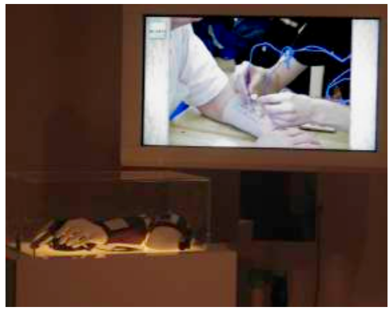
Stage Three Ergonomic Wearable Design 2006 - 2007

E-Skin mobile technology with Qbic computer

After working with the visually impaired users, new inter- faces for e-skin were designed, which embedded pressure, temperature and vibration inside a wearable and comfortable set of devices. The final set included a left-handed armband, a shoulder pad and a miniature computer, all with inbuilt sensors based on these sensory modalities. These components and their wireless potentials would constitute a design in both comfortable and robust and can work for many different contexts.



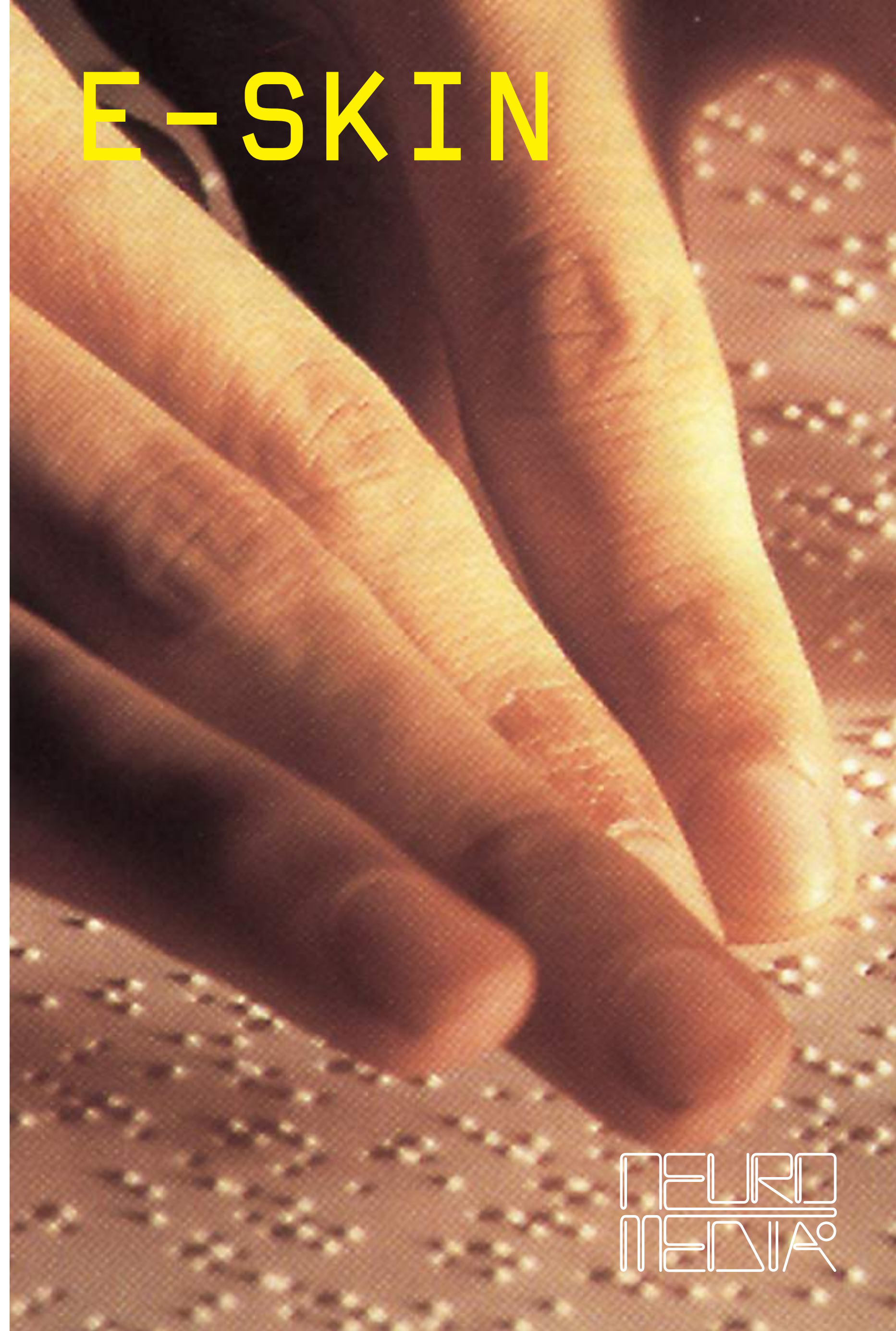
Exhibition at the Welcome Trust, London, UK

