

Quintic Software

Tutorial 5c

High-Speed Video Capture

(Video Capture via USB, GigE or Basler)

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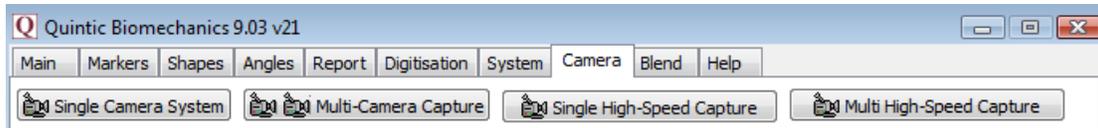
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1. Single High-Speed Capture

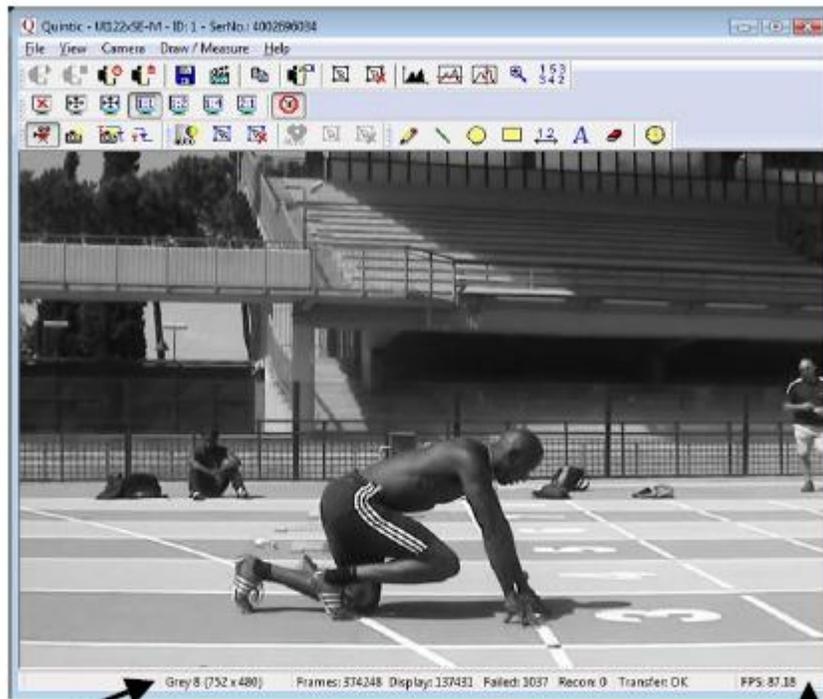
For installation details please refer to the information found on your installation disc.

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  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.

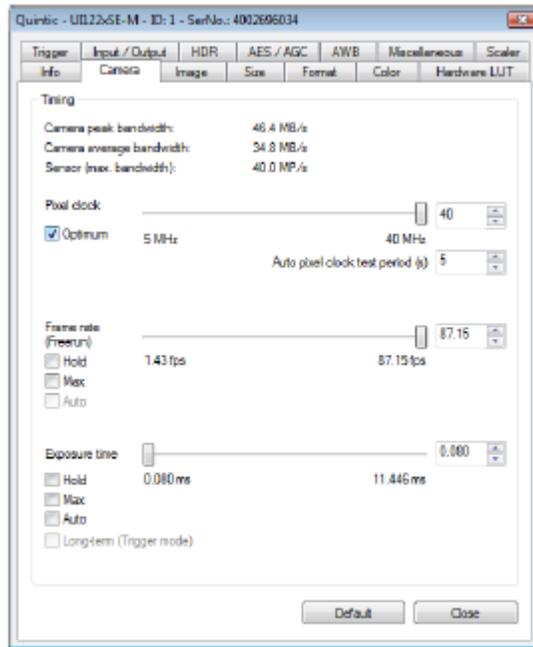
Any settings that are changed within the properties window will be saved and reloaded next time the camera is opened.

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 increase when the user sets a new area of interest (AOI) of image (see page 84).

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.

