Visor™

Neuronavigation with a vision

visor
NEURO-NAVIGATION

3D navigation system for TMS applications

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Visor™ - neuronavigation with a vision

The stimulation of cortical areas with TMS presents one of the most exciting perspectives in current brain diagnostics and therapy. Psychiatry, neurology, neuroradiology and psychology are only some of the groups to which the interdisciplinary work of Transcranial Magnetic Stimulation relates. Neuronavigation is the latest addition to this technology. Anatomical scans, functional information from fMRI and EEG, EMG and results obtained from cognitive testing need to be promptly available when it comes to the stimulation of the relevant cortical patches.
The Visor™ neuronavigation brings it all together – neuronavigation with a vision.

Real-time multimodality scenario's

While MRI is pre-processed to render anatomical images of the subject, high-density EEG as well as EMG is acquired simultaneously with the TMS stimulation. The highly interactive Visor™ system delivers this multimodality scenario in real-time.

Functionality and flexibility

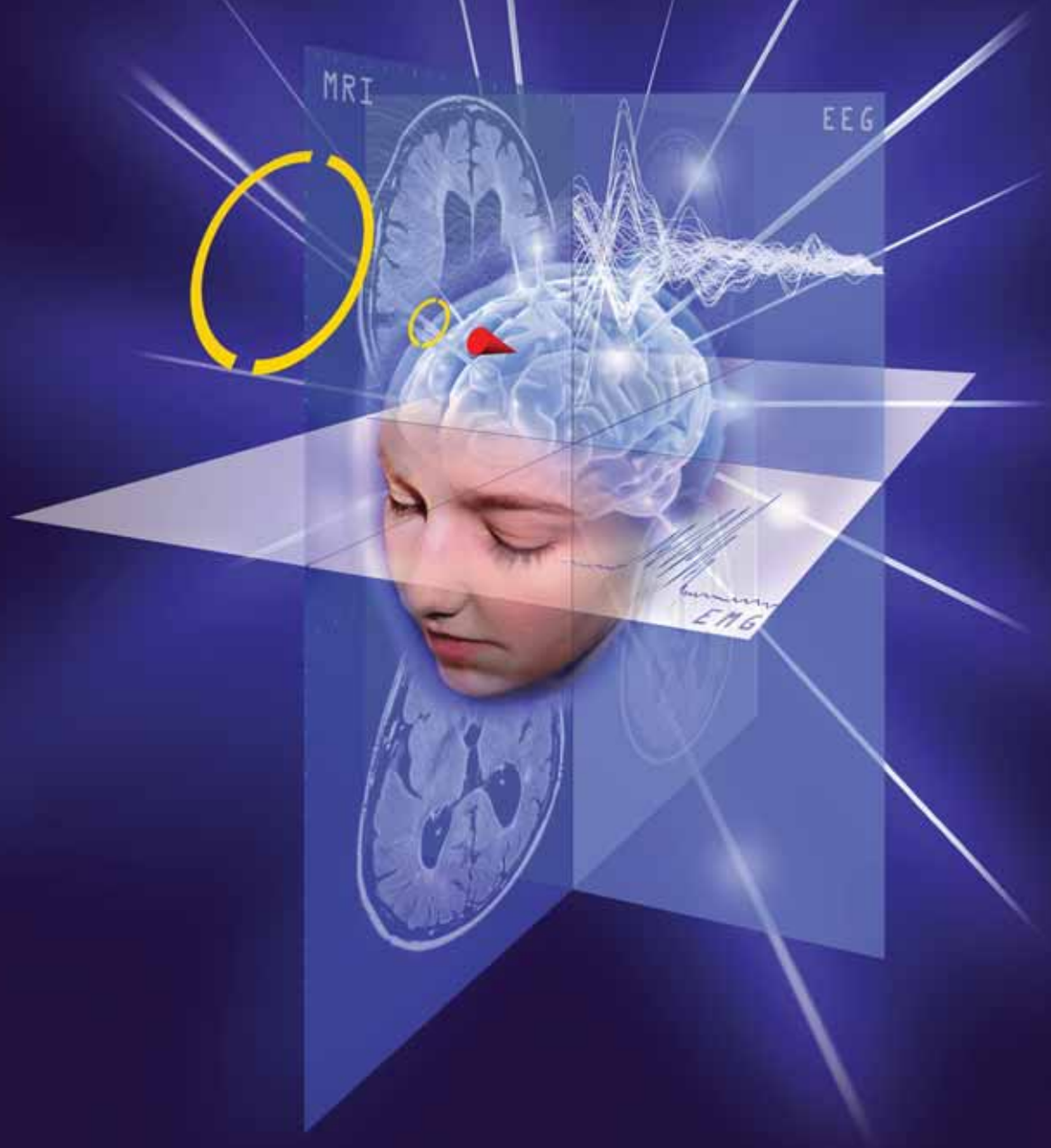
Visor™ combines different streams of information, such as the predicted cortical TMS activation mapping, EMG motor mapping, and noninvasive functional EP imaging: it provides the operator with all tools necessary to yield optimal results. Moreover, clinical reporting, database surveys and further research on the acquired data are facilitated by a system that is unmatched in functionality and flexibility.

