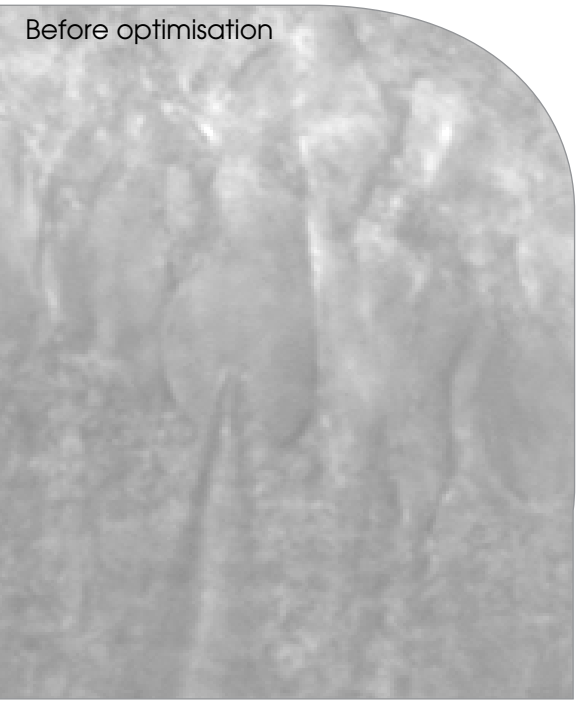
Scientifica
Experts in Electrophysiology & Imaging

Electrophysiology

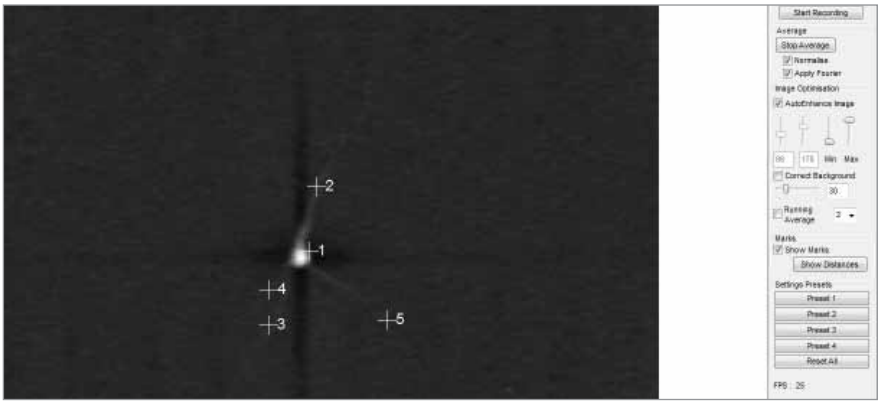
PatchVision

Real-time image optimisation software for patch clamp electrophysiology



PatchVision benefits

Scientifica's PatchVision enhances patch clamp recording procedures by improving image quality and contrast during real-time feeds, as well as recordings from tissue slices and cultured cells. Using live image processing to enhance image quality in real-time, it enables researchers to work more effectively with lower-cost microscope cameras with the benefit of digital image enhancement in electrophysiological experiments.



Real time imaging optimisation

PatchVision is designed for researchers patching cultured cells, brain slices and in culwith transmitted light illumination (eg. IR-oblique, IR-DIC).

The image is vastly improved, making cell identification or patching far easier and clearer.

This is achieved by applying a range of real-time software image processing algorithms.

Fluorescence imaging

Researchers doing fluorescence imaging will also find PatchVision advantageous, allowing them to identify fluorescently labelled cells prior to patching.

This is particularly useful when fluorescence signals are weak (for example when protein expression levels are low), PatchVision will ensure that the researcher has easily visualised cells. This is made possible by the noise reducing and enhance dynamic range functions.

This can then be followed up by adding software markers to allow patching when reverting back to the transmitted signal.

Morphometric analysis

This feature within the PatchVision software allows the user to evaluate the characteristic dimensions of a single cell or to measure distances between different cells after a simple few clicks.

