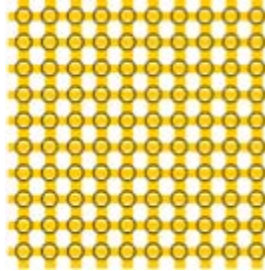




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## Interview with Harry van der Veen from NUITEQ

Harry van der Veen, from Dutch origin, is CEO of Natural User Interface Technologies AB (NUITEQ). Harry holds a bachelor degree in Multimedia, having studied Communication, Multimedia and Design in Holland. With his main focus, during his studies on entrepreneurship, interaction design, consultation and project management, he graduated as one of the first people worldwide, on the topic of multi-touch technology, for his thesis work at the university in Skelleftea (Sweden), in 2007. During his thesis work, together with partners, he started the company Natural User Interface Technologies (NUITEQ), a company that delivers advanced multi-touch hardware, software and services solutions to the global market, in a wide spectrum of industries, covering entertainment, banking, exhibition industry, interactive digital signage, education, retail and more. As CEO he is responsible for general and project management, global sales, finances, marketing, key account management, corporate strategy and vision of this Sweden headquartered high tech startup company. <http://www.natural-ui.com>



**Please give us some background information about Natural User Interface Technologies (NUITEQ).** Quite a few people within our company were working on multi-touch technology -- before Microsoft launched Surface and Apple announced the iPhone. So despite this technology being relatively new, in terms of commercial availability, we have been around, relatively long, when you consider this. Our company is headquartered in Skelleftea in Sweden, has software development operations in Poland and an extended office in Singapore. Our vision is to change the way people interact with computers, whereas our mission is to make the interface between users and technology more natural. We offer multi-touch hardware, software and services solutions, however our main focus and long term vision is to be a software product development company. Our products are being utilized on all continents and in a wide variety of industries. Our main clients and partners are OEM's and system integrators, however we also serve end clients directly or through our partners. Clients include Google, Ferrari, Lockheed Martin, Singtel, Changi Singapore airport, Young and Rubicam, Raffles Education and others.

**There's sometimes confusion between NUITEQ and the NUI Group – who is also working on multi-touch technologies. Can you offer a simple way to help us keep the two groups correctly identified?** Our company NUITEQ offers commercial multi-touch hardware, proprietary software and services solutions. NUI Group is a non commercial, non-profit, free community, where people (students, hobbyists and researchers) share their ideas on hardware and software. Especially the support that NUITEQ offers, is one of the reasons why serious companies approach us, even after they have tried open source software solutions. End of the day, most companies want to have somebody to talk to that is responsible for the software and can support them in a timely manner. I am one of the founders of NUI Group, however I am no longer affiliated with them, as I purely focus my efforts on the commercial side of multi-touch technology with NUITEQ.

**You offer both hardware and software solutions for the multi-touch market. Did your software development evolve as a result of your efforts to build hardware, or the other way around?** Correct. We offer multi-touch services, hardware and software solutions. Services cover entire bespoke projects from conceptualization and consultation to delivery and support on site. Hardware-wise, we offer our standard product, the Horizon, a 40-inch rear camera based interactive multi-touch table and in addition to that, for special clients and partners we can develop customized solutions. All of our hardware solutions come distributed with our software product Snowflake Suite. Snowflake Suite is an advanced multi-touch software package that is available for rear camera based multi-touch systems as well as NextWindow.

Our strength has always been the software and when we started, we knew that over time hardware manufacturers would be mass producing solutions that we simply could not compete with, both quantity-wise as well as quality and requirement-wise. Therefore from day one our focus has been software. The reason why we offered and still

offer multi-touch hardware solutions is because of the simple fact that the technology was so new when we started, that there were hardly hardware platforms available that we could distribute our software on, so we decided to deliver hardware ourselves, for that time being, until more hardware players would get to market.

