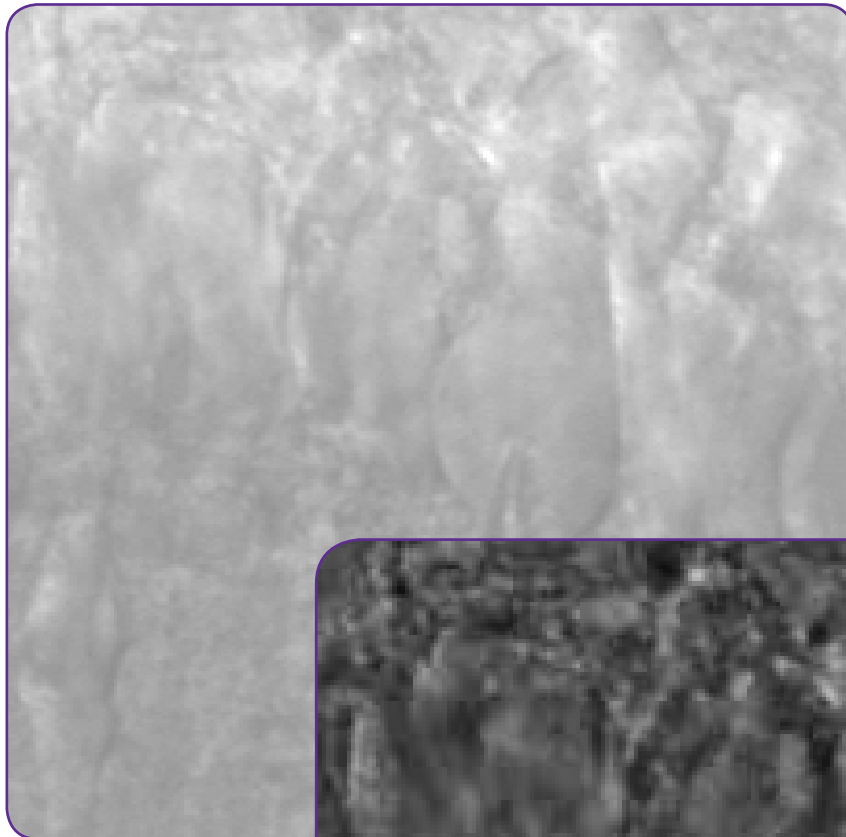


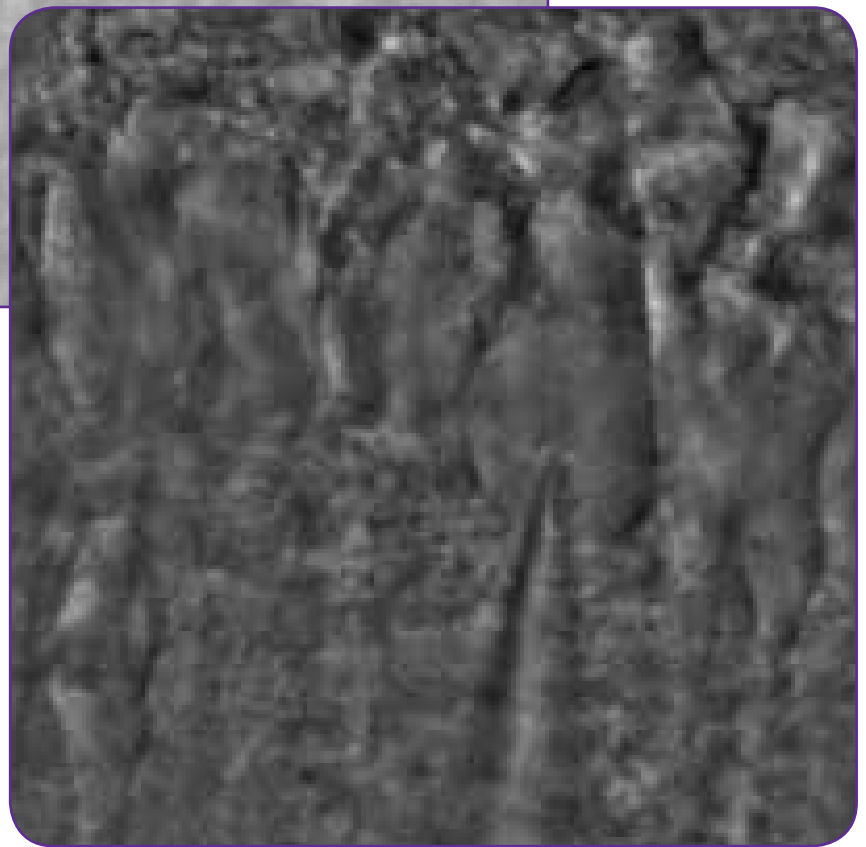


PatchVision

Image Optimisation for Patch Clamping



Before Optimisation



After Optimisation

Control
Productivity through control

Overview

PatchVision Overview

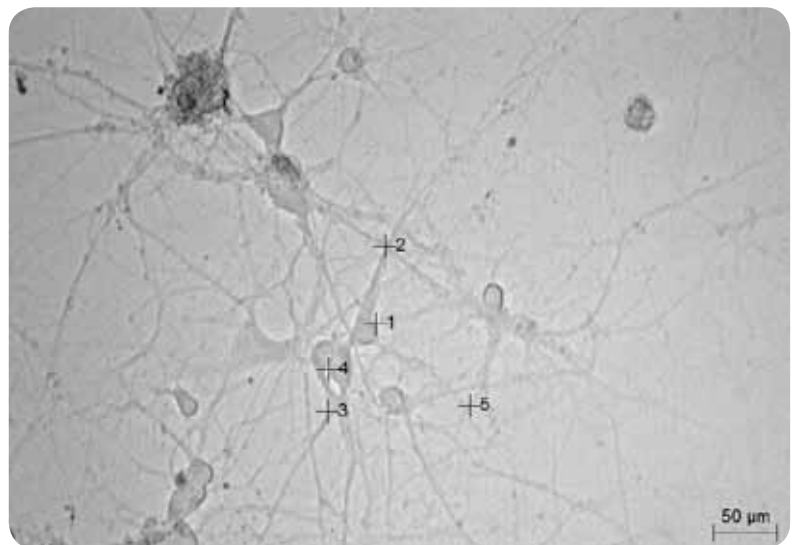
PatchVision is Scientifica's user-friendly image processing software designed with patch clamping electrophysiologists in mind.

It offers a cost effective alternative to high end systems designed with imaging as their final outcome, while offering image quality that you may not have considered possible from a basic analogue camera.

PatchVision is designed for researchers patching cells and brain slices with **transmitted light illumination** (eg. IR-oblique, IR-DIC). By applying a range of real-time software image processing algorithms, a vastly improved resultant image makes cell identification and patching far easier and clearer in comparison to a direct 'live' camera feed onto a monitor screen.

PatchVision will also appeal to those researchers using **fluorescent excitation** to identify fluorescently labelled cells prior to patching. In experimental situations (eg. low fluorescent protein expression levels) where fluorescence signals are weak, the processing power of PatchVision will ensure that you can clearly observe fluorescent cells by applying algorithms to reduce image noise and enhance dynamic range. Cells of interest can be highlighted electronically using on-screen markers assist in identifying fluorescently labelled cells when the researcher reverts back to transmitted (eg. IR-DIC) observation before attempting to patch the highlighted cells.

A **morphometric analysis** feature within the PatchVision software allows the user to measure distances between features of interest after performing a simple calibration procedure.



Morphometric analysis between two stored markers

PatchVision

PatchVision Image Optimisation

Benefits

Benefits

- **Real time:** all image processing takes place in real time, meaning that you can optimise your view of the study taking place & position pipettes at 25 FPS.
- **Image and video sequence capture:** record, store and replay image stills (.bmp) and video (.avi) for later analysis of your experiment taking place.
- **Simple calibration:** user focuses on a calibration grid (supplied) and simply clicks on the grid points on screen to calibrate the microscope 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

Software Functions

Running Average: Reduces image noise and flicker in 'live' image by displaying a running average on screen image from a specified number of frames

Cumulative Average: Facilitates the identification of weakly fluorescent cells by displaying a cumulatively averaged image to reduce background image noise.