Jill Scott Institute Cultural Studies ZHDK University of the Arts Switzerland

In collaboration with the Artificial Intelligence Lab and the Department of Neurobiology: University of Zurich

Credits

Dr. Rolf Pfieffer, Daniel Bisig, Valerie Bugmann, Rolf Basler, Fach-Hochschule Arrau/Brugg.



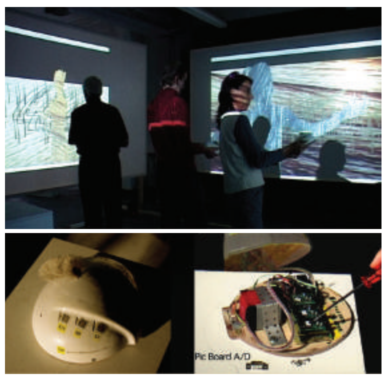
E-SKIN

Our skin is our biggest interface to our immediate environment.

E-skin or Electronic Skin is an on going research project to build interfaces based on the main peripheral sensory and motor nerves in our skin. These are temperature, picked up by the free nerve endings. Pressure, measured by the merkle cells in the dermis and vibration, which comes from the movement of the skin hairs. Thus peripheral nerves pick up these perceptions and send messages to the central nervous system then onto the motor neurons or to the somatic cortex in the brain. These perceptions are aided by our sense of proprioception, or the relative feedback of the position of our body in space and our translation mechanisms. By layering interfaces the viewers and the participants can get closer not only to the complexity of skin itself, but also to its complex political agenda of ideas and ideals about “skin”.

E-skin was produced in three stages and is still a work in progress and as new electro-sensitive materials and retinal implants are being invented, the need for more well designed and creative applications that connect to the skin will also increase in the future.

Stage One
Smart Interfaces 2003 - 2004



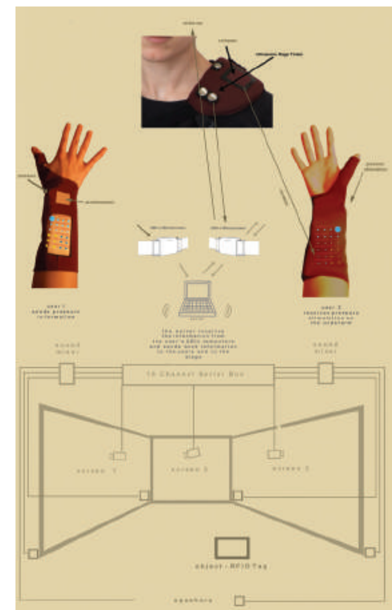
Exhibition at the Fachhochschule Aarau, CH

We started the project by building three wireless interfaces based on these modalities: temperature, pressure and vibration. These incorporated off-the-shelf electronics, which attempted to mimic them. A three-screen media stage was also built to see how the resultant interfaces might behave in a virtual environment and by attaching audio-visual stories, attendant narratives were explored. Skin Modalities mimicked by electronic interfaces navigate and orientate in the environment or even use it to design their own mediated theatrical event!

