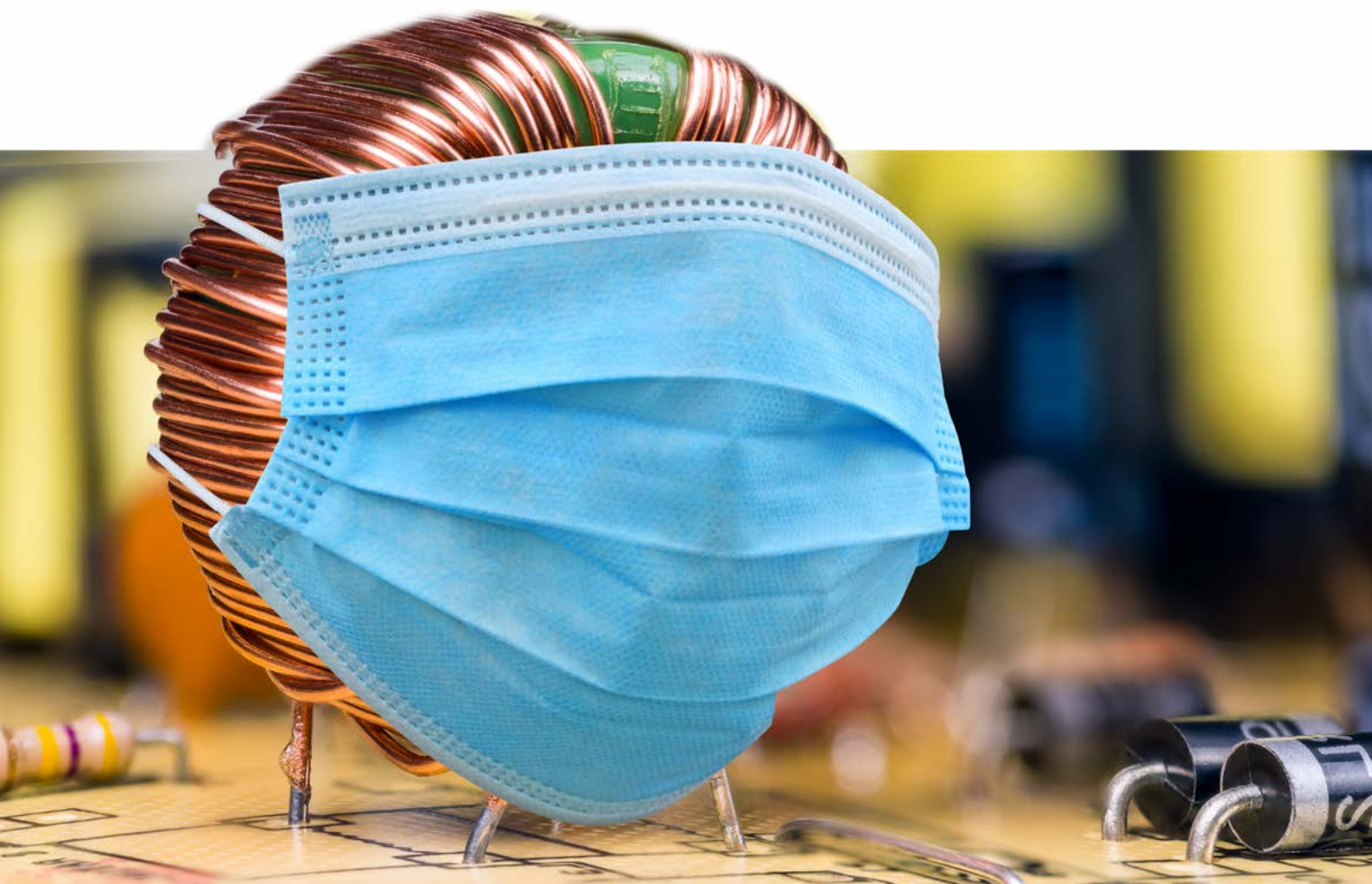
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# Industry and Community Respond to Coronavirus



By Stuart Cording (Elektor)

As everyday consumers stared at empty supermarket shelves, void of flour, yeast, and toilet paper, it was something almost none of us had ever experienced. However, for those in the electronics industry, supply issues and long component lead times are regular events. But, while our industry has contingency plans in place for such situations, the coronavirus has proven to be a challenge like none that has preceded it.



Entering 2020, the electronics industry seemed to be, generally speaking, in a good place. Each year kicks off with two big events that involve the big players from the semiconductor and electronics industry: Mobile World Congress (MWC) in Barcelona, Spain, and Embedded World in Nürnberg, Germany. MWC is a gigantic event, with big, household names showing off the latest in tech. This year should have been all about 5G, new handsets, and how this technology would be rolled out over the next months and years. Instead, as big names pulled out of the event, it rapidly turned into a frantic series of discussions on how to keep the event going even though large sections of the exhibition would be empty. Eventually, the organisers cancelled the show completely.

For industry veterans, Embedded World is a must-attend exhibition that has earned its permanent February slot in the calendar over the last 15 years. Recording annually growing visitor numbers, 2019 saw more than 1,100 exhibitors and over 30,800 visitors participate.[1] Unfortunately, Germany's first coronavirus case had been reported at the end of January, bringing this pending pandemic to the forefront of everyone's minds.[2] The infection had been detected in an employee of an automotive supplier located to the south of Munich, making it feel worryingly close to our beloved industry. The virus had been brought to Germany by an employee visiting on business from China.[3]

By mid-February, STMicroelectronics had confirmed that, in order to ensure the health and safety of its employees, it had pulled out of both MWC and Embedded World.[4] Soon thereafter, semiconductor vendors, distributors, and other big industry players also announced that they would not be participating in the exhibition in 2020. The event went ahead, but there were 15% fewer exhibitors and less than half the number of visitors compared to the previous year.[5]

## Abnormal Supply Chain Issues

The electronics industry is used to supply chain issues. Natural disasters, such as earthquakes and typhoons, regularly disrupt some part of the manufacturing chain. Earthquakes require semiconductor fabrication facilities to check and possibly recalibrate equipment. Typhoons can cause damage to facilities and restrict movement of employees, resulting in the delay of packaging silicon devices. However, such events are thankfully rare and, when they do occur, only a small segment of products, such as flash memory devices, are impacted. While some manufacturers operate just-in-time (JIT) production, many have learnt to deal with these hiccups in supply by building up their own inventory, allowing them to bridge any delays for weeks or even months.

Many industry insiders are used to long lead times on multi-layer ceramic capacitors (MLCC), chip resistors, and even printed circuit boards (PCB), and allocation on certain components during periods of rapid growth. It had been expected that the roll-out of 5G would place additional pressure on a recovering supply chain as demand for new base stations and smartphones grew through 2020. With the government response around the world quickly moving to shut down regions, and then entire countries, it became clear that



Figure 1: UCL-Ventura CPAP (Source: Jason Tye/UCL)

existing mitigation plans would not resolve the challenges that COVID-19 was causing.

PCBs are a great example. At the start of 1980, China had just a 2% share of the global market. Today, around 55% of the world's demand is manufactured there.[6] Due to the shutdown, even if manufacturers could find suppliers who were still operating, there was still the issue of logistics to confront; with employees at home, shipping capacity was also in short supply. In addition to this, some businesses are being limited to work only on manufacturing related to medical and military applications until restrictions are eased again.[7] This has left many in the industrial, automotive, and consumer segments in difficulty.

## The Industry Responds

Engineers love to solve problems, and a crisis has many problems waiting for solutions. As more people became infected, it quickly became clear that the respiratory challenges arising from COVID-19 were placing extreme pressure on health services. The breathing of many patients had to be supported by one of a range of ventilator solutions, but such equipment was often not available in the quantities demanded.

"Project Pitlane" was created by a collective of UK-based Formula 1 technical teams in response to the UK government's request for COVID-19 assistance.[8] This effort resulted in the UCL-Ventura breathing aid (see Figure 1). A Continuous Positive Airway Pressure (CPAP) device, it is the next step in support for patients who need more than an oxygen mask. The patient wears a mask that seals to the face, while the pressurized air that the CPAP device delivers requires the patient's respiratory muscles to work less hard. Where possible, this is preferred over the method of last resort, intubated ventilation, which requires the patient to be sedated as the machine fully takes over breathing.

Medical devices, due to the potential risks they pose to both operators and patients, undergo strict testing and approval processes before they are allowed to enter the market. The decision by engineers at UCL and Mercedes-AMG HPP to reverse engineer an existing device is likely to have contributed considerably to the success of the project. In just 100 hours, the first UCL-Ventura had been manufactured. The device, which has since received approval from the UK's Medicines and Healthcare products Regulatory Agency (MHRA), also reduced oxygen consumption by up to 70% compared to the previous model, saving a valuable hospital resource.

Since then, the design has been made available with a free licence and is being used at UCLH and other sister hospitals across London.





Equipment that would normally be producing pistons and turbochargers for F1 racing cars at the HPP technology center in Brixworth, UK, turned to manufacturing 1,000 CPAP devices a day.

Testing has been another area that has challenged the response to the outbreak. Here a company that had been focussing on DNA testing for the consumer market has repurposed their solution for COVID-19. DnaNudge is a wearable device that is designed to help users make healthy eating choices that are matched to a user's health needs as designated by their own DNA (see Figure 2).[9] Thanks to its lab-in-cartridge design, it can provide a result in about one hour. It could provide much-needed testing capacity and is considerably faster than traditional laboratory tests. Despite its consumer origins, it is exceptionally accurate, with a sensitivity of over 98% (correct identification of COVID-19) and a specificity of 100% (correct identification of those without the disease).[10, 11]

### The Community Responds

While industry collaborated on complex medical devices requiring approvals, front-line health staff and key workers were having difficulties acquiring much simpler items: personal protective equipment (PPE). PPE is used to describe a broad range of items that protect people from dangers at their place of work, from hardhats and steel toe-capped boots, to goggles and chainsaw-proof trousers. For health workers, however, the shortages were in respirators (N95 masks), visors, and gowns.