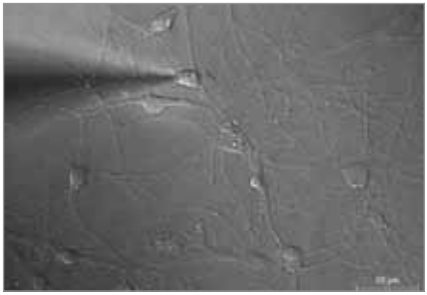


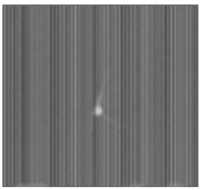
Image optimisation

3 step PatchVision guide

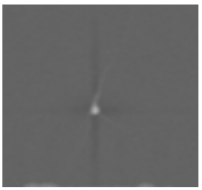
Step 1:

Averaging, normalisation and FFT & Histogram correction.

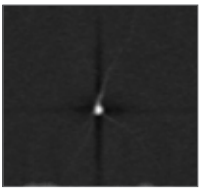
Raw image from camera



After averaging & normalisation



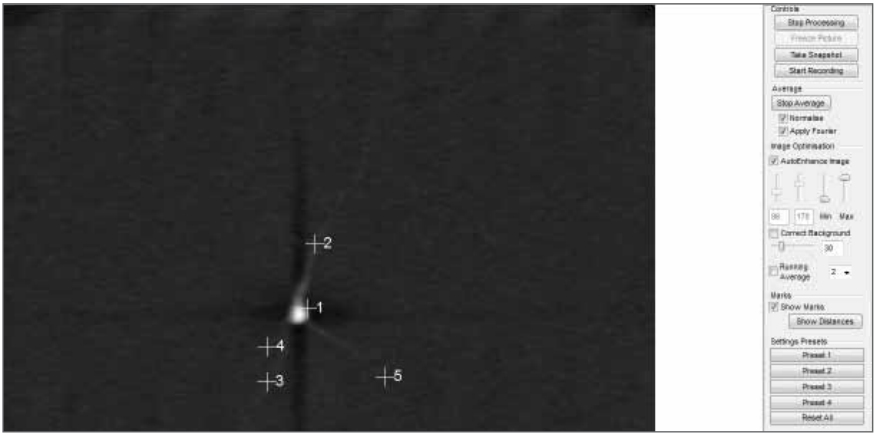
After averaging, normalisation & FFT



After averaging, normalisation, FFT & histogram correction

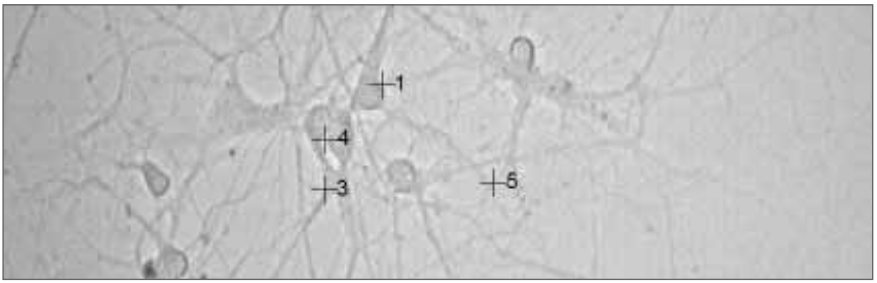
Step 2:

Marking of the identified fluorescent cells.



Step 3:

Visualisation of the identified cells in the transmitted light channel for patch clamp recordings.



The fluorescence tagged cells can be easily identified and patched.

Software functions & benefits

Function	Benefits
Running average	Reduces noise and flicker in 'live' image by displaying a running average on screen image from a specified number of frames.
Cumulative average	Allows identification of weakly fluorescent cells by displaying a cumulatively averaged image to reduce background image noise.
Fast fourier transform (FFT)	FFT filter removes low and high frequency repetitive noise interference patterns from images.
Auto enhancement	Analyses image contrast frame-by-frame in real time, performing histogram equalisation to enhance contrast, making it easier to identify and patch cells.
Correct background	Applies median filter image subtraction to reduce variation in image background levels
Morphometric measurement	Display an on-screen scale bar during a live feed and in exported video (.avi) or still (.bmp) images. Label, store and measure distances between points of interest.
Image flip	Transformation of your image horizontally or vertically on-screen to match directions of manipulator movement or align on screen image with other displays from other cameras in use simultaneously.

