Vision Science Research Center

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VSRC Advanced Image Analysis Core

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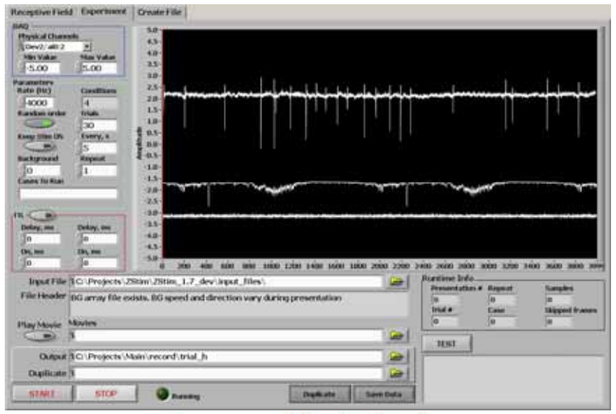
The **Advanced Image Analysis Core** offers researchers a comprehensive programming and image analysis service where custom image analysis routines and standalone programs can be developed for individual project needs by highly trained personnel. The Core also develops the control software that allows custom instrumentation to be interfaced with computers in the laboratory setting, which is typically achieved using LabVIEW, Java, C, C++, Matlab, and other languages
The Advanced Image Analysis Core works closely with investigators and collaborates with other Modules to design and develop custom commercially unavailable systems required to manage experimental equipment and to process experiment data.

Programming Languages and Environments

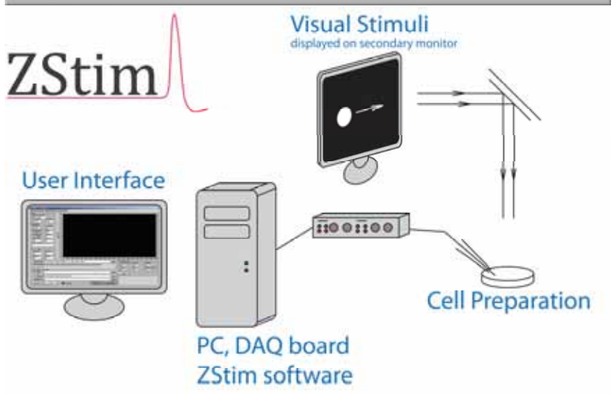
LabVIEW LabVIEW
Matlab and *Phychtoolbox*
PHP, *JavaScript*
C/C++, *Java*
Java 3D, *Adobe Flash*
Joomla!, *SQL*

ZStim is the fully-integrated software system that was developed for whole-cell patch-clamp recordings experiments performed on rabbit retina in vitro. The software, developed in LabVIEW and Matlab, provides an efficient graphical user interface and allows to simultaneously display static or dynamic visual stimuli and to acquire cell responses from a microelectrode or a microelectrode array. Zstim also provides control of external devices as a picoinjector, light sources and other.

Some of the electronic interfaces were developed by the VSRC Electronic Module and some of the mechanical servo-mechanisms by the VSRC Machine Shop. Similar projects were developed or are in development for other VSRC laboratories.



A: The customized graphical user interface allows the investigator to specify parameters of experiment execution, data acquisition and recording. All parameters of the static and dynamic visual stimuli that are displayed during the experiment can be preselected using input files. The frequency and timing of the digital outputs controlling a picoinjector and other devices can be specified through the user interface as well.



B: The sample setup includes the main computer equipped with dual monitor, data acquisition board and full version of ZStim software. Visual stimuli presented on the extension display are projected to the cell preparation. An electrode or an electrode array detects cell responses that are digitized and stored for off-line analysis.

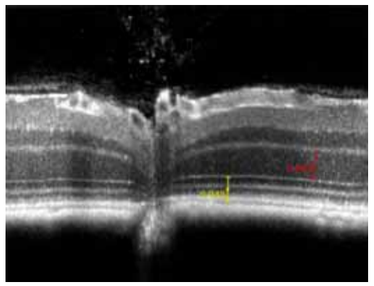
ZStim Lite version is available and was designed to create, test and view visual stimuli on single monitor computers with no data acquisition. Zstim Matlab version is also available and it allows to view and analyze visual stimuli on computers with no LabVIEW installed.