The maker community responded quickly in a manner that was simply unimaginable a decade or more ago. 3D printing and other forms of additive manufacturing have spread rapidly in recent years. There are solutions for every budget and much of the required design software is available for free. Perhaps the biggest challenge, beyond printing equipment in large enough quantities, was linking the demand to the supply. Another key aspect is safety. While visors and masks may look simple, these devices still undergo stringent safety testing before they are brought to market. Finally, siloed approaches by individual makers quickly created plenty of “version 1” designs, so groups were quickly established to coordinate efforts around proven solutions.[12]

The group NYCMakesPPE (<https://nycmakesppe.com/>) is one such result. It functions as a bridge between those who have engineering skills and can make, and healthcare professionals. By June of 2020, they had managed to deliver more than 57,000 pieces of PPE. Their website provides resources for makers, highlighting the preferred designs of a range of products. For face shields, the 3DVerkstan has established itself as a favoured design. It consists of a 3D-printed headband to which transparency film can be attached. Ear savers, a band of plastic with indentations, help to reduce the tension and chafing caused by wearing surgical masks for hours at a time. Both designs are very flat, allowing several to be quickly printed at a time on the available space of the print bed. For those with access to a sewing machine, a range of cotton mask designs are also available.

The challenge with all these designs is that they have been created in a moment of great need to fulfil unprecedented demand. However, they typically come with a disclaimer indicating that they

*With the government response around the world quickly moving to shut down regions, and then entire countries, it became clear that existing mitigation plans would not resolve the challenges that COVID-19 was causing.*

lack any approvals or adherence to regulations governing these types of products. For those with access to multi-jet fusion (MJF) or selective laser sintering (SLS) equipment, the US Department of Health and Human Services NIH 3D Print Exchange provides a Stopgap Surgical Face Mask design (see Figure 3).[13] Although it does not have full Food and Drug Administration (FDA) approval, it meets the necessary requirements and has been tested clinically. It must, however, be fabricated in an ISO 13845-compliant facility, or one that is certified as a Good Manufacturing Practices site. The two-piece design features an exchangeable filter that makes a good alternative to standard surgical masks, but it does not replace N95 designs.

COVID-19 is not the first time shortages in ventilator availability have come to light. Hurricane Katrina, a natural disaster in 2005, left emergency services resorting to bag valve masks (BVM, also known as an Ambu-bag) due to lack of electric ventilators. This manual positive pressure ventilator device is ideal for temporary relief; but, due to relatively rapid operator fatigue, it is not really suitable for long-term use. A term project at MIT around 2010 resulted in a mechanical design that was based around a BVM, something that typically only costs \$10 to purchase.[14] This portable prototype solution featured a battery that was projected to cost around \$200 in mass production, making it ideal even for markets with limited health budgets.

While that design never seemed to have progressed any further, many projects have investigated similar approaches. The Open Source Ventilator (OSV) project (<https://opensourceventilator.ie/>), based in Ireland, was initiated in response to COVID-19. Formed by a small team of three, it works in partnership with the Irish Health Service and OpenLung in Canada to develop a Field Emergency Ventilator (FEV) around a BVM. With the design open sourced, and parts a balance of commercial and 3D printed, it has the potential to be the product the MIT project was aiming to be and a valuable resource for a future pandemic.

### How Will the Future Change?

As already highlighted, this is not the first crisis that the electronics and semiconductor industry has had to deal with. It is, however,





Figure 2:  
DnaNudge  
and testing in  
a laboratory  
(Source:  
DnaNudge)

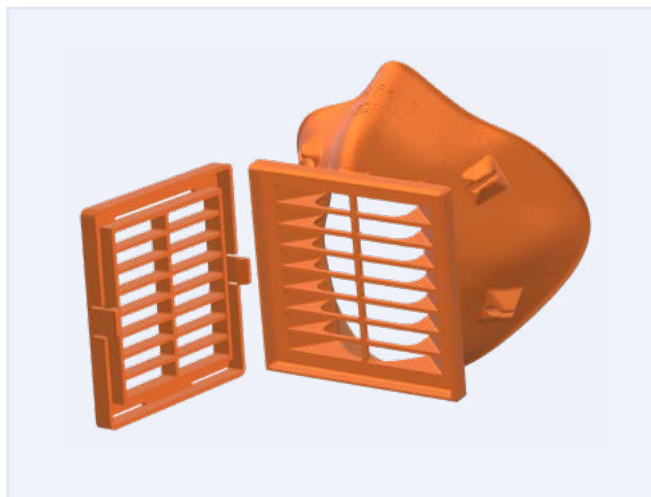


Figure 3: NIH 3D Stopgap Surgical Face Mask revision B  
(Source: Stuart Cording)

unique in the limitations that have occurred with the dual challenges of lockdown measures and compromised logistic services. Semiconductor manufacturers have managed to keep their manufacturing facilities going, although many are operating at reduced capacity.[15] This has been achieved by some by registering as a manufacturer of critical infrastructure. Employee safety and proper risk assessment have also been paramount to implementing this. The Semiconductor Industry Association (SIA) has also produced a white paper calling for its members' operations to be specified as "essential infrastructure." This seems a necessary step considering how broadly semiconductor technology is now intertwined with every facet of our lives.

One thing seems clear: we have moved to a new "normal." Many businesses that had previously viewed working from home with

hesitancy have seen that it can work. Offices that have reopened are typically limiting the number attending at any one time to around half the usual figures. Large events are mostly cancelled for the time being. Annual exhibitions, such as PCIM Europe and the parallel SMTconnect that typically take place in early summer, have moved to a digital platform for this year. This will ensure that networking and the exchange of information can continue to take place, but the effectiveness of this approach compared to the highly regarded face-to-face meetings such events normally offer will remain to be seen. Electronica, the biennial trade fair for the electronics industry, is planned to go ahead in November as planned. However, with various hygiene provisions in place, it is unlikely to be the experience we are used to. The coronavirus may be under control for now, but it will continue to deliver novel challenges to the industry for many months to come. ◀

## WEB LINKS

- [1] "Daten & Fakten zur embedded world": <https://www.embedded-world.de/de/aussteller/daten-fakten>
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# How **Raspberry Pi** Is Navigating the COVID-19 Crisis



By C. J. Abate (Elektor)

Since its 2012 debut, the Raspberry Pi SBC has transformed the way engineers and makers approach electronic system design and prototyping. The compact, general-purpose computer enables countless new innovations every day in the maker community, in classrooms, and throughout industry. A few weeks ago, I asked Raspberry Pi Founder Eben Upton about how his team is navigating the COVID-19 crisis, Raspberry Pi's current approach to industry, and more.

**Abate:** How are you doing personally during this time of global uncertainty?

**Upton:** I'm doing well. My wife and I have a two-week-old baby boy, so neither of us are getting a vast amount of sleep! The lockdown has given us an opportunity to spend more time together, and with our





three-year-old daughter, in the run-up to the birth.

**Abate:** How has the Raspberry Pi staff been working through the COVID-19 crisis? Did you already have team members working from home? And how have you been handling engineering?

**Upton:** We're actually not usually a very remote business, with the exception of our publishing team. Face-to-face interactions bring a lot of value, so we generally prefer that employees work from the office most days. That being said, we were one of the first companies to send people home at the start of March; our office remains open so people can access the lab facilities, and one or two people have chosen to keep coming into work, but by and large we're remote.

We've had to develop some new skills to help us stay productive, but by and large the short-term impact has been very modest, and in some ways (reduced commuting time, for example) it's been valuable. I think we'd experience some loss of productivity if we stayed remote for a long period, so hopefully things can get back to normal at some point. As a talent business we're not ever likely to try to force people back: it's about making people feel comfortable about choosing to return.

**Abate:** How has Raspberry Pi been addressing the maker market during the COVID-19



*On the commercial and technical side, we're concentrating on keeping production going in the face of some supply chain challenges. We had our second-best month ever in March, as people stocked up on things to play with at home.*

Eben Upton

crisis? For instance, in the May 22 newsletter, your team writes about a free Raspberry Pi online course.

**Upton:** The Foundation (our charitable shareholder) has done some great work in producing courses and content (Digital Making at Home, for example) to specifically address people affected by the lockdown measures. And, of course, their

existing content (FutureLearn courses, for example) have seen increased uptake, and completion, during the crisis.

On the commercial and technical side, we're concentrating on keeping production going in the face of some supply chain challenges. We had our second-best month ever in March, as people stocked up on things to play with at home. And we've had a few new product releases — the High-Quality Camera, for instance — which happened to be scheduled in this window, which has kept things interesting.

**Abate:** "Raspberry Pi goes industry" has been a hot topic in the Elektor community since you spoke with us about it at electronica 2018. What is Raspberry Pi's current approach to industry?

**Upton:** As you know, we offer the Compute Module line of products, which are targeted specifically at industrial users. And, of course, a lot of people are using the standard SBC products in industrial applications. A lot of what we've been doing over the last couple of years is around increasing standards compliance (generally no engineering involved: just proving what we have already conforms); providing programs to help our customers integrate our products (Powered by Raspberry Pi and the Raspberry Pi Integrator Program, for example); and providing the level of documentation and marketing



collateral required to help engineers (and their bosses!) get comfortable with Raspberry Pi as an industrial solution.

