

PROXIMITY MONITOR

Forkbeard creates unique, Norwegian technology that can reopen society faster

Used to track thousands of people indoors during the Melodi Grand Prix.



Covid-19 has given the Norwegian technology a completely new area of use, which includes the possibility of contact tracking. (Photo: Marius Bråta Jørgenrud)

Norwegian technology played an important role when Eurovision shook off the covid ghost. While the efforts of the artist Andreas "Tix" Haukeland were rewarded with an 18th place, it was a far more unknown gold contribution from Norway behind the scenes that made it possible to hold the Eurovision Song Contest, also called Melodi Grand Prix (MGP) , with 3500 spectators present.

Such a gathering of people, who filled the Ahoy arena in Rotterdam indoors five days to the end, is seldom food at the moment.

In the host country, a dispensation was granted to the MGP circus as a kind of field exercise or test concert with rigid requirements for infection control, regular quick tests, bandages and social distancing.

The IT company Forkbeard Technologies from Lysaker contributed with its unique technology to track the flow of people in real time.

This is a solution that the international consulting and consulting company EY (Ernst & Young) and the software giant SAP have both pressed to their chests and contribute in their own way as close partners.

The hard work and the core technology itself, including software, algorithms and associated hardware, however, is forkbeard by Forkbeard himself.

Ultrasound + bluetooth



Ultrabeacon combines Bluetooth Low Energy and ultrasonic sensor in one battery-powered device. Photo: Marius Bråta Jørgenrud

The company bears the English name of the Viking king [Svein Tjugeskjegg](#), who in those hard days rebelled against and deposed his own father, Harald Blåtann.

The goal is not to choke bluetooth, far from it. Instead, they combine bluetooth with ultrasound to achieve a more precise positioning.

Forkbeard also develops hardware, preferably with microchips from Nordic Semiconductor, including a product called «ultrabeacon». It is a small box that sends out bluetooth and ultrasound signals with second resolution. 150 such units covered the whole area during Eurovision.

Ultrabeacon cannot receive radio signals. It does not need it either. The mobile phone you and I have in our pocket has good enough microphones and bluetooth receivers to receive.

A world of possibilities

The ultrasound technology and the company are spun out of Sonitor, which has more than 20 years of experience - also those with indoor positioning. The difference is that the origin concentrates on battery-powered tags with hospitals in the US as the most important customer group.

Forkbeard was formed as a subsidiary in 2019 on the basis that mobile phones began to get the necessary sensors.

- It opened up a whole world of new opportunities, says Arne Øyen, who is CEO of both companies.



The collaboration with EY gives sounding coins in the box. It is the driver behind the sales budget, which has grown from zero in 2020 to almost 30-40 million kroner this year, Arne Øyen estimates. Photo: Marius Bråta Jørgenrud

We meet him in an empty, towering building along the E18 and Sollerudstranda, which normally houses at least 1,500 office workplaces for many kinds of businesses. Home office is the new normal. It reminds us that the possibilities Øyen is talking about have definitely been influenced by covid-19.

He reveals that they were well on their way into the retail world, where the solution was to help them find the goods they want to buy in the store. They had to pull the brakes on those plans a year ago.

Instead, they hatched another idea, which exploits the pandemic to their advantage. Then we are over to proximity tracking, which includes digital infection tracking with alerts - if the customer so desires.

Sarsvirus and avian influenza

Tracking who has been in contact with whom, as a measure against virus spread, is something Sonitor has done before, surprisingly long ago.

Then we have to go back to other varieties, such as the closely related and even more deadly (but less contagious) sars virus and cases of bird flu. Sonitor was early involved in the development of tracking technology for Bumrungrad International Hospital in Bangkok.



