Quintic Software

Tutorial 7c
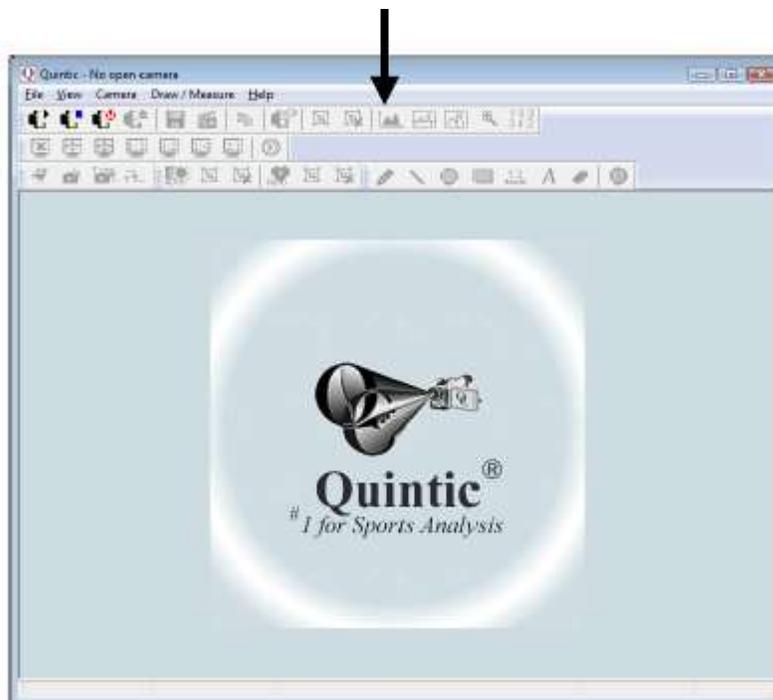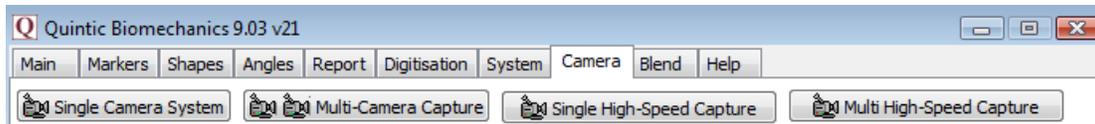
High-Speed Video Capture

(Video Capture via USB or GigE)

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1. Single High-Speed Capture

For installation details please refer to Tutorial 7b – High-Speed Camera Set-up.

Once you have completed the install procedure, double click on the Quintic software icon on the computers desktop to open the Quintic software. Click on the **'Camera'** tab in the Main window and select **'Single High-Speed Capture'**. The camera window will open in standby mode.

(The high-speed camera interface window in standby mode)

To start the live camera preview click on the [icon] button, a live preview will now load, at full 752 x 480 resolution.
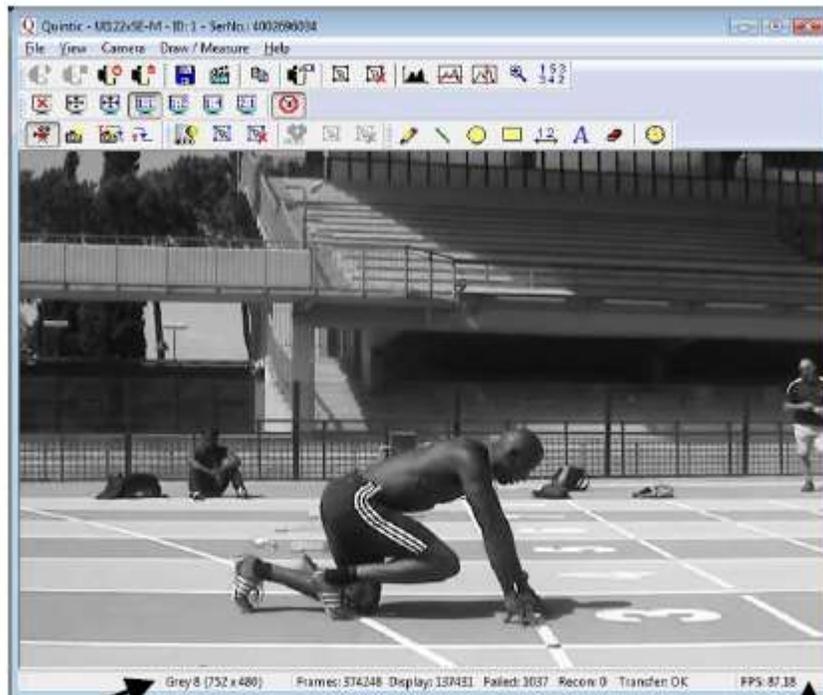
Displays the current video resolution