Services include

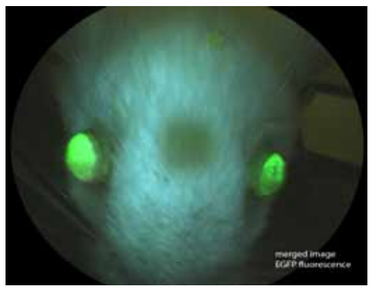
- ✓ development of custom, specialized software:
  - data acquisition
  - data processing
  - video tracking
  - image analysis
- ✓ development of customized hardware/software interfaces and instrument control systems
- ✓ website authoring, hosting and development of web applications
- ✓ development and maintenance of online scheduling services for shared instrumentation

VSRC Ocular Phenotyping and Molecular Analysis Core

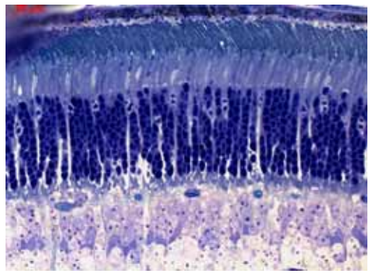
Dr. Steven Pittler – Director
Dr. Marina Gorbatyuk – Associate Director
Dr. Vincenzo Guarcello – Laboratory Director (guarcell@uab.edu)



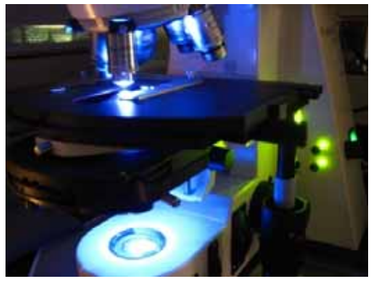
Mouse retina image obtained by Optical Coherence Tomography. Our Bioptigen 840 nm SDOCT allows for non-invasive high resolution imaging of the cornea and retina or any wave penetrable tissue. S. Pittler, H. Fortinberry, S. Sarfare, J. Messinger.



rho-EGFP expression in an albino rat eye imaging using a Phoenix Laboratories Micron III digital fundus microscope with fluorescence capabilities. This instrument is used to obtain semi-invasive high resolution fundus images and movies from mice and rats. T. Wensel, J. Wilson, S. Pittler, A. Gross.



Microscope image of retinal slices of GARP2 Tg mice obtained on our Zeiss AxioPlan2 Microscope. The mouse retina was embedded in Epon, sections were cut at 0.5 mm and stained with toluidine blue. for visualization of cell layers within the retina. S. Sarfare, J. Messinger, S. Pittler



Zeiss AxioPlan2 Microscope with broad range fluorescence capabilities including DAPI, TRITC, FITC and Cy5 filters. This scope has Z-stack capabilities. The objectives are 10X, 20X, 40X, 63X and 100X. The 63X and 100X are oil immersion lenses. H. Fortinberry

The Ocular Phenotyping and Molecular Analysis Core offers equipment usage and consulting for molecular biology and histology experiments, as well as, non-invasive imaging of the eye in a variety of animal models. Our goal is to facilitate the research efforts of investigators throughout UAB with primary emphasis on support for UAB vision scientists.

Equipment available:

- Wallac/Perkin Elmer 1420-041
- Typhoon Trio with ImageQuant TL
- LI-COR Odyssey Fc Imager
- Bio-Rad iQ5 thermo cycler for real-time quantitative PCR
- Zeiss Axio-Plan2 microscope for fluorescence and light microscopy
- Leica Cryostat for cutting frozen tissue sections for histologic analysis
- Beckman and Eppendorf Centrifuges: micro, swinging bucket and ultra high speed
- Bioptigen 840 nm SDOCT ultra high resolution Optical Coherence Tomography
- Micron III digital fundus microscope with fluorescence capabilities

More information can be obtained by visiting our website at http://www.uab.edu/vsrc/support-modules/molecularcellular-analysis In addition to the website; specific details on what is available in this core and other Core Modules can be obtained by contacting the mangers at the e-mail addresses listed above.