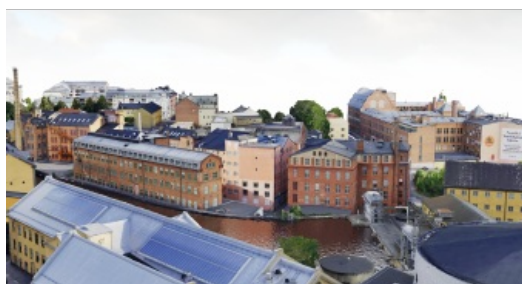


SPOTSCALE

The Quest for Large Urban 3D Scenes without Visual Artefacts



Swedish company Spotscale, based in Linköping and Stockholm, is a reconstruction software start-up that develops cloud services for 3D reconstruction of the built environment. The primary input data source for Spotscale is currently imagery, often captured using multicopters. What makes the company unique is its focus on urban scenes only, captured from all possible

angles at close range.



Spotscale was founded 2013 in the aerospace and image processing Mecca of Sweden where other enterprises like Vicon (SAAB), Sectra and Autoliv are currently thriving. The region of Linköping, including its university, have a long history in computing, visualisation and computer vision stretching back to the early days of computers. Ludvig Emgård, who was the head of product development at C3 Technologies, saw the emerging technology in multicopter drones and started Spotscale together with an early drone entrepreneur, Jonas Lindqvist. Jonas also founded Intuitive Aerial, a manufacturer of drones for film makers.

Since 2013, the company has grown from three to nine employees, most of whom are mathematicians/programmers within computer vision, simulation and cloud computing. Today the company is led by the founder, Ludvig Emgård, together with COO Katarina Nylander, another high-profile member of the Swedish geospatial community and a former colleague of Ludvig's. Over the years, Spotscale has focused on developing superior methods and technology for the capture, reconstruction and visualisation of building imagery. "Each urban setting provides new problems to solve, in order to automatically deliver a truly realistic 3D rendering of the place, and we love tough challenges," says Ludvig Emgård.

Virtual worlds

The goal for Spotscale is to deliver virtual worlds that are on the same visual level as modern computer games with a very high degree of automation. This of course implies not only delivering a geometrically correct point cloud of a scene, but to visualising each material with its true characteristics using modern methods of meshing, texturing and light simulation. To achieve this, many disciplines need to be combined. It has been a crucial success factor for Spotscale to gather all of the right theoretical skill sets under the same roof and to work together towards this common goal.

In a true tech start-up style, the members of the development team are all based out of one big office space in an old apartment downtown. The culture is open minded and casual, and most of the communication is informal and collaborative. The company is also a start-up from a financial perspective in the sense that it is dependent on venture capital. Therefore, it is investing heavily in technology for the future, rather than harvesting the market of current opportunities.

Spotscale has found its first customer groups in real estate development, where early adopters are leveraging the new visualisation capabilities. In addition, a few future-oriented architect firms have picked up on the new possibilities from Spotscale to leverage moving-picture and interactive solutions for their customers as opposed to 2D photo collages and illustrations. Large construction companies are using the technology for internal projects and Spotscale recently signed a strategic agreement with the construction giant Swedish NCC. "We have been seeking a provider that can help us all the way from 3D reconstruction to useful visualisation and planning tools," says Viktor Davidov, head of digital strategy at NCC. "We like to have our own staff in the field, capturing with drones, and then instantly get planning tools in the office."

High-end 3D modelling

In the summer of 2016, the company decided to stretch the limits of drone-produced 3D content in inner city environments when it

processed a neighbourhood of 40 city blocks into a high-resolution 3D model. "This high-end neighbourhood model is unique in its kind," says Ludvig Emgård, who sees huge possibilities for larger areas in high detail. This size of model enables more high-fidelity geospatial applications than anyone has been able to deliver before – a perfect base for computer games or more large-scale planning projects, even though very computationally intense. "Heavy parallelisation on the cloud and lots of tricks for 3D data merging have been developed during this project," adds Ludvig.

Moving forward, Spotscale will continue to invest in its quest for perfect realism in the models and to remove the visual artefacts that come naturally with computer-vision-based reconstruction. It will also focus more on expanding its business to other countries similar to Sweden, where the legislation has evolved to the point where drones are allowed to fly inside city boundaries. The UK, Malaysia and certain Latin American countries are on the company's radar, along with the USA. Therefore, Spotscale is now actively seeking drone operators all over the world who want to bring advanced 3D services to their local real estate development communities.

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