Vindskaber Development

The research was developed for 'Rethinking Tourism in a Coastal City - Design for New Engagements', an Innovation Fund Denmark investigation commissioned by Aarhus University, Aarhus School of Architecture, Ringkøbing-Skjern Council, Naturkraft, VisitAarhus and Danish Coast-and Nature Tourism.

The project responded to Britta Timm-Knudsen’s anthropological research into the wind as an immaterial cultural heritage on the Danish west coast, and involved local wind users and experts from The Danish Nature Agency Ministry of the Environment in Denmark, The Danish Nature Fund, Danish Ornithological Society, meteorologists, windmill engineers (VESTAS), sailors, wakeboard surfers, theatre performers, fishermen, tourism organisations, school children and tourists in developing the work.

Wind simulation advice was provided by The European Centre for Medium-Range Weather Forecasts (ECMWF) and lidar equipment was provided by Sheffield Hallam University.

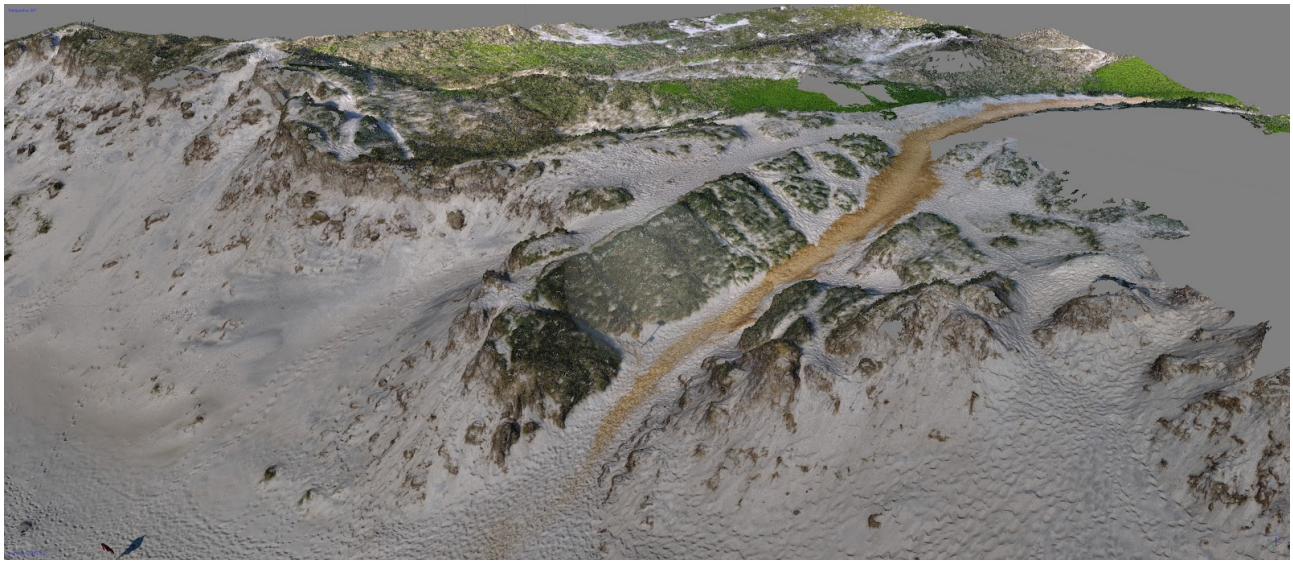
Research

The project is motivated by the hypothesis that in the near future the use of Augmented Reality will become as common as smartphones are today, and that this will impact relations between people and landscape, and consequently on the practice of tourism. Augmented reality glasses allow computer generated imagery and information to be overlayed on the physical world. When using this technology a person is continually walking through a sea of potential information, filtered and presented by their glasses. This will profoundly affect the ways that tourists view the world, creating a mode of engagement that is more reliant on quantified information and less experiential. Rather than engaging with the physical space around them, a user of augmented reality will be increasingly engaged with the information space embedded in the technology. Already the popularity of Pokemon Go - a very early augmented reality application - has shown how the relationship with the landscape can be profoundly altered, with players ignoring the qualities of their physical surroundings in the search for rarities in the virtual world.