Stage Two
Tactile/sound workshop:
Visually Impaired 2005

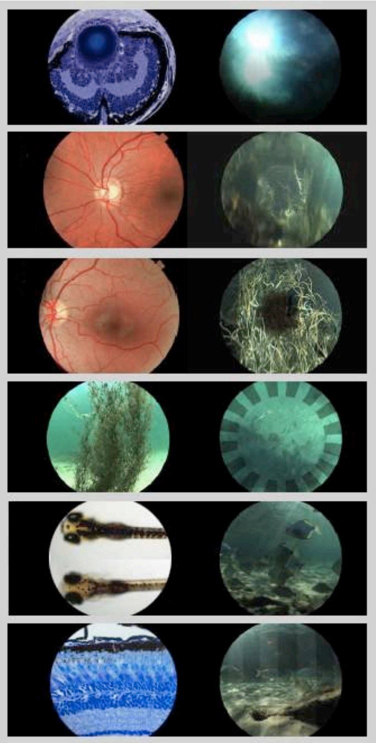
Tests: Visually impaired users, Blindenheim, ZH

In the next stage of e-skin we conducted workshops with people who were congenitally blind. One thing became very clear to us. That the whole system could provide a new experience for visually impaired people because of its potential of cross-modal interaction between sound and tactile feedback. Perhaps e-skin could help visually impaired users to navigate and orientate in the environment or even use it to design their own mediated theatrical event!



E-Skin design for an interactive theatre project wherein the visually impaired can communicate witch each other and the audience are macular degeneration, human diseases of the eye, genetic deficiencies and polarization. It is as if the viewers are looking through the tunnels into the neural chemical layers of the eye. From the other side of the sculpture films of underwater movies are projected onto the wall. These are shot from the perspective of the fish. This “fish eye view” shows how visual impairment can affect the animal’s behaviour. The projected films (affect) are directly related to the content of these ocular films (evidence) and aim is to allow the general public to gain a better understanding of how vision is affected by genetics, disease and degeneration.

Lens based interface for the audience to manipulate the sections of different eye-diseases



Left: Occular Films from scientific research
Right: Projected underwater-films / behavior

Credits

Prof. Dr. Stephan Neuhauss, Corinne Hodel, Melody Huang, Oliver Biehlmaier, Colette Maurer, Markus Tschopp, Marion Haug

