VIA Pixetto

USER MANUAL

The VIA Pixetto Vision Sensor

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Disclaimer

- Please read the information in this manual carefully. Improper use may cause the product to not work properly or even damage the product.
- Do not modify the electronic components on the product without the confirmation and authorization of VIA Technologies, Inc.. Damage caused by modification will not be guaranteed.
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Safety Precautions

- Minors or users under the age of 18 years old are required to be guided by teachers or adults.
- This kit includes different sizes of components that can be harmful to young children, so children under 3 years of age are prohibited to use or assemble this kit.
- Beware of power short-circuits in order to prevent causing harm to yourself and damaging property.
- Do not disassemble components and cables randomly, in order to prevent causing harm to yourself and damaging property.
- The battery power cable should be disconnected immediately when the main control board is not in use.
- The anti-static tasks should be performed properly before using it in order to prevent static from affecting the equipment.
- Avoid letting the hardware touch moist objects or being used in moist environments (except for soil moisture sensor).
- The main control board must be used after it is connected to the charger or battery.
- Please connect the hardware properly under teacher guidance or by following the installation instructions; connect the power last in order to prevent short-circuit.

Box Contents

- 1 x VIA Pixetto Vision Sensor
- 1 x Micro USB 2.0 Cable
- 1 x Quick Guide

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1. Product Overview

VIA Pixetto is a Full HD vision sensor that leverages object, shape, color, face, and handwriting recognition, as well as machine learning, to deliver a powerful and versatile AI learning platform for students, makers, and robotics enthusiasts.

Measuring just 38mm x 38mm, VIA Pixetto features an ARM Cortex-A7 processor (900MHz) combined with a 1920 x 1080 resolution camera. It uses a UART interface to connect to any Arduino, Raspberry Pi, or micro:bit based project, and also includes an integrated microphone, Micro USB 2.0 port, Micro SD card slot and WiFi antenna.

Figure 1: VIA Pixetto vision sensor

1.1 Product Specifications

Processor

- ARM Cortex-A7 (900MHz)

System Memory

- 64MB DDR SDRAM

Storage

- 128MB SPI Flash memory

Camera Sensor

- GalaxyCore GC2053 CMOS image sensor

Camera Lens

- 130° Field-of-View

Onboard I/O

- 1 x Camera lens
- 3 x LEDs (for power, OS booting and active status)
- 1 x Reset button
- 1 x Microphone
- 1 x Grove connector
- 1 x Micro USB 2.0 port
- 1 x Micro SD Card slot
- 1 x Wi-Fi antenna

Power Supply

- 5V/500mA Micro USB 2.0 port
- 5V/300mA 4-pin Grove connector

Operating System

- Linux

Operating Temperature

- 0°C ~ 45°C

Form Factor

- 38mm x 38mm (1.5" x 1.5")

1.2 Layout Diagram

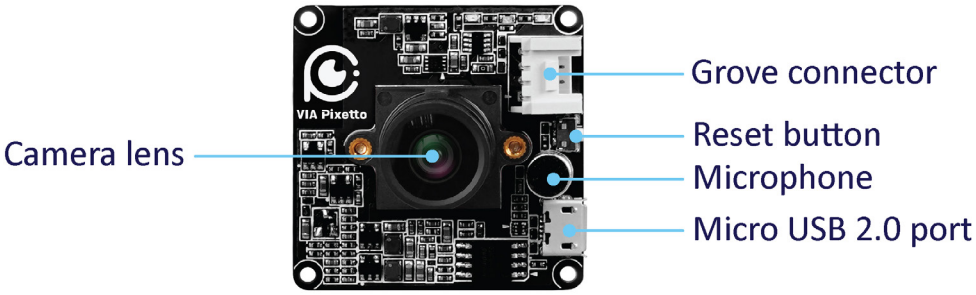


Figure 2: VIA Pixetto vision sensor layout diagram (front)

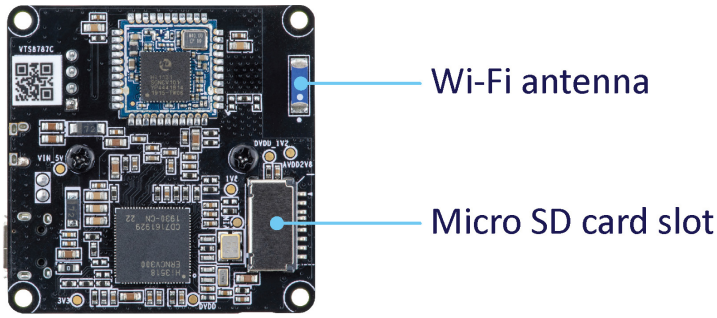


Figure 3: VIA Pixetto vision sensor layout diagram (back)

- Micro USB 2.0 port: Connects to a PC to setup functions, or to upgrade firmware.
- Grove connector: UART

