

## See the difference

At Cambridge Research Systems, our reputation is founded on values of scientific rigour and integrity. For over 20 years, our unique range of Tools for Vision Science has been ubiquitous in laboratories throughout the world, and cited in thousands of papers in fields including vision, ophthalmology, neurophysiology, cognitive neuroscience, experimental psychology and human factors.

By combining engineering expertise with innovation, cutting edge technology, and on going collaboration with our valued academic partners, we design and develop innovative tools that enable the advancement of vision science.

Our products are market leaders, our people, committed and knowledgeable. Our ambition is to continue setting standards in the vision science community, of which we are proud to be a part.





## → ViSaGe visual stimulus generator

Bespoke solution designed for vision research

ViSaGe makes it simple to display calibrated visual stimuli on computer monitors with precision timing and provides a robust and reliable mechanism for synchronising the stimulus presentation with external data collection equipment, including electrophysiological amplifiers, eye trackers and MRI scanners. It is the ideal choice for cognitive, psychophysical, and neurophysiological investigations of vision and the brain.

Accessories include light measurement devices, display calibration and characterisation equipment, a variety of subject response boxes, analogue and video eye movement recorders, specialised displays, even laboratory furniture like chinrests and motorised, height-adjustable tables.

Start collecting data today! Choose from our range of turnkey tests and develop novel experiments with our dedicated Toolbox for MATLAB.



## → Visual Psychophysics Engine

Precise and repeatable psychophysical measurements of visual function

The Visual Psychophysics Engine is a versatile software tool for ViSaGe that was developed by Dr Neil Parry (Clinical Vision Scientist, The University of Manchester). It is supplied with a suite of pre-programmed experimental paradigms which allow you to measure luminance and chromatic Contrast Sensitivity Functions, increment thresholds and De Lange curves. You can also create your own bespoke protocols and present standard visual stimuli like sinewave gratings and Gabor patches using the easy-to-use, menu-driven interface. It has separate Administrator and Operators modes which make it perfect for clinical research applications and for deployment in teaching environments, like undergraduate laboratory practical sessions. No programming or specialist computer skills are required. The simple and intuitive interfaces are very user friendly and easy to learn, but are still sufficiently flexible for most research requirements.



## → Cambridge Colour Test

Investigate the limits of colour discrimination

The Cambridge Colour Test for ViSaGe provides a rapid means of screening subjects for colour vision deficiencies. It can also be used to examine in more detail the changes in colour discrimination that occur as a result of congenital or acquired conditions. The test was developed by Professor John Mollon and his colleagues (Department of Experimental Psychology, University of Cambridge) and determines discrimination ellipses in colour deficient subjects by probing chromatic sensitivity along the colour confusion lines. Ellipses measured in individuals with even slightly anomalous colour vision are characteristically orientated and enlarged. The test is an ideal tool for monitoring quantitatively over time the progression or remission of disease. Many drugs affect colour vision and pharmacologists will find the test well suited to monitoring the short-term or long-term course of such side-effects.



## → Bits# stimulus processor

Add the hardware features you need to the software you already love

Connect Bits# (Bits Sharp) between your computer and CRT or LCD display and turn them into a wide dynamic range, calibrated visual stimulator and frame-synchronous data acquisition system.

Bits# has high resolution video outputs for excellent colour and contrast control and internal gamma correction tables for transparent display linearization. Multiple digital I/O lines for triggering and synchronisation and high performance, buffered analogue I/O for data acquisition synchronised to the stimulus display are included as standard. The special features are already accessible from community tools like Psychtoolbox-3 (MATLAB) and PsychoPy (Python) and are simple to integrate with your own custom software routines.





## → SpectroCAL MKII spectroradiometer

Cost effective reference spectroradiometer with software for vision science

Our latest SpectroCAL design is a highly sensitive, broadband spectroradiometer with NIST traceable calibration. It is ideally suited for characterising computer monitors and projectors, including CRT, LCD (CCFL and LED backlit), DLP, and even OLED based displays.

A novel, laser guided imaging system makes it effortless to remotely align the sensor to take readings of spectral radiance over the entire visible spectrum, and into the UV and IR regions. The all new 2048 element CCD sensor offers a superior signal to noise ratio and returns readings up to 10 times faster than the original design, even at low light levels. In addition to radiometric measurements, the device also natively calculates luminance, chromaticity and correlated colour temperature.

The dedicated SpectroCAL and Colour Toolboxes for MATLAB were developed by Dr Caterina Ripamonti (CVRL, Institute of Ophthalmology/University College London) and provide all the necessary tools for making measurements, visualising the data and specifying visual stimuli in a wide variety of colorimetric and physiologically defined colour spaces.