TMS as combined with neuronavigation, EEG, EMG and fMRI undoubtedly represents the next generation of clinical and cognitive research; it reveals the real potential of this technology.

Visor™ brings it to you – navigation with a vision.

Visor™ - focus on the brain

The Visor™ navigation system provides a complete set of highly sophisticated tools for image-guided TMS in clinical and cognitive research. Visor™ makes the interaction of transcranial magnetic stimulation with the brain visible and provides a solid basis for reliability and reproducibility of the stimulation procedure.



Modularity and mobility

MRI image processing and co-registration of different modalities, easy brain navigation and targeting, functional 3D mapping of induced brain activity and quick EEG electrode digitization are combined with a high-performance graphics and clear user interfaces.

Visor™ can be upgraded to simultaneous EMG/EEG/ERP recording and signal processing, featuring dipole and LORETA-type source reconstruction. The well-designed cart allows for high mobility and flexible adjustment of the system components.

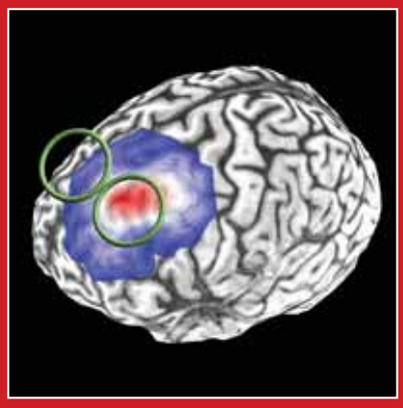
Maximum efficiency of TMS

Take your work to a new level of reliability, flexibility and performance using the most sophisticated TMS neuronavigation system available. Whatever the complexity of your research project or clinical investigation is, Visor™ is the right choice.

Always in control

Take your work to a new level of reliability, flexibility and performance using the most sophisticated TMS neuronavigation system available. Whatever the complexity of your research project or clinical investigation is, Visor™ is the right choice.

The MRI is imported from various data formats and then processed into segmented compartments. Scalp and brain surface are easily separated for rendering and calculation purposes.



The navigation with the TMS coils over the head is visualized and provides a detailed map of the induced activation on the brain surface. This figure is updated in real-time and can be freely rotated while positioning the coil.

Visor™ easy and accurate **TMS** navigation

Visor™ tracks and displays the position of up to two TMS coils. Head movements are automatically detected and compensated by the system without loss of accuracy. The induced electrical activation of brain tissue as produced by the magnetic stimulation is calculated in real-time and projected onto the MR images. Functional data such as EEG/MEG source analysis or fMRI can be overlaid and may be used to target certain areas.
All parameters of the TMS stimulation session are recorded so that it can be easily reproduced. Intermediate and final results such as tables with stimulus information, 3D graphics and session information are stored in studies and reports and can be easily reviewed.