**Which is more difficult – touch-based hardware or software?** There is a relation in between the hardware and the software, in terms of how the user experiences the combination of both. Both hardware and software provide challenges. Good software can work poorly with bad hardware and bad software can work poorly with good hardware. I think multi-touch technology is more advanced in terms of hardware than software, so in that sense, software is more difficult. I think people underestimate how difficult it is to make a truly sensible, intuitive and natural software solution.

**Tell us about the capabilities of your Snowflake software solution.** At this moment in time, Snowflake is available for rear camera-based systems as well as NextWindow. Other platforms like N-trig, iNexio and others are still in the testing phase, but will be available for public release shortly. The rear camera based edition of Snowflake comes with an advanced vision tracking module that does all the math of translating camera images into touch points and includes a wide variety of applications. The NextWindow version of Snowflake comes with a ported bridge between our applications and the NextWindow API and hardware platform.

The Suite includes many different kinds of applications suitable for different industries, like gaming, education, exhibition etcetera. The applications that come with Snowflake, are a Media Viewer supporting a many media formats like jpg, bmp, avi, etcetera, 3d Model Viewer, Draw, Special Effects games like Puzzles, Airhockey, Wong and more. Snowflake comes with an API (Application Programming Interface), that allows developers to connect their own developed multi-touch applications with Snowflake. Many of our clients and partners for example develop



applications in Adobe Flash and they can then seamlessly integrate their applications with Snowflake. Also one of the benefits that our clients and partners value, is the fact that Snowflake can be customized easily and to a great extend. A user can simply load its own content like images, photos, videos, 3d models, backgrounds, audio and logo's inside of Snowflake. This helps them to be time efficient and cost effective. In the upcoming months, we will be releasing a SDK (Software Development Kit) with sample applications, tutorials and instructions on how to develop your own multi-touch applications inside Snowflake.

**You've seen some commercial success with the Snowflake Suite. What products are currently shipping that utilize your software?** Yes, that is correct. In fact I just came back from New York yesterday, where I attended the gala dinner of the Stevie Awards. There we received the International Business Award finalist recognition for Snowflake Suite, in the category Best New Product or Service of the Year - Media & Entertainment, in the 2009. By many the Stevie Awards are considered to be the Oscar awards of international business. Therefore this recognition of our hard efforts over the years, is a very important mile stone to us, as it illustrates the value people attach to our products and services. Though I do want to emphasize that this a collaborative effort of not only our company, but also of our clients and partners that give valuable feedback on how to improve the software.



Snowflake Suite has been developed for over 2-1/2 years in close collaboration with our clients and partners. Our own multi-touch hardware solutions are shipped with Snowflake. As of now, our software is currently not shipped with any specific other hardware technology platforms. Though we do currently offer Snowflake on the

NextWindow platform. In collaboration with our partner N-trig, we have developed Snowflake also for the their platform, running on Windows 7. In fact N-trig utilized Snowflake to demonstrate the strength of their hardware technology platform at SID in San Antonio last May. Furthermore Snowflake is now being tested and demonstrated on other hardware technology platforms as well, including iNexio, IR Touch, Lumio, FlatFrog, Citron, and more. Snowflake for all these platforms will become available in the upcoming period, so people will have something to look out for. There is quite some interest from large OEM's for our software for these specific platforms, so we are foreseeing an interesting time ahead.

**The Snowflake software seems to be technology agnostic, as you currently are supporting FTIR, optical, and projected capacitive. Are there any multi-touch technologies that you cannot support?** It has been a very strong focus of ours, to ensure that our software product Snowflake is technology agnostic, simply because of the fact that our clients and partners have different needs and wishes in terms of hardware technology platforms and we feel we should accommodate our clients and partners. Some clients might want to use Snowflake with the NextWindow platform, whereas others want to utilize N-trig as their preferred platform, or 3M. Every company's success depends on how well they listen to the feedback and inquiries of their prospects, clients and partners, so for us it was a natural organic process to offer compatibility for Snowflake for the major hardware technology platforms that are out there.

