Contents

Lab Exercise 1.1 – Hardware & Connections	3
Lab Exercise 2.1 – Software & Image Acquisition	7
Lab Exercise 3.1 – PatMax RedLine	13
Lab Exercise 4.1 – ViDiDetect Tool	19
Lab Exercise 5.1 – ViDiCheck Tool	
Lab Exercise 6.1 – ViDiRead Tool	65
Lab Exercise 7.1 – Inputs/Outputs & Network Functions	81
Lab Exercise 8.1 – Operator Interface (HMI)	87
Lab Exercise 9.1 – Deployment	103
Final Lab Exercise	111





Lab Exercise 1.1 – Hardware & Connections

At the end of this lab exercise, Participants will be able to:

- Connect their In-Sight camera to the network
- Create a new project

The Participant will utilize the following In-Sight Functions to successfully complete this exercise:

- Connect button
- Job Wizard

Follow the steps below to connect to the In-Sight Camera:

- Create a folder on your desktop named ISVSClass with the date appended, e.g., ISVSClass012720. This is where you will save the jobs you will develop in the lab exercises.
- 2. Double click the **In-Sight Vision Suite** shortcut icon on your desktop.



The **In-Sight Vision Suite Launcher** will display. The In-Sight Vision Suite pane displays the host names of the discovered controllers, as well as icons that indicate the model and current state of the controller.

NOTE: When the launcher first starts, it will discover and enumerate all of the In-Sight Vision Systems on the local subnet network in the In-Sight ViDi System pane. In this example there is an In-Sight Vision system and one emulator that have been discovered on the network.



3. Click on the name of your Vision System and click the **Connect** button.



The Loading window displays.



The **Development Environment** displays. Notice a second tab representing the blank spreadsheet displays.





Connecting to the Emulator

Follow the steps below to connect to the Emulator:

- Create a folder on your desktop named ISVSClass with the date appended, e.g., ISVSClass012720. This is where you will save the projects you will develop in the lab exercises.
- 2. Double click the **In-Sight Vision Suite** shortcut (software version) icon on your desktop.



The **In-Sight Vision Suite Launcher** will display. The In-Sight Vision Suite pane displays the host names of the discovered controllers and emulators, as well as icons that indicate the model and current state of the controller.

NOTE: When the launcher first starts, it will discover and enumerate all of the In-Sight Vision Systems on the local subnet network in the In-Sight ViDi System pane. In this example there is an In-Sight Vision system and one emulator that have been discovered on the network.



3. Click on the name of your Emulator and click the **Connect** button.



The Loading window displays.



The **Development Environment** displays. Notice a tab representing the spreadsheet displays.

🕘 In-Sight V	vision Su	ite 👔	[Uns	aved Job)	@usna-2	313-1064	×																		– a ×
File Edit View		ormat Ima		lools Netw	rork Help																				
	ØVe	rity P-Onli	ne 🗸																						
E Spreads			A																					Templates	~ X
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3																									
4 5																							_		
6																									
8																									
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18				-																					<u>A0</u>
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22	_	_	-									_	_		_	-	_	_	_	_	_	_	• 1		
Filmstrip																									
1 🗢 🤣 🖉 🖉	•					te: Frame																			
18																							×		
① Camera cam) connected	L																							Offine



Lab Exercise 2.1 – Software & Image Acquisition

At the end of this lab exercise, Participants will be able to:

- Create a new project
- Insert Absolute and Relative references into a spreadsheet and observe the differences

The Participant will utilize the following In-Sight Functions to successfully complete this exercise:

- Connect Button
- Job Wizard
- Absolute and Relative References

Follow the steps below to complete the lab exercise (using your camera):

1. If not connected to your camera, select your camera from the list of cameras and click the **Connect** button.

The **Spreadsheet** view displays.

🔍 In-Sight	Vision Su	ite 🚹	[Unsa	ved Job]	@isd905ı	m_Jennife	r ×				
File Edit View	File Edit View Insert Format Image Job Tools Network Help										
🔳 Main	📰 S	preadshe	et ×								
居 No configu	ration was l	oaded. 🛓	1 🖅 🖉	1 a 🗗 🕯	1 7 C	P _ h	. d 🔍	୧. ୧. 🖸	國民	. 🗶 🛙	1 💷 💷 🙎
Arial	~ 9	~ B /	e e e e	∃ 3# ##	🕭 • 🔺						
15 II <i>(</i> , , , , , , , , , , , , , , , , , , ,	12 🗹 📮) 🗖 🖼 🕅	Image	~ = A	cquirelmage	:0					
A	В	С	D	E	F	G	н	1	J	K	L
U Dimage											
2											
3											

- 2. Click the **Live Video** button to start a live image.
- 3. Move the part under the camera to confirm the image is updating.
- 4. Click the Live Video again to stop the live image.
- 5. Double-click cell A0 to access the camera settings.

	A	В	С	D
C	Dimage			
1				
2				



Adjust the Exposure setting to establish light and dark pixels.
 NOTE: Increase the exposure setting for a lighter image.



- 7. Click the **OK** button to close the camera settings.
- 8. Click the **Change Split** Button twice to split the view.





9. Click the **Show Image Saturation** button to verify the writing on the block is dark and the metallic background light on your image.

NOTE: Too much blue means that the image is too dark and too much red means that the image is too light. To remedy this, adjust the aperture setting, exposure or light control (LEDs).



- 10. Click the **Save All** button to save the job. The **Apply Cha**nges dialog displays.
- 11. Click the **Yes** button to continue.

Apply Changes			-		×				
Apply changes to the following items?									
Spreadsheet									
	Yes	No		Cancel					

12. Save the job as *MyFocus* in the folder that you created in Lab #1 and click the **Save** button.



Absolute References

Follow the steps below to complete the lab exercise:

- 1. Click the **New Job** button to begin a new job.
 - The Job Wizard displays.

NOTE: We will not be using an image for this lab.

2. Enter *MyCells* in the File Name field, save to the folder created in Lab #1 and click the **Finish** button.

File Name:	MyCells	MyCells					
File Path:	C:\Users\		\Desktop\I	SVSProjects0127	20		
File Location:	On Device	On this PC					
			Back	Next	Cancel	Finish	

- 3. Enter a value of 1.0 in cell A2.
- 4. Enter a value of 2.0 in **A3**.
- 5. Enter a formula into cell **B2** that adds cells **A2** and **A3** using **Absolute References**.

	A	В	
0	⊡lmage		
1			
2	1.000	\$A\$2+\$A\$3	3
3	2.000		

	A	B	
0	🗆 Image 🚽		
1			
2	1.000	3.000	
3	2.000		

Relative References

Follow the steps below to complete the lab exercise:

- 1. Enter a value of -1.0 in cell **A5**.
- 2. Enter a value of 4.0 in **A6**.
- 3. Enter a formula into cell **B5** that adds cells **A5** and **A6** using **Relative References**.

4			4		
5	-1.000	A5+A6	5	-1.000	3.000
6	4.000		6	4.000	
7			7		



Copying and Pasting Relative References

Follow the steps below to complete the lab exercise:

- 1. Highlight cell **B2**.
- 2. Copy and paste it to cell **D2**.
- 3. Highlight cell **B5**.
- 4. Copy and paste it to cell **D5**.
- 5. Examine the formula in cell **D5** and compare it to the original formula in **B5**.

How do they differ?

Why do they differ?

Why is cell **D2** showing a number? _____

	A	В	С	D	
0	🗆 Image 🚽				
1					
2	1.000	3.000		3.000	
3	2.000				
4					
5	-1.000	3.000		0.000	
6	4.000				

6. Click the **Save All** button.

The Apply Changes dialog box displays.

6	🗿 Apply Change	25		_		×			
	Apply changes to the following items?								
[Spreadsheet								
-		Yes	No		Cance	el			
.1. 41	Yes Yes	h							

7. Click the **Yes** button to close the dialog box and save the project.







Lab Exercise 3.1 – PatMax RedLine

At the end of this lab exercise, Participants will be able to:

- Utilize the PatMax RedLine tool to locate the Cognex logo in the Field of View
- Report the location based on row, column, and angle
- Apply the location information for fixturing in other vision functions

The Participant will utilize the following In-Sight Vision Suite Functions to successfully complete this exercise:

- TrainPatMaxRedLine
- FindPatMaxRedLine

Follow the steps below to complete the lab exercise:

- 1. Open the **MyFocus** job from Lab Exercise 2.
- 2. To verify the card is in the Field of View, click the **Live Video** dutton and position the card under the camera so that it is centered in the field of view, as shown below.



NOTE: Make it as large as possible in the FOV for good resolution but leave some room for part movement.

- 3. Exit Live Video mode.
- 4. Leave the first 10 spreadsheets rows (numbered 0 9) blank (except for A0 AcquireImage).

NOTE: We will use these rows in a later lab to create an operator interface.

5. Enter the comment *Find the Logo* in cell **B10**. Be sure to start with an apostrophe (').

	A	В	С
8			
9			
10		'Find the Lo	go
11			



- 6. Insert a TrainPatMaxRedLine tool into cell C11 of the spreadsheet.
- 7. Click the **Pattern Region** to highlight and click the **Edit Graphic** button. **NOTE**: Double-clicking the Pattern Region parameter will also open the region.



8. Position the Pattern Region around the *Cognex Logo* as shown below and press the **<Enter>** key to return to the Property Sheet.



9. Select **input and result graphics** for the **Show** parameter. Allow the defaults to remain for all other settings.



10. Click the **OK** button to close the Property Sheet. The **Patterns** data structure is added to the spreadsheet.

Find the	Logo		
	Patterns	1.000	

11. Insert a FindPatMaxRedLine tool into cell C13.



12. Click the **Find Region** to highlight and click the **Maximize Region** is button.



- Double click the Pattern setting to open reference cell C11 and press the <Enter> key.
- 14. Select **input and result graphics** for the **Show** parameter. Allow the defaults to remain for all other settings.



15. Click the **OK** button to close the Property Sheet.

A second **Patterns** data structure is added to the spreadsheet.

	A	B	С	D	E	F	G	Н	1	J	K
8											
9											
10		Find the Log	go								
11			□Patterns	1.000							
12				Index	X	Y	Angle	Scale	Score		
13	_		Patterns	0.000	1275.757	646.390	-0.006	100.000	99.317		

NOTE: You can customize the look of your comment notes by changing the background and font colors.



	A	B	С	D	E	F	G	н	1	J	K
8											
9		1 2 2 2 7 2 2 2									
10		Find the	Logo								
11			□Patterns	1.000							
12				Index	X	Y	Angle	Scale	Score		
13			□Patterns	0.000	1275.757	646.390	-0.006	100.000	99.317		
14											



Notice the green lines through the Cognex logo



- 16. Click the **Trigger Once** button to trigger your camera and move the part around, rotate it (scroll through the images if using a database) and observe the results in the spreadsheet.
- 17. Observe the *Angle* value in the spreadsheet as you rotate the card.
- 18. Update the **Angle Start** to -90 and **Angle End** to 90 and click the **OK** button.

E Find Tolerances			9
Angle Start	-90.000	\$	9
Angle End	90.000	:	9
Scale Start	100.000	\$	
Scale End	100.000	\$	
XY Overlap	70.000	:	

- 19. Trigger your camera and notice the changes to the *Angle* value in the spreadsheet.
- 20. Click the **Save As** button to save the job as **MyPatterns** in the folder created in lab #1.



Lab Exercise 3.2 – Logic

- At the end of this lab exercise, Participants will be able to:
 - Utilize logic statements to determine Pass/Fail

The Participant will utilize the following In-Sight Logic Functions to successfully complete this exercise:

- If
- And

Logic – If

Follow the steps below to complete the lab exercise:

- 1. Start a new job.
- 2. Enter a value of -1.0 in cell A2.
- Enter a formula into cell A4 that will display the word Accept if the value in cell A2 is greater than zero, or display Reject if the value is less than zero.
 HINT: Use the IF function under Mathematics → Logic.