Forkbeard had several wearables made, including

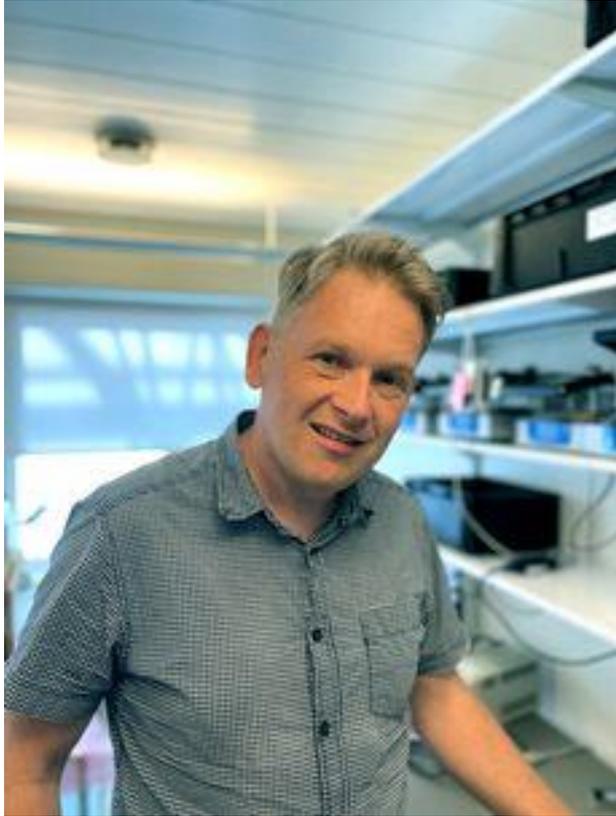
bracelets with a Norwegian BLE chip from Nordic Semiconductor. Photo: Marius Bråta Jørgenrud

- It is one of the major tourist hospitals in Thailand, which is particularly aimed at rich patient groups from the Middle East. They wanted a solution that could track who had been in contact with whom.

Øyen says that these experiences from over ten years ago came in handy when it became relevant to create new tracking solutions, this time without being dependent on tag-based bracelets.

Snorts of the Infection Stop Engine

Wilfred Booij is Technology Director at Forkbeard. He has a doctorate in physics from Cambridge University and has his name on nearly a hundred patents.



Wilfred Booi manages without an infection stop app on his mobile phone. Photo: Marius Bråta Jørgenrud

- Google's and Apple's solution for infection tracking has not worked very well. We now know that this is not how the virus spreads, Booi claims.

He draws a descending graph on a board in the meeting room and explains that the coronavirus does not stop abruptly two meters away from a source of infection, but rather has a long tail that depends on the ventilation in the room.

His score is twofold. The virus is known to spread mostly as a droplet infection, but it can also spread through the airways, ie as aerosols. And the inaccuracy of basing contact tracking on the bluetooth signals that our cell phones send and receive is too high.

- Whether you fall in or out of these measurements is really a game of chance, Booi states.

The infection control app is not installed on his mobile phone, he confides to us, before adding more arguments against the bluetooth approach on which [infection control](#) and its use of Google's and Apple's digital infection detection framework (GAEN) are based.

- The Bluetooth signals are extremely attenuated by our bodies. That's because bluetooth uses the frequency that is least suitable for communication, he smiles.



Faraday cages are a necessity to test Forkbeard's radio-

based solutions. Photo: Marius Bråta Jørgenrud

Bluetooth runs at 2.4 gigahertz, like much other consumer electronics. It is a so-called free-use frequency, which means that it can be used by anyone, without special permission. It's very practical, but do you know the historical background of this frequency?

- The reason we got that frequency is that it was already used in microwave ovens in the 1960s and 70s. The microwaves deliberately chose it, because 2.4 gigahertz is close to the rotational frequency of water, explains the physicist Booij.

According to him, if two people are sitting next to each other, with their mobile phones on opposite sides, you should not trust that the bluetooth signals can pass their bodies, which consist of up to 60 percent water.

Own infection algorithm

Wilfred Booij himself has been involved in creating Forkbeard's own infection algorithm. It calculates the probability of infection based on distance, based on the spread from a source, for example in the form of a sneeze.

The number of virus particles in the air over an area one meter away from the source of infection is four times as high as the number two meters away. [Flux](#) is included in the calculations, if we understand him correctly.

The algorithm is otherwise based on exposure in number of seconds. The Proximity Monitor solution provides a score for each individual user it follows, ie all the way down to the individual level.

Taken a little too many smoking breaks? It is captured

Digi.no got to see screenshots from Eurovision's installation, more specifically a dashboard with data on where the people they tracked were.