Displays the video capture speed (fps)

a. Camera Set-Up / Parameters

To change the camera parameters click on the button or select the **'Camera'** tab and the properties option from the drop down menu, this will open the properties window.
Any settings that are changed within the properties window will be saved and reloaded next time the camera is opened.

Parameters can also be saved as an .ini file so that various frame rate, and resolution settings can be saved for ease of use.

b. Camera Tab (frame rate & exposure)

The camera tab allows the pixel clock frequency, frame rate and exposure time to be altered.

Firstly check the **'Optimum'** selection box, this will allow the software to run at the optimal highest Pixel Clock Rate. This will improve/increase the maximum frame rate at which the camera can capture at.
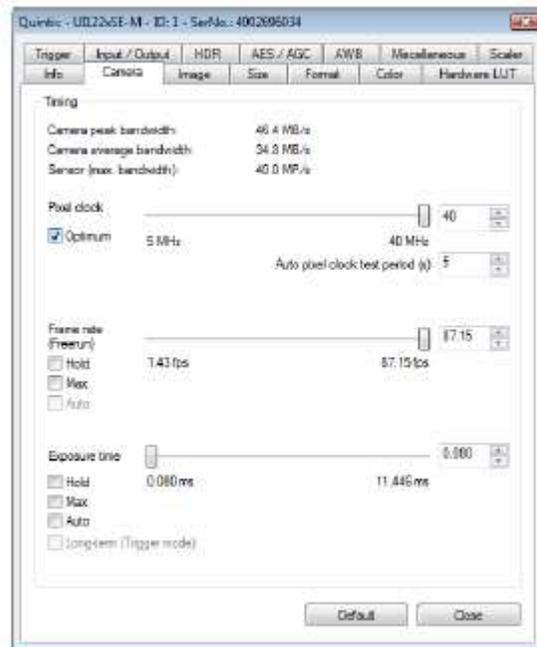
Timing

Camera Peak Bandwidth is the maximum required bandwidth in MB/sec (Peak). If the bandwidth is exceeded this is displayed in red.

Camera Average Bandwidth is the average bandwidth required in MB/sec. If the bandwidth is exceeded this is displayed in red.

N.B. Make sure that these values don't exceed the bandwidth, otherwise performance will be impaired.

Pixel Clock

Sets the clock rate at which the image data is read from the sensor. Altering this setting affects frame rate and exposure time.

Frame Rate

Depending on your bandwidth value there are varying maximum amounts of frames per second that can be captured. This value will decrease as the resolution value increases. When setting the frame rate in freerun mode the camera will capture one image after another at the set frame rate.

Hold: When this check box is selected the frame rate will remain at the set rate, if the pixel clock changes.

Max: when this box is selected the camera will record at the maximum rate that is possible, frame rate depends on the capture resolution and the pixel clock.

Auto: This option selects the Auto Frame Rate Function, this is only available when Auto Exposure is selected.

Frame rate will change when the user sets a new area of interest (AOI) of image.