	A	В	С
0	Dimage		
1			
2	-1.000		
3			
4	If(A2>0,"A	ccept","Rejec	t")
5			

- 4. Click the **green check** button or press the **<Enter>** key to execute the formula.
- 5. Change the value in cell A2 to 1.0 and observe what happens.

	A	В		A	В
0	Dimage		0	□Image	
1		0	1		
2	-1.000		2	1.000	
3			3		
4	Reject		4	Accept	
5			5		



Logic – If & And

Follow the steps below to complete the lab exercise:

- 1. Enter a value of -1.0 in cell **B2**.
- Enter a formula into cell A6 that will display the word Accept in A6 if the two values in cells A2 and B2 are both greater than zero, or display Reject if otherwise.
 HINT: Use the AND function under Mathematics → Logic as the first parameter in an IF statement.

	A	В	С	D			
0	□Image						
1							
2	1.000	-1.000					
3							
4	Accept						
5							
6	If(And(A2>0,B2>0),"Accept","Reject")						
7							

- 3. Click the green check \square button or press the **<Enter>** key to execute the formula.
- 4. Change the value in cell **B2** to 2.0 and observe what happens.

	A	В	С		A	В	С
0	Dimage			0	Dimage		
1				1			
2	1.000	-1.000		2	1.000	2.000	
3				3			
4	Accept			4	Accept		
5				5			
6	Reject			6	Accept		
7				7			

5. Click the **Save As** button to save the job as **MyCells** in the folder created in lab #1.



Lab Exercise 4.1 – ViDiDetect Tool

At the end of this lab exercise, Participants will be able to:

• Utilize the ViDiDetect tool to solve their application

The Participant will utilize the following In-Sight Vision Suite tool to successfully complete this exercise:

• ViDiDetect Tool

Follow the steps below to complete the lab exercise:

Air Filter Inspection

1. Highlight your Emulator, click the System Settings gear and select Emulator.



The Emulator Configuration dialog displays.

2. Select **In-Sight 905M** from the drop-down box and click the **Configure** button.

The In-Sight Emulation Configuration dialog displays.



- Point to the ViDiDetect_AirFilters Runtime folder and click the OK button.
 NOTE: The In-Sight ViDi images can be found in the Student Folder on the desktop of your training computer.
- 4. Click the **Start** button to start the emulator.
- 5. Click the **Connect** button to enter the Spreadsheet environment.





6. The Spreadsheet displays with the first image behind the spreadsheet. Click the **Change Split** button to bring the image next to the spreadsheet.

File Edit View Insert Format Image Job Tools Network Help								
Spreadsheet ×								Toolbox Y
第二 No configuration was backet. 9 第 第 第 25 第 第 9 20 20 下 10 10 10 10 10 10 10 10 10 10 10 10 10	1990 - 1 999		00% ~	*** * E		hi	<u>е</u>	
	A B Dimage 1 2 3 4 5 6		P.	0 H				P Text E Coordinate Transforms F To input/Duput E Cocked Data Storage To Storburs F Storburs F Storburs Storburs
	7 8 9 10 11 12 13							All functions
	14 15 16 17							Toolbox Web Pages Templates
	18 19 20 21 22							Properties × Cell Name Cell Image <u>AQ</u>
Approximate Plant Value @ (1421,1908) - 5	23 24 25						706.4	* *

7. Add a ViDiDetect tool in cell B3.
 NOTE: The ViDiDetect tool is found in the Toolbox under Vision Tools → ViDi Tools.
 The ViDiDetect Property Sheet displays.

Spreadsheet - Property Sheet - ViDiDetect -								
Edit Insert Help								
General Runtime								
	\$A\$0		= 🗇 Image					
External Fixture	0							
🗄 Region	(1004,864,440,320,0)							
Show	hide all	~	= 0					

8. Double-click the **Region** parameter and position the region on the air filter as shown below and press the **<Enter>** key.





- 9. Drag the Show parameter into cell B6.
- 10. Click the **Open ViDi Editor** ^{Open ViDi Editor} button to enter the ViDiDetect Workspace. The **ViDiDetect Workspace** displays.



11. Click Add to bring the images into the ViDiDetect workspace.

Display			*	•
Actions for 0 Views	Refresh	Add		

- 12. Navigate to the ViDiDetect_AirFilters Training folder.
- Select the first image and press <**Ctrl + A>**, this will automatically select all of the images. Click the **Open** button.







14. Once the images have been added, they will appear on the View Panel.

Spreadsheet B3:ViDiDete	t ×		•
Image_00001_OK_png[0:0] 4/23/2020 S1 2111x609 (2448x2048, 1x 8-bit), Zoom 0.6		Displa Activ	ay V C C C C C C C C C C C C C C C C C C
Tool			Database

15. Right click and select Edit ROI, allow the default External ROI to remain.



16. Click the **Close** button.

t External ROI • Apply Clo

- 17. Enter **'OK'** in the **Display** field and press the **<Enter>** key.
- 18. Click Actions for 127 Views and select Label Views.





The Label Views window displays.

Q Label Views	×
Label the selected Views as	
O Good	
○ Bad	
	OK Cancel

19. Label the selected Views as Good and click the OK button.



The images are labeled as Good. Notice the green label in the right-hand corner.



20. Select Not Labeled from the Display drop-down list.





21. Click Actions for 20 Views and select Label Views.



The Label Views window displays.

Q Label Views		×
Label the selected Views as		
O Good		
O Bad		
	OK Cance	1

22. Label the selected Views as **Bad** and click the **OK** button.

🔍 Label Views		×
Label the selected Views as		
⊖ Good		
Bad		
	ОК	Cancel

The images are labeled as Bad. Notice the red marking in the right-hand corner.

23. Train the tool by clicking the **Train** button.



24. Click the **Yes** button to select the training set.





25. Click the Select training set from all views radio button and click the **OK & Randomize** button.



26. When Training is complete, open the **Database Overview** tab and review your results. Notice that there is an area where a score is between Good and Bad and the tool is unable to detect which is which.



- 27. Adjust the parameters for better results, do not focus on getting 100% accuracy. While it is possible to achieve these results, we are not able to devote enough time during our class. Ensure that you understand how to achieve these results.
- 28. Click the **Save As** button to save the job as **ViDiDetect_AirFilters** in the folder created in lab #1.



Textile Inspection

NOTE: Your emulator should be configured to emulate the **In-Sight D902M** camera to complete this lab exercise.

1. Once you have configured your emulator new spreadsheet displays.

Spreadsheet ×												~
題 No configuration was loaded _ 1 望 書 函 為 創 創 ② ② 彡 1 h 台 l 氏 氏 数 数 题 图 图 图 图 图 图 图 图 图 2 m 2 h 1 h 1 h 1 h 1 h 1 h 1 h 1 h 1 h 1 h												
ES EE // Lo. 2/6 🛃 🖓 IN ES Inage 🗡 = AcquireImage()												if1
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	U Dimage		-	-	-	-		-	-	-	-	-
	2	-			-				-	-	-	-
	3	-	-	-	-	-	-	-				
	4			-	-	1	-					
	5											
	6											
	7											
	8											
	9											
	10	_			-	-		-				
	11	-	-			7				-	-	-
	12	-	-	-	-	-	-	-	-			
	14	-	-	-			-		-	-	-	-
	15	-	-	-	-	-						-
	16		-	-							-	-
	17											
	18											
	19											
	20											
	21											
	22	_										
	23	-	-	-								-
	24	-	-	-	-	-	-	-	-	-		-
	20		-	-		-	-	-	-			
	27	-	-		-	-	-	-	-	-	-	-
	28			-	-	-				-	-	-
	29				-							-
												-

2. Click the **Folder** icon in the Filmstrip.



The Select the record and playback directory window displays.

Q Select the record and pla	yback directory			×
← → × ↑ 📕 « Vi	DiDetect > ViDiDetect_Textiles >	~	ර ු Search ViE	DiDetect_Textiles
Organize New folde	er			: • ?
Notebooks ^	Name	Status	Date modified	Туре
> 📰 Pictures	📜 Runtime	C	4/1/2020 11:27 AM	File folder
 S This PC ⇒ 3D Objects ⇒ Desktop ⇒ Documents ⇒ Downloads ⇒ Music ⇒ Pictures ⇒ Videos 	Training	8	4/1/2020 11:27 AM	File folder
V	<			>
Folder:	Runtime			
			Select Folder	Cancel

3. Navigate to the ViDiDetect_Textiles *Runtime* folder and click the Select Folder

NOTE: The In-Sight ViDi images can be found in the Student Folder on the desktop of your training computer.



The Runtime images display in the Filmstrip.



4. Double-click the first image to bring it into the image window.



 Enter a ViDiDetect tool in cell B3.
 NOTE: The ViDiDetect tool is found in the Toolbox under Vision Tools → ViDi Tools. The ViDiDetect Property Sheet displays.

Spreadsheet - Pro	perty Sheet - ViDiDetect	-		×
Edit Insert Hel	р			
	0.			
General Runtime				
Image	\$A\$0		= 🗆 Image	
External Fixture	0			
E Region	(1004,864,440,320,0)			
Show	hide all		= 0	

6. Double-click the **Region** parameter and position the region to include the entire ROI as shown below and press the **<Enter>** key.





7. Click the **Open ViDi Editor** Open ViDi Editor button to enter the ViDiDetect Workspace. The **ViDiDetect Workspace** displays.



8. Click Add to bring the images into the ViDiDetect workspace.

Display			۰	0 💿
Actions for 0 Views	Refresh	Add		

- 9. Navigate to the ViDiDetect_Textiles Training folder.
- 10. Select the first image and press **<Ctrl + A>**, this will automatically select all of the images. Click the **Open** button.

→ × ↑ 📜 « Vi	DiDetect > ViDiDetect	Textiles > Training	~	O ,O Searc	h Training
organize • New folde	er				• • •
Notebooks ^ Pictures This PC 3 D Objects		###		****	***
Desktop	C Defect_01	C Defect_02	C Defect_03	C Defect_04	C Defect_05
 Documents Downloads Music Pictures Videos 	€ 0K_01	C OK_02	20K.03	€ OK_04	© OK_05
🗐 Local Disk (C:) 🗸					
File nan	me: "Defect 01" "Defec	t 02" "Defect 03" "D	efect 04" "Defect 05"	"C > Images	





Once the images have been added, they will appear on the View Panel.



- 11. Enter 'OK' in the **Display** field and press the **<Enter>** key.
- 12. Click Actions for 30 Views and select Label Views.



The Label Views window displays.

🔍 Label Views			×
Label the selected Views as			
⊖ Good			
○ Bad			
			_
	OK	Cancel	



13. Label the selected Views as Good and click the OK button.



The images are labeled as Good. Notice the green label in the right-hand corner.



14. Select Not Labeled from the Display drop-down list.



15. Click Actions for 5 Views and select Label Views.





The Label Views window displays.

Q Label Views	×
Label the selected Views as	
⊖ Good	
○ Bad	
	OK Cancel

16. Label the selected Views as **Bad** and click the **OK** button.

Q Label Views		×
Label the selected Views as		
⊖ Good		
 Bad 		
	ОК	Cancel

The images are labeled as Bad. Notice the red marking in the right-hand corner.



17. Train the tool by clicking the **Train** button.



18. Click the Yes button to select the training set.



19. Click the Select training set from all views radio button and click the **OK & Randomize** button.



20. When Training is complete, open the **Database Overview** tab and review your results. Notice that there is an area where a score is between Good and Bad and the tool is unable to detect which is which.



21. Right-click on the image and select **Edit Mask** from the fly out list.

Ctrl+O
Ctrl+R
Ctrl+M
Ctrl+M



22. Change the **Width** to and click the **Add Border** button.

Mask	<u></u> \0∦ &	Width 60 🗸 [🔅 🖊 💭 🔀 🕁 🕕 Undo Apply Close
------	---------------	--------------	------------------------------

The **Mask** is added to the image.