Key features

- **Real time:** all image processing takes place in real time, meaning that you can interactively optimise live image displayed at the normal video rate (25-30 FPS) during different stages of patch-clamp experiments.

- **Image and video sequence capture:** record, store and replay image stills (.bmp) and video (.avi) for offline analysis of your experiment.

- **Simple calibration:** user focuses on a calibration grid (supplied) and simply clicks on the grid points on the screen to calibrate the live image to allow simple morphometric measurements to be performed. Multiple calibration settings for different objectives, cameras and microscopes can be stored and recalled for subsequent use.

- **USB-interface:** uses a digital converter to transfer an analogue feed onto a laptop or PC.

Case study: fluorescence cell images

PatchVision's image noise-reduction and contrast enhancement capability is particularly useful in situations where signals from fluorescently labelled cells are too weak to allow clear identification of specific cells of interest on an unprocessed raw image.

Patchvision software was used to identify GFP expressing neurones in acute rodent brain slices. A red dye (Alexa 594) was included in the patch pipette. (Figure provided by Dr Wykes)

GFP targeting made easy

Examples may include cells expressing very low levels of recombinant fluorescent proteins such as green fluorescent protein (GFP) or cells that have been fluorescently labelled by microinjection of fluorescent dyes. Once weakly fluorescent cells are identified by image enhancement within the PatchVision software, they can be easily lablled by applying on-screen markers.

These markers are then maintained when the user switches back to a live transmitted light (eg. IR-DIC, IR-oblique) image which allows further investigation of the previously identified fluorescent cells.

Dr Rob Wykes - Department of Clinical Experimental Epilepsy University College London

"I was interested in using viral vectors to up or down-regulate expression levels of specific ion channels in neurons. To see what effect this would have on neuronal biophysical properties and firing I conducted brain slice electrophysiology experiments. In order to be able to visualize successfully transduced neurons the virus also made GFP.

I made acute brain slices, and using patch vision software, I was able to patch GFP expressing neurones and compare their biophysical properties to those of untransduced neurones.

PatchVision was crucial to the success of that project as we were able to adapt a regular electrophysiology rig into one which could allow guided patching of GFP expressing neurons without buying expensive camera's."

To find out more about his paper, search for **Wykes et al 2012 Science Translational Medicine**

Watch the full interview here:
www.scientifica.uk.com/latest-news/patchvision

Warranty & technical specifications

Scientifica's success is founded on supplying superior support and application of our significant manufacturing experience.

We would therefore really value the opportunity to understand your applications better and to offer no obligation advice on equipment, configurations and compatibility.

All Scientifica instruments are sold with a two-year warranty giving you complete peace of mind.

This covers all defects in manufacturing and materials. In this unlikely event, Scientifica will remedy either by repair or replacement.

Our team of customer support engineers is dedicated to providing you with the very best advice and support, should you experience any difficulties with our products.

With all products we offer a complete installation support service.

Technical specifications

Operating system - Windows XP and Windows 7 Only

System requirements - no support can be guaranteed if PatchVision is supplied without a PC. However, the specifications listed here detail a PC capable of running PatchVision.

Intel Pentium Dual Core Processor (2.93GHz)
2048MB DDR3 RAM
160GB Hard drive
512 MB NVIDIA GeForce G310
High resolution screen

Camera:
Watec 902H (1/3", 640x480 pixels)