It always amuses us to see self-described “industrial” manufacturers pitching their products as being somehow more robust than Raspberry Pi. A lot of these people are making a few thousand boards a year, where generally that’s the sort of run we do just to check our production process is working properly. It’s very hard to claim you have a robust product until you’ve built it at real scale.

**Abate:** Engineers and makers around the globe have stepped up during the COVID-19 crisis to develop some helpful designs. I read about a few interesting Raspberry Pi-based projects on your blog. For example, the Raspberry Pi-based FluSense system, developed at UMASS, Amherst, is used to analyze coughing and crowd sizes. And at the University of Toronto, a team used Raspberry Pis to remotely monitor hospital patients’ oxygen saturation levels. Do you have any other examples of exceptional RPi-based designs that you have learned about in the past few weeks?

**Upton:** I think those two are the standout examples that we can talk about at present. There are rapidly manufactured ventilator designs based on Raspberry Pi Zero in production, but we’re not able to talk in detail about those: hopefully, we’ll get

permission to disclose some of this in the near future.

**Abate:** How is the Raspberry Pi Translation ([www.raspberrypi.org/translate/](http://www.raspberrypi.org/translate/)) project going? Elektor has a global audience of engineers and makers from dozens of countries. And, of course, we publish a Dutch and French edition of MagPi magazine. Do you need more translators to contribute to the RPi community? Perhaps Elektor members can help.

**Upton:** It’s going very well: we’ve seen large numbers of resources translated into many languages. The general approach, mixing machine learning and volunteer effort scales very well and produces high-quality output. We’re always on the lookout for more volunteers!

**Abate:** The Raspberry Pi 4 Model B was released in June 2019. A lot has changed in the world since then. I have read reports about strong sales numbers during the last few months. Is demand still up?

**Upton:** It is. Each month this year has seen higher sales than the same month in any prior year. March was our second-best month ever, at 640ku sold, and I’ve just seen the news that we did 530ku in May, which is 23% up year on year. Raspberry Pi 4 sales are closing in on 3 million units, which would be a record for a Raspberry Pi product in its

first 12 months, and sales of Raspberry Pi 3 and 3+ (largely into industrial markets) are still very strong.

**Abate:** You recently announced the new 12.3-megapixel High-Quality Camera. Any new products, projects, or initiatives in the pipeline that you can talk about now?

**Upton:** We don’t discuss unannounced products, though you’ll see we’ve just released the 8GB version of Raspberry Pi 4: it’s our most capable (and at \$75 most expensive!) product ever. I think you’re going to see a real focus on software over the next 12 months, as we squeeze all the available performance out of the Raspberry Pi 4 platform, and close the last functionality gaps that separate us from “traditional” x86 PCs.

**Abate:** I will end with a question that I am asking a lot of engineers these days. What is on your personal workbench? What are you working on right now? Can you share a photo of your workspace?

**Upton:** I can’t share a photo, but mostly what I have in my workspace is a sort of accretion of commercial contracts and technical documentation stretching back to December 2018, when we moved into our office. I suspect if we don’t move soon some of the lower layers might turn into coal. ◀



# Elektor will help you optimize your business

With nearly sixty years on the clock, 2020 might just become Elektor's most remarkable yet. We have seen large, well-known clients cut their marketing activities, but we have also seen unexpected companies that stepped up like never before. And although it took some flexibility, we have been able to help out both.

We all need healthy business, whether that means making things leaner or taking it to the next level. Doing nothing is not an option.



”

My team is ready to help in both scenarios. Be it with compact but highly efficient content marketing strategies or complete multichannel campaigning to take advantage of that new opening in the market, Elektor Helps. These times call for a custom approach for our clients, and we are going that extra mile. In fact, we are convinced that, together with you, we can make the difference.

Yes, that's a challenge!”

Margriet Debeij  
International Client Manager



Contact us at [www.elektor.com/helps-clients](http://www.elektor.com/helps-clients)



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# krtkl's Cofounder on Developing Hardware in Turbulent Times



By C. J. Abate (Elektor)

Developing innovative hardware solutions is never easy; but doing so during a global pandemic while headquartered in San Francisco — where software is king — might seem downright daunting. krtkl Cofounder and CEO Ryan Cousins offers some valuable insight into how his company is addressing such challenges while working on new hardware projects and solutions.

**Abate:** A lot has changed since we last spoke in April 2020. COVID-19 is still a factor today. How are you and your colleagues at krtkl doing these days?

**Cousins:** The team is fortunately doing very well. Aside from tasks requiring a physical presence (e.g., hardware debugging, product testing, packaging, shipping, receiving, etc.), the majority of the team has been set up to work remotely for years, so adjusting to the “shelter-in-place” directive wasn’t as hard as it otherwise would have been.

**Abate:** Tell me a bit about your background. When you were studying engineering at the University of California at Los Angeles, did you intend to launch a company? What were your goals back then?

**Cousins:** The idea of starting a company wasn’t something I really thought about until my senior year. I honestly couldn’t tell you what the catalyst was — maybe reading one too



The krtkl office in San Francisco, CA

many Steve Jobs articles — but that's when it really started to sink in as a possible life path. Of course, it wasn't until several years later that it came to fruition thanks mostly to a series of coincidences and random events. I didn't have a well-laid plan coming out of college. My first job essentially fell into my lap. After a cold call from a recruiter and two interviews, I was employed! I did, however, have a vision of how I would eventually come to own my own company: I would work for a couple years, apply to business school, and somehow once I had my MBA it would be all smooth sailing. Needless to say, that's nothing like what actually played out.

**Abate:** I first got in touch with you back in 2017, and you shared your thoughts on the future of automation. A lot has changed since 2017. Let's start with a short overview of your company, krtkl. When did you launch it and what were your initial goals?

**Cousins:** krtkl — pronounced "critical," by the way, which was derived from our prior experience developing safety- and mission-critical systems — was the brainchild of countless nights mulling what the "right" product or company would be that fit the talents of our founding team. At the time, my two co-founders — Jamil Weatherbee and Russell Bush — and I were doing a lot of consulting work for medical device and automation companies. We found that we kept having to design the same core components over and over again, which involved having to constantly deal with integration, part sourcing, and all the other issues product-centric companies don't want to deal with. That led us to the concept of "productizing" a considerable

portion of our services, which was ultimately in the form of a reconfigurable, business-card-sized computer module — essentially, a "brain" for things like robotics, automation, Industrial IoT, computer vision, and video processing. We wanted to help a community of developers who had the same frustrations we did: The products we were helping develop were too sophisticated and professional for something like a Raspberry Pi but were being deployed in volumes that couldn't support super high end hardware, and that required a bunch of painful integration work that really shouldn't be as bad as it is.

**Abate:** Today, do you focus on developing products or providing engineering services?

**Cousins:** The answer is: "Yes." Our core business comes from product development, manufacturing, and selling hardware modules (along with a complete development platform) to companies designing our products into their products (and, ideally, using them in production). However, we also provide a lot of engineering services that revolve around that same premise: Designing our products into our customers' products and helping them take a product from an idea to commercialization. In addition to the traditional engineering services (embedded hardware, software, IP, mechanical design, and so on), we've seen a lot of interest in contract manufacturing — particularly in the earlier stages of production when elements like product support and supply chain stabilization are so critical.

**Abate:** How has the COVID-19 crisis affected your day-to-day business?

**Cousins:** Operationally, we really haven't seen too much of an impact for the reasons mentioned above. Unfortunately, our revenue has taken a serious hit as some of our largest customers have seen their revenue sources and investment prospects seriously dry up over the last few months. It's been rough, but we're surviving — we always do.

**Abate:** Do you source a lot from overseas? Are you experiencing any difficulties today?

**Cousins:** Years ago, we made a strategic decision to manufacture everything onshore (locally in the San Francisco Bay Area), and we haven't looked back. As you can imagine, quite a few of our components come from offshore — and we have a really good local printed circuit board fabrication partner who builds our PCBs offshore — but having assembly and testing stay local has been a lifesaver. And, in total honesty, it's been a lot easier for us to source components during the pandemic since demand has totally dried up.

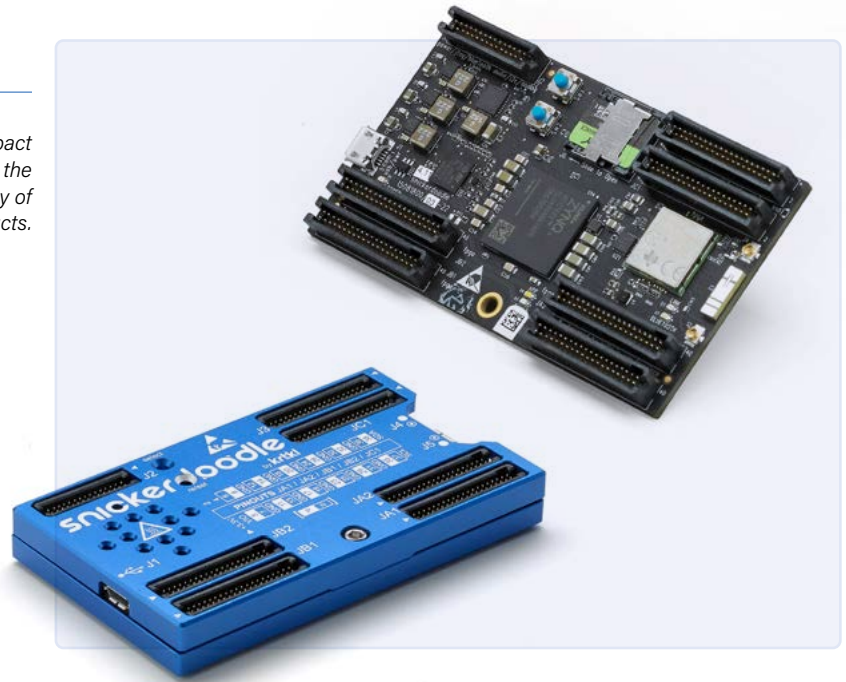
In contrast, it was virtually impossible to get a hold of any kind of DRAM back in late 2017, early 2018; and even when you could, the price might have increased by 20% between the time you placed an order and the time it was ready to ship. That was not fun. Sometimes running a manufacturing business during a strong economy can be a lot harder than running one during a downturn.

