My name is Gunter Schöch, German of 53 years as of 2026.
Every falconer's journey is different, any mine is no exception.
For a strange reason, I fell in love with birds of prey as a kid of around 5 or 6.
Living in big cities and without any hunting backgrounds among family or friends, and any form of hunting being highly regulated and quite exclusive in Germany, I could only dream of falconry "one day". I was out and about observing all, built a small library, did artwork, went to raptor displays and zoos, and dipped my feet into bird conservation in my childhood. Observation, conservation, falconry: These were always different sides of the same medal for me: Admiring raptors from close by, and ensuring their well being.

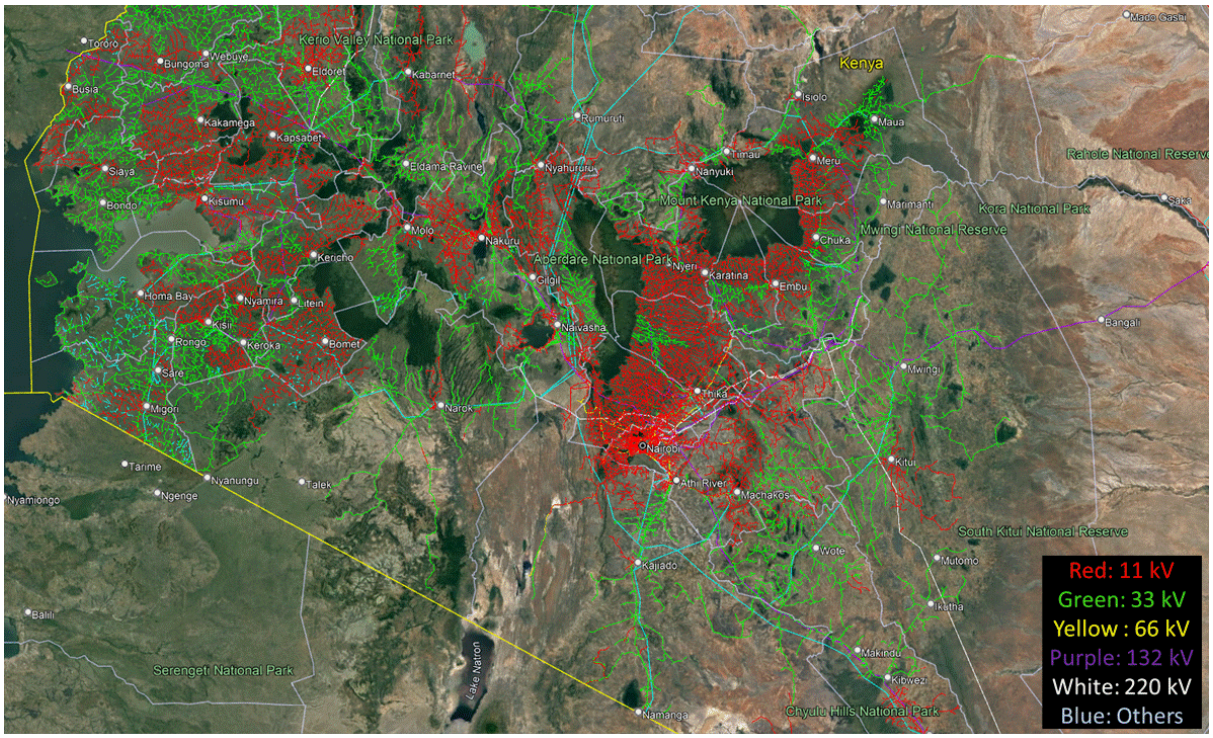
Having moved to a village near Perpignan with my French wife, I fulfilled my dream raising my first bird, an imprint northern goshawk from the late Christian Sanchez standing for the very first time on its own legs on my glove by a freak coincidence on my 50th birthday.