The screens belong to the customer, so we can not share them, but the tool listed anonymous ID keys, linked to each individual, with calculations of how exposed each individual is. You can filter out groups of people, such as employees, room divisions and a lot more.

Without a name, but with a random text string, it is possible to see that a person has been standing outside the smoking area for a long time. Or that someone has stayed most in the press center or canteen.



Ultrabeacon mounted on the ceiling in one of Forkbeard's

meeting rooms. Photo: Marius Bråta Jørgenrud

If the person with the highest score, a potential super-spreader, should later report as covid-infected, the solution can send notification anonymously to the other units. That is, the solution has such functionality for infection tracking, but MGP opted out. Apparently because there were too many participating countries who did not want it.

Eurovision launched a new mobile app called Flockey for data harvesting, but it has also been created by Forkbeard, with good contributions from the Norwegian app development company Shortcut.

Or should we call the app FlockEY? Ernst & Young also has a finger in the pie, if only to give the solution extra credibility and visibility. In retrospect, the data is ground and analyzed in the cloud platform of SAP.

Faster beer, dynamic prices

Cees Stellema is an associate partner in EY. The Dutchman is an old classmate and friend of Booij in Forkbeard.

Through a video conference, Stellema can reveal that both he and EY are centrally very enthusiastic about Norwegian technology. They have also used it themselves, at the group's 24-hour headquarters in London, where several thousand EY employees can choose whether they want to be tracked with a tag or a mobile phone.

Not all Norwegian start-up companies receive support from an international auditing and consulting group with 300,000 global employees, but Forkbeard does.



Cees Stellema is an associate partner in EY. The Dutchman cannot fully praise Forkbeard's unique Norwegian technology. Photo: Marius Bråta Jørgenrud

EY envisages a wide range of possible uses for the Norwegian solution. Among other things, tracking in office buildings, the event market, but also retail, not to mention the experience perspective.

- How cool is it not if you can get your beer faster if you know that the queue on the right has fewer people than the queue on the left, says EY partner Cees Stellema.

Shopping malls with personalized offers and dynamic pricing are other uses he envisions for this technology. Or as security measures, where the solution can, for example, show how many people are left in a building after the fire or emergency alarm has gone off.

Sees no options

In short, they see unimaginable possibilities. However, EY sees the office market and events as the two most important areas, at least initially.

- Have you looked at alternatives, or was it obvious that Forkbeard's technology is what EY wants to use here?

- There is no one else who can do this, says Cees Stellema, who believes that the solution is completely unique.

- It is quite fun, because it is not unusual to face competition, but in this case there is no one who is close to delivering something with the same type of flexibility, claims technology director Wilfred Booij.

What about ultra-wideband?

Things have happened in the market after Teknisk [ukeblad interviewed Forkbeard in Barcelona just over two years ago](#) .

Since then, a wireless technology called ultra-wideband (UWB) has sailed up on the radio side. Among other things, it is in place in Apple Iphone 11, Iphone 12 and the latest mobile phones from Samsung.

However, these sensors are proprietary or not available to third parties, nor can they be combined. A third complaint, according to Wilfred Booij, is that they are consuming power.

- Especially on the beacon side. It's really a mirror. UWB on mobile must be able to respond to a thousand requests. Then the battery is gone quickly.

Ultra-wideband does not scale and does not support battery-powered beacons. Then the battery on the phone would be dead in half an hour, he believes.

When 10 cm is not enough

The reason why the company perceives that they have no real competition has to do with precision. General manager Arne Øyen explains it like this:

- Proximity or proximity between two phones is the easiest. Or between tag and phone. Then you can add different degrees of accuracy. You can start adding beacons, which give you a position. You can add more beacons and increase accuracy. Then it comes to a point where bluetooth reaches a limit of accuracy. It can be in centimeters, or other types of requirements for indoor accuracy than just pure centimeter measurements.

One relevant example he uses is glass windows, which at an airport can be both the physical and legal divide that determines whether you are within or outside the Schengen area.

Here, even ten centimeters of accuracy will not measure up. It is not enough to determine with 100 percent certainty which area you are in.

- There is a slightly different dimension to accuracy, which requires the use of ultrasound, says Øyen.