1.3 Product Dimensions

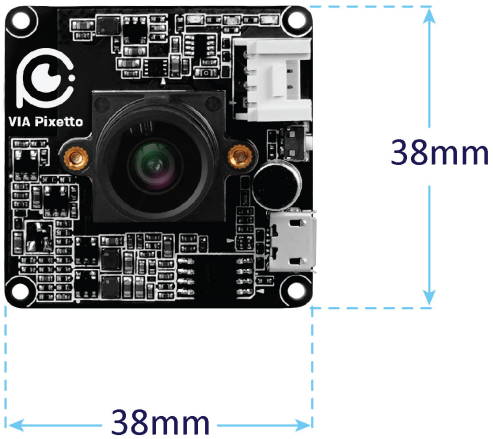


Figure 4: Dimensions of the VIA Pixetto vision sensor

2. How to setup VIA Pixetto Studio Software

This section provides information on how to install and setup the VIA Pixetto Studio software package on your computer. The VIA Pixetto Studio software package includes the Pixetto Utility, Pixetto Editor, Pixetto Junior, Pixetto Link, Pixetto Serial Tool, and Pixetto Launcher applications.

The VIA Pixetto Studio software package is compatible with Windows 10, Windows 8.1, Windows 8, and Windows 7 operating systems.

Applications	Definition
Pixetto Utility	This is used to configure the VIA Pixetto vision sensor when training it to perform the following functions: Color Detection, Color Label Detection, Shape Detection, Sphere Detection, Keypoint and Template Matching. It is an offline application.
Pixetto Editor	This is a programming application for Arduino IDE users, which is based on the Blockly framework. It is an offline application.
Pixetto Junior	This is a programming application for Arduino IDE users, which is based on the Scratch platform. It is an offline application.
Pixetto Link	This creates a bridge which connects the VIA Pixetto vision sensor and Machine Learning Accelerator web page.
Pixetto Serial Tool	This is used for debugging any issues which may occur on the Arduino board.
Pixetto Launcher	This provides easy-to-use rapid online training services for the VIA Pixetto vision sensor.

Table 1: VIA Pixetto Studio Applications

2.1 Installing VIA Pixetto Studio

Step 1

Go to the https://www.pixetto.ai website to download the VIA Pixetto Studio software file from the Download tab.

Step 2

Double click on the PixettoStudieSetup.exe file to execute and begin the installation.

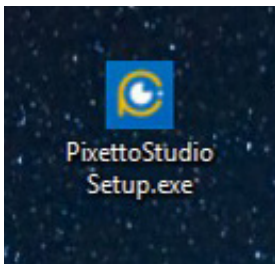


Figure 5: VIA Pixetto Studio package diagram

Step 3

Select the language of your choice to use during the installation process. Both English and Traditional Chinese are supported.

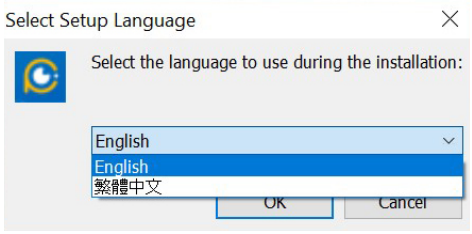


Figure 6: Select Setup language pop-up diagram

Step 4

Click 'OK' button to continue with the installation.

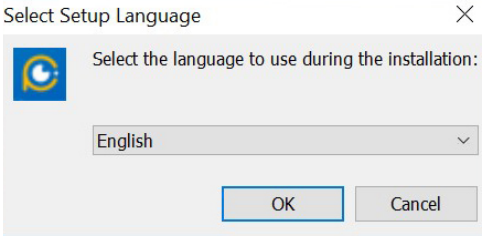


Figure 7: English language diagram

Note:
Please read the following note on the pop-up screen, then click the 'OK' button.

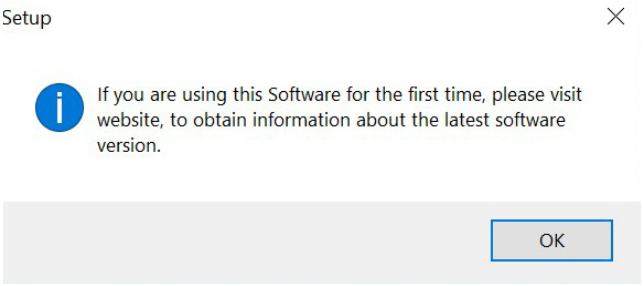


Figure 8: Software notification diagram

Step 5

Please review the License Agreement and select the 'I accept the agreement' section and click the 'Next' button.

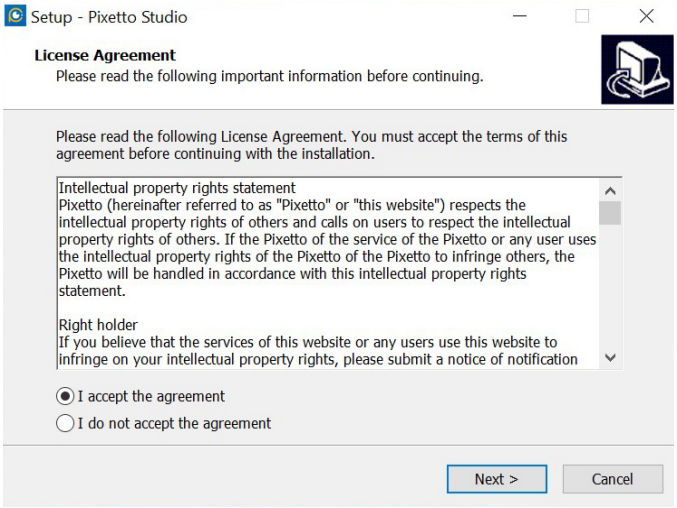


Figure 9: License agreement diagram

Step 6

To create the shortcuts of the icons on your desktop, select the 'Create a desktop shortcut' section. Then select the 'Next' icon.