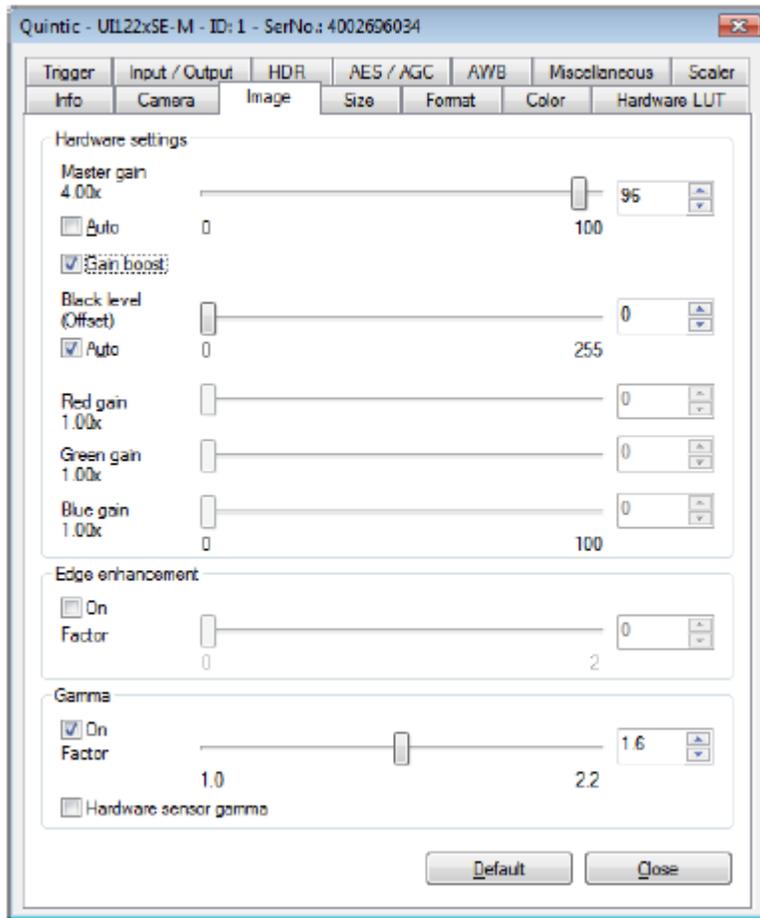
Shutter Speed	Exposure Time (ms)
1/503	1.985
1/672	1.487
1/800	1.249
1/1010	0.99
1/1257	0.795
1/1457	0.686
1/1555	0.643
1/1666	0.6
1/1869	0.535
1/2032	0.492
1/2232	0.448
1/2469	0.405
1/2941	0.34
1/3367	0.297
1/3952	0.253
1/5319	0.188
1/6896	0.145
1/9803	0.102
1/12500	0.08

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.

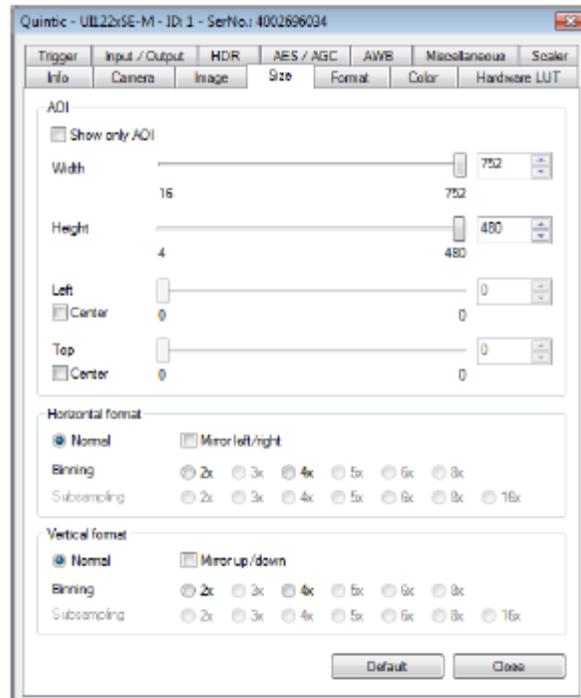
Analogue amplification of the read-out pixel values increases overall image brightness and contrast allowing for a height exposure value/shutter speed to be applied.

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.



AOI

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. The smaller image enables the camera to work 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

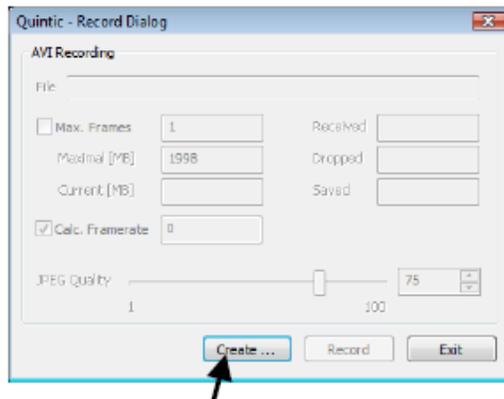
Binning allows the user to reduce the image resolution by the selected factor.