Editing Support

Marille Hahne

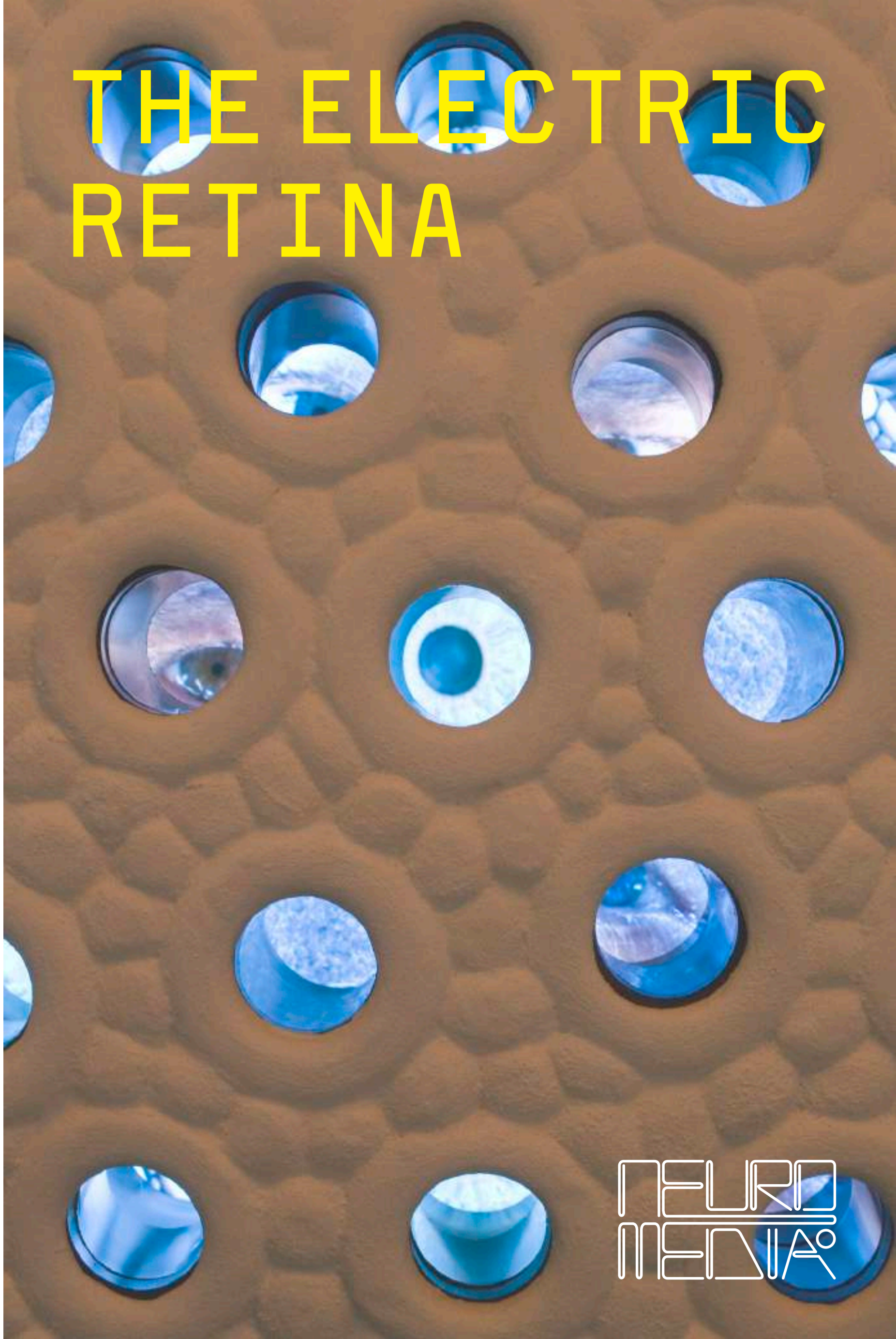
Programming and Sensoring

Andreas Schiffler and Marcus Dusseiller

Construction helpers

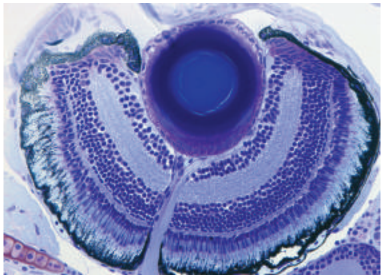
Simone Lüling, Beat Schlaepfer, Christian Tanner

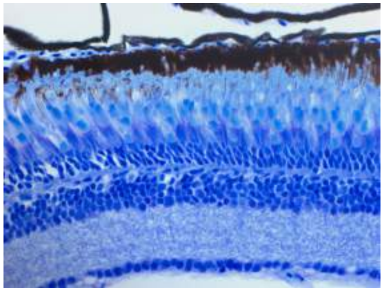
THE ELECTRIC RETINA



THE ELECTRIC RETINA

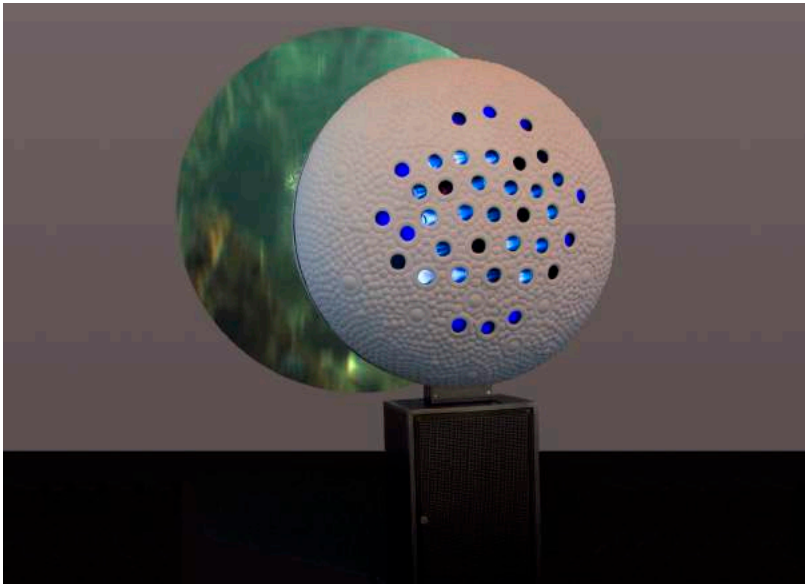
The Electric Retina is collaboration between the artist, Jill Scott and the Neurobiologists from the Institute for Molecular Biology at the University of Zurich. It combines retinal research about visual perception with interactive sculpture. It was developed in collaboration with Neurobiologists at the University of Zurich, where research is conducted into the genetic control of visual system development and function by analysis of zebra fish mutants and their comparisons to human retinal disease. The surface of the sculpture is modelled on photoreceptor pattern arrays from the Scanning Electronic Microscope. Through oculars in the cones, the viewers can see movie-loops from cellular research and though projected films on the wall they can gain a better understanding about how the relationship between our visual perception and behaviour could be affected by genetics, disease and degeneration.