Visor™ real-time **EMG** motor mapping

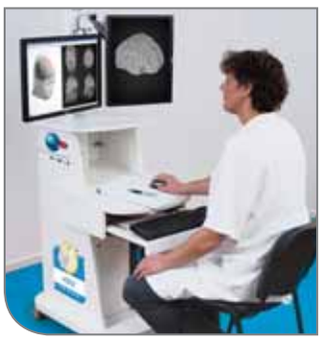
Motor mapping is a common procedure in TMS to determine the site and size of motor cortex representations. In addition, motor threshold measurements are often used as a basis for TMS sessions. Visor™ combines all this in one system. Motor-evoked Potential (MEP) can be recorded for each stimulated site and is projected in real-time to the brain surface in order to create a map with corresponding EMG amplitudes.

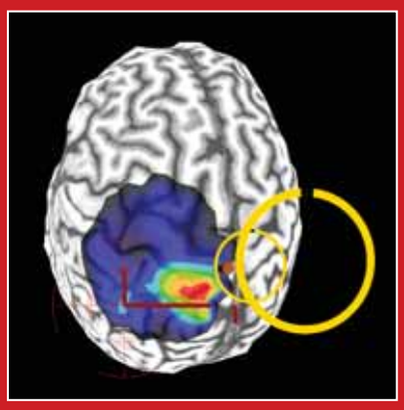
Visor™ for combined **TMS-EEG** recordings

Visor™ provides fully integrated EEG/ERP/EP for recordings combined with TMS. Our Waveguard™ cap and amplifier technology allow simultaneous measurements with minimal impact of TMS artifacts on the EEG signals. TMS triggers are registered in synchrony with the data and can be used to apply TMS artifact correction, evaluate EEG responses or analyze the averaged responses. In addition, spectral 3D mapping, time-frequency analysis, and EEG source reconstruction may reveal further information about the underlying brain activity.

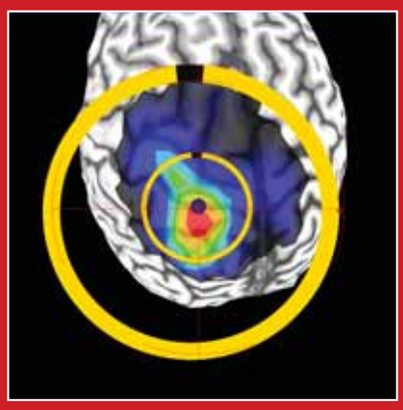
Visor™ **MRI** pre-processing and subject preparation

The MRI of the individual subject is imported in DICOM, Analyze/Nifty or ASA format and further processed to extract the scalp and brain surfaces as well as anatomical landmarks for coordinate transformation. Alternatively, standard MRI can be used in case that no images of the subject are available. The subject is placed in a comfortable chair within a 3 meters distance from the camera. The navigation session starts by attaching a head band or EEG cap with the reference tool and measuring the subject's fiducial points using a pointer. The whole preparation procedure, including MRI import and image processing, is achieved in less than 15 minutes.





The target view allows precise navigation to predefined positions in the brain. Target markers may be defined in Talairach coordinates, the individual MRI/fMRI, or reloaded from earlier stimulation sessions.



When the target is within acceptable distance and angle, the actual TMS stimulation is executed and a stimulus marker is added to the 3D scenario. All stimulus information is available in lists and can be exported to other programs.

Features & Benefits

System

- Mobile high-performance TMS navigation system with EEG/ERP/EMG integration (optional)
- Dedicated cart with highly flexible arms for camera and monitor (optional wall-mounting)
- Wide-range NDI® Spectra™/Vicra™ infrared camera system with total accuracy of better than 2 mm
- Compatible with a variety of standard and custom TMS coils
- No head fixation necessary due to automatic head movement compensation
- TTL link between TMS stimulator and navigation system
- Quick and easy calibration of coils; validation of correct coil/tool positioning

Integration with EMG and EEG

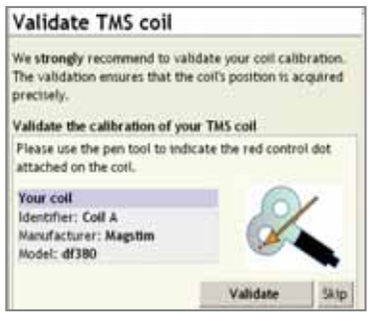
- Visor™ fully integrates TMS neuronavigation with EMG motor mapping and EEG recording in one system
- Motor evoked potential can be recorded with Visor™ for each stimulated point and are projected in real-time onto the brain in order to create corresponding EMG amplitude maps
- Waveguard™ cap and amplifier technology allow simultaneous measurement with minimal impact of TMS artifacts on EEG
- Whenever necessary, TMS artifact correction can be applied to compensate stimulation artifacts. EEG averaging, spectral 3D mapping, time-frequency analysis, and EEG source reconstruction can be applied to reveal information about the underlying brain activity