23. Click Apply.

The Apply Mask dialog displays.

Apply Mas	k	×
?	Apply this mask to the tool ar	nd all Views?
	Yes	No

- 24. Click the **Yes** button to Apply this mask to the tool and all Views?
- 25. Click Close.
- 26. Open the **Tool Parameters** and set the following:
 - Feature Size = 60
 - Rotation = 0, 360
- 27. Click the **Train** button.



Open the **Database Overview** tab and review your results.
 Notice there is no overlap between the good and bad results now.



29. Click the **Save As** button to save the job as **ViDiDetect_Textiles** in the folder created in lab #1.



If Time Allows: Show Pass/Fail Results

- 1. Click to **Spreadsheet** tab to return to the spreadsheet.
- 2. Double-click the ViDiDetect tool to open the Property Sheet.
- 3. Select **result graphics with heatmap** from the Show dropdown list and click the **OK**



4. Click the **ViDiDetect** tab and notice the heatmap markings on the image.



- 5. Click the ViDiDetect tab and notice the heatmap markings on the image.
- 6. Return to the **Spreadsheet** tab, right-click on the ViDiDetect function and select **Format** → **Cells** from the list.

đ,	Cell Graphic				
V	Cell State				
	Format	×	F	Cell(s)	
			8	Row Height	



7. Click the Graphics tab and increase the Line Width setting to 10 (or desired width).



Click the OK button.
 The image now has a 10-pt. red border.



9. Right-click on the ViDiDetect function and select Insert Getters.




This inserts the most commonly used ViDi getter functions into the spreadsheet.



Notice that there is a Passed getter – we will add an IF statement to set a color based on whether the ViDiDetect tool passed or failed.

10. In cell **B6** enter the following IF statement, *If(H3,0x00FF00, 0xFF0000)* and press the <Enter> key.

NOTE: Cell H3 is referencing the Passed getter and 00FF00 = green, and FF0000 = red.

5	
6	If(H3,0x00FF00, 0xFF0000)
7	

11. Insert a **PlotRegion** function in cell **B8.**

NOTE: The PlotRegion function is found under **Toolbox** \rightarrow **Image** \rightarrow **PlotRegion**. The **PlotRegion** Property Sheet displays.

Spreadsheet - P	Property Sheet - PlotRegion	-	-		×
Edit Insert H	lelp				
	. 18 0 ₋				
Image	\$A\$0		= 🗆		
Region	(100,100,300,300,0,0)				
Name					
Color	LimeGreen	~	= 0x3	32CD32	
Show					

12. Open the **Region** property and set the Width to 1750 and the Height to 1000.

Image	\$A\$0 = □Image	•
Region	(100,100,1750,1000,0,0)	
х	100.000 🗘	
Y	100.000	
Width	1750.000 🗘	
Height	1000.000	
Angle	0.000 🗘	
Curve	0.000	

13. Set the **Color** property to reference the *lf* statement in cell **B6** and click the OK button.



- 14. Adjust the **Line Width** of the PlotRegion function to *10* and click the **OK** button.
- 15. Scroll through the Filmstrip images and review the results.

Pass:



16. Click the **Save All** button to save the job.



Lab Exercise 5.1 – ViDiCheck Tool

At the end of this lab exercise, Participants will be able to:

- Utilize the ViDiCheck tool to solve their application
- Create a Layout Model to verify that all parts are present and correct

The Participant will utilize the following In-Sight Vision Suite tool to successfully complete this exercise:

- ViDiCheck Tool
 - Layout Model

Follow the steps below to complete the lab exercise:

Chocolate Assortment Inspection

NOTE: Your emulator should be configured to emulate the **In-Sight D905M** camera to complete this lab exercise. Direct the image folder to the ViDiCheck_Chocolates Runtime folder.

1. Click the **New Job** button.

A new spreadsheet displays.

[Q] In-Sight Vision Suite ↑ [Unsaved Job]@usna-2313-1064 ×													– a ×
File Edit View Insert Format Image Job Tools Network Help													
🖩 Spreadsheet ×												∽ Toolbox	
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🔋 🖿 🖉 🚳 💦 💿 📗 🕅 🔄 Þ 😥 Þ.1 🤤 🔯 Frame name: Frame													
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R												×	
Successful deployment													Offline

 Enter a TrainPatMaxPattern tool in cell B3.
 NOTE: The TrainPatMaxRedLine tool is found in the Toolbox under Vision Tools → Pattern Match.



Spreadsheet - Property	Sheet - TrainPatMaxRedL	ine —	пх
Edit Insert Help			
1日日の見図(D _		
Image	\$A\$0	-	🗆 🗆 🗠
Fixture	(0,0,0)		
Pattern Region	(1004,864,440,320,0,0)		
External Region	0		
🗈 Pattern Origin	(0,0)		
Auto Select Coarse	~		
Auto Select Fine			
Coarse Granularity			
Fine Granularity			
Feature Threshold		20.000 🗘	
Train Event	Train Event		
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Timeout		0	
Show	hide all	~ =	: 0
			*
Image Reference to a cell cont	aining an Image structure	Default - \$	4\$0
Reference to a cell con	aning an image suructure	. Delault = \$	ngu.
		ОК	Cancel

The TrainPatMaxRedLine Property Sheet displays.

3. Double-click the **Pattern Region** parameter and position the region on the chocolate assortment as shown below and press the **<Enter>** key.





4. Click the **OK** button to close the TrainPatMaxRedLine Property Sheet. The **Pattern** is found.

A	В	С	D	E	F	G	Н	1	J	K	L
0 Dimage											
1											
2											
3	□Patterns	1.000									
4											-

5. Enter a **FindPatMaxRedLine** tool in cell **B6**.

NOTE: The FindPatMaxRedLine tool is found in the Toolbox under Vision Tools \rightarrow Pattern Match.

The FindPatMaxRedLine Property Sheet displays.

Spreadsheet - Prope Edit Insert Help	rty Sheet - FindPatMaxRedLine	-		×
i isi Ⅲ /a ⊑, igi	() ÷	_	-	
Image	\$A\$0			ge
Fixture	(0,0,0)			
	(1004,864,440,320,0,0)			
External Region	0	_		
Pattern	0			
Number to Find		1 🗘		
Accept Threshold	50.000	D 🗧		
Ignore Polarity				
Accuracy Mode	High	~		
Clutter in Score				
Contrast Threshol	d 0.00) ;		
Find Tolerances	(-15,15,100,100)			
XY Overlap	70.00) ;		
Advanced Setting:	s (0,60)			
Timeout	5000)		
Show	hide all	~	= 0	
Image Reference to a cell co	ontaining an Image structure. Defa	ault =	\$A\$0.	
		OK		Cancel



6. Double-click the **Find Region** parameter and position it around the box of chocolates, then press the **<Enter>** key.



The Property Sheet displays.

7. Double-click the **Pattern** parameter and reference the TrainPatMaxRedLine pattern in cell **B3**.

```
Set the Find Tolerances parameters – Angle Start = -45, Angle End = 45.
```

8. Click the **OK** button to close the FindPatMaxRedLine Property Sheet. The FindPatMaxRedLine Pattern is found.

4			1.0						
5		Index	Х	Y	Angle	Scale	Score		
6	□Patterns	0.000	1561.112	1099.706	-0.001	100.000	97.991		
7									

9. Next, enter a ViDiCheck tool in cell B9.

NOTE: The ViDiCheck tool is found in the Toolbox under Vision Tools \rightarrow ViDi Tools. The **ViDiCheck Property Sheet** displays.

Spreadsheet - Pro	perty Sheet - ViDiCheck	-		×
Edit Insert Hel	p			
	0.			
General Runtime				
Image	\$A\$0		= 🗇lmage	
External Fixture	0			
Region	(1004,864,440,320,0)			
Show	hide all		= 0	

10. Double-click the **External Fixture** parameter and reference the FindPatMaxRedLine pattern in cell **B6** and press the **<Enter>** key.



11. Double-click the **Region** parameter and position the region to include the box of chocolates as shown below and press the **<Enter>** key.



12. Click the **Open ViDi Editor** Open ViDi Editor The **ViDiCheck Workspace** displays.

button to enter the ViDiCheck Workspace.



13. Click Add to bring the images into the ViDiCheck workspace.





- 14. Navigate to the ViDiCheck_Chocolates Training folder.
- 15. Select the first image and press **<Ctrl + A>**, this will automatically select all of the images. Click the **Open** button.



Adding Images									
Adding Images: Processing image Chocolate_034_OK.bmp									
Cancel									

Once the images have been added, they will appear on the View Panel.





16. Click the **Update Views with External Fixture** button to fixture the images.



17. Return to the **Check** tool.



18. Move the **Feature Size** box over the first chocolate. Drag the red circle to the desired size (approximately the same size as the chocolate) and move it to be centered over the first chocolate.

NOTE: The Feature Size box is found in the lower left-hand side of the Workspace.



19. Click on the image outside of your feature size box.

A green rectangle the same size as your feature size box displays.

20. Move the box over the first chocolate and click the **0** to open the text box. Label this chocolate *Chocolate_0* and press the **<Enter>** key.





21. Click on the remaining chocolates in the box to label.
 NOTE: As you click on each chocolate the labeled box will display – make sure that each one is centered over the corresponding chocolate.



- 22. Label at least three images with the names of each chocolate.
- 23. Move onto the next chocolate assortments in your image database and label at least five assortments with the names of each chocolate as shown below.





24. Select the Training Set by clicking the Training Set parameter.

	Training Training Set <u>0 Views</u> Epoch Count 50	
The Select Training	Set dialog displays.	
🔍 Se	lect Training Set	×
	 Select training set from all views Select training set from Image Sets Selection 50% 	

25. Select training set from all views and click the OK & Randomize OK & Randomize button.

OK & Randomize

Cancel

26. Click the **Train** button to train.



- 27. Once the training is complete scroll through your images to view the results. Notice on the images in addition to the green labels there are also yellow markings recognizing the different chocolates.
- 28. Confirm that all chocolates are marked correctly and label any chocolates that are not marked. Right-click and **Accept View** for the views that are marked in yellow, (make any necessary corrections).





In-Sight ViDi may mark a feature in orange – this means that there is a mismatch between what you labeled and what ViDi found.



29. If there is a mismatch, or ViDi has marked a chocolate incorrectly, right-click on the image select **Accept View**, (make any necessary corrections) right-click and select **Add to training set.**

		_
Accept View	Ctrl+Shift+A	
Clear Marking		
Clear Marking & Labels		
Process	Ctrl+P	
Sets		•
Rename Image		
Remove Image		
Add to training set		
Paste label(s)	Ctrl+V	

30. Once you are done labeling, click the **Train** button to train.



31. Review your results.

	Feature	Found	Train	Labeled	Recall	Precision	F-Score
C (' 11	Chocolate_0	241	82	110	100.0	100.0	100.0
Confusion Matrix	Chocolate_1	90	50	64	100.0	100.0	100.0
	Chocolate_2	70	46	58	100.0	100.0	100.0
	Chocolate_3	215	103	113	100.0	100.0	100.0
	Flipped_1	7	4	6	100.0	100.0	100.0
	Flipped_2	21	11	13	100.0	100.0	100.0
		644	296	364	100.0	100.0	100.0
	(2) (6 clas	(ses)		100.0	100.0	100.0



Build the Models for the Chocolate Assortments

Follow the steps below to complete the lab exercise:

1. Select the first assortment with four different chocolates and then select **Edit Models** from the Tool menu.



The Model Editor displays.