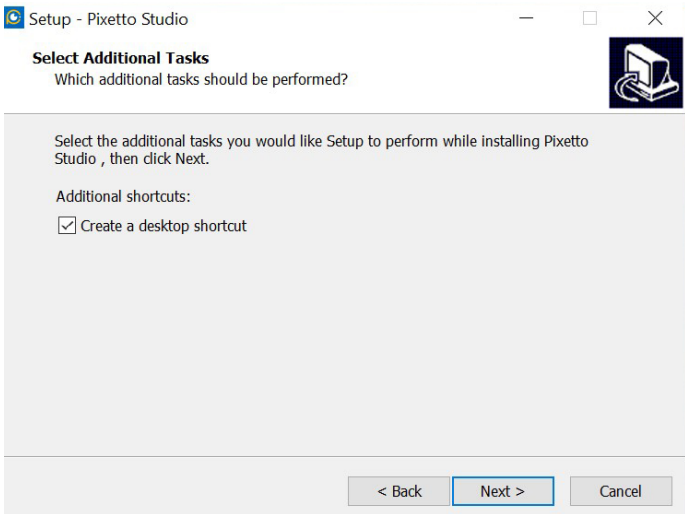


Figure 10: Create desktop shortcuts diagram

Step 7

Click the 'Install' button to continue with the installation process.

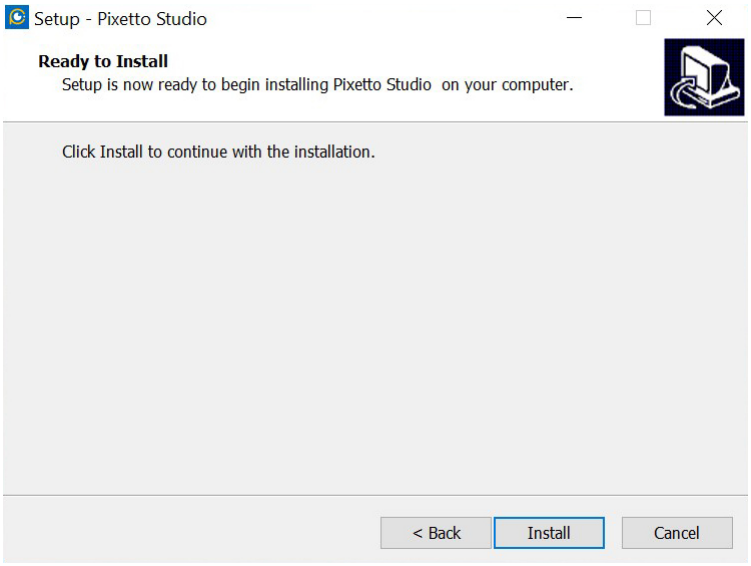


Figure 11: Installation button diagram

VIA Pixetto Studio will begin to install as shown below.

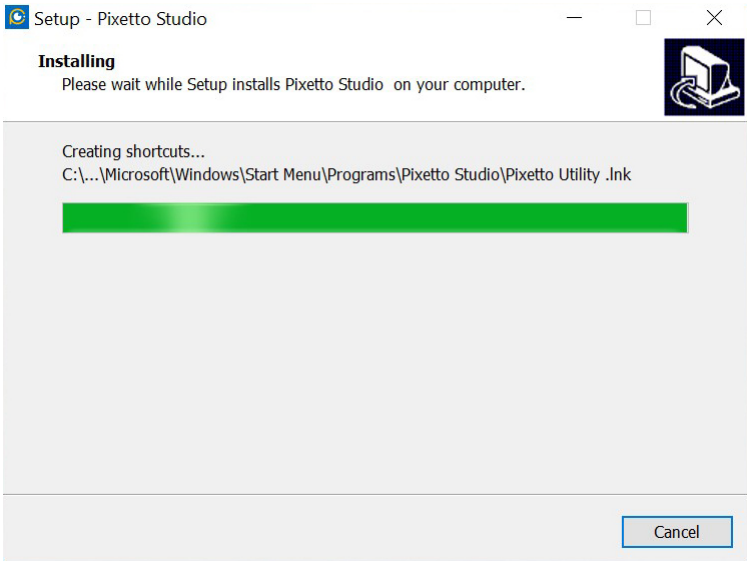


Figure 12: Installation of VIA Pixetto Studio diagram

Step 8

When VIA Pixetto Studio is installed, click the 'Finish' button to exit the setup.