Thanks to my fellow ANFA falconer friend Guillaume Collonge, I dug up the connection to legendary raptor conservationist Simon Thomsett in 2023, and we visited him together for 2 weeks in his self-built mud hut live-in- aviary in the jungle of a nature reserve in Kenya in 2024. Simon was one of my childhood heroes I knew from BBC and National Geographic TV programs I taped on VCR in Germany in the 1980's. For those who don't know Simon, here is a quite good portrait of him and his work in French (https://www.laprovence.com/article/france-monde/9405265763484914/au-kenya-

lopiniatre-travail-de-sauvegarde-des-rapaces-menaces-dextinction).

Simon has dedicated his entire life to the protection of raptors in Africa and around the world, and achieved many world's first, although he is entirely self taught, be it in veterinary care (surgery, medication, even making protheses), captive reproduction, flying with raptors and much more, and is an unbelievable falconer who got his first lanner at age 4, more than 60 years ago.
The idea of the visit for me was to meet this amazing man, and to find out what I could do from my own vantage point to best support his tireless efforts.
During intensive WhatsApp contact over 1.5 years before the visit, I had already learnt about the many problems facing raptors in Africa. Surging populations being at the root of almost all, the single biggest one is the electrocution risk. The grid expansion is massive due to compounding effects: More people, a higher portion having access to electricity, the whish to electrify further e.g. replacing firewood, EVs, and the fact that Kenya is even a net exporter of electricity, sitting on massive geo-thermal resources due to the location on the tectonic fault line of the rift valley.



You might ask: where is the problem, I see birds sitting on power lines all the time. We even use and encourage pylons as artificial nesting trees. And you are right, a bird even on an uninsulated wire will only get statically charged, which it won't even notice. Small birds preferring to sit on wires, like e.g. starlings, are totally unharmed. Think of it like when you might be statically charged after sitting on a plastic chair, running on astroturf or sometimes getting out of the car. The discharge can be noticeable, but isn't a real problem, although you might be charged with many kV at that moment, but the current that can flow from the charge is almost nothing at all.
But mid- and large sized raptors on small power distribution lines are different and deadly story. They

prefer the poles or their cross arms as perches. On the typical smaller powerlines (typically 20 kV in France, 11 kV or 33 kV in Kenya), the 3 phases are so close that the bird can connect them with it's wings. Even more frequently, they connect one phase to the cross arm of which they sit, bridging the ceramic or silicone insulators which normally keep the wire from getting grounded. The poles today being made of concrete, with rebar steel inside, make very good earthing conductors. Either way, the birds get "grilled", because now, a huge current can flow. Most are dead instantly, falling to the ground literally well cooked. Some bird have been known to cause wildfires, when they hit the ground on fire. Some can even still fly off, but they eventually almost all die, because the current will have at least carbonized their nerves which then leads to necrosis. They lose limbs in the following days.

The logic conclusion: Build powerlines with safe geometries (e.g. the "chapeau de gendarme" triangular distribution, insulators hanging down not standing up etc.), and retrofit dangerous lines with additional insulating elements on critical points. While this is a serious project on live wires distributed in the landscape, retrofitting is being done in many countries since the 1980s.



Not so in Sub-Sahra Africa. Over 30 years of relentless fighting with the utility companies have led to basically nothing. 3, in words three, poles have been retrofitted, in the year 2025, with great fanfare, and on the very game reserve on which Simon lives. That is all that has ever been done in all of Centra/East Africa, while the raptor populations there are estimated to have been decimated by 90-95%% in the last 20 years (official numbers understate what Simon is observing, and I know who I trust more). Worse, all new poles in the warehoused to be deployed going forward are all of the most unsafe type.
We all knew: This is a losing battle. Local politics tries to deny the problem, because if they acknowledged it, and that something could be done, the next question would be why they had not reacted decades earlier. Instead, they continue to deploy new unsafe poles by the hundreds of thousands. The utilities, wildlife administrations and so on are usually all government controlled, and national and also international law (such as the UNESCO world natural heritage status of the Kenya Lake System in which Simon lives) is not enforced. While still struggling to bring electricity to the people, the safety of the distribution lines for wildlife realistically is a concern of second or third order, even to the EU who sponsors the grid expansion with hundreds of millions annually, although we also give ourselves increasingly ambitious targets for preserving biodiversity. But we can't only make plans for the next 30 years, raptors will be gone for good by then.

