Acquiring and Displaying Images Using LabVIEW and IMAQ

Objectives:

- To acquire live images programmatically using LabVIEW.
- To acquire live images using a WHILE loop around IMAQ Snap.vi.
- To acquire live images using Grab.
- To create a histogram from a live image acquisition.
- To apply a threshold to a live image acquisition.

Procedure A: Snap and Display [3-1]¹

- 1) Launch LabVIEW and select **New VI**.
- 2) Go to the block diagram of the new VI by selecting Windows>>Show Diagram.
- Right-click inside the Diagram window to display the Functions palette. Locate the Motion and Vision palette and then the Image Acquisition palette. Explore the Vision Utilities and the Image Management function groups.
- 4) Place the following icons on the block diagram:
 - IMAQ Init
 - IMAQ Create
 - IMAQ Snap
 - IMAQ WindDraw
 - IMAQ Dispose
 - IMAQ Close
 - Simple Error Handler (from **Time and Dialog**)
- 5) Connect the error clusters between:
 - IMAQ Init and IMAQ Create
 - IMAQ Create and IMAQ Snap

¹ Numbers in square brackets such as [3-1] refer to exercises in the LabVIEWTM Machine Vision and Image Processing Course Manual by National Instruments.

- IMAQ Snap and IMAQ WindDraw
- IMAQ WindDraw and IMAQ Dispose
- IMAQ Dispose and IMAQ Close
- IMAQ Close and Simple Error Handler
- 6) Connect the image clusters between:
 - IMAQ Create and IMAQ Snap
 - IMAQ Snap and IMAQ WindDraw
 - IMAQ WindDraw and IMAQ Dispose
- 7) Connect the IMAQ Session between:
 - IMAQ Init and IMAQ Snap
 - IMAQ Snap and IMAQ Close
- 8) Create a constant on IMAQ Init (img 0).
- 9) Create a constant on IMAQ Create (My image).
- 10) Run the VI. An image window opens.
- 11) Save this VI as "Snap and Display.vi". You will use this VI in future exercises.

Procedure B: Snap and Display Continuous [3-2]

- 1. Open "Snap and Display.vi".
- 2. Draw a WHILE loop around IMAQ Snap and IMAQ WindDraw to acquire multiple images (a continuous acquisition).

Tip: You can add a Boolean control (such as a button or a switch) to the loop control. This control on the front panel allows you to stop a continuous acquisition at any time when you set the control at the top of your WHILE loop to **Stop if True**.

3. Add a shift register to the WHILE loop by right-clicking on the edge of the loop and selecting **Add Shift Register**. The shift register determines how long an acquisition takes to complete (frames/ms).

- 4. Add the Tick Count (ms) VI from LabVIEW's **Time and Dialog** palette.
- 5. Add the Subtract VI from the **Numeric** palette.
- 6. Wire the output of Tick Count (ms) VI to the top input of Subtract and to the right side of the shift register.
 - Wire the left side of the shift register to the bottom input of Subtract.
 - Create an indicator on the output of Subtract.

Use the Boolean switch on your front panel to stop the acquisition. The numeric indicator displays how many milliseconds it takes to acquire each frame.

- 7. Save this VI as "Snap and Display Continuous.vi".
- 8. Run the VI. Watch as the images are displayed in the WindDraw window and notice the amount of time it takes to acquire each frame.
- 9. When finished, close the VI.

Procedure C: Grab and Display [3-3]

Obtain a modified version of "Snap and Display Continuous.vi" called "Grab and Display.vi" from your instructor. Examine the block diagram and then run the VI to explore its behaviour. Compare its acquisition rate with that of "Snap and Display Continuous.vi". Finally, describe the VI in detail in your lab book. [Description]

Procedure D: Snap and Display with Options and Save to File [3-4]

- 1. Open "Snap and Display.vi".
- 2. Add IMAQ GetPalette.
- 3. Connect the color palette output of this IMAQ GetPalette to the color palette input of IMAQ WindDraw.
- 4. Create a control for the **Palette Number** input on IMAQ GetPalette.
- 5. Run the VI. Select different values for the palette number. Your image window displays the image using different palettes. Note: While the display may change dramatically, a new call to IMAQ snap is the only operation that changes the image stored in memory.

- 6. Add IMAQ Write BMP File (Motion & Vision >> Vision Utilities >> Files). Place the new VI between IMAQ WindDraw and IMAQ Dispose.
- 7. Rewrite the image and error clusters so that they pass through IMAQ Write BMP File.
- 8. Add controls for the **Compress?** input and the **File Path** input. Set the file path to c:\image.bmp.
- 9. Run the VI
- 10. Change the filename to c:\image1.bmp, change the **Compress**? control, and run the VI again. Notice the difference in the file size.
- 11. Substitute the IMAQ Write JPEG File VI for the IMAQ Write BMP File VI. Right-click on IMAQ Write BMP File and select **Replace** >> **Motion & Vision** >> **Vision Utilities** >> **Files** >> **IMAQ Write JPEG File**. Notice that you can wire the color palette to IMAQ Write JPEG File VI. This allows you to save the display changes with the file. Note: you must replace the **Compress?** control with a numeric control.
- 12. Run the VI again using a quality score of 100.
- 13. Now change the filename and run the VI again, with a quality score of 50. Examine the file sizes to see how they compare to BMP file sizes.
- 14. When you are finished, stop the acquisition and save the VI as "Snap and Display with Options and Save to File.vi".

15. Close the VI.