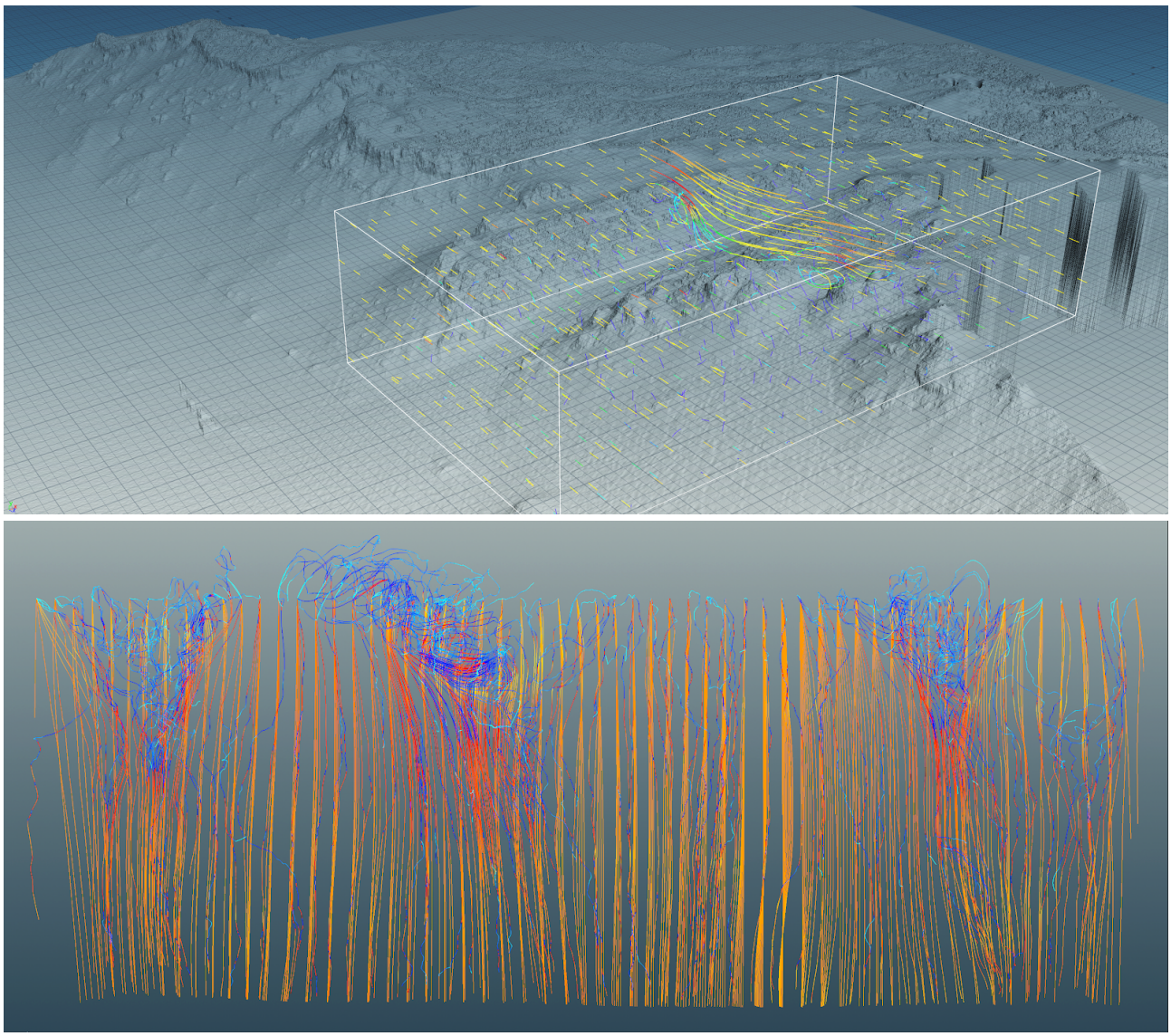
In contrast, this project imagined what it would be like to walk through the coastal dunes of the Danish west coast, wearing glasses that, rather than presenting a cacophony of information, instead attempt to create an experience that grounds the wearer more intimately within their physical space. This augmented reality application would reify the physicality of the wind and its relationship to the landscape by making visible the flow of air as it swirls and eddies around the shapes of the dunes. This possible future experience of walking through the dunes while literally seeing the air around you is the basis of the project.

Mapping The Landscape and Simulating the Wind

To explore these themes a site specific art installation based on current (2018) virtual reality technology was developed for a particular location among the dunes of Hvide Sande (West Denmark). Achieving convincing augmented reality is still extremely difficult in outdoor environments; new glasses are only just now being released that can track adequately indoors; full outdoor tracking is even more difficult, especially in rural areas. Rather than attempt a full augmented reality experience, the project used a conventional virtual reality system and created an accurate three dimensional model of the physical location of the installation, so that when participants put on the headset the view they saw exactly matched the terrain around them.



A 3D model of the landscape was created using drone and ground based photogrammetry in combination with lidar scanning. This 3D mesh was used as the basis of a fluid dynamics simulation that calculated the way the wind interacted with the landscape at various wind speeds and directions. The velocity of the air in an area around the site of the installation was represented by a three dimensional vector field with a resolution of 1 cm. The force of the wind was simulated by constraining the velocity of air at the edges of this field to the required wind speed and direction. The fluid simulation was calculated using SideFx Houdini Pyro solver software running on a cluster of cloud servers. The simulation was allowed to run for enough frames that the wind energy had propagated through the space of the simulation and had stabilised somewhat. The resulting vector field - representing the velocity of the air at a single frozen moment in time - was used to drive a particle simulation within the interactive virtual reality system.



VR Experience

The VR system was implemented using the Unreal game engine driving a Vive Pro VR headset. VR trackers were installed on a temporary structure situated within the volume of space that had been captured and the virtual space was aligned with the real space so that when a participant put the headset on the virtual view would match their previous view of the real world.

The experience was installed in the coastal dunes near Lyngvig Lighthouse, Hvide Sande on the west coast of Denmark, and was available to an audience of approximately 6000 between 13/8/2018 - 24/8/2018.

Passers-by were invited to wear the headset, with minimal explanation or context beyond informing them that it was a different way to experience the wind and the landscape. Assistance was given to those who requested it, but most participants understood the affordances of the system within a few minutes and after a brief period of settling in would start to experiment and explore the virtual wind and its interaction with the dune landscape. After their experience, participants were interviewed about whether they felt their perception of the landscape had been altered in any way by the encounter.