So out of pure desperation, we developed a radical idea: What if, instead of making the infrastructure safe, we made the birds safe? Ok, they can't of course wear little insulating rubber boots, but what if they had a sixth sense for those dangers? They can't read the "mortal danger" warning sign on the poles which we humans can. But what if they got warned in a way they can follow?
All attempts to add equipment to the infrastructure for that, as is commonly done (think e.g. of anti-collision flares and balls on large transmission lines), would run into the same issues as the insulation. If we could do that, then we should rather simply fix the mentioned insulation material. But what if instead, the protective device was worn by the animal? It seems counterintuitive, and that's why nobody has ever tried it. "You can't trap and equip each individual" is the most common first reaction I hear.
But bear with me: Think about some specific use cases: Would you a) rather want to tag a pair of martial eagles with an active tag, capable of warning them of human-made dangers such as electrocution, or would you b) rather want to retrofit potentially thousands of power poles with deadly live high voltage, spread across the martial eagle pair's territory of often several hundred km^2 of lion, buffalo and hyena infested territories? All of a sudden, for truly rare species, the math looks very different! Simon has trapped many hundreds of raptors in his life, and with a little luck, several get trapped and e.g. equipped with transmitters in a day for research projects already.
Even if we could make some national parks safe, which we manifestly already can't: Then think about migrating birds where it becomes utterly totally impossible to make their corridors of thousands of km, spanning many countries, safe. I am also not even talking yet about wind turbines, where, as we all know, another mortal danger lurks, and to make those safe is even more difficult.



Another common objection is ethical: "But wouldn't this turn the bird into a cyborg?" the purists argue. And frankly, it is exactly people like Simon and me who feel this very strongly. We'd all prefer

pristine nature without the need for such drastic use of technology to defeat the negative effects humans have on the planet. But we are also realists. It is the lesser evil. And nobody can really argue that if only we turned all those passive tracking tags which are already being deployed to birds into active tags with warning function, by adding this feature invisibly to the inside, all that would change is that the bird now gets an immediate pay back for the payload that we make it carry. No indirect promise of the species benefitting from humans better understanding its behaviour, but a tangible and individual payback in the form of being protected from some of the greatest dangers it is facing. In ambitious projects such as the one by Aigles de Léman and the white tailed sea eagle, ~100% tag coverage of the "fleet" of birds is already a reality. 100% of captive bred and released birds, plus any that could be captured and tagged.

So what it would take is: We need the information about the location of the danger onboard the bird. For wind turbines, this is the most easily done with geofencing. GPS tags already know where they are, and map data for the location of wind turbines is readily available. Small power transmission lines are a very different matter: they are linear developments, map data is often spatially wrong, outdated, or not available at all. For this, we came up with the idea to simply use the electrical wire as an antenna in itself, which can be detected: Every cable under voltage has an electric field around it, if AC current flows, even an electromagnetic field. It is key to understand that these fields are always there, automatically, if the utility company wants it or not. Zero additional infrastructure (and thus no cooperation by the utilities) is required to use that unwanted antenna signal as information source for actual location of those lines.

The other thing that we need is what in the internet of things would be called the "actuator": An active element that can actually do something: In this case: make the bird change course and avoid the dangerous areas.
Today, we already talk about the "Internet of Animals": It is extremely common to have animals gather information for us. Not just position data, but a lot of additional data. E.g. it has become standard that tiny 3D accelerometers register every movement of the animal, giving researchers clues about what the animal is doing. We combine that with sightings, weather data and many other pieces of information. We use computer models to analyse nature. But if any action derives from that research at all, it is very indirect action by humans. In the best case, e.g, wind turbines might get shut down during peak bird migration periods. But really nobody worldwide has ever closed the feedback loop directly on the animal. We intend to influence the individual birds directly, on-board.

Till we discussed this idea, the stay in Kenya had been as depressing as it had been glorious. Simon showed us both sides: The stunning beauty which was still visible from some angles, and the utter destruction which was visible in far too many areas for us, and basically everywhere if you had the eye of the master of fieldcraft who also knew what had been where years or even generations earlier. He compared Kenya to a beauty queen who had been disfigured in an acid attack. A stark image that is totally fitting! It was depressing.