**Abate:** What has been the most difficult business challenge you've faced during the past few months? Sales issues? Supply or logistics-related difficulties?





*snickerdoodle is a compact computer module that enables the miniaturization and scalability of high-performance IoT products.*



**Cousins:** Sales. That's it. As mentioned, our revenue has taken a serious hit as some of our largest customers have seen their revenue sources and investment prospects seriously dry up over the last few months. We've also been fortunate (depending on how you look at it) in that we run a pretty lean operation from a personnel and overhead standpoint, so we weren't put in a position of having to make difficult decisions around cutting back.

**Abate:** Many of the engineers in Elektor's community are familiar with the snickerdoodle. But for those who aren't, can you provide a short introduction?

**Cousins:** snickerdoodle is a business-card-sized computer module that enables the miniaturization and scalability of high-performance IoT products. It's targeted at applications in between a Raspberry Pi and some insane multi-thousand-dollar development platform. It's based on Xilinx's Zynq system on chip — a dual-core Arm Cortex-A9 processor and Xilinx FPGA on the same chip. The idea is you have the flexibility of an FPGA (for customizing I/O, accelerating complex algorithms, etc.) combined with the convenience of an Arm processor (for, say, running Linux, handling networking, file systems, etc.). We also integrated a wireless module — so you get Wi-Fi and Bluetooth connectivity out of the box — along with things like DDR memory, a USB console, boot flash, chip and external antennas, power supplies, a supervisory microcontroller, and connectors that allow for a small overall footprint without sacri-

ficing usability — basically everything you'd need as a starting point for a sophisticated IoT product or embedded system.

We provide an Ubuntu Linux SD card image on our site, along with some other helpful development resources. We've worked on so many of these types of projects, we ultimately built a product we knew we would use religiously on anything from mechatronics to video compression — which we have and continue to do! More details specifications can be found on our website: <https://krtkl.com/snickerdoodle/#specs>.

**Abate:** Tell us about your other products.

**Cousins:** Snickerdoodle itself comes in a couple variations — or flavors if you will — "one" and "black." The main differences are: Connector orientation ("down" for plugging into a baseboard and "up" for accessing on a benchtop) and the Zynq/radio/memory combination. We also provide some snickerdoodle baseboards to simplify development. One is a breakout board called breakyBreaky. The other is an "all-in-one" video processing, audio processing, and networking platform called piSmasher. It's essentially a single-board computer on steroids, with HDMI in and out for high-performance video processing, audio input/output/headset with a built-in

CODEC, dual-Gigabit Ethernet RJ45 jacks, four USB 2.0 ports, JTAG, 25 I/O pins, and a few other peripherals. Some people have built some super-cool projects around this snickerdoodle + piSmasher combo, and it's the basis for a number of commercial products. You can check out more here: <https://krtkl.com/pismasher/>.

**Abate:** Anything new in the pipeline? If you can't announce yet, can you give us a general idea?

**Cousins:** Most of the projects we work on (or have worked on) are under NDA, so we can't reveal too much there, but we get involved with some super-cool applications. Everything from six-axis robotic arm controllers and remote sensing products to video compression/networking boxes and eSports accessories. One of the things we're most excited about is an educational platform we're working on with one of our university partners. We hope to have more public details about that project in the coming months.

**Abate:** Tell us about running a hardware-focused business in San Francisco. What is the hardware scene like in the area these days? Do you think you'll remain in the Bay Area?

**Cousins:** I think running a hardware startup



*piSmasher is an all-in-one platform with multiple HDMI, audio, Ethernet, and USB interfaces.*

anywhere is pretty brutal — especially when you're talking about prototype-to-production and development platform products. There never seems to be a shortage of seemingly unsolvable problems you're dealing with; you have to really enjoy this stuff to stick with it. San Francisco has actually been a solid place to start a hardware company. With a largely remote team, the insanely high salaries aren't as big of an issue, and we don't require a ton of office, warehouse, or manufacturing space for what we do. There's a surprisingly solid hardware startup community in San Francisco; granted, most are doing consumer hardware, so the customer base from our perspective can be pretty limited, but it's a good resource nonetheless. We haven't had to really sit down and think about the long-term home for the business yet, but I'm sure that day will come eventually.

**Abate:** Where do you see krtkl in six to 12 months?

**Cousins:** Because so much of our product-centric business depends on our customers' development timelines and market success, it's always hard to predict what might happen within a year. We of course hope that a couple of the projects we've wrapped up in the last six to 12 months will make it, but that's largely out of our control. But we're always thinking about "what's next" and looking for new product development, funding, and collaboration opportunities. We have a lot of irons in the fire right now in terms of grants, new customers, fundraising, and the like, so you never know.



*Sometimes running a manufacturing business during a strong economy can be a lot harder than running one during a downturn.*

**Ryan Cousins**

**Abate:** With your busy schedule of engineering, running your business, and even taking time out to do interviews and marketing, do you ever have any free time to work on DIY electronics projects?

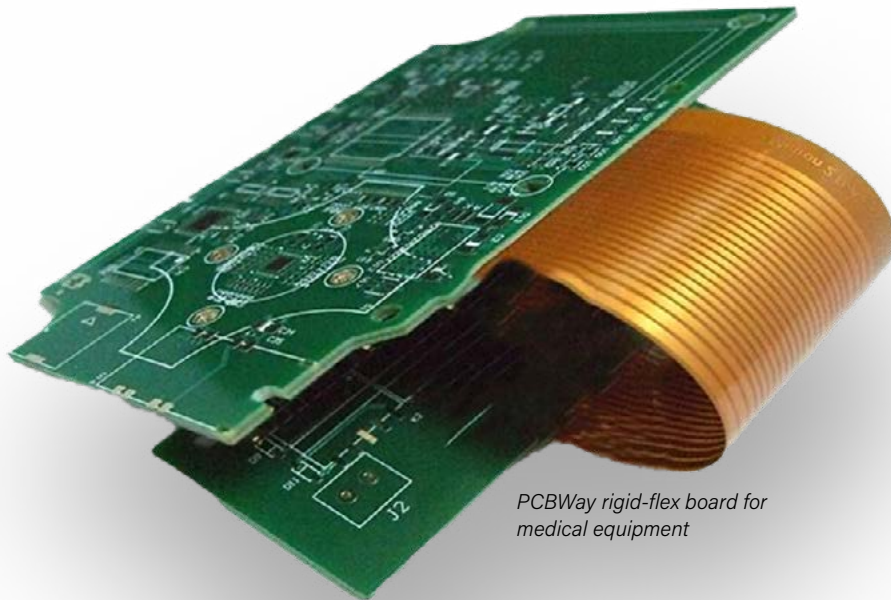
**Cousins:** I wish. Sadly, that list of tasks barely scratches the surface, but that all comes with the territory. It's almost embarrassing how little I've personally been able to play with our products over the last couple years with everything else going on. I will say that I'm constantly reaching out to engineers, makers, hobbyists, students, and anyone else interested in creating snickerdoodle-related

products and projects. The more community-driven use cases we have the better, and we're always open to sponsoring people with hardware and any other resources. So, if anyone reading this is interested, have them reach out to us at [hello@krtkl.com](mailto:hello@krtkl.com) with a project idea and we'll be happy to speak with them and look into helping them out.

**Abate:** Do you have any advice for electronics-focused small business leaders struggling to navigate the COVID-19 situation?

**Cousins:** I'm not sure I have any COVID-specific advice, but I guess I would say this time actually presents a unique opportunity in a lot of ways. While a lot of bigger companies are cutting back on their ad spend and scrambling to figure out how they're going to meet their profit targets — whether by reducing headcount, cancelling projects, and whatever else — this is where small business agility can be really powerful. Use this time to take a step back and evaluate where you are and where you want to be as a company. During the (relative) downtime, consider tweaking processes or strategies that weren't working before the crisis. Without going crazy, look into increasing advertising spend because you can likely capture more of the audience than when everything is comfortably humbling along. "Fortunately," small businesses (especially hardware companies) are all too used to the roller coaster ride and powering through the tough times. Now is the time to stick with it, because there are always opportunities hiding when people least expect them. ◀

# Advantages and Uses of Rigid-Flex PCB



*PCBWay rigid-flex board for medical equipment*

By PCBWay

The birth and development of FPC and PCB have spawned a new product: rigid-flex board. Rigid-flex board, as the name implies, is a combination of a flexible board and a rigid board. It is a clever design and connection of a thin flexible bottom layer and a rigid bottom layer, and then it is laminated to form a PCB. It changed the traditional flat design concept and expanded to the three-dimensional space concept, which brought great convenience to the design of electronic products.