🗕 Model Editor - dxaqugg5.2to/default/Check				×
Move Back Previous View Next View	Model 1 (Layout)		- 00	
Chocolate_026_OK.png(0:0) Train 595x1522 (2448x2048, 1x 8-bit),	Enable 🔽 View Filter			
	Add Re:	move Rename	1]

- 2. Click the **pencil** icon to rename the model *Assortment_0* and press the **<Enter>** key.
- 3. Click the **Add** button.

		_		×
Assortment_0			0C	∕∕≣
Enable 🗸				
View Filter				
Add	Remove	Rename	1	4



4. Move the ROI to outline the first chocolate. Rename the Region to *Chocolate_2* and check the *Chocolate2* checkbox.



5. Repeat for the remaining 3 chocolates. *Chocolate_1*

Move Back Previous View Next View Assortment_0	– 🗆 ×			:k	- dxaqugg5.2to/default/Check	🔍 Model Editor - dxa
Chocolate 026. OK.prg/D0 Train 1995x1522 (2448x2048. 1x 8- bit)	00/		Assortment_0		k Previous View Next View	Move Back Pr
View Filter View F		v	Enable		K.png 0:0 Train	Chocolate_026_OK.png
Chocolate_1 Account 12 Chocolate_1 Account 12 Chocolate_1 Account 1 Region Units Mode Percent Extent X [53.115%, 89.575%] Extent Y [9.722%, 51.306%] Feature Matching [d='Chocolate_1' Chocolate_1 Chocolate1 Chocolate2 Chocolate2 Chocolate2 Feature Count		5	View Filter		2048, 1x 8-bit),	595x1522 (2448x2048
Add Remove Rename I Region Units Mode Percent Extent X [53.115%, 89.575%] Extent Y [9.722%, 51.306%] Feature Matching Id='Chocolate_1' Chocolate_1' Chocolate_1 Chocolate1 Chocolate2 Chocolate2 Chocolate3 Flipped1 Flipped2 Feature Count 1			Chocolate_1			
Region Units Mode Percent Extent X [53.115%, 89.575%] Extent Y [9.722%, 51.306%] Feature Matching id=Chocolate_1' Chocolate_1 Chocolate2 Chocolate3 Choco	Kename T 1	кетоve к	Add			1 1 1 N 1 1
Units Mode Percent Extent X [53.115%, 89.575%] Extent Y [9.722%, 51.306%] Feature Matching id='Chocolate_1' Chocolate_1' Chocolate1 Chocolate2 Flipped1 Flipped2 Feature Count 1			Region			Deres -
Extent X [53.115%, 89.575%] Extent Y [9.722%, 51.306%] Feature Matching id='Chocolate_1' Chocolate_1' Chocolate_1' Chocolate1 Chocolate2 Chocolate3 Flipped1 Flipped2 Feature Count Feature Count 1		Percent	Units Mode			
Extent Y [9.722%, 51.306%] Feature Matching id='Chocolate_1' Chocolate_1 Chocolate1 Chocolate3 Flipped1 Flipped2 Feature Count 1	9.575%]	[53.115%, 89.5759	Extent X			
Feature Matching id='Chocolate_1' Chocolate Chocolate1 Chocolate2 Chocolate3 Flipped1 Flipped2 Feature Count	306%]	[9.722%, 51.306%	Extent Y			
Id='Chocolate_1' Id='Chocolate_1' Id='Chocolate_1 Chocolate1 Chocolate2 Chocolate3 Flipped1 Flipped2		ning	Feature Match			
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Chocolate1 Chocolate3 Chocolate3 Chocolate3 Chocolate3 Chippe11 Flippe22 Feature Count 1		2120	Gam	All in the		1000
Chocolate2 Chocolate3 Flippe11 Flippe2 Feature Count 1		ate1	Chocol	14		
Flipped1 Flipped2 Feature Count 1		ate2		A CONTRACT OF	38 1	
Flipped2 Feature Count 1		1	Flipped	Star - Al		
Feature Count 1		2	Flipped	1000		
		unt 1	Feature Con		0	100
						16.



Chocolate_3



Chocolate_0

👰 Model Editor - dxaqugg5.2to/default/Check	<u>100</u>	- 🗆 X
Hove Back Previous View Next View	Assortment_0	~ 00 / ≡
Chocolate 026 OK.png)00 Train TystsT322 (2448x2048, tx 8-bit)	Assortment_0 Enable View Filter Chocolate_1 Chocolate_1 Chocolate_0 Add Kemove Kenar Region Units Mode Percent Extent X [53.297%, 89.575%] Extent Y [54.328%, 96.103%] Feature Matching id='Chocolate_0' Chocolate0 Chocolate0 Filipped1 Filipped1 Filipped2 Feature Count 1	

6. Close the Model Editor and process the model.



7. Review the Results.





When the chocolates are all in the proper slots the results will display 4/4.

When none of the chocolates are in the proper slots the results will display 0/4.







When one of the chocolates is in the proper slot the results will display 1/4.

8. Click the **Save As** button to save the job as **ViDiCheck_Chocolates** in the folder created in lab #1.



Spark Plug Inspection

1. Click the **New Job** button. A new spreadsheet displays.

Q In-Sight Vision Suite ↑ [Unsaved Job]@usna-2313-1064 ×								-	σ×
File Edit View Insert Format Image Job Tools Network Help									
🖬 Spreadsheet ×							- Toolbox		
E Speechheet × IP hocomputer water of a for a	A A A Consider C	》 中	E	6		J	 Toolbox Toolbox Toolbox Sources Toolbox Sources Sources Toolbox T	: ianoforms 1 Storage kcess	mplates Cell A0
🔋 🕨 🕫 📆 🛞 O 🐘 [13] (33] Þ (20 D1] [4]; (20) 🕱 Frame name: Frame 🗸 🗸									
							×		
Successful deployment									Offline

2. Click the **Folder** icon in the Filmstrip.



The Select the record and playback directory window displays.

Q Select the record and play	yback directory			×
← → ~ ↑ 📕 « ViE	DiCheck > ViDiCheck_SparkPlugs >	~	ට , Search ViD	iCheck_SparkPlugs
Organize New folde	r			
Notebooks ^	Name	Status	Date modified	Туре
Pictures	🣜 Runtime	C	4/1/2020 12:02 PM	File folder
🧢 This PC	📜 Training	C	2/25/2020 1:45 PM	File folder
3D Objects				
Desktop				
Documents				
Downloads				
Music				
Pictures				
Videos				
😂 Local Disk (C:)	<i>,</i>			
•				
Folder:	Runtime			
			Select Folder	Cancel



3. Navigate to the ViDiCheck_SparkPlugs *Runtime* folder and click the Select Folder

NOTE: The In-Sight ViDi images can be found in the Student Folder on the desktop of your training computer.

The Runtime images display in the Filmstrip.

Filmstrip											
🕨 🕫 🖗 🔍	• □ 10 ≪1 ► 00) XI % @ %	Frame name: Frame	× .							
Image 00047			Mixed (14)	Mixed (15)				Mixed (21)	Mixed (6)	Mixed (7)	Mixed (8)
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4. Double-click the first image to bring it into the image window.

Spreadsheet ×											
- 월: No configuration was loaded. 🚬 🏠 🗿 🚓 🗿 🏭 🏭 🗇 한 오 오 🚬 타노랑 역, 역, 역, 🗐 🧱 😾 🚺 💷 💷 🎟 🕮	100% 🗸	🐉 🐉 💠	A 🖪 _								
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Enter a ViDiCheck tool into cell B3.
 The ViDiCheck Property Sheet displays.

Spreadsheet - Pro	perty Sheet - ViDiCheck	-		×
Edit Insert Hel	p			
) 🏥 🏥 🖉 🖳	. O .			
General Runtime				
image	\$A\$0		= 🗇 Image	
External Fixture	0			
E Region	(1004,864,440,320,0)			
Show	hide all	~	= 0	

6. Position the region to include all of the sparkplugs and click the **Open ViDi Editor** button to enter the ViDiCheck Workspace.



The ViDiCheck Workspace displays.

File View Tool ImageDatabase Tool View Job Tools Network Help		
III Spreadsheet BSWUUCheck X	Toolbox	
🗄 input 💿 – 🧱 Check 🔀 🔀 🖁		
Directory Toronto the second s	Database Overview () Propertie	Web Pages Templates IS Ý
Filmstrip		
Image Mixed (10) Mixed (12) Mixed (15) Mixed (17) Mixed (17) </td <td></td> <td></td>		
Created new workspace: mcy/lw/som/sj		Offline

7. Click Add to bring the images into the ViDiCheck workspace.

Display			*	0 💿
Actions for 0 Views	Refresh	Add		

- 8. Navigate to the ViDiCheck_SparkPlugs Training folder.
- 9. Select the first image and press **<Ctrl + A>**, this will automatically select all of the images. Click the **Open** button.





10. Once the images have been added, they will appear on the View Panel. Click an image to select.



11. Click the **Update Views with External Fixture** button to fixture the images.

	Fixturing Images
External Input 🚭 🗣 🕂 Check	Fixturing Images: Fixturing image NGSilver (2).png

- 12. Right-click on the image and select Edit ROI to define the Region of Interest.
- 13. Allow the default of External ROI to remain and click Close.



- 14. Open the **Tool Parameters** and set the following:
 - Feature Size = 460
 - *Detail* = 4
 - *Epoch Count* = 150
 - *Rotation* = -180, 180
 - Luminance = 5%
 - *Contrast* = 5%
 - Sampling Density = 3



15. Click on the image and center the green **Feature Size** box over the first sparkplug, as shown below.



- 16. Click the **0** to open the text box. Label this sparkplug *Silver* and press the **<Enter>** key.
- 17. Label the remaining sparkplugs in the image.



18. Label at least 75 of each sparkplug. Open the Database Overview to confirm the number of each sparkplug labeled.

Feature	Found	Train	Labeled	Recall	Precision	F-Score
Black		0	81 75			
	0	0	156	0.0		
4	Ø (2 clas	ses)		0.0		

19. Select the **Training Set** by clicking the Training Set parameter.

Training	
Training Set	0 Views
Epoch Count	50



The Select Training Set dialog displays.



- 20. Select training set from all views and click the OK & Randomize OK & Randomize button.
- 21. Click the Train button to train.



- 22. Once the training is complete scroll through your images to view the results. Notice on the images in addition to the green labels there are also yellow markings recognizing the different sparkplugs.
- 23. Confirm that all sparkplugs are marked correctly and label any sparkplugs that are not marked. Right-click and **Accept View** for the views that are marked in yellow and are correct.





24. The marking will change from yellow to green, right-click and select **Add to training set.**

Review the remaining images.



25. Click the **Train** button to train.



26. Review your results.

Feature	Found	Train	Labeled	Recall	Precision	F-Score
Black	205	115	205	100.0	100.0	100.0
Silver	221	113	221	100.0	100.0	100.0
	426	228	426	100.0	100.0	100.0
ç	ð (2 clas	ses)		100.0	100.0	100.0
Model	Found	Train	Labeled	Recall	Precision	F-Score
Model 1 (La	0	0	0			

Build the Layout Model for the Sparkplugs

1. Find a sparkplug assortment that has a black sparkplug in each spot and then select **Edit Models** from the Tool menu.



The Model Editor displays.



- 2. Click the **pencil** icon to rename the model *Black_SparkPlugs* and press the **<Enter>** key.
- 3. Click the **Add** button.





4. Move the ROI to outline the first sparkplug. Rename the Region to *Black* and check the *Black* checkbox.



5. Repeat for the remaining sparkplugs in the assortment.

🔕 Model Editor - m0wapqei.unz/default/Check		– 🗆 X
GO Move Back Previous View Next View	Black_SparkPl	ugs 🗸 🗘 🖉 🖉 🚍
OKBlack (1).png 0:0 Train 2448x2048 (2448x2048, 1x 8-bit),	Enable View Filter	
	Black Dlack Black Black Dlack Black Black Dlack Black	Remove Rename 1 1 Percent v
	Extent X	[70.941%, 91.576%]

6. Close the Model Editor and process the model.





7. Review the Results.

When there are black sparkplugs in every spot the results will display 16/16.