Utilising the highest frame rate possible is especially important when capturing fast movements (e.g. the golf swing). A typical golf swing can occur at 100mph or 150ft/sec if your camera is sampling at 30Hz the club will move 5 feet per 1/30 of a second.

In order to ensure that all actions are accounted for you must sample fast otherwise the subtle movements will be lost.

Example Resolution and Frame Rates:

Example Computer Specs.	Frame Rate (fps)	Resolution	Bandwidth average
1.80GHz Processor 1 Gb RAM	87	752x480	34.8 MB/s
1.80GHz Processor 1 Gb RAM	98	700x450	34.8 MB/s
1.80GHz Processor 1 Gb RAM	111	652x420	34.8 MB/s
1.80GHz Processor 1 Gb RAM	132	600x390	34.8 MB/s
1.80GHz Processor 1 Gb RAM	146	552x350	34.8 MB/s
1.80GHz Processor 1 Gb RAM	158	500x320	34.8 MB/s
1.80GHz Processor 1 Gb RAM	172	452x280	34.8 MB/s
1.80GHz Processor 1 Gb RAM	194	400x250	34.8 MB/s
1.80GHz Processor 1 Gb RAM	216	352x220	34.8 MB/s
1.80GHz Processor 1 Gb RAM	243	300x190	34.8 MB/s

Exposure Time

This is the amount of time the shutter remains open to allow light into the sensor in order to form an image.

This option sets the exposure time. The available exposure time depends on the pixel clock setting and the frame rate. A low frame rate setting allows long exposure times, where as a high frame rate reduces the maximum possible exposure time.

Hold: When the check box is selected the exposure will remain at the desired setting if the frame rate changes.

Max: The camera runs at the maximum exposure time that is possible at the current frame rate.

Auto: this option selects the Auto Exposure Function, the exposure time changes automatically depending on the selected frame rate.

See the table below which illustrates exposure time and shutter speed settings.

Shutter Speed	Exposure Time (ms)
1/503	1.985
1/672	1.487
1/800	1.249
1/1010	0.99
1/1257	0.795
1/1457	0.686
1/1555	0.643
1/1666	0.6
1/1869	0.535
1/2032	0.492
1/2232	0.448
1/2469	0.405
1/2941	0.34
1/3367	0.297
1/3952	0.253
1/5319	0.188
1/6896	0.145
1/9803	0.102
1/12500	0.08

c. Image Tab (gain boost)

In digital imaging a voltage proportional to the amount of incident light is output at the sensor. To increase image brightness and contrast, this signal can be amplified by an analogue gain and offset before the digitising process.

Analogue amplification of the read-out pixel values increases overall image brightness and contrast allowing for a height exposure value/shutter speed to be applied.

Click on the **'Gain Boost'** option within the Image tab, to automatically increase the brightness and contrast of the image.
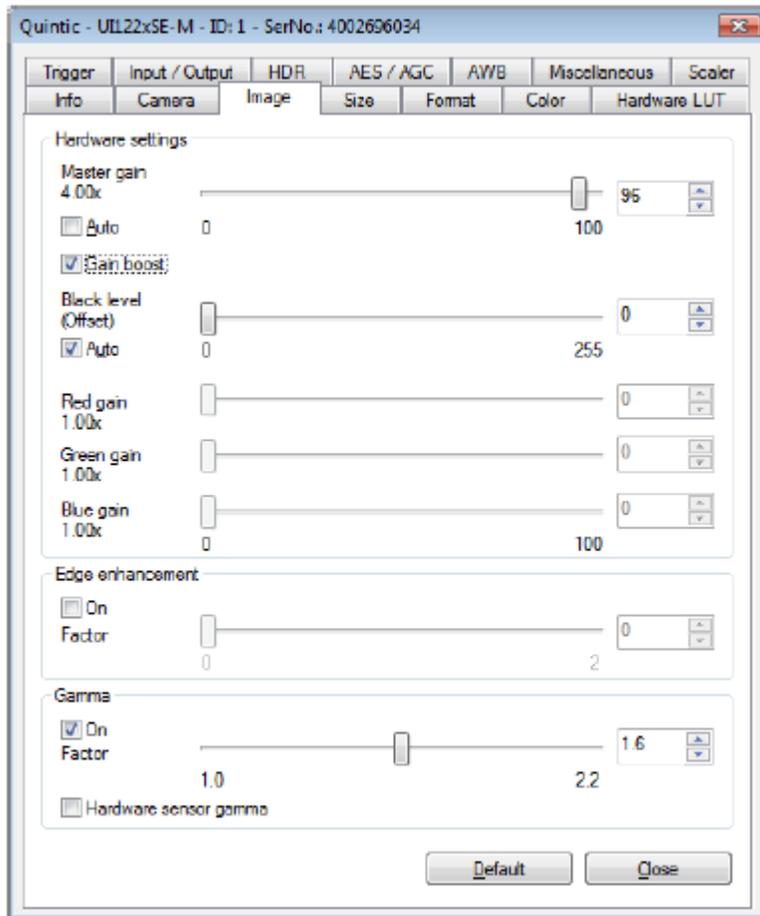
d. Size Tab (video size, area of interest)