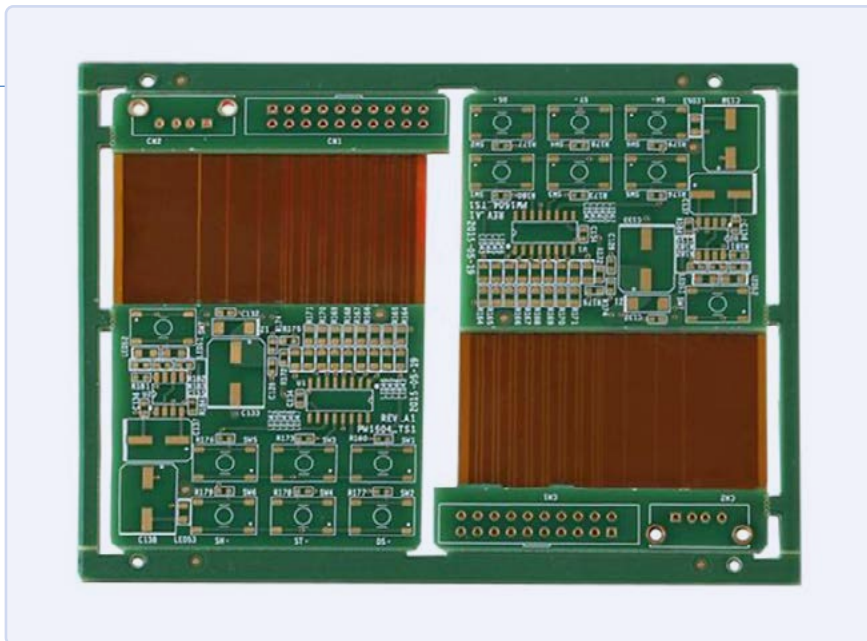
## The Application of Rigid-Flex Board

Rigid-flex board's uses include industrial, military, and medical equipment. Most industrial parts require precise, safe, and non-destructive soil. Therefore, the characteristics required for rigid and flexible boards are: high reliability, high precision, low impedance loss, complete signal transmission quality, and durability. But because of the complexity of the process, the output is small and the unit price is quite high.

In these difficult times of fighting the COVID-19 epidemic globally, PCBWay is contributing its own strength to help produce the PCBs for medical devices. The application of rigid-flex boards also applies to mobile phones: the common turning points of folding mobile phones (hinge), image module (camera module), key pad (keypad), radio frequency module (RF Module), and so on.

Another area of application involves consumer electronics products. Among consumer products, DSC and DV are representative of the development of rigid-flex boards, and they can be divided into two main areas of performance and structure. In terms of performance, the rigid-flex boards can connect different rigid PCB and components in three dimensions, so the total area of the PCB can be increased at the same line density, which can relatively increase the circuit carrying capacity and reduce the signal transmission limit of the contacts. On the other hand, since rigid-flex boards are light and thin and can flex the wiring, they have a substantial benefit in reducing the volume and weight.





PCBWay  
automotive  
inverter



*Rigid-flex board, as the name implies, is a combination of a flexible board and a rigid board.*

Automobiles are another area of application. The uses of rigid-flex boards in the car include the buttons on the steering wheel to connect the motherboard, the connection of the car video system screen and the control panel, the operation connection of the audio or function keys on the side door, the reversing radar imaging system, the sensors (including air quality, temperature and humidity, special gas regulation, etc.), the vehicle communication system, satellite navigation, the rear seat control panel and front controller connection board, the outside vehicle detection system, and so on.

### The Clear Advantages

You can realize three-dimensional assembly, save assembly space, make electronic products more compact and lightweight, and maintain uniform electrical characteristics. Furthermore, the design of the rigid-flex board can use a single component to replace the composite printed circuit board connected by multiple connectors, multiple cables and ribbon cables, with stronger performance and higher stability. Such boards provide the best solution for space-constrained conditions. This technology provides the possibility of safely connecting device components while ensuring polarity and contact stability, and it reduces the number of plug and connector components. Lastly, combining HDI technology, the design space of rigid-flex board has been gradually expanded.

### The Best Solution

In the following situations, the use of rigid-flex board becomes the best solution:

- High-impact and high-vibration environment. The rigid-flex combination board has high-impact resistance and can survive in a high-stress environment; otherwise, it will cause equipment failure.
- High-precision applications where reliability is more important than cost considerations. If a cable or connector failure is very dangerous, it is best to use a more durable rigid-flex board.
- High-density applications. Some components lack all the necessary surface area for connectors and cables. Rigid-flex board can save space to solve this problem.
- Applications that require multiple rigid plates. When the assembly is full of more than four connection boards, replacing them with a single rigid-flex board may be the best option and more cost-effective.

In PCB prototyping, rigid-flex PCB belongs to a special process, which has a certain technical threshold and difficulty in operation. It is expensive and has a high error rate and loss rate. PCBWay solves the pain points that enterprises have no processing for difficult boards, precision boards and special boards in PCB prototyping and assembly, and we provide customers with a variety of PCB manufacturing services. ◀

Visit [www.pcbway.com](http://www.pcbway.com) for more information.



# From Award-Winning Start-Up to Scale Up:

## How an e-ffwd Alum Is Attacking the COVID-19 Crisis with a Wearable

Teiimo CEO  
Markus Strecker

By Elektor

Germany-based Teiimo develops biometric garments that are intended to help people live safe and healthy lives. CEO Markus Strecker talks about the company's development since winning First Prize in *electronica Fast Forward 2018*. He also offers some valuable advice for innovators looking to create some buzz around their products and solutions.

**Elektor:** Teiimo won First Prize in *electronica Fast Forward 2018* in Munich. Looking back, how has that experience impacted your company? What would you say have been the top one or two benefits associated with participating in *electronica Fast Forward*?

**Strecker:** Winning the Fast Forward Award was an important step for *Teiimo* and has impacted us in many ways. First of all, the event itself, presenting our company, the conversations with judges and attendees and getting feedback on our technology and the chosen approach we take has been a very valuable experience.

There is one moment at the awards ceremony that I remember very vividly. Before announcing the winner, the jury expressed their appreciation. They said that the winner has a technology that will be in all of our lives in the future — in one form or the other. This was most encouraging. The conversations that followed underlined that the jury believed in our

approach, the business opportunities, and the value for the society.

Being the winner of such an important industry award presents an acknowledgement that we happily and with pride accept, show, and communicate. The partnership with Elektor allows us to raise awareness in the technical community and well beyond, as well as to professionalize our appearance in the print and social media. However, we did not immediately start all activities with respect to communication. We are actually preparing a campaign this summer and fall with good news about technology and products.

**Elektor:** Do you have any advice for the start-ups participating in *electronica Fast Forward 2020*? Is there something you know now that you wish you had known back then?

**Strecker:** A first message to the start-ups: If you are invited to the *electronica* evening event at the start of the *electronica*, go. It is great, and was already of im-





Teiimo won First Prize in electronica Fast Forward 2018 for its innovative textile system.

portance. I met a lot of people out of my strong network in the electronics industry that I have not met in the last years. The pitch sessions took place at the booth in a big hall. That was a new experience with respect to the bustling atmosphere around us. It is important to stay focused and keep yourself from being distracted. You have to get to the point fast, speak loud and clear, and keep your audience involved. Now, something you know as a start-up, but as we need to be reminded from time to time: practice your pitch. I was lucky to get support from my team members, who helped with feedback. The pitch competitions helped to get better. In the final round, I got messages and timing right.

**Elektor:** Can you give us a short update on the story of Teiimo? What has happened since 2018? Are you where you thought you would be? Have there been significant changes to your proposition or product?

**Strecker:** The past two years were marked by further technological advances and a growth in customized development projects. We help customers from different industries bring their ideas to life. The projects that we work on increase in number, size, and complexity. We now have a powerful solution proposition when it comes to conformable sensing and problem solving on an application level. With our building blocks, we can solve challenges and generate new solutions and teaming up with our customers is a win-win situation.



*The partnership with Elektor allows us to raise awareness in the technical community and well beyond, as well as to professionalize our appearance in the print and social media.*

Markus Strecker

Customer requests also show us where our technology can have a strong impact. We work with selected customers that are not competing with each other; and, at the same time, we follow our strategic agenda. Most of the customer projects are under NDA; hence, we cannot disclose the content and the solutions.

In 2018, we first revealed our sports shirt and then a project with a medical direction regarding ECG measurements. The feedback was great. Our main focus for our products today is on healthcare, well-being, and medical. Industries where expectations are high and requirements

strict. We experience a strong pull from the medical community. Doctors and institutions as well as pharmaceutical companies have expressed their interest and would like to use our products as soon as possible.

For the near future, you can expect a product announcement from us! We are working on a product tailored for Active Assisted Living. I cannot give away too much. Next time when we speak there will be more details.

**Elektor:** How has COVID-19 impacted your business?

**Strecker:** It is important to me to talk about COVID-19 because our solution could have a strong impact. But first to your question. It was a threat for us in the beginning, and we — as many others — had to see that we sustain our business in this challenging new situation which we were successful to do. Knock on wood.

The pandemic is keeping us on our feet and our minds busy. Since our foundation, we strive to sustainably change people's lives by making it easier, safer and by helping them live healthy.

We started to look deeper into ways how we can contribute. We were worried that our solutions might come too late, but after interactions and discussions with the doctors we work with and after reading about related World Health Organization (WHO) studies, we realized that our shirt can make a valuable contribution with







*We started working on setting up an initiative with the goal to provide a biometric shirt that can be used in detecting COVID-19 symptoms and potentially help identify individuals infected with the virus as early as possible.*

Markus Strecker

mitigating the pandemic. We sat down, talked, and established a plan to adopt the shirt for the detection of most of the early symptoms of the disease. Feedback from hospitals, care homes, and service companies was overwhelming. We are experiencing strong interest and a pull from the user side.

