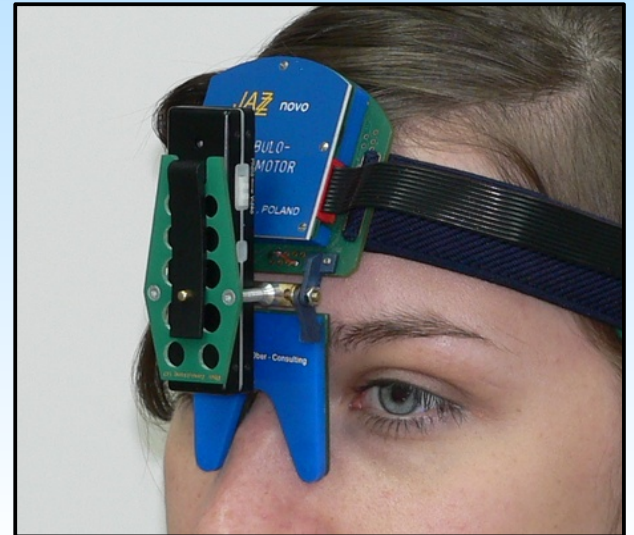


JAZZ-novo Multisensor Human Behaviour Capture System

Operator Attention Monitoring & Warning in low risk high impact situations
Operator Selection and On-Line Analysis of the training process

Main features of the JAZZ-novo system:

- multiple signals – one system
- optimised for field use in complex environment
- non-intrusive, not restricting visual field
- zero setting time
- subject can wear own spectacles
- optically isolated, battery powered
- modular structure
- lightweight (sensor weight is only 100g)

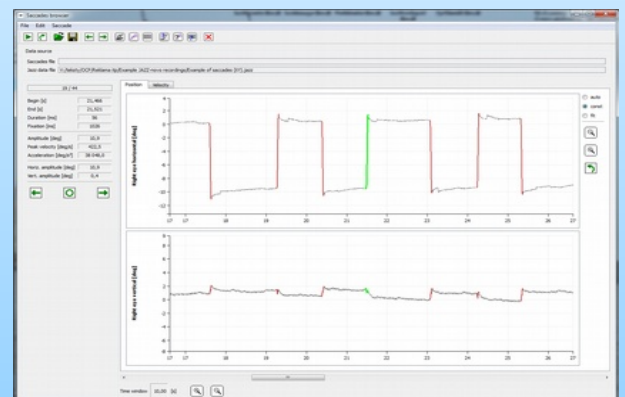


Optional functionality include:

- inertial sensing of head tilt and rotation
- 24-hours of autonomous data recording on flash memory card
- wireless data transmission
- head-mounted scene camera
- synchronous recording of visual stimulation status using screen sensor option
- synchronous monitoring of two operators

Recorded signals:

- ocular motility (horizontal and vertical)
- head rotation velocity (pitch and yaw planes)
- head tilt (roll and pitch planes)
- heart rate (pulse-plethysmography)
- operator's speech / background sound
- visual stimuli status (screen sensor)



JAZZ-novo Standard setup

- eye movements in the horizontal and vertical axes (1 kHz sampling frequency)
- total hemoglobin and oxyhemoglobin plethysmography (650/910 nm wave length)
- microphone signal (8 kHz sampling frequency, 12 bits sampling resolution)
- connection with computer using an optical fiber link (optical system isolation) and USB

Vestibulum option

The Vestibulum options enhance JAZZ-novo with dual axis accelerometer for measuring head tilt (roll and pitch axes, $\pm 1g$ range) and dual axis rate gyroscopes for measuring the velocity of head rotations around the vertical and horizontal axes (pitch and yaw, $\pm 300^\circ/s$ range). The gyroscope provides absolute values of head rotation velocities, and can be used to cross calibrate the eye movement signals based on the Vestibulo Ocular Reflex.

Autonomous recording option

The JAZZ-novo system can also be used as a stand-alone system equipped with a battery powered controller allowing data to be recorded on flash memory card (SD). It fulfills the function of a Hollter type device where eye and head motility can be recorded for a whole day. Visual interaction with the normal environment, such as the work-place or a neurological rehabilitation clinic, provides the most natural visual stimulation and regular daily activity can become an ecological diagnostic experiment.

Wireless option

Complementary to the autonomous recording option is the telemetry facility providing data transfer over a 2.4 GHz Bluetooth radio link. To name just one of the possible JAZZ-novo applications, it allows the experimenter to monitor continuously the eye and head behavior of the tested person, when he/she moves freely around the control room.

Scene camera option

The scene camera option allows to record the scene viewed by the person. It documents the areas of attention and facilitates the interpretation of the eye and head movements which accompany subject exploratory interaction with the visual environment. The scene camera is powered by the built-in battery and allows 1.5 hours of recording time.

Synchronic option

JAZZ-novo with the synchronic option can perform the measurement synchronously with the external triggering signal. It can also provide the synchronizing signal necessary to trigger other physiological-data acquisition systems or to synchronize two independent JAZZ-novo measurement systems. The screen light sensor allows to synchronize the visual stimuli displayed on the computer screen with recorded eye movement data.

Acknowledgements

The JAZZ-novo is the result of more than 15 years of research and engineering development conducted by Ober Consulting in the cooperation with Nalecz Institute of Biocybernetics and Biomedical Engineering Polish Academy of Sciences and in the framework of the following projects: "White Box" - monitoring psycho-physiological status of the pilot during combat flight, VINTHEC EU Consortium - Visual Interaction in the civil airliner cockpit (EU project), VITA EU Consortium - Vital Infrastructure Threat and Assurance (EU project).