8. Click the **Save As** button to save the job as **ViDiCheck_SparkPlugs** in the folder created in lab #1.



If Time Allows:

1. Create a Layout Model named *Silver_SparkPlugs* for the sparkplug assortment that has a silver sparkplug in each spot.



2. Click the **Save All** button to save the job.

Lab Exercise 6.1 – ViDiRead Tool

At the end of this lab exercise, Participants will be able to:

• Utilize the ViDiRead tool to solve their OCR application

The Participant will utilize the following In-Sight Vision Suite tool to successfully complete this exercise:

ViDiRead Tool

Date Code OCR

NOTE: Your emulator should be configured to emulate the **In-Sight D905M** camera to complete this lab exercise.

Point to **ViDiRead_DateCodeOCR Runtime** image folder. You will be prompted to Restart your Emulator.

 The Spreadsheet displays with the first image behind the spreadsheet. Click the Change Split button to bring the image next to the spreadsheet.



 Enter a TrainPatMaxRedLine tool in cell B3.
 NOTE: The TrainPatMaxRedLine tool is found in the Toolbox under Vision Tools → Pattern Match.

The TrainPatMaxRedLine Property Sheet displays.

Spreadsheet - Property	Spreadsheet - Property Sheet - TrainPatMaxRedLine 🗕 🗆 🗙								
Edit Insert Help) <u>.</u>								
Image	\$A\$0	=							
Fixture	იით								
🗄 Pattern Region	(1004,864,440,320,0,0)								
External Region	0								



3. Double-click the **Pattern Region** parameter and position the region around the bottle cap as shown below and press the **<Enter>** key.



4. Click the **OK** button to close the TrainPatMaxRedLine Property Sheet. The **Pattern** is found.

	A	В	С	D	E	F	G	Н	1	J	K	L
0	Dimage											
1												
2												
3		□Patterns	1.000									
4												

5. Enter a **FindPatMaxRedLine** tool in cell **B6**.

NOTE: The FindPatMaxRedLine tool is found in the Toolbox under Vision Tools \rightarrow Pattern Match.

The FindPatMaxRedLine Property Sheet displays.



- 6. Double-click the **Find Region** parameter and click the **Maximize Cell Region** button to utilize the entire Region of Interest and press the **<Enter>** key.
- 7. Double-click the **Pattern** parameter and reference the TrainPatMaxRedLine pattern in cell **B3**.
- 8. Click the **OK** button to close the FindPatMaxRedLine Property Sheet.

The FindPatMaxRedLine Pattern is found.

CONTRACTOR DESCRIPTION		A	В	C	D	E	F	G	н	- E -	J	K	L
	0	Dimage											
	1												
	2												
	3		Patterns	1.00)								
	4												
	5		1	Index	X	Y	Angle	Scale	Score				
	6		Patterns	0.00	1274.193	574.652	0.018	100.000	98.254				
	7												
	8		1		1		1		-				
	9							-					
	10												
	11												
	12		1	1	-								
	13												
	14				-		-						
	15			-	-			-					
	16						-		-				
	17			-		-							
	18				-			-	-				
MAR 12 . RP., STE43	19							-					
1236WHD91495	20						-	-	-				
	21			-	-	-	-	-	-		-		
10 m m	22						P	-	-	-			
	23					-			-				
	24				-		-	-	-				
	25		-		-	-				-			-
	26							-				_	_
	20			-	-	-	-	-	-	-	-		
	1	_		1	1								

- Enter a Fixture tool in cell B9.
 NOTE: Type Fixture(in the cell and the tool will display.
- 10. Open the Fixture parameter, click the **Insert Relative Reference** button and reference cells **D6**, **E6** and **F6**, press the **<Enter>** key.

4								
5		Index	X	Y	Angle	Scale	Score	
6	DPatterns	0.000	1274.19	3 574.652	0.018	100.000	98.254	
7								
8		×	Y	Angle				
9	□Fixture	0.000	0.00	0.000)			
10								

11. Click the **OK** button to close the Fixture tool. Notice the red crosshairs on the bottle cap.



- 12. Enter a **ViDiRead** tool in cell **B12**.
- 13. Double-click the **External Fixture** parameter and reference the Fixture tool in cell **B9**.



14. Double-click the **Region** parameter and position it as shown below and press the **<Enter>** key.



- 15. Click the **Open ViDi Editor** ^{Open ViDi Editor} button. The **ViDiRead Workspace** opens.
- 16. From the toolbar select **Tool** \rightarrow **Edit Models**.



17. The **Model Editor** dialog displays. Click the Minus 🕑 button to remove the current model.

		33 <u>-</u>		×
Model 1 (String)	0	~ C C) # ≡
Enable	~			
Threshold	50%			
View Filter				
Occurrences	1			all



- 18. Click the **OK** button to remove model from the tool and close the Model Editor dialog.
- 19. Click **Add** to bring the images into the workspace.
- 20. Navigate to the ViDiRead_DateCodeOCR Training folder.
- 21. Select the first image and press **<Ctrl + A>**, this will automatically select all of the images. Click the **Open** button.



The images display.

Notice that the ViDiRead tool has identified some of the characters and marked them in yellow.



- 22. In the **Tool Parameters** set the following:
 - Epoch Count = 100
- 23. Move the **Feature Size** box over the first character. Drag the red circle to the desired size (approximately the same size as the character).
- 24. Click on the image outside of your feature size box.



A green rectangle the same size as your feature size box displays.



25. Move the box to the first letter, click the **?** to open the text box. Label this character **M** and press the **<Enter>** key.



26. Scroll out to confirm that all characters are visible and add the labels to the remaining characters.



- 27. Repeat for more bottles.
- 28. From the toolbar select **Tool** \rightarrow **Edit Models**.



29. The **Model Editor** dialog displays. Click the **Plus b** button to add a **Regex Model**.



NOTE: There are two lines on each bottle, so we will enter 2 Regex Models.

30. Line 1 is the date code, enter \u{3} \d{2} \d{2} \u{2}\d{3} in the Regex Properties Regex field and uncheck the Angle checkbox.

NOTE: $\ \ u = upper \ case \ letter \ and \ \ d = digit.$

Regex	\u{3} \d{2} \d{2} \u{2}\d{3}

31. Click the **Plus** Sign to enter a new **Regex Model**.

Model 1 (Re	gex)	
Enable	7	Node Model
		Regex Model
Threshold	50%	String Model
		String Model

32. Enter \d{4}\u{2}\d{6} in the Regex Properties **Regex** field and uncheck the Angle checkbox.

Regex F	Properties	
Regex	\d{4}\u{2}\d{6}	

- 33. Click the **X** in the upper-right hand corner to close the Model Editor dialog.
- 34. Click the **Book** to process the models.



35. Confirm the models are found and click the **Train** (brain) button.





37. Click the **OK & Randomize** OK & Randomize button to select the training set.



- 38. Once the training is complete scroll through the images to view your results.
- 39. Adjust the parameters for better results, do not focus on getting 100% accuracy. While it is possible to achieve these results, we are not able to devote enough time during our class.
- 40. Click the **Save As** button to save the job as **ViDiRead_DateCodeOCR** in the folder created in lab #1.


Spice Bottles OCR

Follow the steps below to complete the lab exercise:

1. Highlight your Emulator, click the **System Settings** gear and select **Emulator**.



The Emulator Configuration dialog displays.

2. Select **In-Sight ViDi PC** from the drop-down box and click the **Configure** button.

The In-Sight Emulation Configuration dialog displays.

O In-Sight Emulation Configuration		×
In-Sight ViDi PC		
Set the image directory.		
2048 X 1536 C:\Users\jmacdona\OneDrive - Cognex Corpor	ration\Desktop\IS_ViDi Images\ViDi	
	OK Cano	:el

- 3. Point to the ViDiRead_SpiceBottlesOCR *Runtime* folder and click the OK button.
- 4. Click the **Start** button to start the emulator. **NOTE**: If the emulator is already running the In-Sight ViDi PC the start button will have a Stop button in its place. Click the X in the upper-right hand corner to close the Emulator Configuration dialog.
- 5. Click the **Connect** button to enter the Spreadsheet environment.





6. The Spreadsheet displays with the first image behind the spreadsheet. Click the **Change Split** button to bring the image next to the spreadsheet.



7. Notice that the date stamp is upside down on the spice bottle cap. From the toolbar select **Image** → **Orientation** → **Rotate 180**.

Imag	je Job Tools Network Help		-	
A	Zoom	۲		
	Orientation	•	殹	
	Show Saturation Ctrl+Shift+B		Ø	Rotate Clockwise 90
			風	Rotate 180
<u>b 1</u>	토토르130426년· 북·		K	Rotate Clockwise 270

The image rotates 180°.



- 8. Add a **ViDiRead** tool to cell **B3**.
- 9. Maximize the region and click the **Open ViDi Editor** button. The **ViDiRead Workspace** opens.



10. Click **Add** to bring the images into the workspace.



- 11. Navigate to the ViDiRead_SpiceBottlesOCR Training folder.
- 12. Select the first image and press **<Ctrl + A>**, this will automatically select all of the images. Click the **Open** button.



- 13. Scroll out so that the complete image is in the view.
- 14. Right-click and select Edit ROI from the list.

Create Model	
Paste label(s)	Ctrl+V
Edit ROI	Ctrl+O
Edit Mask	Ctrl+M



15. Change the ROI to Internal and set the following parameters:

- Offset = -100%, -100%
- *Size* = 100%x100%
- *Rotation* = 180%

Click Apply and Close.

Region of Interest	Percent •	+	-100%, -100%	\square	100%x100%	\leq	18 <mark>0°</mark>	\blacksquare	1x1	Internal •	Apply	Close	
--------------------	-----------	---	--------------	-----------	-----------	--------	--------------------	----------------	-----	------------	-------	-------	--

The ViDiRead tool will process on the GPU.



- 16. In the **Tool Parameters** set the following:
 - *Feature Size* = 70x130
 - Angle Range = -45,45
- 17. From the toolbar select **Tool** \rightarrow **Edit Models**.



18. The **Model Editor** dialog displays. Click the Minus **b** button to remove the current model.

		_		×
Model 1 (String)	1	~ C C	/ ≡
Enable	-			
Threshold	50%			
View Filter				
Occurrences	1			all



19. Click the **OK** button to remove model from the tool.

🔍 Remove Model		×
Remove model 'Model 1 (S	tring)' from tool?	
	ОК	Cancel

- 20. Click on the first letter of the string to add the green Feature Size box, click the **?** to open the text box. Label this letter **B** and press the **<Enter>** key.
- 21. Click on the remaining characters to add the labels.



- 22. Repeat for more bottle caps. **NOTE**: There should be a minimum of 5 of each character labeled. Open the Database Overview tab to see the count.
- 23. From the toolbar select **Tool** \rightarrow **Edit Models**.





24. The **Model Editor** dialog displays. Click the **Plus b** button to add a **Regex Model**.



NOTE: There are three lines on each bottle cap, so we will enter 3 Regex Models.

25. Line 1 always has **BEST BY** so enter that into the Regex Properties **Regex** field.

Regex P	roperties	
Regex	BEST BY	

26. Click the **Plus Sign** to enter a new **Regex Model**.

Model 1 (Re	gex)	
Enable	7	Node Model
		Regex Model
Ihreshold	50%	String Model

27. Line 2 is the date code. Enter \u\u\u \d\d \d\d \u in the Regex Properties Regex field.
NOTE: \u = upper case letter and \d = digit.



28. Click the **Plus** Sign to enter a new **Regex Model**.

Model 2 (Re	gex)	• • • • • • • • • • • • • • • • • • •
Enable	7	Node Model
		Regex Model
Threshold	50%	String Model

29. Line 3 is the time code. Enter \d\d:\d\d in the Regex Properties Regex field.

Regex Properties					
Regex	\d\d:\d\d				

- 30. Click the X in the upper-right hand corner to close the Model Editor dialog.
- 31. Click the **Book** to process the models.