We started working on setting up an initiative with the goal to provide a biometric shirt that can be used in detecting COVID-19 symptoms and potentially help identify individuals infected with the virus as early as possible, which will help starting treatment sooner and slowing down the spreading of the disease. If we detect infections among nurses in hospitals or care givers in nursing homes, for example, early and are that way able to contain the spreading of the disease, the impact on the numbers would be immense. Or take people who are infected and live alone: a remote insight into their health status helps doctors to decide when to send them to a clinic. Seeing data on a daily basis is a huge advantage.

So, in order to speed up the development, we gathered a strong group of organizations from different areas — for example, AI, cloud, electronics R&D and production, medical and care facilities. Elektor is part of it and supports the communication efforts and contributes with the network.

**Elektor:** When you won the electronica Fast Forward Award in 2018, you presented a sensor-based t-shirt that was already

able to track body functions. So, you were ready to hit the ground running?

**Strecker:** Yes, definitely. Our core system that combines sensors, interconnects, and state-of-the-art electronics integrated in a garment can be adapted for other areas. The award-winning technology that we first tested in our sports shirt has already proved to be a door opener to enter different areas such as work-safety, medical, and active assisted living. In the past year, even more customers without any relation to garments contacted us and started some incredibly interesting projects. The simple question is always: Do I have to or do I want to measure something in a way that it is not noticeable? As we do in our biometric shirt. It captures a large variety of body and position data, but the user feels as if he would wear an ordinary shirt. So, if the answer to the question above is yes, we may have or find a fitting solution.

But even if you hit the ground running, you need the resources to accelerate and to sustain the speed. This represents a major challenge — still today. The medical market segments — which we are entering now — are very different from the sports market. We had to adapt to longer development times. And with our COVID-19 initiative, parameters have changed again dramatically. Time is of the essence now.

As we were preparing to raise funds, we had to learn that investors stopped the new investments and allocated their

funds to existing investments — ready to inject additional money in existing investments — and having a rank-list with companies that they disengage from if the situation worsens.

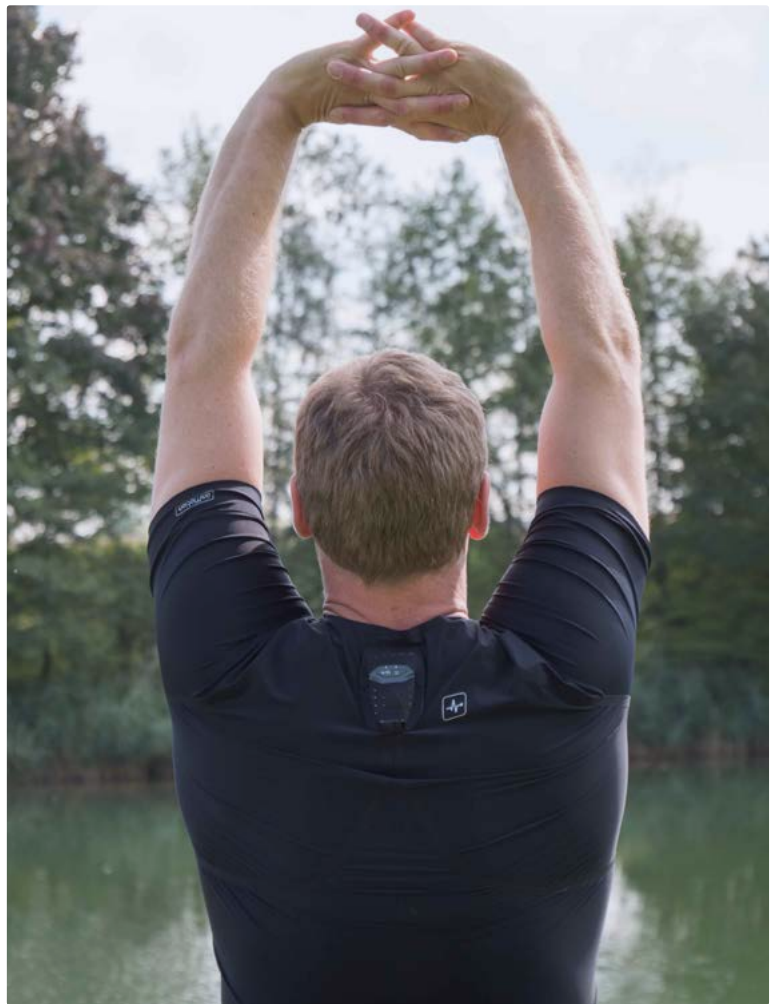
With our customers and the self-sustained operations, we grow, but we grow slow. So, we have a great technology, a good plan, a market pull. Now we need the necessary financial resources to ramp up and be fast.

**Elektor:** Can you share some details about your COVID-19 initiative and the product?

**Strecker:** According to a February, 2020, study by the WHO based on almost 56,000 laboratory-confirmed cases of COVID-19, among the most prevalent signs and symptoms of the infection were: fever (87.9%), dry cough (67.7%), fatigue (38.1%), shortness of breath (18.6%), chills (11.4%). These factors can be monitored and detected through the use of our shirt — or, as we should rather call it, biometric platform. In addition to the symptoms, there are other physiological measurements, notably heart rate (HR), heart rate recovery (HRR), and heart rate variability (HRV), which can provide early diagnostic insights into the onset of an infection.

Our plan is to have an integrated solution that monitors with our smart shirt approach, and with the appropriate cloud infrastructure, we can immediately support the response times and give insights to doctors and decision makers faster,

*The iinMotion shirt features an integrated system that provides important data, such as heart rate, heart rate variability, and speed.*



help the individuals to get support, and at the same time learn more about a disease.

We measure ECG, breathing, detect coughing, track the oxygen saturation in the blood, and give the person and the care taker valid data and a good visibility on the daily activity and the wellbeing of the patient —or information on a threatening onset of an illness. The fact that our solution captures a variety of biometric parameters makes us feel confident that it can help in other cases. And back to the business perspective: There is a sustainable market for the biometric platform. Enough reasons to keep pushing forward.

**Elektor:** You have assembled a consortium of strong partners in an impressively short amount of time. What are the next steps?

**Strecker:** Yes, we were grateful and impressed by the response from our network. R&D institutes, companies, and hospitals joined the consortium in no time. We applied for programs within calls from the European Research community and proposed the solution to the funding bodies. We hope for positive feedback within the next weeks. The European Commission has put together in a short time frame support programs to help to deal with the pandemic and the time after. If not, we will look for alternative ways to help and accelerate our activities. We all strongly believe that we have a valuable offer to make when it comes to containing and mitigating the pandemic.

**Elektor:** Do you think you will be able to present your progress during electronica Fast Forward 2020 in November? And if so, can we hereby invite you to join us on stage to share your insights?


**Strecker:** Thank you for the invitation that we hereby accept. It would be wonderful to be back on the stage with such a solution. In any case, we will present an update of our activities and the status in November with your support at electronica.

The pandemic is not over, and it will threaten societies and economies in the near future. We need to hurry and are committed to do so with our partners in the consortium. Everybody puts as much energy as possible behind the initiative, so let's hope that we will soon be able to show results.

**Elektor:** Engineers and executives all over the world read *Elektor Industry* magazine. You now have the chance to shamelessly call upon the industry to stand up

and help your initiative. Where do you need help in terms of development and hardware, knowledge, and test capacity? Do not hold back!

**Strecker:** Thank you for this opportunity. First of all, we are looking for motivated talent — engineers in textiles, electronics, and software — to join our team. Then, support from the manufacturing industry that would advance manufacturing resources — such as electronics components, manufacturing services, mechanics design, and injection mold tools — could help us accelerate significantly. Testing labs could support the fast CE certifications. Please contact Elektor or us if you are willing to join the initiative!

Apart from support in terms of knowledge and technology, the initiative needs funding. This is quite essential for success. Especially with an ambitious goal in terms of timing. Financial support as investment or financial contributions are welcome. It was a pleasure talking to you. Thank you. 

From -50% to +35% turnover with Summer Sale

# Give Your Products Center Stage!



By Erik Jansen

At the start of the coronavirus crisis, the Elektor webshops plunged deep into the red — in some cases, to as much as half of normal turnover. We needed to step up fast and we did. Together with our suppliers, we were able to turn sales from -50% to +35% through a very successful sale. We are quite proud of this achievement. And we intend to repeat it together with more of our partners. We can help each other!



In the coming months, Elektor is organizing an extended Summer Sale that we will intensely promote on a weekly basis in all our media. Obviously the only way we can get away with intense promotion is if we can bring an offer that is super attractive to our audience. This means that together with you, we need to create a surprising offer, an attractive offer, or both. At Elektor we have done so quite successfully over the last two months and have been able to lower our stock levels where it was needed and were able to make up for lost margin with increased volumes.

If this sounds like an attractive situation to you, we encourage you to contact us at [sale@elektor.com](mailto:sale@elektor.com). Our e-commerce team led by e-commerce manager Muhammed Soküt will closely examine if there is a good match possible between your offer and our customers. We cannot guarantee that it will always work, but we do guarantee that we will do our utmost to make it work! Your product can connect with our target group, and our best e-commerce, sales and marketing staffers are ready to think along with you. Elektor Helps Suppliers!