But this idea was a revelation that excited me. Use cutting edge and ever improving technology to combat the negative effects of human activity. Instead of choosing between 2 evils, and being locked in eternal struggle for a compromise, try to enable co-existence and win-win. It is not "either we have green energy from wind-turbines and dead birds, or we protect the birds but have no or dirty energy". It is not "should we focus on bringing electricity to the people who have none so far, or should we protect birds from electrocution?" What, if we could have both?

“But can it be done ?” - I hear you ask. Yes it can! I am engineer by training, and self employed strategy consultant by profession, and intuitively knew that this was rather “only” a question of “how exactly” and “how much does it cost”, and “wo does the lots and lots of tedious execution” , but not an idea that runs against the laws of nature, nor one that runs against the self-interest of powerful societal forces. Nobody is against biodiversity protection per-se, it’s just usually a “nice to have” priority. Technologically, “the trend is our fried” with performance increasing all the time, while size and costs come down in the world of electronics, telecommunications and data processing.

But we need much more than a brilliant idea and the certainty that “in theory, it could be done”. We also need somebody to do it, and since nobody has ever done this, globally, and it is nowhere in sight, I decided, being an entrepreneur and builder at heart, that I should pick up the ball and run with it myself. What better way to ensure it ever becomes a reality?

So now let me tell you about the current status of what has already been achieved in the past ~1.5 years, and the next steps and outlook. I dearly hope this won’t be the last time I write in the ANFA journal about progress, and that you will come along for the ride as this slowly but steadily evolves over time.

I called the initiative bAWARE, which stands for “bionic Animal Warning And Response Electronics”

bAWARE
BIONIC ANIMAL WARNING AND RESPONSE ELECTRONICS

SCAN ME

The biggest challenge and most fundamental hurdle initially seemed the sensor for the electrical fields. There is nothing readily available, as all commercially available sensors are for very different use cases and unsuitable. It took a long time, many generations of prototypes, endless testing and de-bugging to develop, but I am happy to report that this challenge has been overcome, and a fingernail sized printed circuit board assembly now exists, which very reliably can detect even the weakest lines at distances of up to 50 meters, giving birds ample time and space to make up their minds to change course.

The attention turned to the core of the invention, the onboard alarm itself that would sustainably get the bird’s full attention: As gentle as can be, but at the same time also as annoying as it has to be, so that the birds rather learn to completely avoid it from happening, rather then learn to simply get used to it and ignore it.
I started with a buzzer and vibrating alarm, and tested on poultry and my goshawk. But since we falconers know perfectly well how quickly birds get used to noises and learn to ignore them, we will combine that with physiologically totally harmless, but sufficiently annoying electro-tactile stimulation, tuneable to the exact strength required. Once again, components had to be custom developed. The readily available dog collars which some of you may use to train your hunting dogs, are electrically very much over-dimensioned for the birds. But in any case, we do need to generate a few kV of tension out of a tiny 3.7V battery, and that is no small engineering feat considering the extreme size and weight limitations. We can greatly reduce the current and thus energy transferred to the birds. I worked with a specialist transformer maker to develop a custom component for that. We don’t want to, nor need to inflict real pain. Stimulating the nerves in the flight muscles to make

them twitch involuntarily should already sufficiently annoy a flying bird for it to try to “do something about it”. I staggered the 2 alarms to go off at different distances, and we sincerely hope and rather expect that eventually, the birds will learn to associate the buzzers beep with an imminent muscular stimulation if they don’t change course, and will, as “Pavlov’s bird”, learn to avoid the electro-tactile stimulation altogether.

This also being achieved technically, and verified with encouraging initial tests, the attention turned to things like the battery management and the solar power supply this needs for long term use. Obviously, we target life long deployment on the animal. You could consider bAWARE like a vaccine against certain dangers: Applied only once to the individual, and ideally with protection for the rest of life after that, effective always and anywhere.