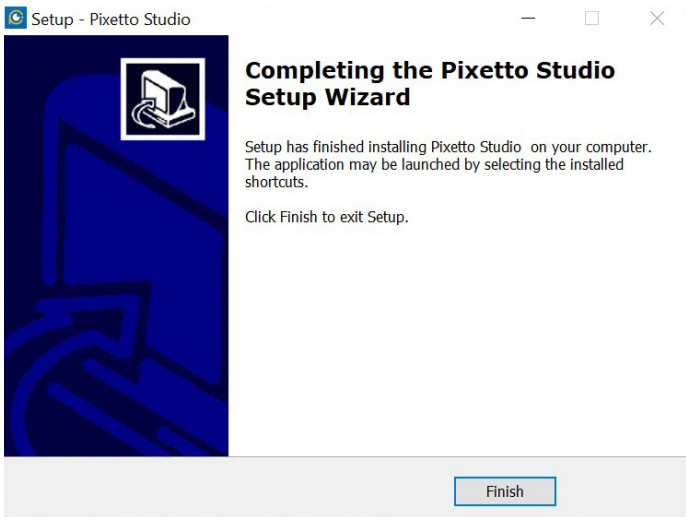


Figure 13: Completing the Pixetto Studio Setup diagram

Step 9

After the installation is completed, the following shortcuts will be created on your desktop.

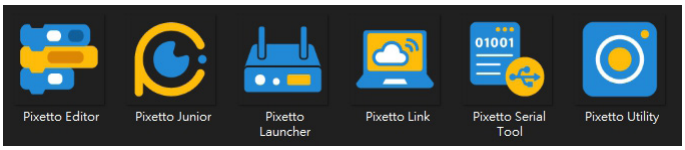


Figure 14: VIA Pixetto Studio icons diagram

Note:
The VIA Pixetto Link icon will be displayed on the taskbar of the PC. You can create a shortcut to the desktop by finding the setup of VIA Pixetto link file in the PC.

3. How setup the VIA Pixetto Vision Sensor

This section provides information on how to setup the VIA Pixetto vision sensor using a Microsoft Windows PC.

3.1 Connecting VIA Pixetto to a PC

Step 1

Connect the Micro USB 2.0 cable to the Micro USB 2.0 port on the VIA Pixetto vision sensor.

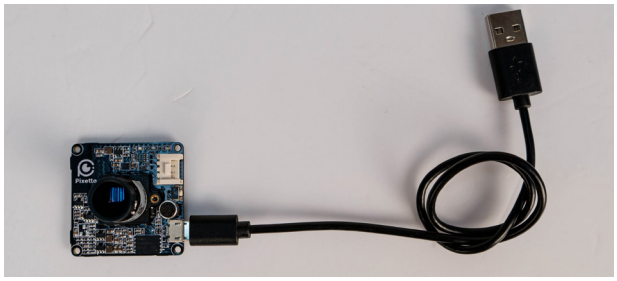


Figure 15: Connecting the Micro USB 2.0 cable to the VIA Pixetto vision sensor

Step 2

Connect the VIA Pixetto vision sensor to a USB 2.0/USB 3.0 port on the PC.

Figure 16: Connecting the VIA Pixetto vision sensor to the computer

Step 3

Wait until the green, blue and red LEDs are lit indicating that the vision sensor is ready to use. Remember to remove the lens cover.

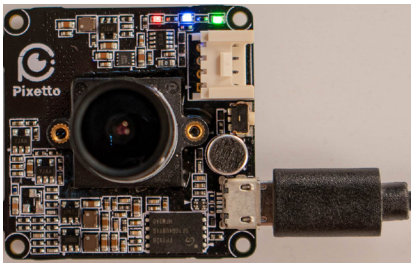


Figure 17: LED light diagram

4. How to configure VIA Pixetto Utility Functions

VIA Pixetto Utility is used to configure the VIA Pixetto vision sensor when performing the following functions: Color Detection, Color Code Detection, Shape Detection, Sphere Detection, Keypoint, and Template Matching.

4.1 How to configure Color Detection function

Select the Color Detection function in the VIA Pixetto Utility application to configure the VIA Pixetto vision sensor to detect the following six colors: red, blue, black, green, yellow and purple.

Step 1

To configure this function, open VIA Pixetto Utility. Select 'Color Detection' from the 'Function' menu on the upper right side of the application interface. Select any color by checking its designated box as shown in the diagram below. Click the 'Apply' button. You can now aim the VIA Pixetto vision sensor directly at the color you want to detect.