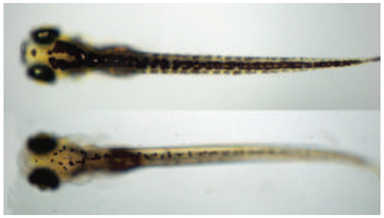


Top: Histology of a zebra fish retina
Bottom: Light adaptation / pigment migration

Viewers can gain a deeper insight into the genetic control of visual system development and function by analysis of zebra fish mutants. We wish to understand the relationship between the zebra fish retina and similar human eye diseases and to share their research with other international researchers. The Electric Retina displays examples from some of this research and its surface is constructed according to the rod and cone pattern array of photoreceptors in the human retina. Inside the "cones" the viewers can see oculars, where movie-loops appear about the histological evidence, behaviour tests, molecular staining, cellular research images and related keywords from the researchers. The issues covered

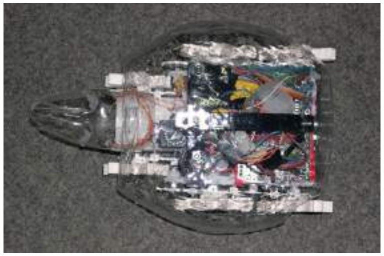


Exhibition of the Electric Retina at the Brain Fair, 2008, by Life Science Zürich, CH



A zebra fish changing its skin colour

Observers of the scientific research / occulars themselves on the epidermal and dermal skin cells beneath them, but when the projection changes, the robots represent our own machines that dig up our fragile landscape. Dermaland raises public awareness about skin damage, by combining this care of skin with the care of our environment.



Arduino BT microcontrolled Robots based on dust mites with whegs (wheels & legs) and tilting heads

A collaboration with the Uni-Spital Zurich, the Dermatology unit of the University Hospital at the University of Zurich and the Institute for Microscopy SEM Science City, ETHZ

Credits

Robots

Marc Ziegler, Artificial Intelligence Lab, University of Zurich

Programming

Nikolaus Völzow, Roman Haefeli

Tracking

Wim Ton

Visual Effects

Phillippe Kipper, Christian Tanner, Andrew Quinn

Help

Marille Hahne, Juanita Schlaepfer-Miller

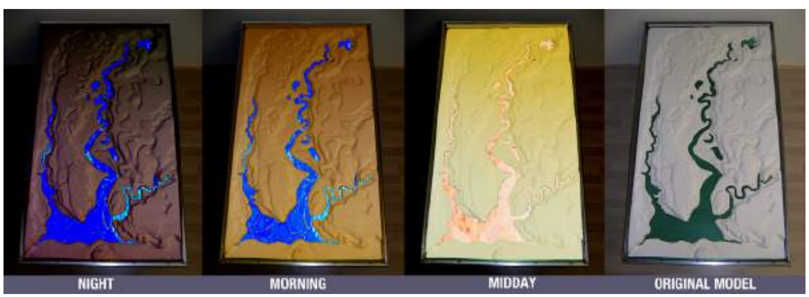
Scientific Consultants

Dr. Dummer, The Dermatology Unit, Uni-Spital, University of Zurich, The Light Microscopy Centre and EMEZ The Electron Microscopy Center at the ETHZ, Zurich, Switzerland