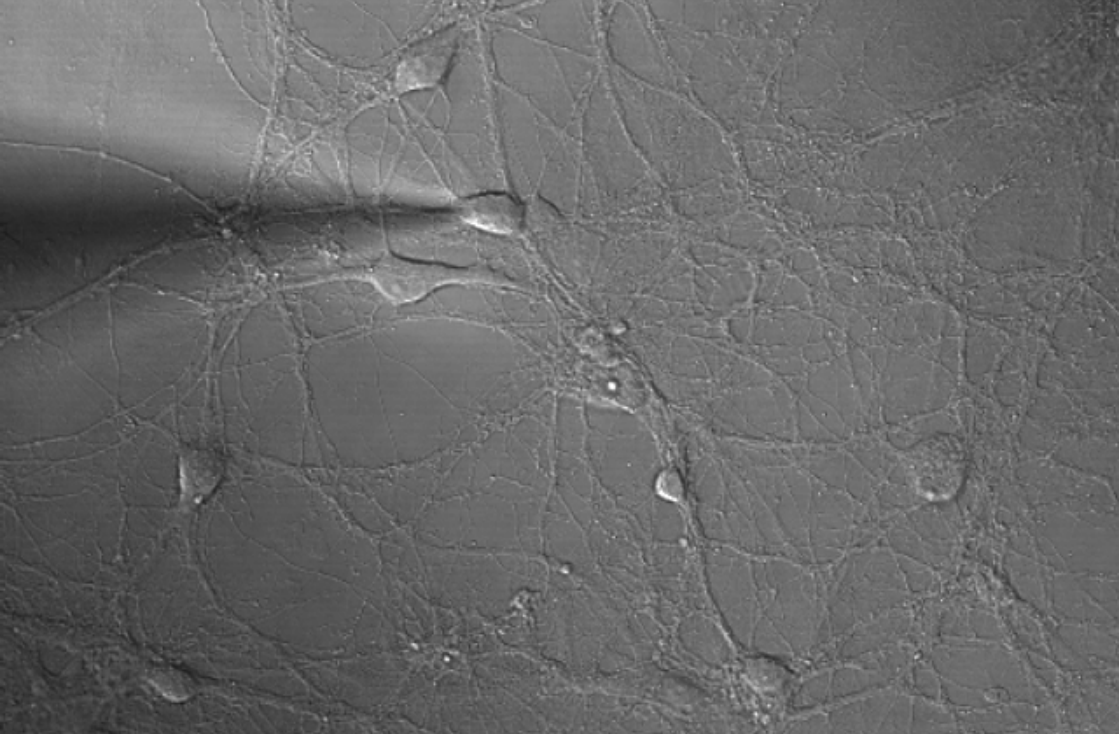
Supported file formats

Input - Bitmap (.bmp), Audio Video Interleave (.avi) and live feed from analogue camera via supplied USB analogue-digital converter.

Output - Bitmap (.bmp), Audio Video Interleave (.avi).

Hardware compatibility - Any standard analogue-output mono CCTV camera with an image format < 0.5 x 106 pixels.

Interface - USB 2.0, via a analogue-digital converter (supplied).



Ordering Information

Product code:	PV-1000* Full package	PV-2000 (no camera)	PV-3000 (no PC)	PV-4000 (no PC or camera)	PV-5000 (software only)
PatchVision software CD	✔	✔	✔	✔	✔
HASP security USB dongle	✔	✔	✔	✔	✔
PC and monitor	✔	✔	-	-	-
USB analog/digital converter	✔	✔	✔	✔	-
Calibration grid	✔	✔	✔	✔	✔
Camera	✔	-	✔	-	-
BNC-phono connection cable	✔	✔	✔	✔	-
Software manual	✔	✔	✔	✔	✔

* Comprehensive user support and compatibility of package components is guaranteed for purchases of the full PatchVision software, PC & camera package (PV-1000) only. No support is guaranteed in respect of compatibility and software performance issues experienced by users opting to use PatchVision software with a PC or camera not supplied by Scientifica.

Scientifica

Revision 1

Tel: +44(0)1825 749933
Fax: +44(0)1825 749934
Email: info@scientifica.uk.com
Web: www.scientifica.uk.com

SCIENTIFICA LTD
Kingfisher Court
Brambleside
Bellbrook Industrial Estate
Uckfield
East Sussex
TN22 1QQ
UK

Find out more about the Scientifica range of products and interviews on our channel, including a full demonstration of PatchVision.

www.youtube.com/scientificauk

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