Navigation

- Co-registration with MRI (DICOM, ANALYZE, NIFTY) using anatomical landmarks
- Forward field calculation of TMS focus using realistic head model to visualize the expected activation of brain tissue
- Simultaneous visualization of MRI and fMRI (slices, freely rotating cutting planes, 3D regions, rendered compartments, and curvilinear displays) and EEG/ERP/EP (maps, head model, sensors, 3D inverse solutions) during navigation
- Sophisticated display of induced brain activation in freely rotating cutting planes as well as in curvilinear maps
- Simultaneous visualization of pointer and up to two stimulation coils in real-time
- Display of MRI slices is adjusted on-the-fly to show the point of navigation (digitizer pen, stimulation coils)
- All parameters of the TMS stimulation session are stored so that it can be easily reproduced, reviewed and reported

Targeting

- Intuitive target view: accurate and fast positioning of coils over desired stimulation target (indicating distance to target and orientation of coil relative to desired orientation)
- Interactive placement of markers for back-tracing of positions (e.g. in Talairach coordinate frame)
- Define new targets for stimulation based on MRI, fMRI, ERP source analysis results, and dipoles. Alternatively, use pointer to set a target or simply enter coordinates



Before using the coil in the navigation session, we validate the coil position relative to the tracking tool mounted to it. This way, we ensure that no navigation errors are introduced by accidental dislocation. The validation takes less than ten seconds to carry out.

The visor system is compatible with a variety of standard and custom coils.

The head reference tool can be attached to an electrode cap easily and tracks all head movements during the navigation session.

ASA-Lab™: turnkey solution for EEG/ERP research

Event-related potentials and high-density EEG are a key source of information to unveil the highly dynamic relations between cortical brain regions. ASA-Lab™ provides you with a turnkey solution to explore the brain's reaction to a particular experimental paradigm within minutes! This complete system for acquisition, stimulation and analysis in cognitive and clinical research meets all requirements.

eevoke™: exciting cognitive stimulation!

A major challenge in brain research is the design of intelligent experimental paradigms. eevoke™ provides you with a dedicated environment rather than just a programming tool to cope with your multimedia scenario designs. The Microsoft Office Excel® based eevoke Experiment Generator™ brings even the most complex paradigm down to a structured sheet with parameters. Behavioral analysis of subject responses is fully integrated. The eevoke™ stimulation package runs with the highest possible timing precision.

Waveguard™ cap system: TMS compatible EEG cap

The WaveGuard™ EEG cap system comes with ASA-Lab™ and provides unmatched signal quality combined with highest wearing comfort at surprisingly short subject preparation times. The cap is fully compatible with MRI and TMS and can be used in the noisiest environments. All sizes from neonatal and newborns to adults are available.

ANT: the positive impulse to improve your results

To help you with your research and applications ANT develops flexible products that seamlessly fit together. You are guaranteed to benefit from our continuous development. Add good support and special services: ANT is the perfect partner in cognitive neuroscience!

Advanced Neuro Technology (ANT) was founded in 1996. The activities of ANT are dedicated to the development of systems for recording and analysis of neurophysiological signals in neurological, psychological, physiological research and related clinical applications.

ANT is specialized in delivering high quality and user-friendly systems that meet the standards set by modern research. ANT is an innovative company with a specialized and strong scientific staff. ANT benefits from the scientific know-how gained through many years of research at Twente University (Netherlands), the Max Planck institute for Cognitive Neuroscience (Germany) and other scientific organizations.

The development of **ASA™** commenced in 1993 and was made commercially available in 1996 through ANT. Since that time ANT has continued the development of different products to be used in both research and clinical fields.
It's products are used in many laboratories worldwide and offered both directly or through our distributor network.
ANT actively supports and contributes to research projects.
ANT frequently organizes workshops to provide training and services to our users and to communicate future developments with the participants.

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