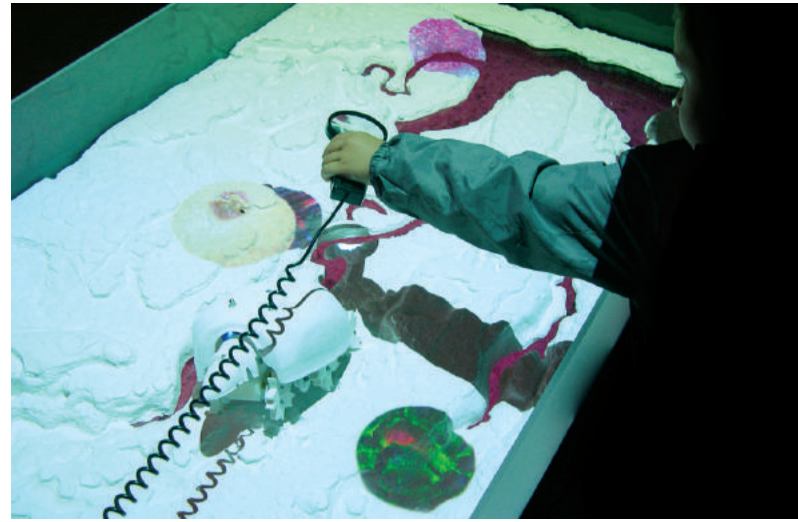
DERMALAND

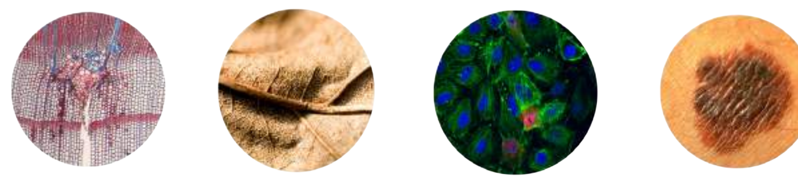
Dermaland was inspired by research into embodiment in Artificial Intelligence and Dermatology about the environmental effects of UV rays upon the cellular layers of our human skin and on the moisture levels in the surface of the earth. The whole surface of Dermaland is inspired by SEM images of all the dermal and epidermal layers in actual human skin specimens right down to the collegen fibres and the veins. The shape of the skin however, is based on a google landscape map of the fragile ecosystem of the South Alligator River in Kakadu National Park (North Australia). The side effects of unusually intensive sun irradiation already threaten this landscape.

Scientific research images from a overhead projector are projects on top of this landscape and they demonstrate the effects of increased UVA and UVB light on these two skins: the human skin



Map: South Alligator River in Kakadu National Park (North Australia)
Model: Landscape of the human skin with blood stream