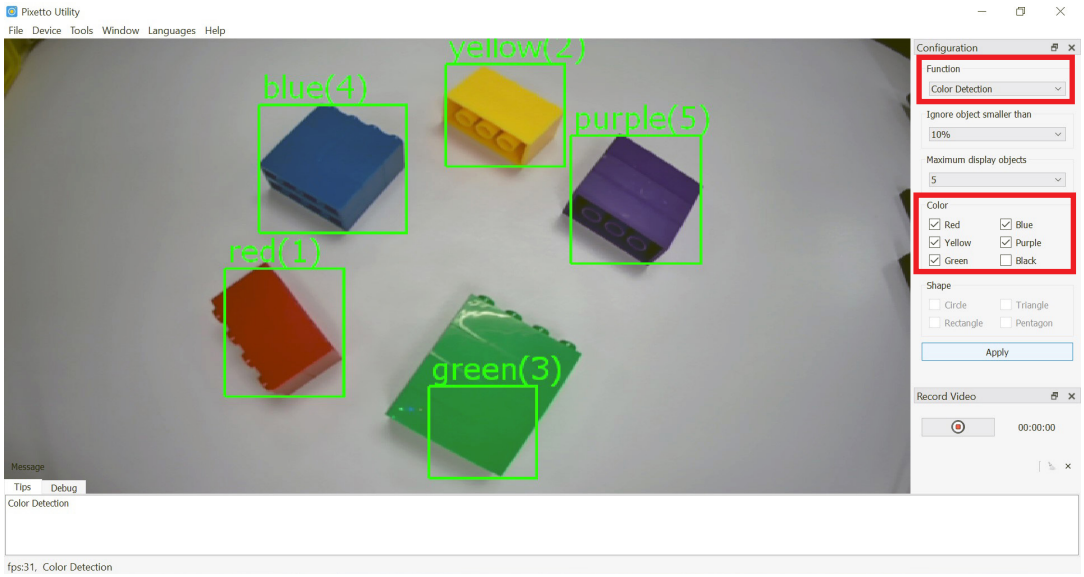


Figure 18: Color Detection diagram

Notes:
1. The 'Ignore object smaller than' function can be used to set the VIA Pixetto vision sensor to disregard objects that are smaller than a specific size, ranging from 10-50 percent of the view-point.
2. The 'Maximum display objects' function can be used to set the number of objects the VIA Pixetto vision sensor can detect.

4.2 How to configure Color Code Detection

To configure the VIA Pixetto vision sensor to detect two or more color tags placed together and present as a single object, select the Color Code Detection function in the VIA Pixetto Utility application.

Step 1

To configure this function, open VIA Pixetto Utility, and select 'Color Code Detection' from the 'Function' menu on the upper right side of the application interface. Select any color by checking its designated box as shown in the diagram below. Click the 'Apply' button. You can now aim the VIA Pixetto vision sensor directly at the colors you want to detect.

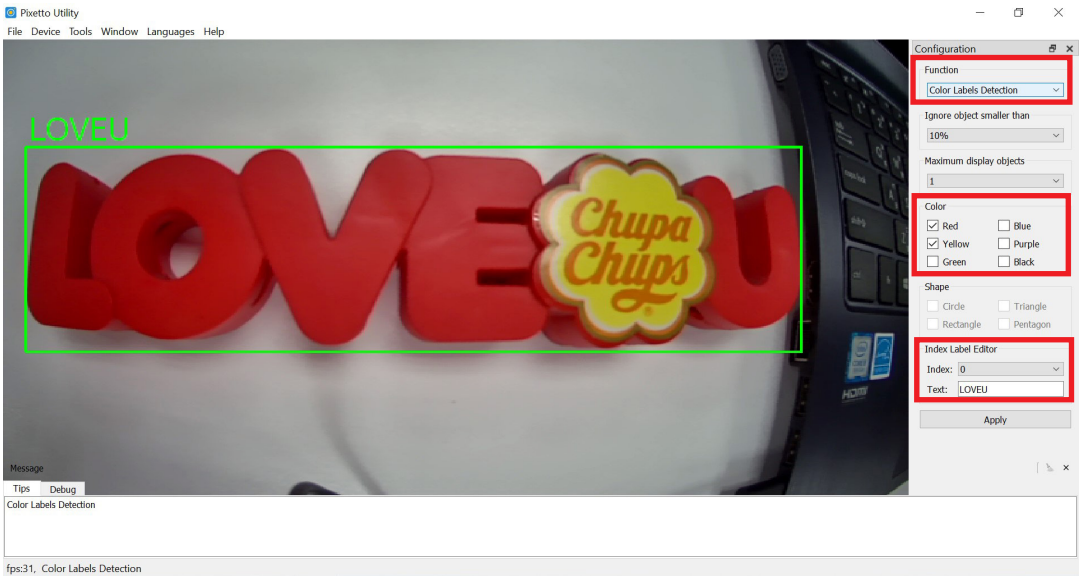


Figure 19: Color Code Detection diagram

Notes:
1. The 'Ignore object smaller than' function can be used to set the VIA Pixetto vision sensor to disregard objects that are smaller than a specific size, ranging from 10-50 percent of the view-point.
2. The 'Maximum display objects' function can be used to set the number of objects the VIA Pixetto vision sensor can detect.
3. The 'Index Label Editor' can be used to rename the detected label. For example, below you can see that the Index Label Editor has been used to rename the label detected as 'LOVEU'.

4.3 How to configure Shape Detection

Select Shape Detection in the VIA Pixetto Utility application to configure the VIA Pixetto vision sensor to detect shapes in the following forms: circle, triangle, rectangle, and pentagon.

Step 1

To configure this function, open VIA Pixetto Utility and select 'Shape Detection' from the 'Function' menu on the upper right side of the application interface. Select any shape by checking its designated box as shown in the diagram below. Click the 'Apply' button. You can now aim the VIA Pixetto vision sensor directly at the shape you want to detect.