On this tab the user can set the image size parameters for your uEye camera.
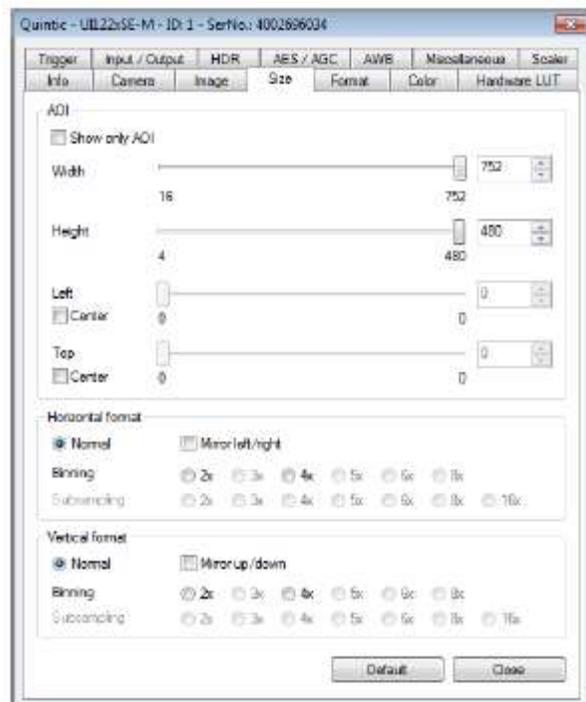
Area of Interest (AOI)

The area of interest function allows the user to centre the camera on the action they wish to film by altering the resolution the camera captures at. These parameters allow the user to select the size and position of the Area of Interest (AOI). AOI sets the camera so that only data included within the specific area is captured. Using the AOI function to create a smaller also enables the camera to capture at a higher frame rate.

Selecting the **'Show Only AOI'** box sets the camera preview to only display the AOI, without a black border. This function saves memory and processing time when rendering the image.

Width/Height

Sets the AOI width and height.

Left

Sets the left hand position of the AOI.

Selecting the **'Centre'** box centres the AOI horizontally.

Top

Sets the top position of the AOI.

Selecting the **'Centre'** box centres the AOI vertically.

Mirror Left/right / Up/Down

Select this check box to flip the image in the vertical or horizontal plane.

Binning

Binning allows the user to reduce the image resolution by the selected factor.