The platforms that we amongst others support are NextWindow, N-trig, Lumio, IR Touch, iNexio, Citron, FlatFrog and a hand full of other platforms of companies with whom we have yet still confidential relationships. Their products range from small hand held mobile devices like mobile phones, GPS systems and laptops to large scale interactive displays and touch foils. So to answer your question in regards to, if there is a hardware technology that we cannot support, my answer is, probably not. For us it is relatively simple to port our software to different platforms.



**Is there a multi-touch technology that stands out as providing superior performance?** I believe that each touch technology has its own niche market vertical. For example, specific applications simply do not need more than 1 or 2 touches. But when we are talking about true (more than two) multi-touch, then I must say that I am very amazed by the high performance and stability of the hardware technology platform of our partner N-trig. I recently met 3M Touch systems in their Boston office and I was also very intrigued with their platform. Wacom, however also has a technology to keep an eye out for...

**Latency is a common issue associated with multi-touch solutions. Is there a solution out there, for example, which would adequately enable two concert-level pianists to play a duet on a touch surface?** Other than knowing that fast response time is critical for musicians, for me particularly it would be hard to give you a very exact answer as I am not a musician, so I do not have a clear insight into the exact requirements of an artist in relation to multi-touch technology. Though I do like the response time on the N-trig and 3M multi-touch platforms, but if it stands up to the requirements of a musician, I'm not sure.

**What's your favorite multi-touch implementation that you've seen to date?** It might sound corny, but I'm a fan of our Media Viewer, a simple but very useful multi-touch application that allows people to play around with images, photos and videos. Many consider similar applications to be the application that has been demonstrated over and over again, yet however, many companies have products that they want to show and a good way to present their products is with images and photos of their products in the Media Viewer. With our application people are

able to easily change the content, like putting their own images and videos in there as well as customize their own background, logo and artwork. That way I believe not only I, but also our clients and partners appreciate this application, because of the flexibility it offers. In addition to that, an application doesn't get more intuitive than the one that utilizes the good old zoom in, zoom out gesture. Currently we are working on a new application for Retail, where retailers can easily maintain this application and the content themselves by dragging and dropping their items like banners, prices and products around in the way they want. I believe that application will become my new favorite one.

**Tell us about Snowflake and Windows 7.** Snowflake is running on the Windows 7 for the NextWindow, N-trig platform and a hand full of others. Currently we do not support Snowflake for rear camera based systems yet, as we want to wait until Windows 7 is officially launched. We will have a strong focus on ensuring that Snowflake continues to seamlessly work on Microsoft their new operating system Windows 7, as this is the multi-touch operating system that everybody has high hopes for and will work with.

**Please give us your spin on gesture recognition. Do you feel that there's a formal need for some standardization, or will standard gestures evolve naturally over time to best optimize the specific interaction?** I think this topic is a challenge that is often discussed within the industry. As there is no real standard yet, companies implement their own gestures in accordance with what seems logical to them, without proper research and field testing of what really does make sense. Some gestures are already widely adopted like the zoom in and out gesture, which is probably the gesture that everybody uses in the same way. However as soon as you talk about additional gestures like panning, rotating objects etcetera, then the challenge comes along. Some adaptations use 2 fingers for a specific action, others might use 3. Maybe also these gestures will evolve over time and there might be one specific gesture for a specific action, used by everyone, however it could also be that there will be many different variations that do the same, which will be confusing for the end user and the end user is one of the most important factors to keep in mind, as the success of the technology depends heavily on how well they receive it. Though I think it will be good if large corporations sit together and come up with standards, yet however question is, who will take this first step? Perhaps many companies just push their set of gestures as standard and if that will be a push from a large company, it has the potential to become a standard.

**Tell us about your Horizon table.** The Horizon is our standard single rear camera rear projector based, interactive multi-touch tabletop solution, which utilizes DI (Diffused Illumination) technology. Horizon comes distributed with the latest version of Snowflake Suite at its core for the vision tracking. The Horizon is manufactured at our facility in Singapore and is distributed globally. Many of our clients and partners have successfully used these systems in different industries like exhibition, education, real estate, telecommunications, gaming and more.