Using the binning factor will also increase maximum frame rate.

e. Using the Camera



To start capturing video footage click on the 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). 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.

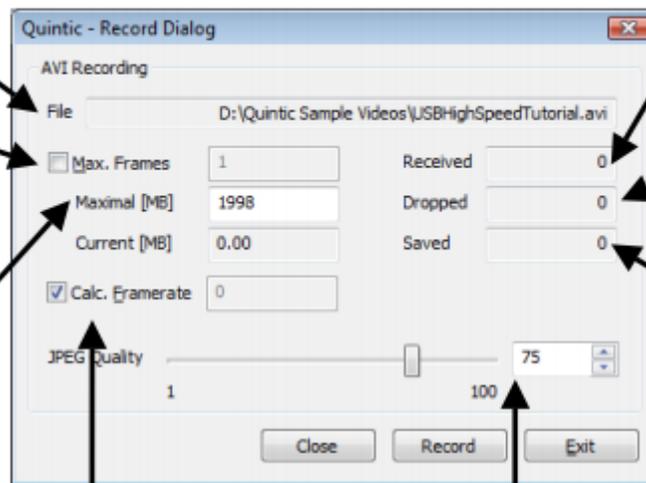
Maximal MB:

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.



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

Area of Interest

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. Using the AOI function also enables the camera to capture at a higher frame rate.

To use AOI click on the **'Camera'** tab and select **'Set New AOI'** or click on the  button.

Once the Set New AOI tool has been selected click on the video and hold the left mouse button down, now drag a window over the area of interest on the screen, a white grid will appear illustrating your desired AOI. Once the grid is highlighting the desired AOI, release the mouse button, the preview screen will now only show the desired AOI and the frame rate will increase (only if set on max within camera parameters).

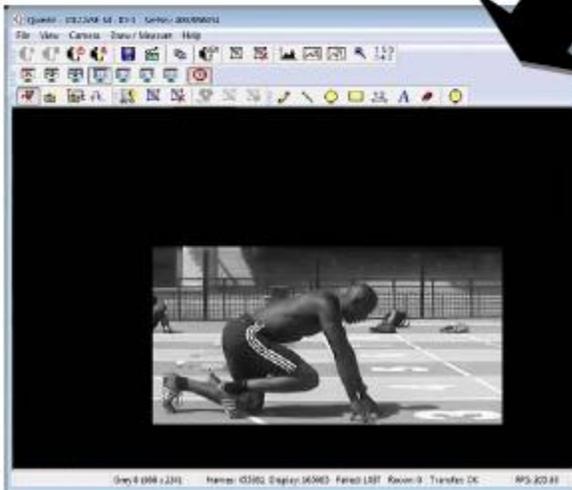
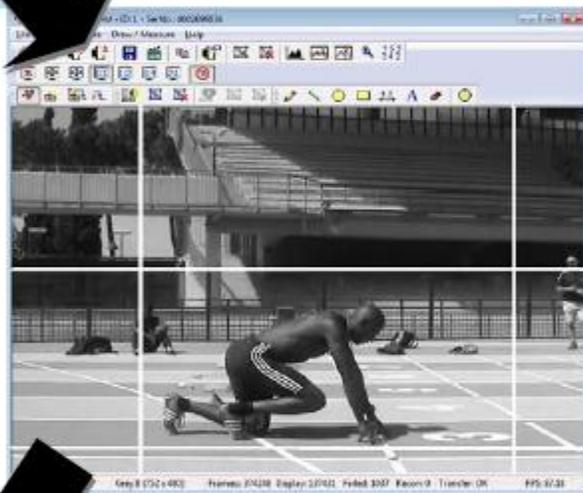
If you wish to reset the AOI select click on the **'Camera'** tab and select **'Clear AOI'** or click on the Clear AOI button on the too 