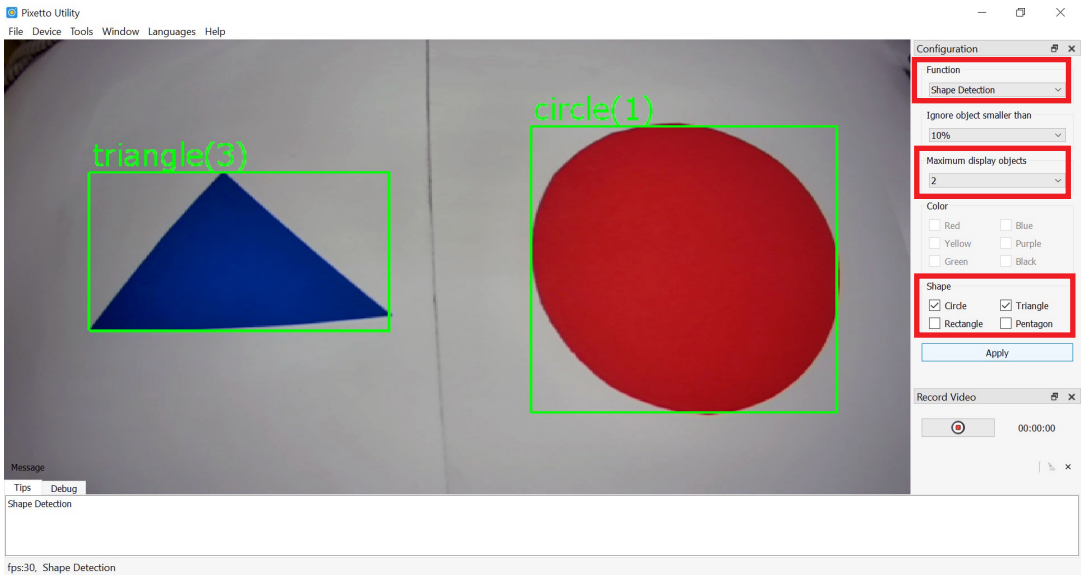


Figure 20: Triangle and Circle Shape Detection diagram

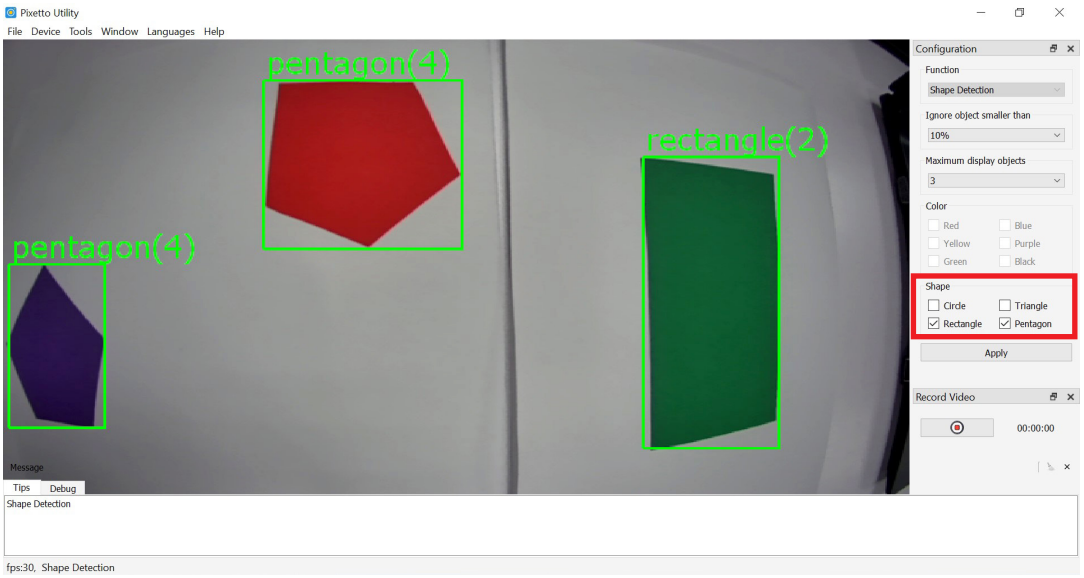


Figure 21: Rectangle and Pentagon Shape Detection diagram

Notes:
1. The 'Ignore object smaller than' function can be used to set the VIA Pixetto vision sensor to disregard objects that are smaller than a specific size, ranging from 10-50 percent of the view-point.
2. The 'Maximum display objects' function can be used to set the number of objects the VIA Pixetto vision sensor can detect.

4.4 How to configure Sphere Detection

Select Sphere Detection in the VIA Pixetto Utility application to configure the VIA Pixetto vision sensor to detect Spherical objects in the following colors: red, blue, yellow, purple, green and black.

Step 1

To configure this function, open VIA Pixetto Utility, then select 'Sphere Detection' from the 'Function' menu on the upper right side of the application interface. Select any color by checking its designated box as shown in the diagram below. Click the 'Apply' button. You can now aim the VIA Pixetto vision sensor directly at the Sphere object you want to detect.

