Dave's Solar Recorder

User Manual

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INTRODUCTION

Dave's Solar Recorder (DSR) allows you to simultaneously record 2 separate exposures of the Sun using The Imaging Source cameras. This allows you to record prominences and surface features at the same time.

DSR can colorize and merge these exposures into a single video file. This lets you produce a yellow and orange solar disk with red prominences in a blue sky, for example, even using a monochrome camera.

The software takes 2 simultaneous videos of the Sun's surface and edge (where the prominences are). It does this by switching the camera exposure time between the short exposure time needed for the surface and the longer time needed for the edge.

These raw videos are then colorized and combined to give full color videos of the Sun that show the surface as well as the prominences. The raw and combined videos can be processed using stacking software such as AviStack or Registax.

WHAT'S NEW

Version 2
All clips now timestamped to suit DVS overlays.
Zoom buttons.

Version 3
You can now adjust the edge and surface exposure by clicking on their boxes at bottom right of the main screen. Left-click to decrease exposure time and right-click to increase it.

QUICK START INSTRUCTIONS

Download and Install

Download the zipped software package and unzip it to your hard drive. Open the unzipped folder and run the file called DSRv4.7(.exe) or similar. You can create a shortcut to this file or pin it to your start menu to make it easier to launch.

If DSR doesn't run first time then you need to install some Microsoft components. Check your Control Panel first to see which ones are installed under Programs.

DSR needs the Microsoft .NET Framework 4 and the Microsoft Visual C++ 2010 Redistributable Package to work. You can download and install them from these links:

http://www.microsoft.com/en-gb/download/details.aspx?id=17718

http://www.microsoft.com/en-gb/download/details.aspx?id=5555

Image the Sun

Attach your camera to your solar h-alpha scope and launch DSR.

Select your camera when the software first loads and select the highest frame rate available and the Y800 video format.

Point your telescope at the sun so that you can see part of the surface and part of the sky. Click menu item CAPTURE>SET EDGE EXPOSURE and adjust the camera gain and exposure settings to show the prominences. The solar surface should be overexposed and completely burnt out.

Click CAPTURE>SET SURFACE EXPOSURE and adjust the camera exposure to show the solar surface correctly exposed. Note that the same camera gain is used for both exposures. If you change it here you should re-check the edge exposure.

You should now see a live preview of the colorized sun at top left. The live video will show top right and the edge and surface views will be bottom left and right.

You can now calibrate your camera to give the maximum capture frame rate. Click SETTINGS>SHOW VIDEO SETTINGS and adjust the camera exposure delay until the correct exposure is showing consistently in both the edge and surface windows. You can also set the other video settings here and then click SETTINGS>SAVE SETTINGS AS DEFAULT.

Once you are happy with the exposure settings, click SETTINGS>SHOW PROCESS SETTINGS. Adjust the 4 color buttons and level sliders until you are happy with the colorised sun. Click SETTINGS>SAVE SETTINGS AS DEFAULT if you want to use these as default.

You can now click CAPTURE>CAPTURE PROCESSED VIDEO to start capturing colorized video. Click CAPTURE>STOP CAPTURE to stop capturing. These videos are ready for processing in stacking software like AviStack.

Click CAPTURE>RECORD RAW VIDEO (SAFE) to capture 2 sets of raw (unprocessed) videos exposed to show the surface and edge.

Alternatively, CAPTURE>RECORD RAW VIDEO (FAST) will capture the raw videos at a higher frame rate. Here, you may need to adjust the camera exposure delay in SETTINGS>SHOW VIDEO SETTINGS until the correct exposure is showing consistently in both the edge and surface windows.

The raw videos can now be processed off-line using the post-processing menu.

First click POST-PROCESS>SELECT FILES to select the surface video or videos that you want to process. (The corresponding edge videos will be automatically loaded.) The frame slider will then appear together with a 4-view. Moving the slider will take you through each frame on each video. Releasing the slider will preview that frame according to the current process settings.

Again, click SETTINGS>SHOW PROCESS SETTINGS and adjust the 4 color buttons and level sliders until you are happy with the colorized sun. Finally click POST_PROCESS>START PROCESSING to start processing.