COGNEX

32. Confirm the models are found and click the **Train** (brain) button.



- 36. Once the training is complete scroll through the images to view your results.
- 37. Adjust the parameters for better results, do not focus on getting 100% accuracy. While it is possible to achieve these results, we are not able to devote enough time during our class.

38. Click the **Save As** button to save the job as **ViDiRead_SpiceBottles** in the folder created in lab #1.



Lab Exercise 7.1 – Inputs/Outputs & Network Functions

At the end of this lab exercise, Participants will be able to:

• Use the TCPClient to define a spreadsheet cell as a TCP/IP client, initiating the communication with another TCP/IP device for sharing data over the network

The Participant will utilize the following In-Sight Vision Suite tools to successfully complete this exercise:

- TCPClient
- Format String
- HyperTerminal

Follow the steps below to complete the lab exercise:

- 1. Open a new job and capture an image of the Cognex business card.
- 2. Enter a **TrainPatMaxRedLine** tool in cell **B3**, set the **Pattern Region** to find the Cognex Logo.

The **Pattern** is found.



 Enter a FindPatMaxRedLine tool in cell B6, set the FindRegion to the entire Region of Interest, and set the Pattern to reference cell B3.
 The PatMaxRedLine pattern is found

The **PatMaxRedLine** pattern is found.

2								
3	□Patterns	1.000						
4								
5		Index	х	Y	Angle	Scale	Score	
6	□Patterns	0.000	1489.792	304.706	0.009	100.000	97.776	
	0	4						

4. Enter a **TCPClient** function in cell **B9**.

NOTE: The TCPClient function is found in the Toolbox under Input/Output \rightarrow Network \rightarrow TCPClient.

The TCPClient Property Sheet displays.





- 5. Enter your computer's *IP Address* in the **Host Name** field and *3000* in the **Port Number** field.
- 6. Click the **OK** button.

The **TCPClient** information is entered into the spreadsheet.

Device	¤Write	Test string.	

7. Enter a **FormatString** function in cell **B12**.

The FormatString Property Sheet displays.

- 8. Enter the following information in Starting/Ending section of the Property Sheet:
 - Leading Text = ' (single quote)
 - Trailing Text = ' (single quote)
 - Terminators = Carriage Return (CR)
 - Use Delimiter = check the checkbox

Spreadsheet - Property Sheet - FormatString	– 🗆 ×
Starting/Ending	✓ Use Delimiter
Leading Text: Trailing Text: Terminators: Carriage Return (CR) ~	Standard: Comma Other:

- 9. Click the **Add** button to enter the following information in the Arguments section of the Property Sheet:
 - Line 1 = Check the **Include Label** checkbox, enter **X** (**space**) in the Label field, reference the *X* parameter in the FindPatMaxRedLine tool, 2 decimal places
 - Line 2 = Check the **Include Label** checkbox, enter **Y** (**space**) in Label field, reference the Y parameter in the FindPatMaxRedLine tool, 2 decimal places
 - Line 3 = Check the Include Label checkbox, enter Angle (space) in the Label field, reference the Angle parameter in the FindPatMaxRedLine tool, 2 decimal places

Ar	guments								
	Include Label	Label	Cell	Data Type	Decimal Places	Fixed Width	Field Width	Padding	Add
		x	\$D\$6	Floating Point 🛛 🗸	2				Delete
		Y	SE\$6	Floating Point \sim	2 🛟				Ор
	~	Angle	SF\$6	Floating Point 🛛 🗸	2 🛟		8 🛟		

- 10. Click the **OK** button.
- Open the WriteDevice function in cell C9, change the formula to reference the FormatString function in cell B12 (WriteDevice(\$A\$0,B9,B12)).



12. Click the **Online** button to Online.



Setting up HyperTerminal

- 13. Start HyperTerminal.
- 14. The HyperTerminal warning displays. Click the **No** button to continue.

HyperTern	ninal	×
	You may need to install a modem before you can make a connection. Would you like to do this now?	
	Yes No	

The Connection Description dialog displays.

Enter a name and	hoose an icon for the connection:
Name:	
con:	
<	>

 Name the new Connection TCPIP and click the OK button. The Connect To dialog displays.

Connect To		?	×
TCPIP			
Enter details for	he host that you want	to call:	
Host address:	l.		
Port number:	23		
Connect using:	TCP/IP (Winsock)	Car	×



- Enter the *IP Address* of your camera in the Host address field and enter 3000 in the Port number field.
 NOTE: The port number must be the same as the port number that was entered in the TCPClient function.
- 17. Connect using: TCP/IP (Winsock) and click the OK button.
- 18. Click the **OK** button to continue.
- 19. The HyperTerminal warning dialog displays. Click the OK button to continue.



20. From the Call menu in the Toolbar select Wait for a Call.

TCPIP - Hyper	Terminal	_	×
File Edit View	Call Transfer Help		
D 🗃 🎯 🖇	Call		
	Wait for a Call		 -1 ^
_ '	Stop Waiting		
	Disconnect		

21. The HyperTerminal warning dialog displays. Click the No button to continue.



The results display in HyperTerminal.

	_	1 ^
'X 1637.83,Y 231.53,Angle -4.15'		
'X 1714.47,Y 237.41,Angle -4.99'	11	
'X 1765.36,Y 272.31,Angle -5.91'	11	
'X 1810.93,Y 339.84, Angle -6.40'	11	
'X 1823.73,Y 432.21,Angle -6.10'	11	
'X 1813.80,Y 507.11,Angle -5.58'	11	
'X 1791.40,Y 540.42, Angle -5.21'	11	
'X 1768.55,Y 557.32,Angle -4.51'	11	
'X 1750.95,Y 535.11,Angle -4.88'		



22. Move the business card in the FOV, review your results and click the **Offline** button to go Offline.



- 23. Save your job as **TCPClient** in the In-Sight Vision Suite folder created in Lab #1.
- 24. Close HyperTerminal and click the **Yes** button save the TCPIP connection







Lab Exercise 8.1 – Operator Interface (HMI)

At the end of this lab exercise, Participants will be able to:

• Create a custom interface accessible from other devices, including status indicators, inspection results and interactive controls to view and affect the vision application

The Participant will utilize the following In-Sight Vision Suite tool to successfully complete this exercise:

- Tags
- WebPages
- User Inputs

Follow the steps below to complete the lab exercise:

ViDiCheck_Chocolates HMI

NOTE: In order for the chocolate images to display in the HMI your emulator should be configured to emulate the In-Sight D905M camera and directed to the ViDiCheck_Chocolates Runtime folder.

1. Open the ViDiCheck_Chocolates job from lab exercise #5.

The ViDiCheck_Chocolates job displays.



2. Highlight cell **H6** (the PatMax RedLine score), right-click and select **Publish** from the fly-out list.

5		Index	х	Y	Angle	Scale	Score	
6	□Patterns	0.000	1564.519	1096.847	2.967	100.000	89.000	6.4
7							65	Cut
8							i)	Сору
9	ViDiCheck	<					â	Paste
10								Create a WebPage from Selected Cells
11					Č.			cicate a webrage nom selected cells
12								Publish



A new Tag named **Score** displays in the *Properties* panel.



3. Open the **ViDiCheck** tool and drag the **Show** parameter into cell **B13**. Close the ViDiCheck tool.

The Show parameter displays.

12		
13	Show	
14	hide all	~
15	0.000	
16		

4. Highlight cell **B14** and type *Menu* in the textbox of the Edit Toolbar.

Main Spreadsheet ×						
📰 No configuration was loaded. 🖕 🗃 ङ 🗗 🖓 🕼 🖓 🖓 🖓 👌	8 9	s 🔍 🗖	🛱 🗷 🗔		III III 😣	100%
🖺 🌐 🕼 🖳 🎉 📝 🤿 👿 🙀 Menu 🛛 🗸 ListBox("hide all","result graphics on	ıly","ir	nput graph	ics only","inp	out and result	graphics")	
		A	В	С	D	E
	0	Dimage				
	1					
	2					
	3		Patterns	1.000		
	4					
	5			Index	х	Y
- D.	6		Patterns	0.000	1179.246	997.689
AT AN A A A A A A A A A A A A A A A A A	7					
	8					
	9		ViDiCheck	k		
	10					
	11					
	12					
	13		Show			
	14		hide all		~	
	15		0.000)		

A new Tag named **Menu** displays in the *Properties* panel.

Properties	~
Cell Name	Cell
Image	AQ
Score	H6
Menu	<u>B13</u>



5. Add a **GetAllTime** function in cell B1 and reference cell **A0** type *JobTime* in the textbox of the Edit Toolbar.



A new Tag named **JobTime** displays in the *Properties* panel.

Properties	×
Cell Name	Cell
Image	<u>A0</u>
Score	<u>H6</u>
Menu	<u>B13</u>
JobTime	<u>B1</u>

6. Double-click the **Main** WebPage in the Address panel to open. The **Main** WebPage opens in a new tab.

Spreadsheet	🖩 Main ×	
		Main
		Cine Onine
		Tigger Orace Go to Carr 0 Setup page

7. Open the Tags menu by clicking the **Tags** tab.



8. Drag the three new tags onto the Main WebPage.

NOTE: The new tags are found under the **Tasks** → **Spreadsheet** section of the Tags menu.



NOTE: Use the grid lines to line up the new tags on the web page.

Main	
	Pause Online
Image	
() ()	
	Score 89.810
	Menu hide all
	JobTime 0.096
Trigger Once Go to Carn 0 Setup page	
	Ł
- 조미 조미 조미 조미	

9. Navigate to the **Spreadsheet** tab.



10. Right-click on the ViDiCheck tool and select **Insert Getters** from the fly-out list.



The Getters for the ViDiCheck tool display.

NOTE: You may need to click the Trigger Once button for all getters to display.

7													
8	 	Check	View	Index	Match Index	Match	Check Regi	Check Region	Check Region Name	Expected	Actual	Passed	Chocolate_1
9	ViDiCheck	■ViDiChecł	ViDiCheck	0.000	0.000	ViDiMatch	0.000	ViDiCheckRegion	Chocolate_2	1.000	0.000	0.000	0.000
10							1.000	ViDiCheckRegion	Chocolate_1	1.000	0.000	0.000	0.000
11							2.000	ViDiCheckRegion	Chocolate_3	1.000	0.000	0.000	0.000
12							3.000	ViDiCheckRegion	Chocolate_0	1.000	0.000	0.000	0.000
13	Show												
14	hide all		~										
15	0.000												

NOTE: The information in the cells to the right of the Passed parameter is not going to be used and can be deleted.

11. Right-click on cell **M9** (the ViDiCheck Passed parameter) and select **Publish** from the fly-out menu.

8		Check	View	Index	Match Index	Match	Check Regi	Check Region	Check Region Name	Expected	Actual	Passed		IsRunning
9	⊡ ViDiCheck	ViDiCheck	ViDiCheck	0.000	0.000	ViDiMatch	0.000	ViDiCheckRegion	Chocolate_2	1.000	0.000	\$2	Cut	
10							1.000	ViDiCheckRegion	Chocolate_1	1.000	0.000			
11							2.000	ViDiCheckRegion	Chocolate_3	1.000	0.000		Сору	
12							3.000	ViDiCheckRegion	Chocolate_0	1.000	0.000	â	Paste	
13	Show												Country of Ma	nhDana from Coloriad Colle
14	hide all		~										Dublich	
15	0.000													

A new Tag named **Passed** displays in the *Properties* panel.

12. Rename the tag to Result_Chocolate_X.

NOTE: Review the Check Region Name parameter to select the correct chocolate #.