Using the binning factor will also increase maximum frame rate.

e. Using The Camera

To start capturing video footage click on the [icon] button or select the **'File'** tab from the menu bar and then select record a video sequence from the drop down menu. Once selected the Record dialog window will open.
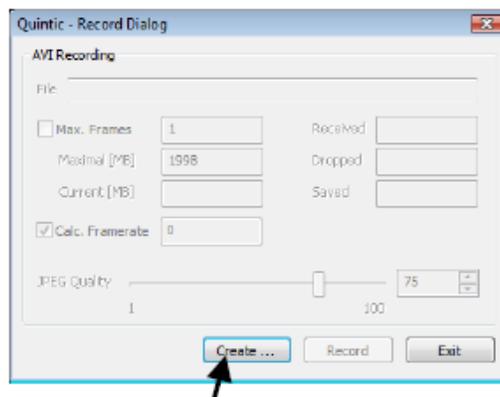
Before recording a video click on the **'Create'** button, this will load the **'Save As'** window, select the file directory where you wish to save your video and also select a file name and then select **'Save'**.

To start capturing video footage click on the **'Record'** button, the software will now capture video until the **'Stop'** button is selected or the video reaches the maximum frames (if selected) or the maximal size (MB). Once the video has stopped recording, click on **'Close'**, which causes the video to save. You are then ready to create a new video. To play the video within the Quintic software the capture window must first be closed. To close the capture window after the video has been captured click on the **'Exit'** button.

File:
Name of the Avi being recorded
Max Frames:
If selected, user can set the number of frames after which recording stops.
Maximal MB:
Sets the maximum size (MB) of the Avi file. Recording stops when the Avi file reaches this size.
Current MD:
Indicates the current Avi file size.

Quintic - Record Dialog

AVI Recording

File	D:\Quintic Sample Videos\USBHighSpeedTutorial.avi
Max. Frames	1
Maximal [MB]	1998
Current [MB]	0.00
✓ Calc. Framerate	0

Received   0
Dropped   0
Saved   0

JPEG Quality   75
1   100

Close   Record   Exit

Received:
Indicates number of frames transferred.
Dropped:
Indicates number of dropped frames during capture.
Saved:
Indicates number of frames saved to the Avi file

Calc. Frame rate
If selected the frame rate of the video is determined automatically during recording. Quintic recommend keeping this selected.

Jpeg Quality:
Sets the JPEG compression level, 1 = lowest quality/highest compression, 100 = highest quality/lowest compression. Quintic recommend a setting of 75, as going higher than this value may result in dropped frames.

f. Other Functions

Set New AOI

To use the AOI function select **'Set New AOI'** from the camera tab or click on the **'Set New AOI'** button on the toolbar.

The original preview is 752 x 480 resolution and capturing at a max frame rate of 87fps.

To set the area of interest click and hold the left mouse button down, and drag over the desired area you wish to set as the AOI. A white grid will illustrate the selected area.
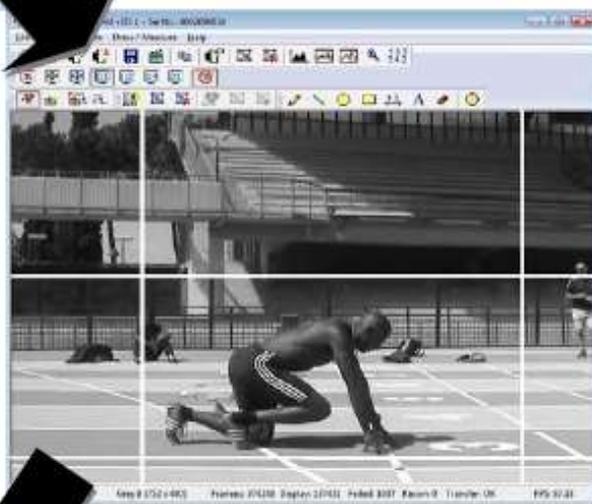
Only the AOI is now shown on the preview screen and will be captured.

The new video resolution is 468 x 234 and the maximum recording speed is now 205fps.

Image Preview Controls

The user can control the size of the video preview screen by clicking on the **'View'** tab and selecting render or by using the display function buttons located on the menu.

Disable the video preview

To disable the camera preview click on the button this will disable the preview screen.

Enable full screen video preview

To enable a full screen preview click on the button, to exit out of full screen mode click on the **'Esc'** button.