MAIN WINDOW
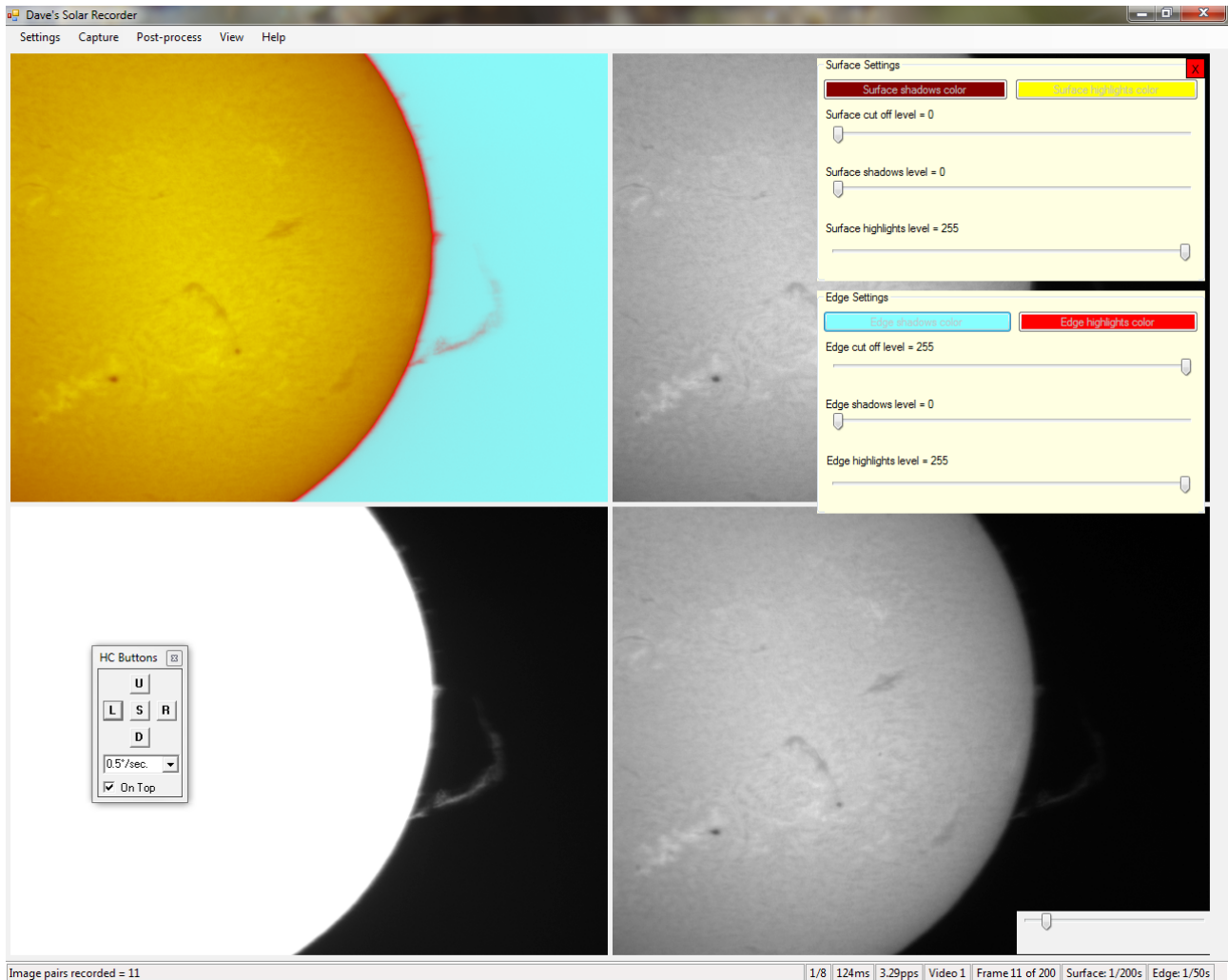
The DSR main window has a default display showing 4 video windows. The bottom windows show the edge and surface exposures. The processed and raw videos are shown in the top windows. You can also select other individual views using the View menu.