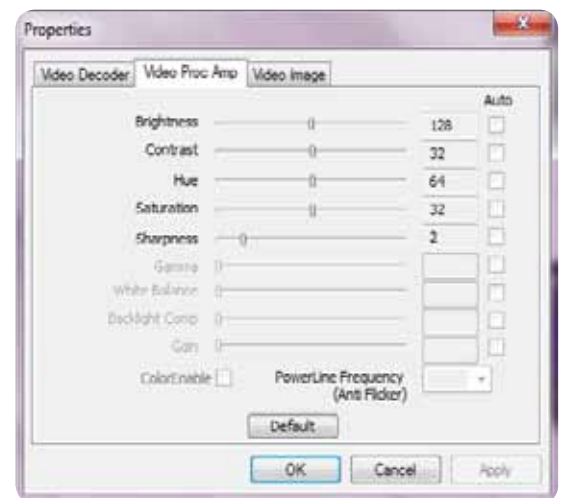
Fast Fourier transform (FFT): FFT filter removes low and high frequency repetitive noise interference patterns from images

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



Initial camera setup dialogue

Case Study: fluorescent 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 within the field of view.

Examples may include cells expressing very low levels of recombinant fluorescent photoproteins 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, on-screen markers can be added to highlight the weakly fluorescent cells within the field of view.

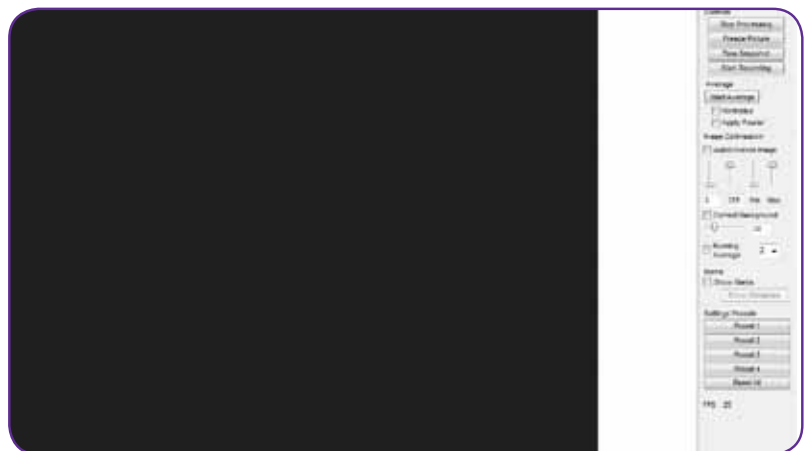
Markers added to identify specific cells within the fluorescence image are maintained when the user switches back to a live transmitted light (eg. IR-DIC, IR-oblique) image which allows further investigation of the previously identified fluorescent cells.

This powerful feature of the PatchVision software is particularly useful when dealing with mixed populations of cells and in situations where a sparse population of weakly fluorescent cells exists alongside a larger population of non-fluorescent cells.

The process for this is shown below:

Stage 1:

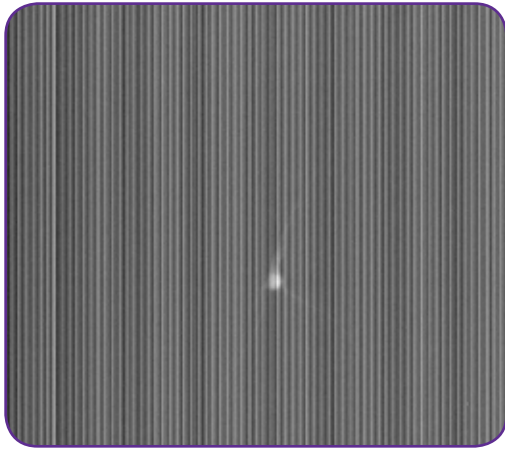
Captured fluorescent image as video sequence which can be saved as an .avi file.