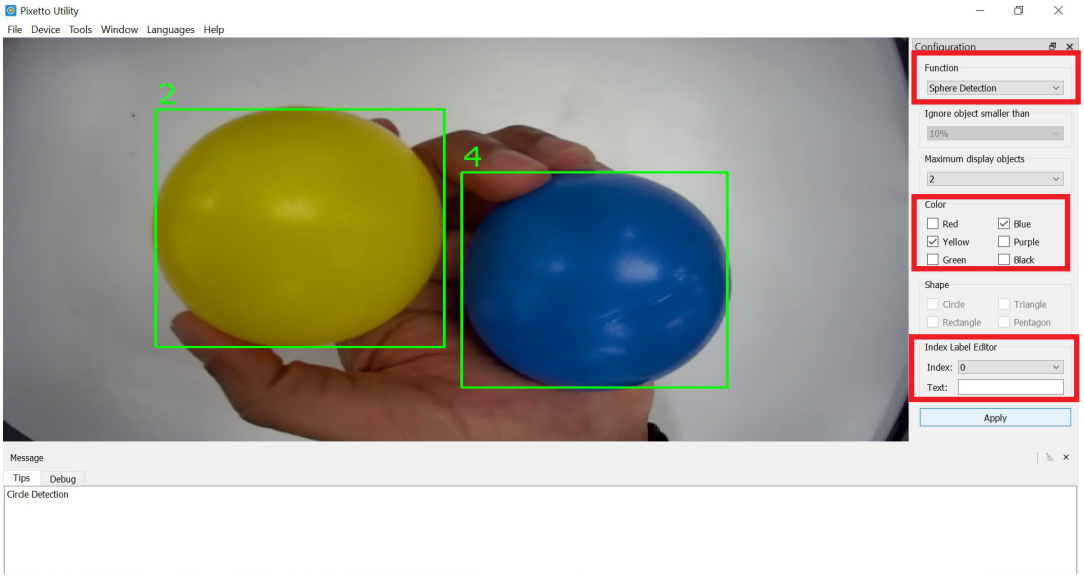


Figure 22: Sphere Detection diagram

Notes:
1. The 'Ignore object smaller than' function can be used to set the VIA Pixetto vision sensor to disregard objects that are smaller than a specific size, ranging from 10-50 percent of the view-point.
2. The 'Maximum display objects' function can be used to set the number of objects the VIA Pixetto vision sensor can detect.
3. The 'Index Label Editor' can be used to rename the detected Spheres.

4.5 How to configure Template Matching

To locate a specific area on an image using the VIA Pixetto vision sensor, use the Template Matching function in the VIA Pixetto Utility application.

Step 1

To configure this function, open VIA Pixetto Utility, and select 'Template Matching' from the 'Function' menu on the right side of the application interface.

Next, aim the VIA Pixetto vision sensor at the area of the image, then highlight the area on the image you want to template using the mouse, then select 'Apply'.

Figure 23: Highlighting template diagram

Step 2

To name the template area, use the Index Label Editor by entering the name in the 'Text' box as shown in the image below and select 'Apply'. Next, aim the VIA Pixetto vision sensor directly at the template area to detect it.

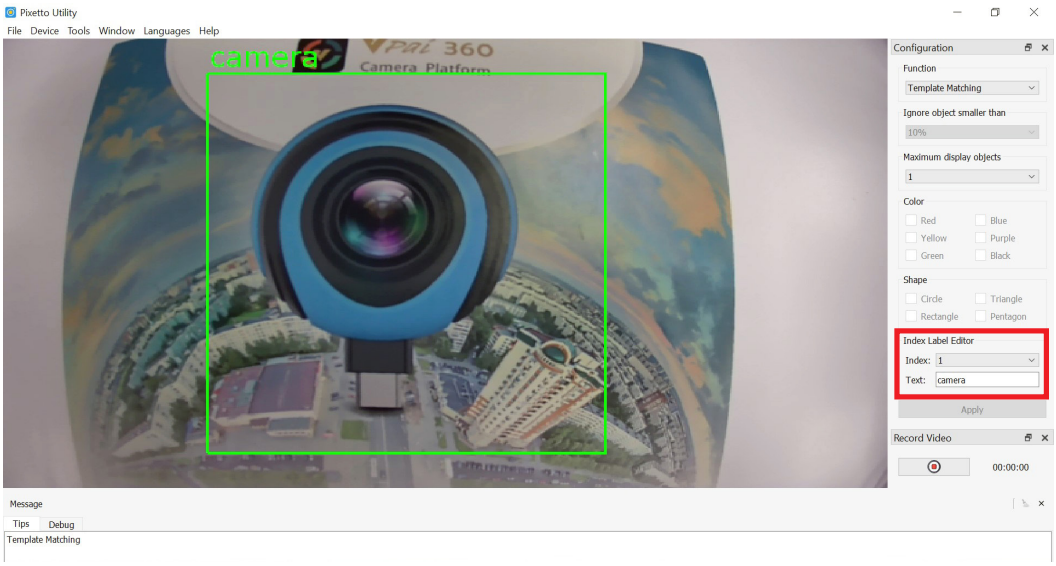


Figure 24: Template Matching diagram

Note:
The 'Maximum display objects' function can be used to set the number of objects the VIA Pixetto vision sensor can detect.

4.6 How to configure Keypoint

To configure the VIA Pixetto vision sensor to locate specific keypoints on an image or a body part, select the Keypoint function in the VIA Pixetto Utility application.

