Follow text and video step-by-step tutorials how to create basic VSRC web site. The site was developed using content
The Advance Image Analysis Core designed and administers the research scientists to focus on their areas of core competency, while providing state-of-the-art instrumentation.

Mr. Zotov

The Scanner, Color Laser Printer, Slide/Film Scanner

Equipment § LabVIEW standalone programs can be developed for Computational Analysis Core through design and development of custom computer hardware/software interfaces and data processing including parallel processing. The research aims to analyze and compare visual search organization in various clinical populations, in particular in patients after stroke who are undergoing inpatient rehabilitation. Preliminary findings indicate that the method can be used even for patients with the most severely impaired language comprehension due to aphasia, and therefore can provide insight to the general self-organization capabilities of brain impaired individuals, even those who have lost language skills. The method is unobtrusive and simple for patients of various kinds and can be used to evaluate others with cognitive disorders during their recovery before and after training.

Services include

- development of custom, specialized software including:
  - data acquisition
  - data processing including parallel processing
  - video tracking
  - image analysis and processing
  - development of customized hardware/software interfaces and instrument control systems
- website authoring, hosting and development of web applications including online equipment scheduling systems

Web Programming

Online Equipment Schedulers

The Research Programming and Computational Analysis Core created, hosts and administers multiple online schedulers that allow the affiliates to reserve shared equipment in the VSRC Cell/Molecular Analysis Module and imaging facilities online. All affiliates can register as users and view reservations immediately. To prevent unauthorized reservations, an administrator has to permit a new user to reserve equipment.

Parallel Computing Data Processing

Post-processing of Optical Coherence Tomography (OCT) images for vessel shadow removal, contrast enhancement, and signal recovery. Adaptive amplification with image depth is applied to the image in order to estimate the tissue-intrinsic optical attenuation coefficient of each layer of the ocular tissues.

A scheduler calendar that displays all posted reservations and can be viewed online by all registered members at any time.

The available equipment can be reserved online by all registered members by filling a form.

Video Tracking and Processing

The subject searches and marks with a pen specific shapes in a large field of objects. The software analyzes the recorded video, tracks pen movements, and records its position and time in each frame for further analysis of speed and directions of movements. The research aims to analyze and compare visual search organization in various clinical populations, in particular in patients after stroke who are undergoing inpatient rehabilitation. Preliminary findings indicate that the method can be used even for patients with the most severely impaired language comprehension due to aphasia, and therefore can provide insight to the general self-organization capabilities of brain impaired individuals, even those who have lost language skills. The method is unobtrusive and simple for patients of various kinds and can be used to evaluate others with cognitive disorders during their recovery before and after training.

A fully interactive display created as an animated figure for one publication authored by Dr. A. Dobbins. The bistable wire cube continuously rotate and the user can control the presentation by changing the axis of rotation, the number of cubes displayed, speed of rotation, and tilt of the cubes by simple button presses on the keyboard. The animation can be viewed at www.vsrc.uab.edu/adbobbins.

The system finds the location of the pen in each frame and records the coordinates into a file for further analysis

Software and System Development

Instrument Control and Visual Stimulation

The VSRC Research Programming and Computational Analysis Core developed four separate fully-integrated software systems to execute and control whole-cell patch-clamp recordings performed on retinas in vitro. The systems control visual stimulation, record cell responses, and drive external devices during the experiments. Two of the systems generate and display custom stationary or dynamic visual stimuli on the secondary monitor. The other two systems control external light sources for visual stimulation.

All of the systems allow precise control of operation of external devices like pumps, picoinjectors, etc. by generating high speed digital outputs.

The systems are currently used in several laboratories at the VSRC and are actively supported and updated by the Research Programming and Computational Analysis Core.

Zstim is the fully-integrated software system that was developed for whole-cell patch-clamp recordings performed on rabbit retinas in vitro. The software allows to simultaneously display static or dynamic visual stimuli and to acquire cell responses from a microelectrode or a microelectrode array. The system allows precise real time control of external devices.

A. The GUI allows the investigator to specify parameters of experiment execution, data acquisition and recording. All parameters of the visual stimuli can be preselected using input files.

B. Visual stimulus image can be superimposed on the background or a 1-bit mask can be used to define where the background and the stimulus are visible. Stimuli can be of any shape, stationary or dynamic, and the same is true for the background.

Psychophysics

Speed of Processing system developed using Matlab for lab of Dr. Visscher. The system generates and displays visual stimuli and collects and records subject responses. The system monitors eye movements before, during, and after the Speed of Processing training.

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