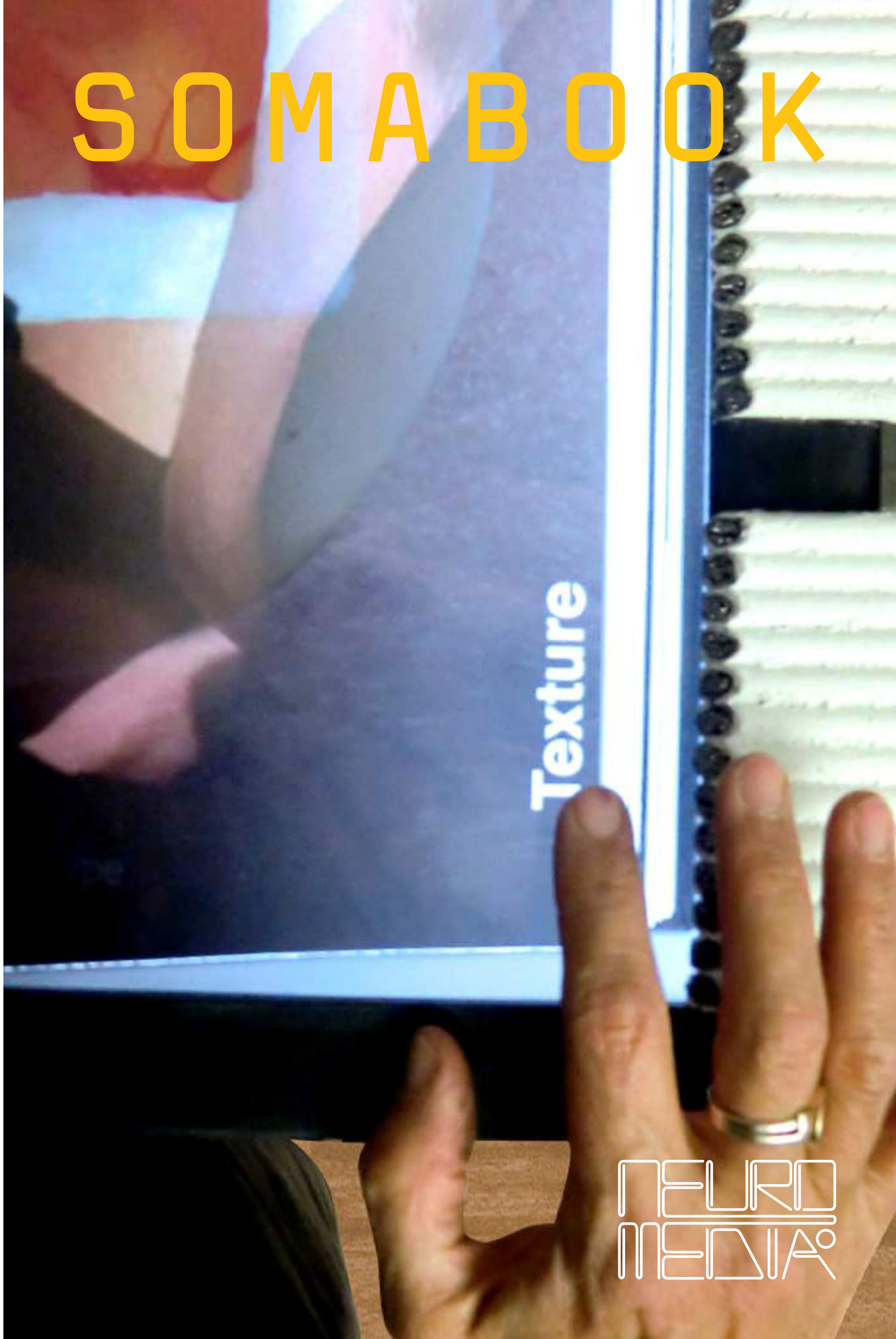


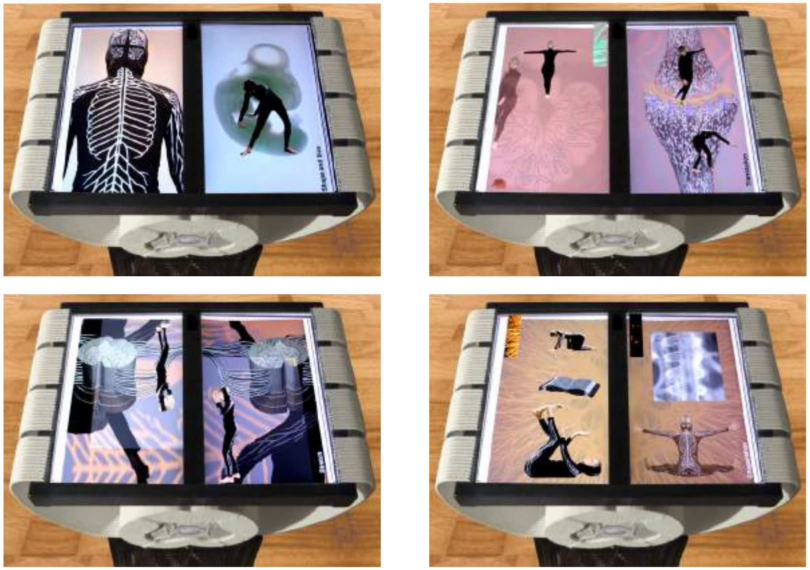
Exhibition of Dermaland, Museum für Gestaltung, Zürich, 2009, showing the interaction with the magnifying glass and the resultant projections of AV damage on the landscape / skin

and the earth. People interact with these projections by using two tethered magnifying glasses, which can move the projections around, and by doing so reveal actual effects of UV irradiation damage on cellular/molecular tissue and on leaf, plant and soil structures are revealed. Other background colours can cause day to night transformations and appear to change the human skin into real landscape.