### Shameless!

But... is this then nothing but a shameless promotion for our store? Well, no. We like to think it is creating a win-win situation. In the first place, and this is truly our number one priority, it will be great value for our extensive audience. Second, we will go a long way to help our partners benefit from our unique store sale in difficult times. And finally, Elektor also benefits from happy customers, a positive impact for our suppliers, and, yes, a successful stores sale. Win-win!

### Promotion

Being an editorial webshop offers a lot of unique benefits; obviously, we have our own media and our own community that will allow us to communicate as long as we remain relevant. The Summer Sale will be promoted in all our media and beyond. This means mailings, news, reviews, social posts, video posts, etc. There will be a standard approach, but we will extend that to fit the proposition at hand. Not only will we use organic channels but we will also work with professionals to help extend campaigns in paid media. ◀

## Here's everything in a nutshell

### What we want to achieve

1. An attractive and enjoyable SALE for our 120,000 members.
2. A boost to your sales and ours.
3. Surprising and spectacular campaigns will put a smile on faces.

### What we ask

1. A substantial margin, most of which we give as a discount to our customers (various scenarios can be discussed).
2. Prompt availability of stock for faster delivery (drop shipment is also possible).
3. That, together with a positive cooperation, is going to make the difference!

### What we offer standard

1. Inclusion of your product in the 4 Elektor webshops and, of course, in the SALE section.
2. Admission in one or more of our three weekly shop emails to our 120,000 active members\*.
3. Presentation in a native ad on our homepage.

\*Depending on your offer, this may vary from one of the 5 products to a dedicated mail!



Although during this summer the most impactful but necessary measures have been lifted, the coronavirus continues to have a major impact on our world and our business. It is precisely for this reason that Elektor has launched a program under the name Elektor Helps ([www.elektor.com/helps](http://www.elektor.com/helps)). Together with our main stakeholders, we are looking at how we can make the best possible contribution to a slightly better situation with our limited resources.

Electronics engineers and pro-makers in the worst-affected areas receive a free subscription; and where news stands are difficult to reach, the shipping costs on our magazines were eliminated. For our clients who currently have to do without fairs and trade shows, we offer extra communication possibilities with 4 free extra Elektor Industry editions for our 120,000 members, editorial webinars and podcasts. Finally, we are also motivating our global community members to contribute helpful engineering solutions through a small contest.

[www.elektormagazine.com/elektor-helps-projects](http://www.elektormagazine.com/elektor-helps-projects)

# Industry & Product News

## Bluetooth LE-Powered Hand Sanitization Monitoring Solution

Nordic Semiconductor recently announced that Sani nudge — a Denmark-based healthcare solutions company — has selected Nordic's nRF52832 Bluetooth LE System-on-Chip (SoC) and its nRF51822 Bluetooth LE SoC to provide the wireless connectivity for its "Sani nudge" hygiene monitoring solution. Developed by Poland-based Grinn Global, Sani nudge is designed to help healthcare institutions improve hand hygiene compliance and processes, which are critical as the world looks to quickly recover from the Covid-19 pandemic and mitigate against further outbreaks. The nRF52832 SoC-powered "Sani sensor" is fitted to new and existing hand sanitizer dispensers (i.e., gel, soap, and foam). Facility staff use an nRF51822 SoC-powered "Sani ID" beacon attached to their ID badge. Upon use, the Nordic-powered Sani sensor credits the closest staff member's Sani ID badge with an effective hand hygiene "event." This data and more are relayed to a centralized gateway using Bluetooth LE wireless connectivity provided by the nRF52832 SoC, and in turn sends it to the Cloud via a low power wide area network (LPWAN) protocol.

Source: Nordic Semiconductor



Learn more



Learn more



## SCHURTER Is United Against COVID-19

Coronavirus SARS-CoV-2 spreads quickly. SCHURTER takes this fact into account and has "prioritized and ramped up the production of its components and input systems, which are used in medical devices." With decades of experience as a supplier to the medical technology industry, SCHURTER was able to avert the lockdown of numerous of its own production facilities. System-relevant operations — which include SCHURTER production plants — were closed in only a few countries. As a result, and thanks to a high degree of flexibility, SCHURTER drastically increased its capacities for medical technology. [Learn more](#) about the company's applications, Human Machine Interfaces, and V-Lock Cord Retention.

Source: SCHURTER

## 500W-650W AC-DC Power Supplies for Medical Devices Including BF Applications

XP Power recently unveiled two new ranges of AC-DC power supplies that provide BF class insulation for healthcare applications where excellent EMC performance is required. The PBR500 and PBR650 series offer power levels up to 500W and 650W, respectively. Both accept a wide, universal input range of 80VAC to 264VAC at 47Hz to 63Hz, and they offer a total of eight single output voltages (12V, 15V, 18V, 24V, 28V, 36V, 48V, and 57V), giving system designers the flexibility to cover many applications with the same series. In addition, both series offer efficiencies of 90%,

reducing the heat generated during operation and prolonging the lifetime. The PBR500 is available in two formats. The U channel format provides 350–400W when convection cooled and 450–500W with external forced air cooling. The covered version, including a variable speed integral cooling fan for low audible noise, provides a complete 450–500W solution. The PBR650 provides 600–650W in an enclosed supply also with a variable speed integral fan with low audible noise.

Source: XP Power



Learn more





## congatec Whitepapers on Embedded Computer Tech for the Medical Sector

congatec has published several informative whitepapers on embedded computer technologies that can be used in the medical sector. "Applications range from high-performance systems such as stationary tomography (MRT, CRT) and semi-stationary ultrasound and diagnostic devices, to small mobile and ultra-mobile devices for use in diagnostics and care," the company reports on its [Embedded in Medical Technology](#) page. The following whitepapers and more are available: "New Benchmark Modules for High-End Medical Computing"; "Focus on Mobile Devices"; "Scalable Artificial Intelligence"; and "Medical Interview Paper: congatec COM-Express with 8th Generation Intel Core Processors."

Source: congatec

Learn more



## Imagination Announces Next-Gen IEEE 802.11ax/Wi-Fi 6 IP for Low-Power Applications

Imagination Technologies recently launched IMG iEW400, its latest IP based on Imagination's Enigma Wi-Fi technology. iEW400 delivers integrated RF and baseband, designed for low-power and battery-powered applications, such as the IoT, wearables, and hearables. Based on the latest IEEE 802.11ax Wi-Fi 6 standard, the iEW400 offers improved robustness, throughput, and power-saving through a range of new features such as 20/40MHz operation, Target Wake Time (TWT), Orthogonal Frequency-Division Multiple Access (OFDMA), Basic Service Set (BSS) Coloring, Dual Sub-Carrier Modulation (DCM), an optional upper MAC, and an optional power management unit (PMU). Available for licensing, the iEW400's key features include: complete 2.4/5GHz low-power Wi-Fi solution; silicon-ready design, with a 6.84 mm<sup>2</sup> die area, including analogue pads, in TSMC 40nm LP; internal power amplifiers, LNA and switch; a sleep controller to ensure overall system-level power consumption reduction; optional integrate PMU; and supports Station, Soft AP and Wi-Fi Direct operating modes.

Source: Imagination Technologies

Learn more



## Microchip Introduces 3 kW Transient Voltage Suppressor Diode Array Family

Microchip Technology recently launched an expanded portfolio of Transient Voltage Suppressor (TVS) vertical arrays – the MDA3KP Transient Voltage Suppressor (TVS), a 3-kW diode family including more than 25 products with different screening levels, polarities, and qualification standards. The MDA3KP TVS diode array family delivers an integrated multi-diode solution. According to Microchip, it is "the only available technology offering a comprehensive voltage range tested to a high reliability standard and qualified based on the MIL-PRF-19500 JANTX level equivalence standard." Available in unidirectional and bidirectional construction in stand-off voltages of 6V to 40V, the components provide ESD and EFT protection according IEC standards and a Peak Pulse Power rating of 3000 W at 10/1000  $\mu$ s. Device applications include automotive, marine systems, industrial logging equipment, and power supplies.

Source: Microchip Technology

Learn more



## Honeywell Software Helps Enforce Social Distancing and Safety Procedures

Honeywell offers several new software solutions designed to help companies enforce COVID-19 site health and safety procedures for highly mobile workers. Offered through the Honeywell Operational Intelligence asset management platform for the workplace, the software features "monitor on-site social distancing compliance, help enforce customizable device cleaning procedures and deploy software to digitally trace who has handled each device." The features — which are well suited for use in the health care, warehousing, logistics, and retail fields — provide companies with real-time data to better respond to critical factors for businesses re-opening under modified conditions due to rapidly evolving health and safety guidelines. Features include: Social Distancing Proximity Detection, Check Out/In and Device Cleaning Management, Remote Control and Remote Wipe, and Customer Counter.

Source: Honeywell

Learn more





# We get by with a little **help** from our **friends**

While we are in the midsts of a **transformation** from a health to economic crisis, we strongly believe we need to unite to get through this storm called COVID-19. We are calling this **united** approach Elektor Helps and we open up our platform to our friends, clients, suppliers and anyone that has a need to communicate. In the upcoming editions of Elektor Industry we therefore offer some sponsored or even free ad space, these pages are a first result. Interested? Contact our team at [elektormagazine.com/helps-industry](http://elektormagazine.com/helps-industry). We can always help!



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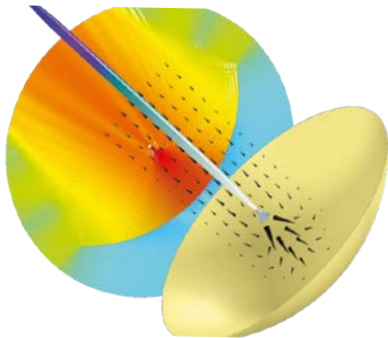
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## EM simulation could help the Internet of Space lift off.