N.B. in order to use this function Direct X 3D may need to be installed.

Scale the video preview to the window size.

To fit the preview video to the open window click on the button this will scale the open video preview to the current window size.

Scaling the display

The preview display can be scaled down to ¼ of the original size or up to twice the original display size.

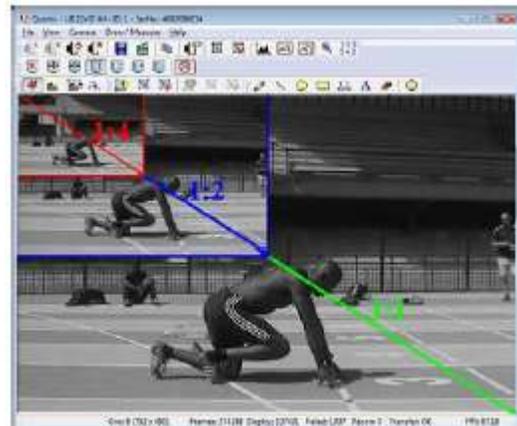Displays the video preview at original size

Scales the video preview to half size

Scales the video preview to quarter size

Scales the video preview to double size

Drawing tools

When using the preview screen drawing tools can be used to highlight key areas on the screen although these shapes and lines won't be saved to the video. Draw any of the shapes by clicking on the shape button you require, moving the cursor over the screen to where you want the shape to be, then holding down the left mouse button and dragging the shape across the screen. To add text to the video preview screen, click on the area of the screen where you want the text to appear and use the keyboard to type the desired text.
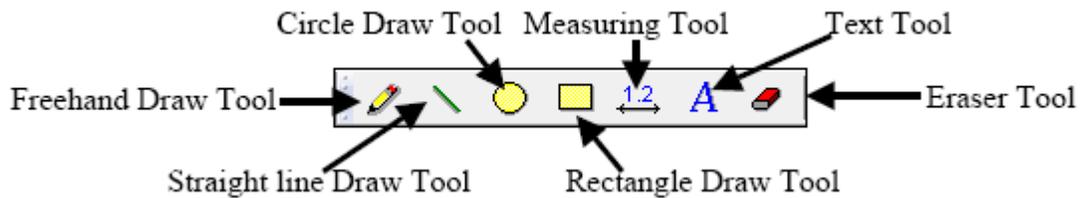
Screenshot

When using the preview screen a screenshot can be captured and imported into another program. To import a screenshot click on [button image] button, this will save a copy of the frame to the internal memory. To import the screenshot into another program click on the paste function or press the Ctrl button + the 'V' button.

Display Rate

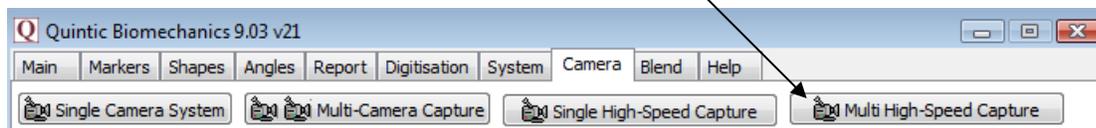The video frame rate can be limited to 30fps. To set the display rate to 30fps click on the [button image] button.

Standby / close camera

To close or set the camera on to standby mode click on the [button image] button.

2. Multi High-Speed Capture

For installation details please refer to Tutorial 7b - High-Speed Camera Set-up.

From the **'Camera'** tab select **'Multi High-Speed Capture'**.

Depending on the number of cameras present, you will see that number in the screen below.

If however, you have a blank screen, you will need to ensure you have followed the installation steps correctly. First, check the Camera ID numbers with the IDS Camera Manager. Please refer to Tutorial 7b - High-Speed Camera Set-up for instructions.

N.B. The maximum recording time for one file is 5 minutes.

It is possible to pause and continue, or stop recording.