Cell Name	Cell
Image	<u>A0</u>
Score	<u>H6</u>
Menu	<u>B14</u>
JobTime	<u>B1</u>
Results_Chocolate_2	<u>M9</u>

- 13. Repeat this step for the 3 remaining chocolates, again consult the Check Region Name parameter to select the correct chocolate #:
 - Cell **M10**
 - Cell M11
 - Cell **M12**



14. Enter 'Total in cell L13 and an And statement in cell M13 (And(M9:M12)).

7													
8		Check	View	Index	Match Index	Match	Check Regi	Check Region	Check Region Name	Expected	Actual	Passed	
9	■ViDiCheck	ViDiCheck	■ViDiChecł	0.000	0.000	□ViDiMatch	0.000	ViDiCheckRegion	Chocolate_2	1.000	0.000	0.000	
10							1.000	ViDiCheckRegion	Chocolate_1	1.000	0.000	0.000	
11							2.000	ViDiCheckRegion	Chocolate_3	1.000	0.000	0.000	
12							3.000	ViDiCheckRegion	Chocolate_0	1.000	0.000	0.000	_
13	Show										Total	0.000	

- 15. Navigate to the **Main** tab.
- 16. Enter a Ellipse on the Main page.
 NOTE: The Ellipse is found in the Toolbox under Graphics → Ellipse.



17. Click the **Source** arrows on the **Fill Color** property.

Appearance		~
Fill Color	🔝 Transparent 🗸	
Line Color	#FF8C8C8C ~	

The Expression Builder displays.

		Expression Builder (Fill Color, CjsColor)		-		×
		1			Help	
					Validate	:
						ions
					Tag Select	tor
					nsert	
					Tag	
					Constan	t
				_[Functior	۱
		No binding		` [
			OK		Cancel	
18.	Click the Tag	Selector Tag Selector	button.			



The Tag Selector dialog displays. Only WebPages displays.



19. Check the Show All Types checkbox at the bottom of the dialog.



- 20. Navigate to Tasks → Inspection Task → Spreadsheet → Results_Chocolate_0 and click the Accept button. NOTE: You can also type \$Tasks.InspectionTask.Spreadsheet.Results_Chocolate_0 directly in the Expression Builder to build the expression.
- 21. The **Type mismatch** dialog displays. Click the **Yes** button to continue.



The Expression is built.



22. Click the **Associations** button.



23.

The **Binding Associations** dialog displays.

	Binding Association	ations ion Elack Ciations	× • 🔁 Cancel	
Build your Association	and clic	k the Accep	Accept	button
	Binding Associ	ations	×	
	Add Associati	on		
	0.000 🗘	Red	~ क	
	Current Assoc	ciations		
	Current Assoc	ciations	~ 8	
	Current Assoc	ciations	~ & ~	

- 24. The Association is built, click the **OK** button to close the Expression Builder.
- 25. Copy the ellipse and paste it next to the first.

NOTE: This will copy your association and bring it into the new ellipse.

26. Open the **Expression Builder** and change the expression to Chocolate_1. Click the **OK** button to close.



27. Repeat for the remaining chocolates.

There are now 4 circles on your webpage.

28. Add a label to each ellipse to identify a chocolate region. Label the ellipses in the same order as the Layout Model that you created.



NOTE: The label is found in the Toolbox under Data Display. Toolbox \rightarrow Data Display \rightarrow Label.



NOTE: This is a suggestion. Arrange the ellipses on the webpage as you would like.

- 29. Return to the **Spreadsheet** tab. We will add some logic to let us know when the chocolate is in the correct spot in the assortment.
- 30. Enter the text in the following cells:
 - Cell N8 = Chocolate_0
 - Cell **O8** = Chocolate_1
 - Cell **P8** = Chocolate_2
 - Cell Q8 = Chocolate_3
 - Cell **R8** = Which Chocolate?

Press the **<Enter>** key after each entry

8			Check	View	Index	Match Index	Match	Check Regi	Check Region	Check Region Name	Expected	Actual	Passed	Chocolate_0	Chocolate_1	Chocolate_2	Chocolate_3	Which Chocolate?
9		ViDiCheck	ViDiCheck	■ViDiCheck	0.000	0.000	ViDiMatch	0.000	ViDiCheckRegion	Chocolate_2	1.000	0.000	0.000					
10)							1.000	ViDiCheckRegion	Chocolate_1	1.000	0.000	0.000					
11								2.000	ViDiCheckRegion	Chocolate_3	1.000	0.000	0.000					
12								3.000	ViDiCheckRegion	Chocolate_0	1.000	0.000	0.000					
13		Show										Total	0.000					

31. Enter a GetFeatureCount function in cell N9, in this spreadsheet it will reference cells I12 and N8. GetFeatureCount(I9,N8).
 NOTE: The first cell referenced for Chocolate_0 is the Cell for its ViDiCheckRegion,

and the second cell referenced is the Name of the Chocolate (that you entered).

- Cell O9 = GetFeatureCount(I10,O8)
- Cell P9 = GetFeatureCount(I11,P8)
- CellQ9 = GetFeatureCount(I12,Q8)
- 32. Repeat step 31 for the remaining chocolate rows.
- 33. Click the **Trigger Once** button to view the results.

	Check	View	Index	Match Index	Match	Check Region Index	Check Region	Check Region Name	Expected	Actual	Passed	Chocolate_0	Chocolate_1	Chocolate_2	Chocolate_3	Which Chocolate
□ViDiCheck	ViDiCheck	ViDiCheck	0.000	0.000	■ViDiMatch	0.000	ViDiCheckRegion	Chocolate_2	1.000	0.000	0.000	0.000	0.000	0.000	0.000	
						1.000	ViDiCheckRegion	Chocolate_1	1.000	0.000	0.000	0.000	0.000	0.000	0.000	
						2.000	ViDiCheckRegion	Chocolate_0	1.000	1.000	1.000	1.000	0.000	0.000	0.000	
						3.000	ViDiCheckRegion	Chocolate_3	1.000	0.000	0.000	0.000	0.000	0.000	0.000	
Show										Total	0.000	-				

- 34. Next, we will add the logic to determine which chocolate is in each spot. Enter the following formula in cell **R9**, *If(N9,N8,If(O9,O8,If(P9,P8,If(Q9,Q8,"NONE"))))*
- 35. Repeat step 34 for the remaining chocolate cells.



36. Click the **Trigger Once** button to view the results.

	Check	View	Index	Match Index	Match	Check Region Index	Check Region	Check Region Name	Expected	Actual	Passed	Chocolate_0	Chocolate_1	Chocolate_2	Chocolate_3	Which Chocolate?
ViDiCheck	ViDiCheck	ViDiCheck	0.000	0.000	ViDiMatch	0.000	ViDiCheckRegion	Chocolate_2	1.000	0.000	0.000	0.000	0.000	0.000	0.000	NONE
						1.000	ViDiCheckRegion	Chocolate_1	1.000	1.000	1.000	0.000	1.000	0.000	0.000	Chocolate_1
						2.000	ViDiCheckRegion	Chocolate_0	1.000	1.000	1.000	1.000	0.000	0.000	0.000	Chocolate_0
						3.000	ViDiCheckRegion	Chocolate_3	1.000	1.000	1.000	0.000	0.000	0.000	1.000	Chocolate_3
Show										Total	0.000	1				

- 37. Publish cell M13 and name the Tag Results_All.
- 38. Navigate to the Main tab.
- 39. Add a rectangle around the four chocolate circles.
 NOTE: This rectangle has been placed on top of the current rectangles.
 Right-click → Send to Back → Send to Bottom.

Chocolate_2 Chocolate_1 Chocolate_3 Chocolate_0			
\land	*	Cut	
	ð	Сору	
≫I .↓.	â	Paste	
	×	Delete	
	£	Toggle Lock	
	цар Г	Bring to Front	
	£	Send to Back	Send Backward
	G	Export to Template	Send to Bottom

40. Click the **Source** arrows on the **Fill Color** property.



The Expression Builder displays.

Expression Builder (Fill Color, CjsColor)	-		×
1		Help	
		Validat	e
		Tag Selec	tor
	In	sert	
		Tag	
		Consta	nt
ļ		Functio	'n
No binding			
		Cancel	



41. Click the **Tag Selector** button.

The Tag Selector dialog displays. Only WebPages displays.



42. Check the Show All Types checkbox at the bottom of the dialog.



43. Navigate to Tasks → Inspection Task → Spreadsheet → Results_All and click the Accept button.

NOTE: You can also type \$Tasks.InspectionTask.Spreadsheet.Results_All directly in the Expression Builder to build the expression.

44. The **Type mismatch** dialog displays. Click the **Yes** button to continue.



The **Expression** is built.

		Expression Builder (Fill Color, CjsColor)		-		×
		<pre>\$Tasks.InspectionTask.Spreadsheet.Results_All</pre>	L		Help	
					Validate	e
					Associat	ions
					Tag Selec	tor
				In	isert	
	_				Tag	
					Constar	ıt
				_10	Functio	n
		Result: Double				
			OK		Cancel	
(- Click the Ass	sociations • Associations button.				



46.

The Binding Associations	dialog displays.
--------------------------	------------------

	Binding Associations Add Association O.000 Black Current Associations Accept	× • 🔁
Build your Association	and click the Accept	Accept button
	Add Association 0.000 Red Current Associations Green 1 Green 0 Red	 ✓ ⊕ ✓ Ø ✓ Ø ✓ Ø Cancel

47. The Association is built, click the **OK** button to close the Expression Builder.



48. Return to the spreadsheet, open cell **A0** (Image) and set the **Trigger Mode** to *Timer Interval* and the **Timer Interval** parameter to *500ms* and click the **OK** button.



- 49. Save your job as ViDiCheck_ChocolatesHMI in the folder created in lab #1.
- 50. Click the **Online** button to go Online.





51. Click the **Home** tab to return to the ISVS home page.



52. Click the **Open HMI** button.



The HMI will open in a browser. Scroll through the images and review the results.

53. Click the **Offline** button to go Offline.



54. Click the **Save All** button to save your job.

File Edit View Job Tools	s Network Help
🗈 🛋 💾 🐉 🖕 🖉 Veri	fy 🕨 Online 🖕 🦃 🤗 🔀 🐰 🕼 🛱 🏦 🗈
🖽 Spreadsheet	Main ×



If time allows:

- 1. Navigate to the **Spreadsheet** tab.
- 2. Highlight cells J8 through R13.

Check Region Index Check Region	Check Region Name	Expected	Actual	Passed	Chocolate_0	Chocolate_1	Chocolate_2	Chocolate_3	Which Chocolate?	
0.000 DViDiCheckRegion	Chocolate_2	1.000	0.000	0.000	0.000	0.000	0.000	0.000	NONE	
1.000 DViDiCheckRegion	Chocolate_1	1.000	0.000	0.000	0.000	0.000	0.000	0.000	NONE	
2.000 DViDiCheckRegion	Chocolate_0	1.000	0.000	0.000	0.000	0.000	0.000	0.000	NONE	
3.000 DViDiCheckRegion	Chocolate_3	1.000	0.000	0.000	0.000	0.000	0.000	0.000	NONE	
			Total	0.000						
	-									

3. Right-click and select Create a WebPage from Selected Cells from the fly-out.

¥	Cut
Ð	Сору
î	Paste
	Create a WebPage from Selected Cells

A new WebPage is created.