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



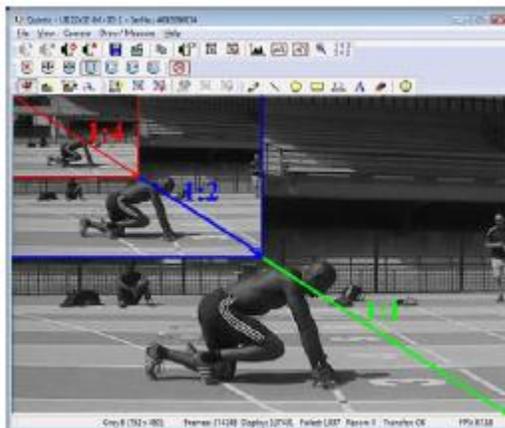
Scales the video preview to half size



Scales the video preview to quarter size

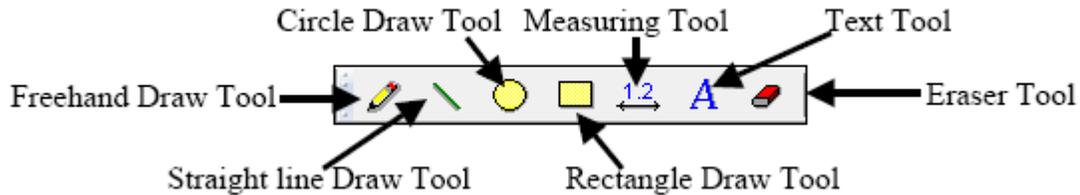


Scales the video preview to double size



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 the  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.

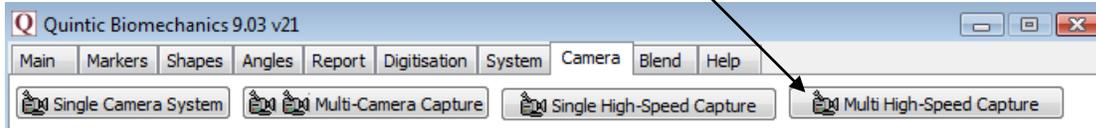
Standby / close camera

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

6. Multi High-Speed Capture

For installation details please refer to the information found on your installation disc.

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: Please check Camera ID numbers with the IDS Camera Manager.

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.

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

4. High-Speed Basler Camera Capture (XP only)

a. Set-up

To use high speed Basler capture the following hardware items are needed:



Basler Monochrome camera.



6pin to 6pin firewire card



PCMCIA Firewire card with an external power adaptor, to run high speed capture on a laptop.

Before high-speed capture can be run the camera and high-speed drivers must be installed.

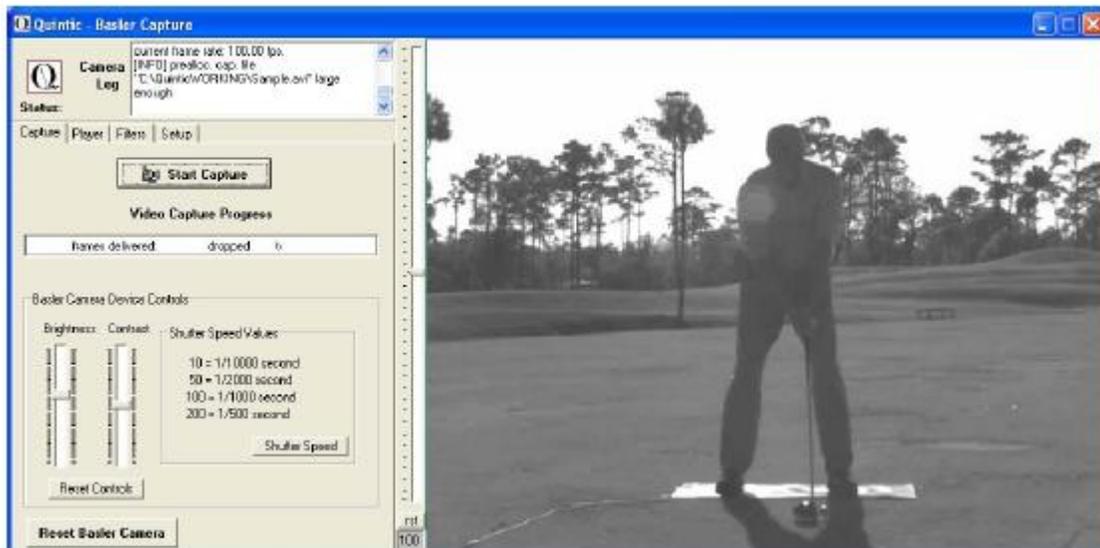
Please follow the step by step instructions below these can also be located in the following directory on the High speed capture installation disc that has been supplied.