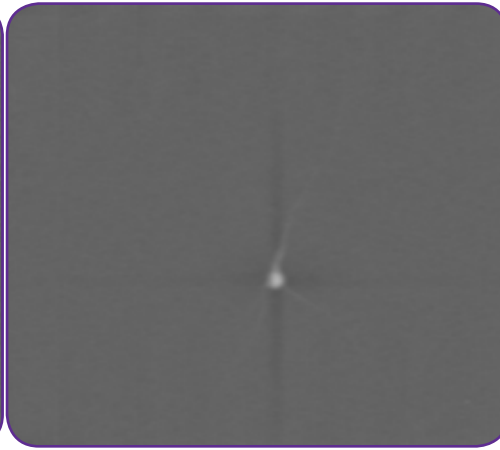
Snapshot from a typical fluorescence image which would be impossible to patch before adding noise reduction and normalisation

Stage 2 -

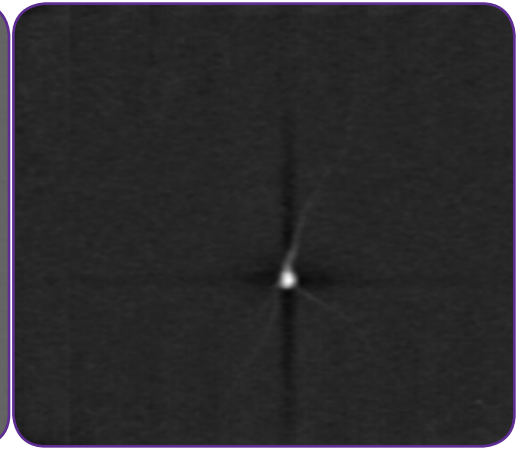
Video sequence using PatchVision's noise reduction & dynamic contrast normalisation to identify weakly fluorescent cells



Averaging and normalization algorithms applied.

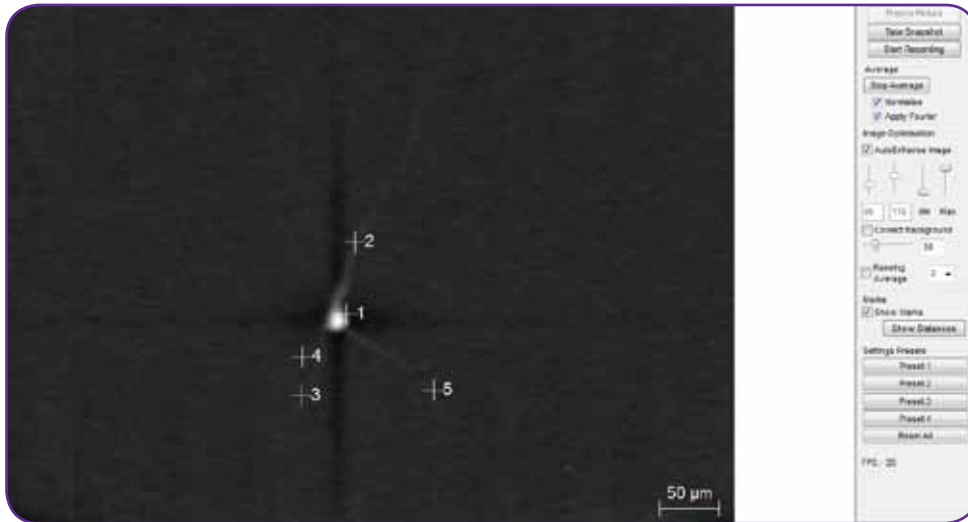


Averaging, normalization and FFT filter settings applied

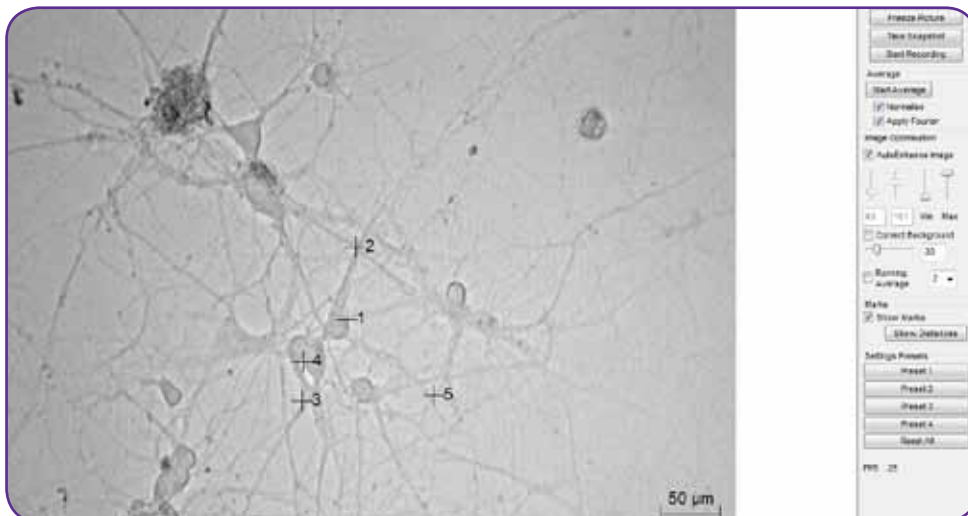


Averaging, normalization and FFT filter settings applied prior to using AutoEnhance to optimise displayed image contrast