## → ColorCAL MKII colorimeter

Calibrated and affordable colorimeter performs better than a spectroradiometer for gamma correction

Display linearization can be a time consuming, manual procedure, but ColorCAL helps to make it automated and fast. This compact USB colorimeter measures CIE chromaticity coordinates and photopic luminance. The data is returned via a virtual serial port interface which is straightforward to control and incorporate with a wide variety of software.

Each unit is carefully calibrated using a spectroradiometric device and appropriate light sources; the units contain multiple calibration matrices for use with CRT and LCD monitors. This approach provides the best possible accuracy at a very affordable price.

A TTL compatible, photodiode style output provides an elegant way to generate screen based triggers. This feature can aid in characterising signal processing delays (input lag) in LCD monitors, projectors and other digital display technologies, which if undetected might introduce a confound in experimental results.



## → LiveTrack FM fixation monitor

The discrete way to monitor observer compliance

LiveTrack FM is ideal for monitoring observer behaviour and pupil response during visual psychophysics and cognitive neuroscience experiments. Position LiveTrack a short distance away from your observer and stabilise their head using the provided chin rest; connect the device to the computer by USB and start monitoring their fixations.

Direction of Gaze coordinates are calculated for each eye inside the device in real time and are made available to host software on a buffered interface; this means no extra processing load on the host computer and no complicated real time programming is required.

A Live View of the observer's eyes is always available and is overlaid with the tracking information. An embedded BNC trigger input port is provided for synchronising the fixations with external events (e.g. stimulus onset).



## → AudioFile digital audio processor

The easiest way to deliver auditory stimuli with synchronous triggers

AudioFile is a USB soundcard with a difference. It is designed for scientific applications where the timing and synchronisation of stimulus streams is critical. It supports real time streaming directly from the host computer and buffered, offline playback of files stored on a high capacity SD card.

In streaming mode, the embedded digital I/O interface automatically generates TTL compatible triggers at the true onset of the auditory stimulus. In buffered mode, you can trigger the playback of a specific file or a whole playlist using TTL compatible digital input lines. This selection scheme means that files are played precisely when they should and without variable host operating system delays. Since a TTL compatible digital output line goes high during playback, you always know precisely when the track started and stopped.

AudioFile has a complete collection of analogue and digital outputs. Choose from headphone, line and optical S/PDIF for connection to a third-party amplifier.



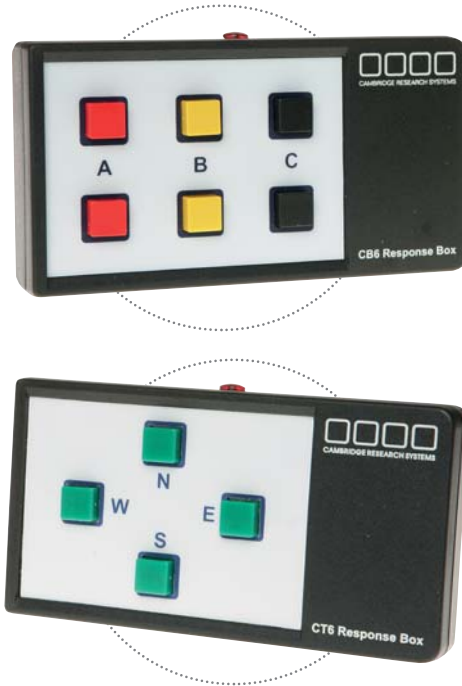
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## → CB6 and CT6 push button response boxes

Measure reaction times with wireless response boxes

A new high power, infra red wireless transmitter combined with robust push buttons and mounted in a light weight handheld enclosure makes it simple to capture behavioural responses from your observers.

Choose from six buttons arranged across two horizontal rows, or four push buttons arranged like the points of a compass. The designs are compatible with the wireless receivers inside ViSaGe and Bits# and generate video synchronous timestamp events using their high resolution reaction time clocks.



## → CRS Toolbox for MATLAB

Get the most from your investment in CRS technology

All CRS equipment is programmable and MATLAB is our recommended software tool. Its interactive script language is very easy to learn and incorporates a vast range of powerful mathematical functions and graphics. The simple command line interface allows you to quickly try out commands and immediately see the result. We have created a set of high level routines that extend MATLAB and make it easy to control our equipment in powerful and familiar ways. Many of the supplied demonstrations address the needs and problems of developing real vision science applications. All of the examples are supplied as M script files, so you can examine exactly how they work and even modify them to your own special requirements.

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