- i) Make sure the Basler camera is NOT connected.
- ii) Double click on the ' **BCAM 1394 Runtime 1_8_0050**' driver package. (Located on High speed capture installation disc)
- iii) Follow the instructions from the driver package and connect the camera when asked to do so.
- iv) Basler have produced a BCAM Viewer which can be used to test their driver and setup the controls for use with the Quintic-Basler Capture program.
- v) The '**BCAM Viewer**' icon should have been installed on the desktop. Double click on this icon and check that the A602f (Basler Driver) has been installed. (Left Click on the A602f' driver icon located in the left hand menu. Now click on the '**Continuous Grab**' icon . This can be found just below the '**Tools**' menu. If the driver has been installed correctly a video preview should appear on the right hand side. If a Preview does not appear please check all connections and repeat steps 1-4.
- vi) The Quintic-Basler capture program can now be loaded.

Once you have completed the install procedure open Quintic Biomechanics and click on the '**Camera**' tab in the Main window and then click on '**High-Speed Camera Capture**'.



The high-speed camera window will then open.



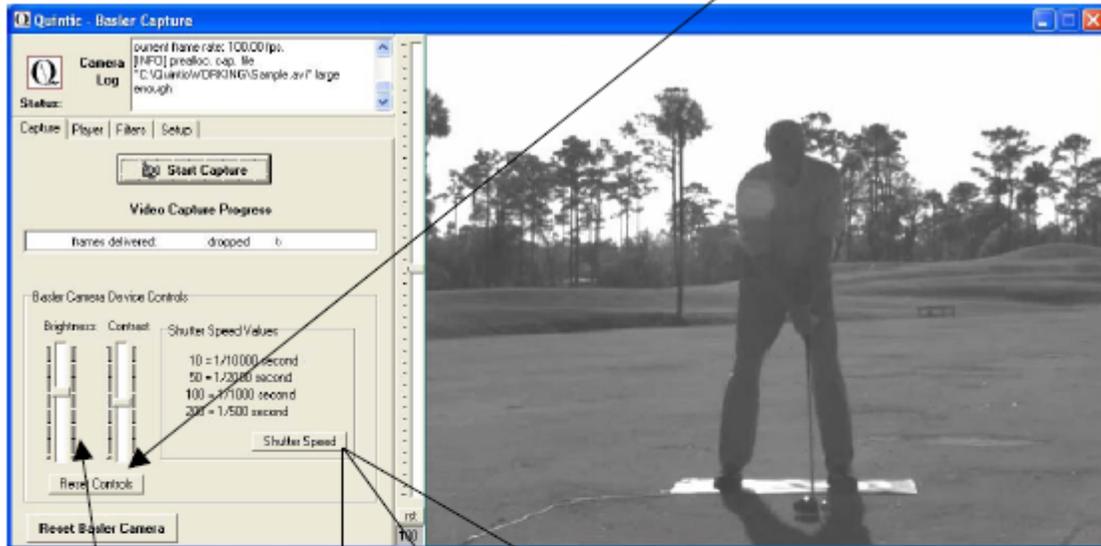
The capture of AVI (Audio Video Interleave) video files requires significant computer resources. It is recommended that sets of pre-allocated files are created during an initial set up process. All video capture (AVI) are then written to these files. This approach will significantly reduce the risk of dropped frames during the video capture process.

Please click on **'Setup'** followed by **'Check the Current Pre-Allocation File Status'** and follow the on screen instructions. For more information see Tutorial 5 - Video Capture Set-up.

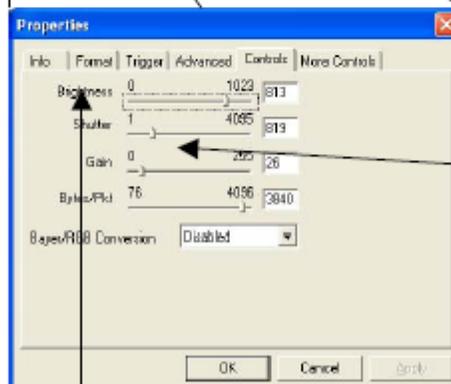
b. Capturing High Speed Video

Double click on the Quintic Biomechanics icon on the computers desktop to open the Biomechanics software. Click on the **'Camera'** tab in the Main window and select **'High Speed Capture'**. The camera window will open and a live preview will appear in the right hand side of the capture screen.