The status bar at bottom shows the following information from left to right.

Status messages.
Zoom button (left click to zoom out, right click to zoom in).
Cores used.
Time to process each pair of exposures (milliseconds).
Exposure pairs per second (pps) during preview or capture.
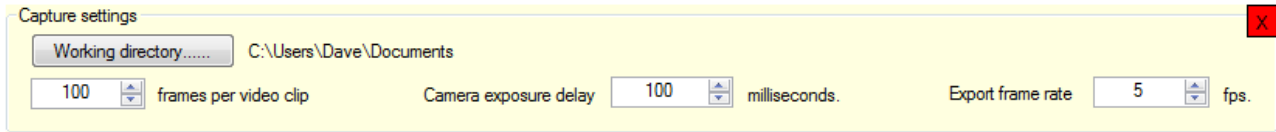Current video number.
Current frame number.
Surface exposure time (seconds) (left click to decrease, right click to increase).
Edge exposure time (seconds) (left click to decrease, right click to increase).

SETTINGS MENU

Video Settings

Working Directory
Directory where all video capture directories will be automatically created.

Frames per Video Clip
Number of frames captured in each video clip.

Camera Exposure Delay
Time in milliseconds that your camera needs to change exposure time. This needs to be as low as possible to maximise the capture frame rate while still ensuring that the surface and edge frames are correctly exposed. Alternatively, use a higher value to slow the capture rate to give fewer video files.

Export Frame Rate
This is the playback frame rate that will be applied to all captured and processed videos.

Process Settings

Each pixel in the raw videos can have a brightness between 0 (black) and 255 (white). The edge and surface videos are processed and combined to give a new colorized video. The surface of the sun is over-exposed (brightness = 255) in the edge video and these over-exposed pixels are replaced by the corresponding surface pixels. The edge and surface pixels can be colorized using separate parameters.
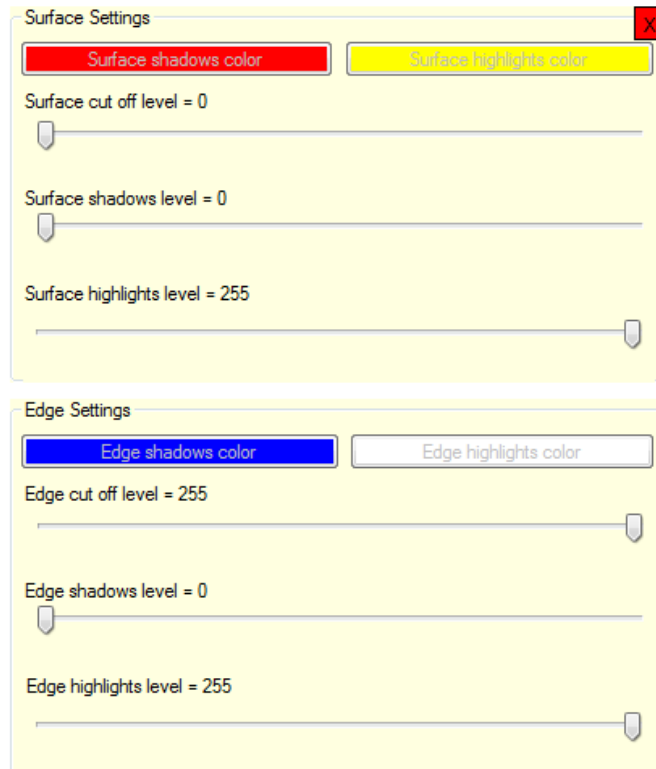
Surface Shadows Color
This is the color that will be applied to the darkest parts of the surface. Click the button to choose a new color.

Surface Highlights Color
This is the color that will be applied to the brightest parts of the surface. Click the button to choose a new color.

Surface Cut Off Level (factory setting = 0)
Any parts of the surface that are darker than this level will be replaced by edge pixels. You can use both cut off sliders to adjust where the 2 exposures merge.

Surface Shadows Level (factory setting = 0)
Use this slider to increase the surface shadows.