Next, I thought about how to increase the “vaccination protection” to other dangers, most notably wind turbines. As mentioned before, those are best addressed with geofencing, where a GPS maps the current position to known locations of dangers and would set off the alarm.

I also thought about how to prove the effectiveness of the bAWARE devices scientifically and beyond doubt in nature, and for that it would be best to log the alarm events together with their position and the birds behaviour and reaction around the alarm events, and then transmit that data for analysis. For example, researchers could search for “Pavlov’s bird” learning, instead of measuring again and again how deadly power lines are by counting grilled birds which they tag for that purpose, waiting for the location signal to go static. Simon already sarcastically asked one researcher: “With what percentage of mortality would you be happy with ?!”

And for once, this time I don’t have to (re-)invent the wheel to achieve all that. Quite similar to our falconry trackers, solar powered wildlife trackers exist, which could in principle be made to do all I want. Obviously, it would make much sense to try to cooperate with one or several of those companies.

Till this point, I had done all the work myself, and occasionally hired freelancers specialized in certain tasks. Now I needed to arrange a co-operation with at least one world-class wildlife tracker tag maker, which has also been achieved.
I am happy to say that recently, serious integration work between their any my electronics has started. Besides exchanging information, we will also share the solar power supply, the harness, and fit it all into a single housing.

Besides the sensor and the alarm features, bAWARE provides a 3rd key feature: Simon and I feel that actually all tags, also passive tracker tags, should have a deliberate release mechanism: Imagine the research project is finished, or we see in the data that the battery is about to die or that the bird is immobilized, possible by a snagged harness, or that the research project is simply over:
Then we should be able to capture the exact position, and hit a button in the software to drop of the compete device, harness and all, at that spot, freeing the bird and allowing the retrieval of the device. It is poor ethics that in most cases, birds are simply left to carry the “pay load” for the rest of their lives, even if the data is no longer wanted or the battery is dead. Unfortunately, we see in daily images how drones drop payloads on the enemy in Ukraine. Why should we not be able to drop a tag from a bird?
I have developed a first prototype for a tiny mechanism which will be triggered over the air, and can then ensure that ribbons come off at once.

Since the fundamental idea is so revolutionary, really nothing has ever been done quite like it, and the development cost a lot of time, effort and also money , I decided to file for a global patent, which is now pending. A terrible and expensive bureaucracy, I still think it was the right step looking at the long term development potential of this idea. As I write this, it is already clear that a patent will be awarded for core elements. The exact extent of the claims is still a lengthy back and forth till nailed down.
For total independence and freedom to move fast, I have so far financed the entire development out of my private pocket. It is a true passion project and great fun to see evolve, and I am committed to drive this myself at least to the point where industrially made pre-series units become available in numbers which would allow to do proper scientific field tests with a target species. Simon and I are beginning to talk to NGOs inside and outside of Africa for this. Cooperation partners welcome!
There is no fixed timeline. I move as fast as I can, and don't waste energy on planning a timeline I can't possibly estimate well until I actually do the steps in real life.

While we falconers applaud all conservation actions, you might ask, if this is also something for falconers and our birds more directly. When discussing with falconers in France and beyond, I found that many had birds killed on powerlines themselves, or know somebody who had. No wonder, after an unsuccessful flight, the bird might perch, and in our landscapes, the power pole is rarely far away. While I clearly build this with wild rare species as first priority in mind, I now think that eventually, a falconry version will be made too. Since we all already have our tried and tested (and paid for!) telemetry for our birds, I think it would make most sense to build a standalone alarm: Retain only the powerline sensor and the bird alarm itself, but drop what isn't needed or redundant: GPS, telecommunications module, remote release mechanism and solar. It would only share the harness and attach to the existing telemetry, but otherwise be separate to your transmitters.

For this future plan, as well as the entire concept and its future roadmap, I would be very grateful for any feedback and ideas you might have. You can follow the evolution on the website www.baware.ai which I occasionally update. There you also find a 1-minute video clip that explains the essence, if you want to share it with others.

I look forward to all the good discussions online and at the ANFA meeting in November. Stay tuned, I shall update you with future progress.