Web Pages	~ ×
Filter By Name:	
Address	
▲ 《》WebPages	
Cam0Setup	
Þ 🏪 Main	
WebPage	

4. Highlight all items on the new WebPage.

🖩 Spreadsheet 🔳 Main	🔳 WebP	'age ×							
	hete Region Name			••• *****	• • • • • • •		e Province, 2	e energy	the Cartain
		****	** •• ••				**	**	
		400			000	000			
			*****	•• **				****	• • • • • • • • • • •
		400							
				•••					

5. Change the Border Color to *Blue*, Border Size to 5, Font Size to 12 and Text Alignment to *Center*.





6. Change the **Background Color** to White.

Check Region Name	Expected	Actual	Passed	Chocolate_0	Chocolate_1	Chocolate_2	Chocolate_3	Which Chocolate?
Chocolate_2	1.000	0.000	0.000	0.000	0.000	0.000	0.000	NONE
Chocolate_1	1.000	1.000	0.000	0.000	1.000	0.000	0.000	Chocolate_1
Chocolate_0	1.000	1.000	0.000	1.000	0.000	0.000	0.000	Chocolate_0
Chocolate_3	1.000	1.000	0.000	0.000	0.000	0.000	1.000	Chocolate_3
		Total	0.000					

7. Right-click on the WebPage, rename to *Table* and click the **Accept** button.

Rename	×
Enter a new name for the WebPage.	
Table	
Accept	Cancel

Add a button to the webpage.
 NOTE: The button is found in the toolbox under User Inputs.



9. In the Properties, set the **Click Command** to *HMI.ShowPage*, set the **pageName** to *Main*, and change the **Text** to *Go to Main Page*.

Click Command	HMI.ShowPage				
pageName	Main				
lcon					
Text	Go to Main Page				

10. Format the text color and background color as you choice. **Note**: This button has a background color of black, text color of yellow, font size 18 and the text is centered on the button.

Check Region Name	Expected	Actual	Passed	Chocolate_0	Chocolate_1	Chocolate_2	Chocolate_3	Which Chocolate?	
Chocolate_2	1.000	0.000	0.000	0.000	0.000	0.000	0.000	NONE	
Chocolate_1	1.000	1.000	0.000	0.000	1.000	0.000	0.000	Chocolate_1	
Chocolate_0	1.000	1.000	0.000	1.000	0.000	0.000	0.000	Chocolate_0	
Chocolate_3	1.000	1.000	0.000	0.000	0.000	0.000	1.000	Chocolate_3	
		Total	0.000						
Go to Main Page									



- 11. Repeat steps 8 10 to add a button to the Main webpage.
 - Click Command = HMI.ShowPage
 - pageName = Table
 - Text = Go to Table Page

NOTE: You can also copy and paste the button from the Table page and change the pageName and Text.

12. Click the **Online** button to go Online.



13. Click the **Home** tab to return to the ISVS home page.



14. Click the Open HMI button.



The HMI will open in a browser. Scroll through the images and review the results.

15. Click the **Offline** button to go Offline.



16. Click the **Save All** button to save your job.





Lab Exercise 9.1 – Deployment

At the end of this lab exercise, Participants will be able to:

• Utilize the utilities available in In-Sight Vision Suite to finish deploying the application

The Participant will utilize the following In-Sight Vision Suite Functions to successfully complete this exercise:

- User Settings
- Update Firmware
- Network Settings
- Backup
- Restore

NOTE: In order to complete this lab exercise, you should not be connected to your camera or emulator. This will allow you to access the Utilities.

User Settings

Follow the steps below to complete the lab exercise:

1. Click on the **User Settings** link – this is found in the **Utilities** menu.



The User Settings dialog displays.

User	Settings			-	o x
Conf	igure the user settin	igs for isd905m_J	ennifer		
	Name 🔺	Access Level	Comment		Add
	admin	Full			
				ОК	Cancel

2. A user with the Name **admin** should already be there, with Full access. Click the **Add** button to create a new user.



A new line displays.

Configure the user settings for isd905m_Jennifer Name Access Level Comment Add
Name Access Level Comment
Dalata
Default Full
Change the user settings:
User Name: Default Password:
Access Level: Full Confirm Password:
Comment:
OK Cancel

3. Enter the new user's information in the appropriate fields and click the **OK** button.

NOTE: Create two new users, one with Protected access and one with Locked access. Choose the names you would like, use the password Cognex for both.

Us	er Se	ettings						-		×
Co	onfig	ure the user s	settin	gs for isd905m_Je	ennifer					
		Name	•	Access Level	Comment				A	dd
		admin		Full						
		Bob		Locked						
		Jennifer		Protected						
							0	(Cance	el

- 4. Connect to your camera. (if there is a job open on your camera, close it and open a new job).
- 5. Click the **Main** WebPage tab.
- 6. From the Job menu, select Settings from the drop-down list.





The Job Settings dialog displays.

7. Click Web HMI Settings and check the Enable Built-in Authentication checkbox.

	Job Settings					-		×
	Online	Enable Built-in Auth	nentication					
	Security	Inactivity Timeout					10 🗘	(min)
L	Web HMI Settings							
				ок	Apply		Cance	-

- 8. Click the **OK** button.
- 9. Click the **Online** button to go Online.



10. Click the **Home** tab and click the **Open HMI** button.



11. A new web browser opens – login as admin (with no password)

Username	admin	
Password		
		Login



- Log into the HMI with the other users that you created. Notice the difference in the access that the different users have based on their access levels.
- 13. Return to your camera and click the **Offline** button to go offline. Do not save the job.



Page 106



Firmware Update

NOTE: In this lab, you will look at the steps needed for a firmware update to the Controller and cameras, but you will **not** actually do an update.

1. From the Utilities tab select **Firmware Update**.



The Firmware Update dialog displays.

2. Select the Firmware version from the Update to: drop down list.

Firmware Update			-		×			
Ready to update devi	Ready to update devices. Press Update to begin, cancel to close without updating.							
Update to: In-Sight	t ViDi 2.2.0 (770) 🗸							
Host Name	Firmware Version	Status						
isd905m_Jennifer	2.2.0 (645)	Offline						
🗹 Backup	Force Update							
		Up	date	Cance	•			

3. **Do not actually do an update,** but if you were, highlight the camera to be updated and click the **Update** button. (In this screenshot there is only one camera available).

Firmware Update			-		×		
Ready to update devices. Press Update to begin, cancel to close without updating.							
Update to: In-Sight	ViDi 2.2.0 (645) 🗸						
Host Name	Firmware Version	Status					
isd905m_Jennifer	2.2.0 (645)	Offline					
🗹 Backup 🗌 I	Force Update	Upc	late	Cance	1		

The **Update** will begin.

4. Click the **Cancel** button to exit from this dialog.



Network Settings

1. From the Utilities tab select **Network Settings**.



The **Network Configuration** dialog displays and might look like one of the following:

Network Configuration - iso	1905m_Jennifer X	Network Configuration - isd905m_lennifer X			
Set network configuration of	on isd905m_Jennifer	Set network configuration on isd905m_Jennifer			
Host Name:	isd905m_Jennifer	Host Name:	isd905m_Jennifer		
Address Assignment:	Auto (DHCP) O Static	Address Assignment:	🔿 Auto (DHCP) 🔍 Static		
IP Address:	169 . 254 . 114 . 163	IP Address:	169 . 254 . 114 . 164		
Subnet Mask:	255 . 255 . 0 . 0	Subnet Mask:	255 . 255 . 0 . 0		
Default Gateway:	0.0.0.0	Default Gateway:	0.0.0.0		
DNS Server:	255 . 255 . 255 . 255	DNS Server:	255 . 255 . 255 . 255		
Domain Name:		Domain Name:			
	Copy PC Network Settings		Copy PC Network Settings		
	OK Cancel		Validating Cancel		

2. Review the settings.


Backup

1. From the Utilities tab select **Backup**.



The **Backup** dialog displays.

Ba	ckup			_		×
Ready to backup devices. Press Backup to begin, cancel to close without backing up.						
	Host Name	Firmware Version	Status			
	isd905m_Jennifer	2.2.0 (645)				
			В	ackup	Cance	<u>!</u>

- 2. Select the camera to backup and click the **Backup** button.
- 3. Once the Backup is complete click the **Close** button.



Restore

1. From the Utilities tab select **Restore**.



The Restore dialog displays.



NOTE: If you want to see all the backups available on the network check the Show all backups checkbox.

- 2. Select the Backup that you would like to restore the camera from and click the **Restore** button.
- 3. Once the Restore is complete click the **Close** button.





Final Lab Exercise

Objective:

In the Final Lab Exercise will allow the student to tie together all the training that was learned over the course of the two day In-Sight Vision Suite Standard class.

There is a lab for each of the In-Sight ViDi tools: *ViDiDetect*, *ViDiCheck* and *ViDiRead*. You will select a lab for one of the tools and complete it, inclusive of creating an HMI. If you have completed the lab and still have time available select a different tool and work on solving that lab also.

You will notice that the labs are not written step by step as they were during the class – this will allow you to come up with your own solution to the lab. There will be more than one solution for each lab exercise, so allow your creativity to shine through. Be prepared to discuss how you solved the lab with the class.

The images for each lab exercise can be found in the In-Sight Vision Suite folder in the Student Folder on the desktop of the computer or laptop.

Before You Start:

Create a folder named *In-Sight Vision Suite Final Lab* within the folder that you created in the first lab of the class.

Contents:

- ViDiDetect Lab
 - o Glass Vial Images
- ViDiCheck Lab
 - Medical Kit Verification Images
- ViDiRead Lab
 - Phone Back OCR Images

Goal:

The goal of each lab exercise is to utilize the In-Sight ViDi tool and show the good part and the bad part and why it either passes or fails.

Also, an HMI should be created including graphics showing why the part passes or fails.

Final Lab Exercise 1 – ViDiDetect Tool

Images Needed:

- Glass Vial Runtime Images
- Glass Vial Training Images

Emulator:

- In-Sight D905M

Part to Inspect:

- The challenge is the transparent part makes it difficult to distinguish breakage from debris along the front or back. The reflective surface also creates variability that would challenge tradition rules-based vision.

Goal:

- Use the ViDiDetect tool to accurately distinguish natural part variation from anomalies within the glass vials
- When complete save the job as ViDiDetect_Final in the folder created in lab #1



Good Part



Bad Part



Task Inspections:

1. Consistently find the part in the image.

2. What tools did you add to your spreadsheet to find the part in the image?

3. Did you change any parameters in the ViDi Editor? If so, what did you change and to what?

4. Create an HMI that shows the status of all the inspection tasks and the status of the overall inspection.

Final Lab Exercise 2 – ViDiCheck Tool

Images Needed:

- Medical Kit Verification Runtime Images
- Medical Kit Verification Training Images

Emulator:

- In-Sight D905M

Part to Inspect:

- The challenge is that the elements must be identified through a transparent medical bag, which can be reflective and obscure the appearance of the elements.

Goal:

- Use the ViDiCheck tool to find the bag within the frame and determine if the four required features are present.
- When complete save the job as ViDiCheck_Final in the folder created in lab #1.



We are looking for 4 items in the Medical Kit:

- 1. Clip
- 2. Scalpel
- 3. Syringe
- 4. Pigtail

All 4 parts must be in the kit in order to be considered a good part. If 1 or more part(s) are missing, then that is to be considered a bad part.

Task Inspections:

1. Consistently find the part in the image.

2. What tools did you add to your spreadsheet to find the part in the image?

3. Did you change any parameters in the ViDi Editor? If so, what did you change and to what?

4. What did you use to find all four of the parts within the Medical Kit?

5. Create an HMI that shows the status of all the inspection tasks and the status of the overall inspection.



Final Lab Exercise 3 – ViDiRead Tool

Images Needed:

- Phone Back OCR Runtime Images
- Phone Back OCR Training Images

Emulator:

- In-Sight D905M

Part to Inspect:

- The challenge is that there are varying font and character sizes on a complex textured background creating a difficult application for traditional OCR.

Goal:

- Use the ViDiRead tool to accurately read the letters in a wide range of lighting and background conditions.
- When complete save the job as ViDiRead_Final in the folder created in lab #1.





Task Inspections:

1. Consistently find the part in the image.

2. What tools did you add to your spreadsheet to find the part in the image?

3. Did you change any parameters in the ViDi Editor? If so, what did you change and to what?

4. Create an HMI that shows the status of all the inspection tasks and the status of the overall inspection.