**With your tabletop solution, do you find that users also want a physical keyboard when in some PC-based application mode, or do they pretty much migrate entirely to touch inputs?** Sometimes I think, nothing beats a keyboard, because of its tactile feedback. A keyboard is in many scenarios the preferred tool for typing text. Though technology is advancing, so if over time, the tactile feedback of touchscreens can be simulated in a very natural way, there might not be a need for a keyboard anymore eventually, but we are not there yet.

**Is a horizontal surface the best way to utilize multi-touch or do you anticipate that vertical surfaces will also see wide implementation?** The best way, is always hard to say. Each surface has its different application. For example, if you have a conference board room, where two users at the same time want to present their content, a vertical solution is more suitable, because the content can be seen by the entire room, without the necessity to stand close to and over the screen, like with a table. The benefit of having a horizontal surface is that you can have many people around it, interacting with it at the same time, like for example in museums. I think both horizontal and vertical will become widely implemented, how widely for each specific category, will depend on the specific market vertical. I would expect to see vertical applications be more widely adopted in the retail industry, like for example shopping windows, whereas for example angled kiosks and horizontal surfaces are more likely to have

wide adaptation in for example the casino industry. What you have to keep in mind as well is, how long will people have to interact with it. People don't want to be interacting for a too long period of time with a vertical solution, because it is fatiguing to keep your arms up all the time, in comparison to table solutions, where you can lean and have your arms in a more resting position. For casino's its more likely to have table solutions, as you would want people to sit at the table for a long time, if the goal is that these users will generate the money for the casino.

**Does your tabletop solution have the capability to recognize objects on the surface?** Our tabletop solution does indeed have the capability to recognize objects on the surface, however we do not offer object recognition standard with Snowflake Suite. We do have objects recognition inside Snowflake, however we only offer this to very special partners and include these in large scale customization projects.

**To what level can such objects conceivably be recognized? Can the system act as a scanner? Can it go so far as to recognize a fingerprint?** The system can recognize objects, as in, you can place a specific marker on the table and you can let Snowflake interpret this specific marker for example as a volume button or an air hockey puck in one of our games and there are many more variations possible. However we do not go as far as scanning high resolution pictures or papers, simply because there is a projection screen in between that



prevents the camera from having a clear image of the object that you would want to scan. Recognizing a fingerprint would theoretically be possible, if the camera that is being used has a high enough resolution and if it is close enough to the surface. As of now, we have not implemented this, as there was no mass demand for that solution yet.

**Can you recognize objects beyond the surface of the tabletop?** Objects can be recognized beyond the surface, however, as because of the diffusing specifications of the projection screen, the further an object is from the surface, the harder it will become to detect for the camera. In addition to that, there is the option to recognize objects in proximity to the screen, if they are equipped with RFID, which is something we are working on and is in fact quite exciting.

**How important is tactile feedback in a typical tabletop situation?** That really depends on the application, I believe. In some applications it is not critical, but just “nice to have”. However for example, if you consider a niche market for blind people that really benefit from different tactile feedback on table top surfaces, then it is a critical part of the whole. I'm a fan of tactile feedback. Whatever we can do to lower the barrier between tangible and non tangible HCI, the better.

**Have you seen any tactile feedback solutions that are truly compelling?** I tested a tactile feedback touch solution of 3M and it was in fact quite compelling. This opens up so many opportunities to lower the barrier to make a computer interface more natural and intuitive. I'm especially a fan of such technologies because of the benefits it can give to blind people, but also in general how it can enrich the user experience.

**What are some examples of hardware platforms that you think might have the opportunity to really create some new and exciting touch-based markets?** Our partner N-trig is one of them. They not only have the opportunity to create new touch-based markets, but they are in fact already doing it, by integrating their technology with amongst others HP and Dell laptops. They are a pioneer in the multi-touch laptop market. Last week I met with the business team of 3M in their facility near Boston, where I saw and tested their true multi-touch technology and I can definitely recommend that platform. Wacom has an interesting platform as well. I tested their multi-touch platform on several occasions at different events.