Surface Highlights Level (factory setting = 255)
Use this slider to increase the surface highlights.

Edge Shadows Color
This is the color that will be applied to the darkest parts of the edge. Click the button to choose a new color.

Edge Highlights Color
This is the color that will be applied to the brightest parts of the edge. Click the button to choose a new color.

Edge Cut Off Level (factory setting = 255)
Any parts of the edge that are brighter than this level will be replaced by surface pixels. You can use both cut off sliders to adjust where the 2 exposures merge.

Edge Shadows Level (factory setting = 0)
Use this slider to increase the edge shadows.

Edge Highlights Level (factory setting = 255)
Use this slider to increase the edge highlights.

Settings File Commands

Load Settings
A new settings file is created in each capture and processed folder with the current settings. You can rename these and keep your favourites.

Save Settings
Save the current settings to your hard drive.

Save Settings as Default
Save the current settings as the defaults that are loaded on start up.

Notes.
You should save a default settings file as soon as possible. Otherwise, DSR will startup with factory settings.

The default folder for settings files is My Documents\Window Sill Observatory\DSR. You can change this folder to 'hidden' if you don't want to display it.

CAPTURE MENU

Camera Settings
Select a camera and select the highest frame rate available.

Set Surface Exposure
Alter the camera exposure to properly expose the Sun's surface. Use the same gain for surface and edge.

Set Edge Exposure
Alter the camera exposure to properly expose the Sun's edge (prominences). Use the same gain for surface and edge.

Capture Raw Video (Fast)
Capture 2 streams of raw video in a new capture folder. The capture folder is automatically created and is named Capture plus the date and time. The video streams will be split into individual uncompressed clips. These are timestamped and will be called something like e20120731073436 073543.avi or s20120731073436 073543.avi etc. for the edge and surface clips. This routine uses a fast algorithm to maximise the capture frame rate. You can adjust the Camera Exposure Delay in Video Settings until the correct exposures are reliably captured.

Capture Raw Video (Safe)
As per Capture Raw Video (Fast) except that the manufacturer's recommended exposure flip routines are used. This eliminates the risk of capturing a wrongly exposed frame at the cost of a slower capture frame rate.

Capture Processed Video
Capture a single processed video stream in a new capture folder. The capture folder is automatically created and is named CaptureProcessed plus the date and time. The video stream will be split into individual uncompressed timestamped clips called p20120731073436 073543.avi etc. Note that the capture frame rate for processed video may be slower than for raw video and that the captured clips can not be processed further by the software.

Stop Capture
Stops capture of raw or processed video.

POST-PROCESS MENU
This section is used to process and colorize the video clips.

Select Video(s)
Select the surface video(s) that you want to process. The frame slider will then appear together with a 4-view. Moving the slider will take you through each frame on each video. Releasing the slider will preview that frame according to the current process settings. Use the slider to check that your process settings are OK for all the videos.

Start Processing
Produce a sequence of processed videos in a new processed folder. The processed folder is automatically created and is named Processed plus the date and time. The video clips will be called p000001.avi etc. You can process the captured videos as often as you want. A new folder is created each time.

Stop Processing
Immediately stop the processing.

VIEW MENU

Surface Live
Sets the camera exposure to the surface setting and shows the live surface video. Not available during capture.

Edge Live
Sets the camera exposure to the edge setting and shows the live surface video. Not available during capture.

Surface Raw
Shows the raw images from the surface video stream.

Edge Raw
Shows the raw images from the edge video stream.

Combined Raw
Shows the raw images from the surface and edge video stream.

Processed
Shows the processed images.

Quad-View
Shows 4 windows for processed, combined raw, surface raw and surface edge. DSR's default view.

Show Frame Slider
Shows or hides the frame slider during video processing.

Zoom 100%
Zooms the current video window to 100%. Not available in quad-view.

Show Zoom Slider
Shows or hides the zoom slider at bottom right.

Zoom to Fit
Zooms the current video window to fit. Not available in quad-view.

HELP MENU

Starry Dave
Opens the Starry Dave web site.

Support Forum
Opens the online support Yahoo group.

About
Show about box.