It is possible to change the Camera exposure time using the slider bar should you require.
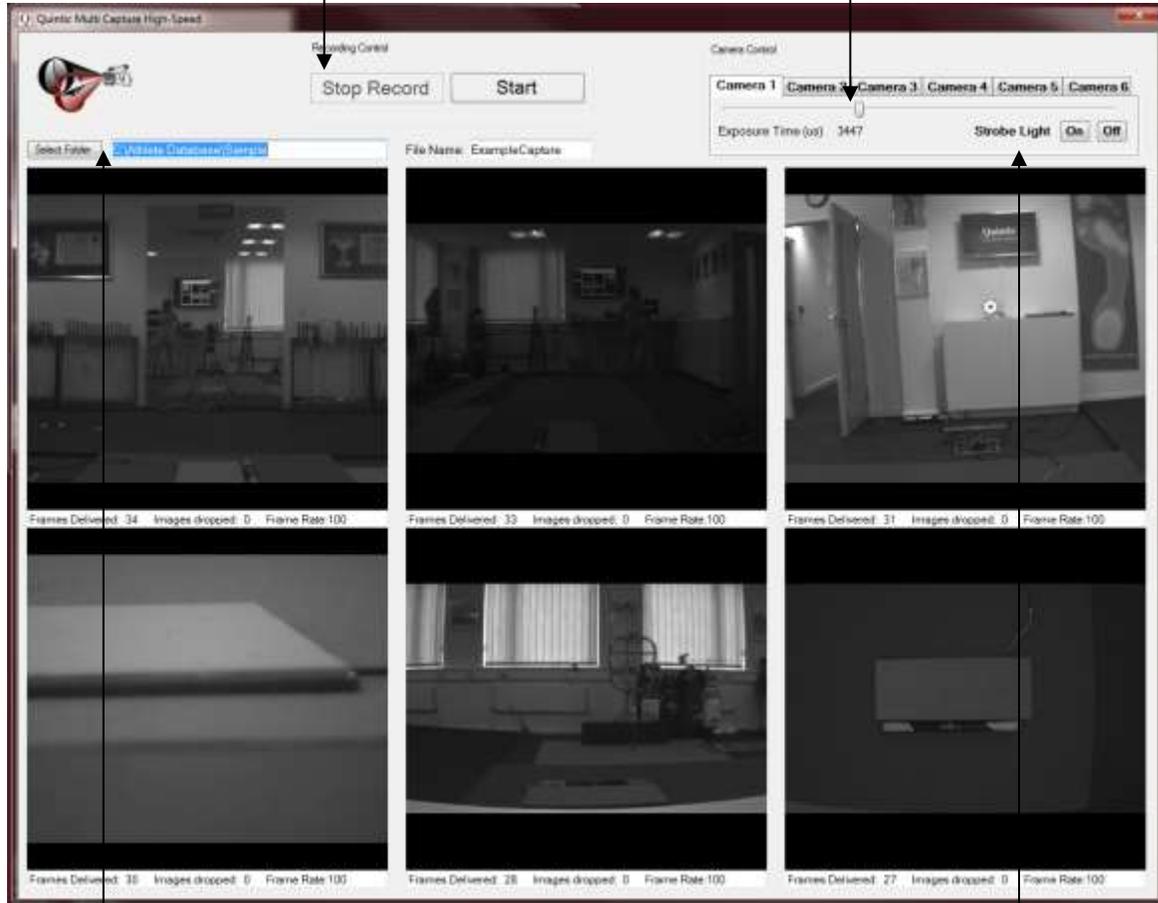
Select the destination folder you wish to save the video files, enter a file name, and start recording. This must be on the C Drive.

If you are using an IR ring light you can control this here.

Once recorded, please return to Quintic Biomechanics, Main Tab, click on file open and view your recorded images.

Using v21/v26/v29, if you open *Cam1.avi you will have the option to open all the associated videos in the across the number of windows you have open. These videos will automatically be synchronised.