By clicking on the **Shutter Speed** button and then selecting the **'Controls'** tab the user can alter the cameras shutter speed depending on the light. Using the 2 scroll bars can also alter video brightness and contrast accordingly. To reset the brightness or contrast to their default settings click on the **'Reset Controls'** button.



Video Brightness and contrast can also be altered by using the two scroll bars.



Alter the Shutter speed by using the scroll bar. In brighter conditions a higher shutter rate can be used, which will also produce a sharper image. N.B for fast movements use the highest shutter speed possible.

The video brightness can also be altered by using the scroll bar. When using high shutter speeds you may need to increase the brightness as well.

Once the shutter speed, brightness and contrast settings have been altered click on the

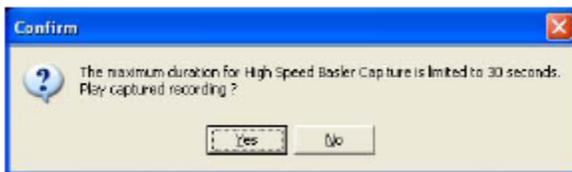


button to commence high speed capture. Once you click on this button the preview window will disappear so make sure that the camera is set up correctly.

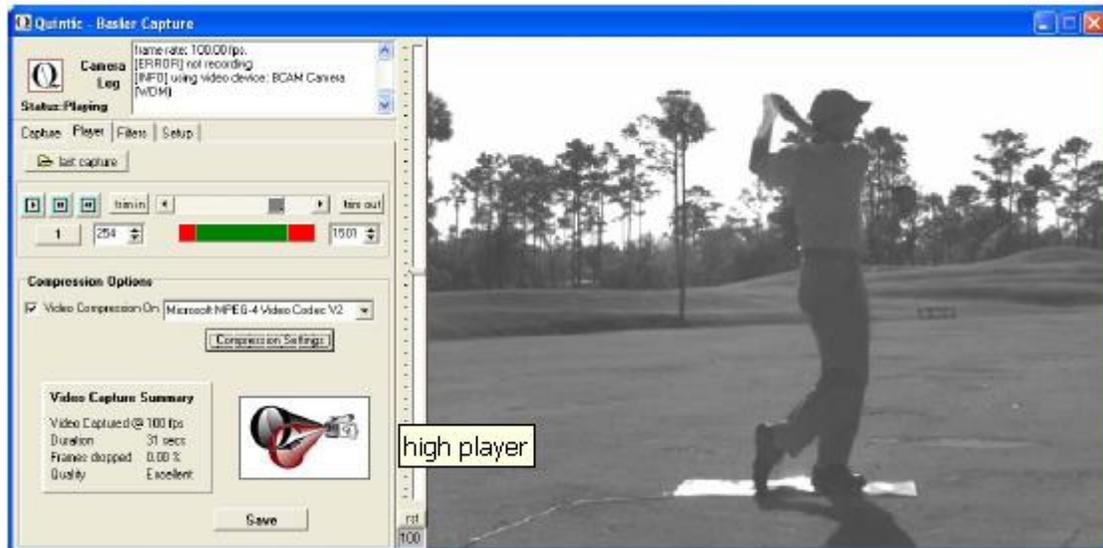
Once you have done this you will be prompted to **‘Start the Capture’**. Click on the **‘OK’** button and the computer will begin to capture for a maximum duration of 60 seconds, if you wish to stop the capture process before the time limit is reached click on the **‘Stop Capture’** button. You will then be given the option to play the captured recording.



If high speed capture is stopped before the 30-second limit. The captured video can be played in the preview window by clicking on **‘Yes’**



Once the 30-second limit is reached. Capture automatically stops and the captured video can be viewed in the preview window, by clicking on **‘Yes’**.



Use the buttons on the left hand side of the screen to play and review the captured video. You can also use these buttons to trim the captured videos before saving.

After the videos have been trimmed click on the '**Compression Settings**' button to change the compression and video quality settings (See Tutorial 5 for more details).

N.B. Once the compression settings have been set the software will remember the last values used during the video capture process.

Filters can also be added to the captured video please see Tutorial 5c for more details.

Once you have changed the compression settings, trimmed your video and added any filters you can save the captured video by clicking on the '**Save Video**' button.