The wired and wireless networks that currently connect people around the world cannot reach everywhere on Earth. To solve the problem, engineers are turning their eyes toward space. The goal is to form a suborbital high-data-rate communications network to revolutionize how data is shared and collected. Before this Internet of Space can be built, design engineers need to optimize their antenna designs.

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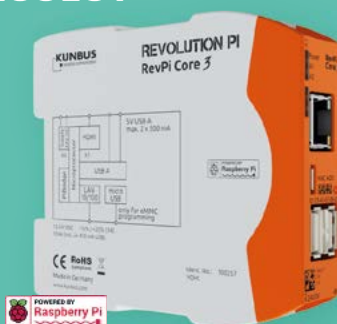
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## The COVID-19

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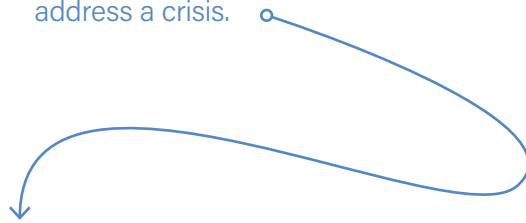
# Industry Spotlight

COVID Edition

## Tech companies step up

The COVID-19 crisis has affected us all in different ways. Fortunately, many companies in and near our industry have stepped up and launched helpful initiatives during the past few months. Elektor recognizes these

companies for their proactive approach to helping others during these turbulent times. We appreciate any business, whether successful or not, that acts to address a crisis.



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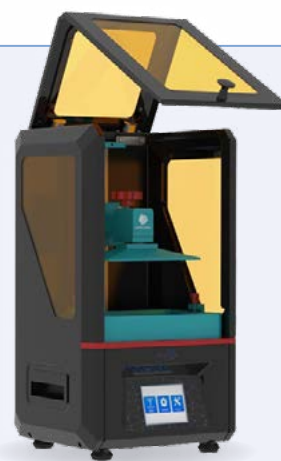
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# A Focus on Driving Sustainable Progress

By Elektor

The COVID-19 crisis has created challenges throughout the electronics industry, which is why electronica 2020 in Munich (November 10-13, 2020) presents long-established companies, start-ups, and innovators with exciting opportunities to demo technology and learn about new engineering solutions. Falk Senger, Managing Director of Messe München, explains how his organization is planning for the event and what exhibitors and attendees can expect.



Falk Senger, Managing Director of Messe München (Source: Messe München)

**Elektor:** Due to the COVID-19 crisis, 2020 has been a challenging year, especially for events. But we hear that electronica 2020 (November 10-13) in Munich will be one of the first big industry events. Can you tell us something about that?

**Senger:** The preparations for electronica are in full swing. The show will be the first unique opportunity this year for the industry players to make direct customer contact and present innovations. Feedback has been very positive: the number of registered exhibitors is almost on the same level as for the previous event. This year's motto for electronica is "driving sustainable progress." With new impulses, at the trade fair we will demonstrate how electronics with its innovations can make a decisive contribution to sustainable progress. The focus will also be on medical electronics, intelligent energy solutions, and 5G for the Industrial Internet of Things (IIoT). At four conferences — electronica Automotive Conference (eAC), electronica Embedded Platforms Conference (eEPC), Wireless Congress and the electronica Medical Electronics Conference (eMEC) — experts will present the latest developments in electrical engineering.

**Elektor:** What precautions are you taking to reduce COVID-19-related risks at the event?

Did you learn from other events, or were you largely on your own? And are there any measures that will probably stay in place for future events?

**Senger:** Together with the Bavarian State Government and the responsible authorities, we have set up a safety and hygiene concept for all our events, which is constantly adapted to the current situation. It provides a number of concrete measures to ensure that even in times of COVID-19 we are able to hold trade fairs such as electronica, with the usual success and safety for everyone involved. Essentially, it is a matter of three things: keeping distance, hygiene, and traceability of all participants. In addition to the official requirements, our experience from previous trade fairs in the first quarter of this year is also being considered in the planning, such as increased cleaning intervals.

**Elektor:** Looking at your bookings, are there industry sectors that will be more represented due to COVID-19? Are there certain sectors, or perhaps regions, that are more reluctant than others?

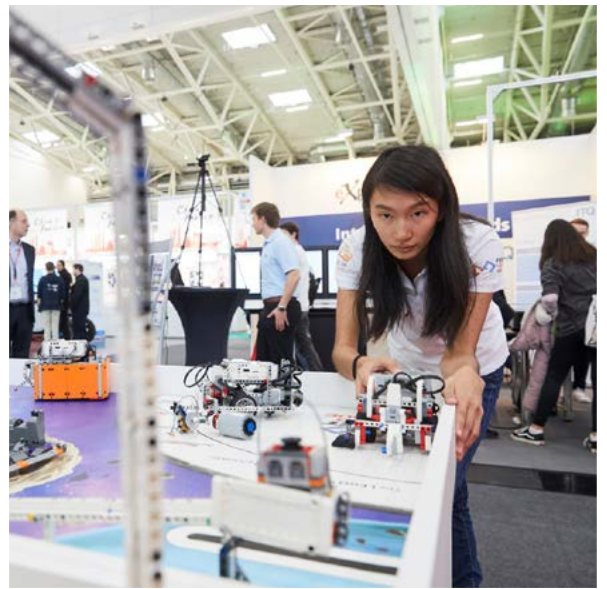
**Senger:** Registration for electronica 2020 is still open. Only then we will have a complete overview of the industries represented and the exhibitors' countries of origin. The current number of registrations is on the same level as for the previous event.

**Elektor:** The threat of a second wave hovers over the market. How is Messe Munich reducing its own risks?





electronics fast forward, the start-up platform powered by Elektor, offers start-ups an opportunity to present their solutions to the industry. (Source: Messe München)



electronics 2020 is scheduled for November 10 to 13, 2020, in Munich, Germany. (Source: Messe München)

**Senger:** The past few months in which we have been living and working with the Corona pandemic have shown that the situation needs to be reassessed on a daily basis and requires a rapid response if necessary. This is why we are in close and constant contact with the Bavarian state government and the authorities.

**Elektor:** Many event management companies have turned to virtual events this year. What is your take on virtual events for the electronics industry?

**Senger:** We are working hard to organize a safe and successful event for everyone involved, just as exhibitors and visitors at electronics have been used to for many decades. For our extensive conference program, we are planning a partly virtual implementation in order to let also those participate, who do not have the possibility to be present this year. In fact, in the current situation, there is no 100% certainty in the long term. If, contrary to expectations, the situation should become worse, we will inform the industry about further steps in time.

**Elektor:** The start-up area for electronics Fast Forward (e-ffwd) gets larger and more professional every year. This year, Elektor and Messe Munich will dedicate even more square meters to start-ups. How do you explain the success?

**Senger:** Start-ups are innovation drivers for the industry and play a decisive role in its success. With our partnership and the development of the start-up program, we have absolutely met the demands and meet our claim as the world's leading trade fair and most import-

ant industry platform. electronics offers the perfect setting for bringing together young, agile entrepreneurs with established and renowned companies — the success has proven us right.



*With new impulses,  
at the trade fair we  
will demonstrate how  
electronics with its  
innovations can make a  
decisive contribution to  
sustainable progress.*

Falk Senger


**Elektor:** This event no doubt is one of the biggest opportunities for start-ups to get in contact with the industry face to face and give the industry the chance to get in touch with new technology, innovative approaches, and the agile start-ups behind them. What do you feel will be different about this matchmaking, especially after COVID-19 presented both sides of the table with so many challenges?

**Senger:** The concept of matchmaking and the associated opportunities remain as usual. Considering the existing uncertain situation, the

proper contacts and networks are even more relevant for one's own business success than before. We expect the situation with the uncommon general conditions at the trade fair to be perceived as less irritating, as it is already known and learned from everyday life.

**Elektor:** Any advice, or words of encouragement, for companies still on the fence about exhibiting in November?

**Senger:** Trade fairs are an important motor for the economy and give industry a boost. electronics is an indispensable international industry platform and this year is the only opportunity to present innovations and make personal contacts. After the corona-related decline in sales in the industry, this is now more than ever important.

In view of the number of visitors, we assume that the positive trend, especially in Europe, will continue and that the situation will have largely normalized by autumn. Whereas extensive travel restrictions were imposed in recent months, border closures and travel warnings are now being gradually lifted — at least for the European countries from which the majority of electronics visitors come. With our hygiene concept and comprehensive measures, we are also ensuring a safe and secure trade show participation! 

#### electronics 2020

Munich, Germany (Nov 10-13, 2020)

> [Details and Registration](#)

> [electronics Fast Forward 2020](#)

## Our Contributors

C. J. Abate

### ► Q&A with Eben Upton:

How Raspberry Pi Is Navigating the COVID-19 Crisis

### ► Q&A with Ryan Cousins:

krtkl's Cofounder on Developing Hardware in Turbulent Times

Stuart Cording

### ► Industry and Community Respond to Coronavirus

Erik Jansen

### ► Give Your Products Center Stage!

PCBWay

### ► Advantages and Uses of Rigid-Flex PCB

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## Next edition

Edition 4/2020 of Elektor Industry magazine focuses on Embedded Development. Background reports and news on the topic come from companies, industry specialists, Elektor editors and freelance authors.

Elektor Industry no. 4/2020 is published on August 7, 2020. Subject to changes.



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