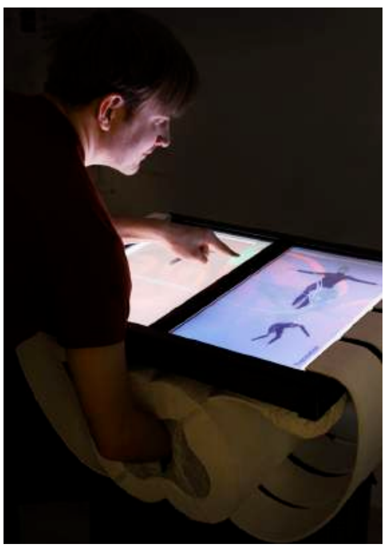
Two robots with special legs wander around these human and the earth landscapes, their behaviour is based on Dustmites, tiny spider predators that eat human skin. The projections on backs of the robots add to the drama, as they creep around and nourish

SOMABOOK





Four representations of the somatic cortex: Shape & Size, Translation, Stretch and Cooperation



Viewer interacting with the touchscreens and the touch sensors inside the neuraltube model

A collaboration between Jill Scott and Prof. Dr. Esther Stoeckli at the Institute of Molecular Science, University of Zurich.

Credits

Programming

Nikolaus Völzow

Visual Effects

Phillippe Kipper, Annette Busch, Andrew Quinn

Help

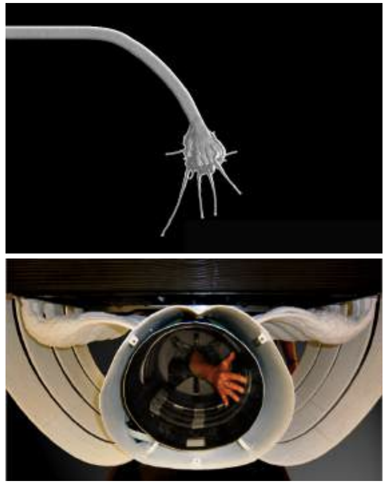
Marille Hahne, Corinne Hodel, Beat Schlaepfer

Scientific Consultants

Tobias Alther, Bettina Baumann, Jeannine Frei, Nicole Wilson and Livia Weber from the Institute of Molecular Science

SOMABOOK

The average public leaves the media sculpture of "Somabook" having experienced some understanding about the complexity and wonder of the development of neuronal circuits in the human body. The sculpture itself is based on a scaled-up model of our own neural tube or spinal cord and through interaction; the viewers can discover how the network for incoming sensory perception and outgoing motor coordination has been developed. As can be shown by neurobiologists, before we are born, thousands of molecules work with proteins to guide our axons to grow from this central neural system into the correlating locations so that we can feel, smell, taste, hear, see and move normally. This embryonic development is best studied inside fertilized chicken eggs, using what is called "an open book" method of dissection and there it can be shown that inappropriate connections and influences not only result in loss of functions,



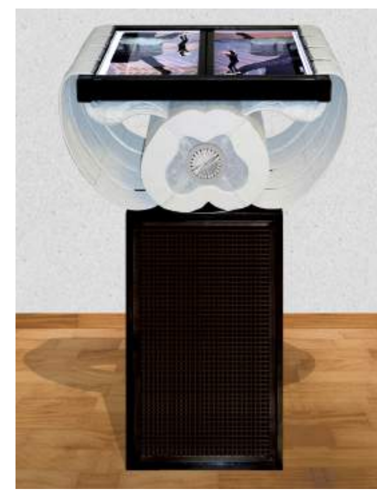
Top: Growthcones guided by animated hands
Bottom: Pressure strip sensors in neural tube

causing various problems in growth patterns, movement and coordination, but also distortions of perception. Axons also transmit neural information through the spinal cord into the cerebellum and are projected from there into the somatic and motor cortexes of the brain. Here five overlapping representational maps help us to function and be embodied in our environment. (A) Texture, (B) Shape and Size, (C) Stretch, (D) Translation and (E) Correlation. Therefore, through the use

Users playing with the touch screen potentials and learning about neural tube development

Top view: Texture: Embryonic development

of touch screens, the viewers can access each one of these layers, in order to learn more about molecular and neural research in a novel way.



Exhibition for the International Conference on Neuroscience, University of Zürich, CH, 2012