Stage 3 - Markers can be added to the optimised image



Stage 4 - This can then be switched back to a live transmitted light image (EG IR-DIC)



The fluorescence tagged cells can be easily identified and Patched

Case Study

Case Study: Transmitted Light

PatchVision's AutoEnhance Image feature to enhance image contrast in samples viewed in transmitted light mode:

Image before
AutoEnhance & Correct
Background features enabled

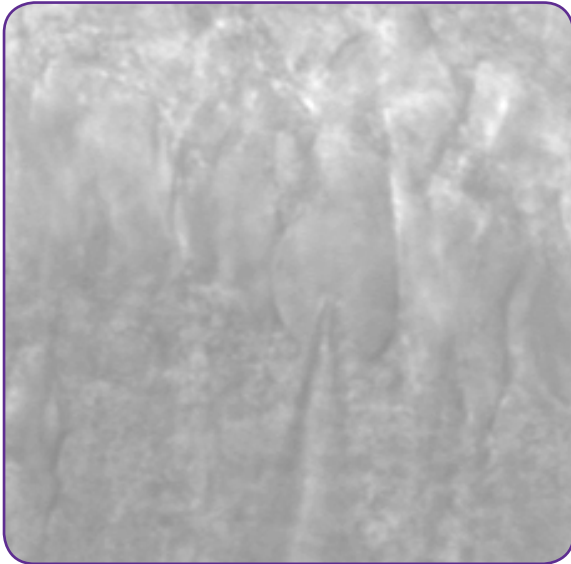
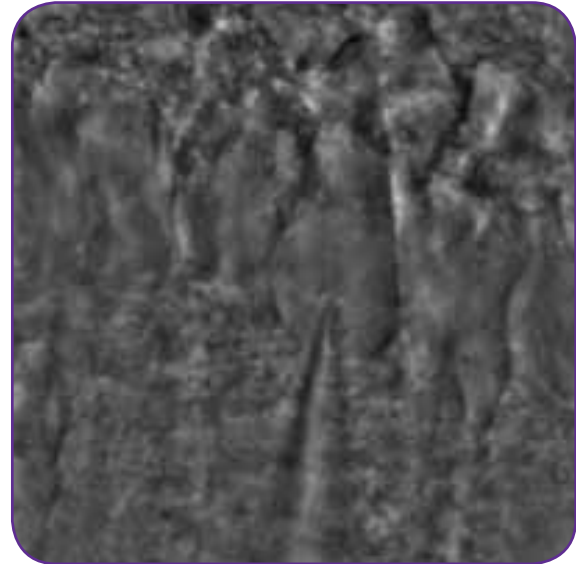


Image before
AutoEnhance & Correct
Background features enabled



Technical

Technical Specifications

Operating system compatibility: Windows XP and Windows 7 only

System requirements: As detailed in the ordering information section, no support can be guaranteed PatchVision not supplied with a PC. However, the specifications listed there detail a PC capable of running PatchVision.

Supported file formats:

INPUT: 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). Filter and presets stored by PatchVision as a .pvo

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.

PV-1000 PC system specifications:

We highly recommend our turn key complete system for piece of mind and full support.

PC:

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

Camera:

Water 902H (1/3", 640x480 pixels)



System supplied may vary

Warranty

All Scientifica instruments are sold with a two year warranty to give you complete peace of mind. This covers all defects in manufacturing and materials, providing the system is registered with us within 30 days of delivery. An extended warranty can be purchased if desired after this two year period.

For more information or to order within the UK and Eire, please contact Scientifica directly. Outside these areas, please contact your local distributor or visit our website.

SCIENTIFICA LTD,
Kingfisher Court, Brambleside,
Bellbrook Industrial Estate,
Uckfield, East Sussex TN22 1QQ
United Kingdom

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