Step 1

To configure this function, open VIA Pixetto Utility, then select 'Keypoint' under the 'Function' menu on the upper right side of the application interface. Next, aim the VIA Pixetto vision sensor directly at the area to locate the keypoints, as shown below in the image.

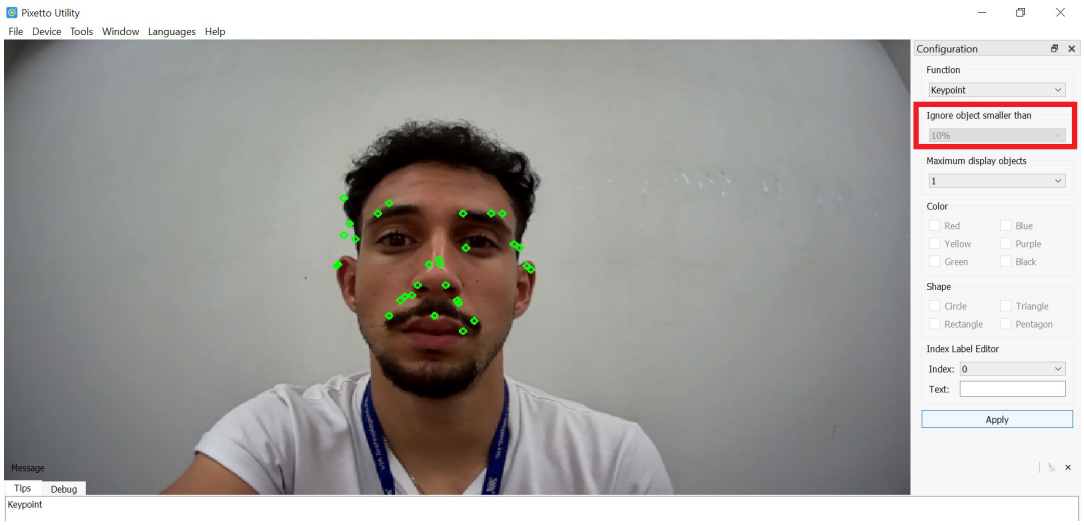


Figure 25: Keypoints diagram

Step 2

When the keypoints are located, a green box will highlight the keypoint area. To name the Keypoint area use the Index Label Editor by entering the name in the 'Text' box as shown in the image below. Next, aim the VIA Pixetto vision sensor at the Keypoint area to detect it.

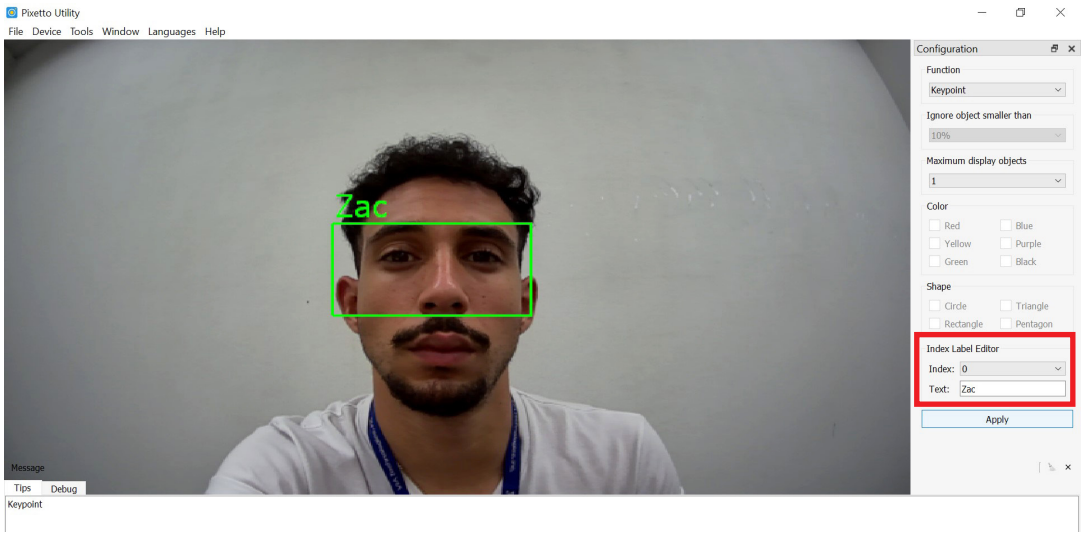


Figure 26: Keypoints detected diagram

Note:
The 'Maximum display objects' function can be used to set the number of objects the VIA Pixetto vision sensor can detect.

4.7 How to configure Face Detection

To configure the VIA Pixetto vision sensor to detect the facial features of a person, select the Face Detection function in the VIA Pixetto Utility application.

Step 1

To configure this function, open VIA Pixetto Utility, then select 'Face Detection' from the 'Function' menu on the upper right side of the application interface.

When the facial features of the person are detected, a green box will highlight the facial area. To name it, use the Index Label Editor by entering the name of the person in the 'Text' box as shown in the image below. Next, aim the VIA Pixetto vision sensor directly at the face of the person that you want to detect as shown below in the image.

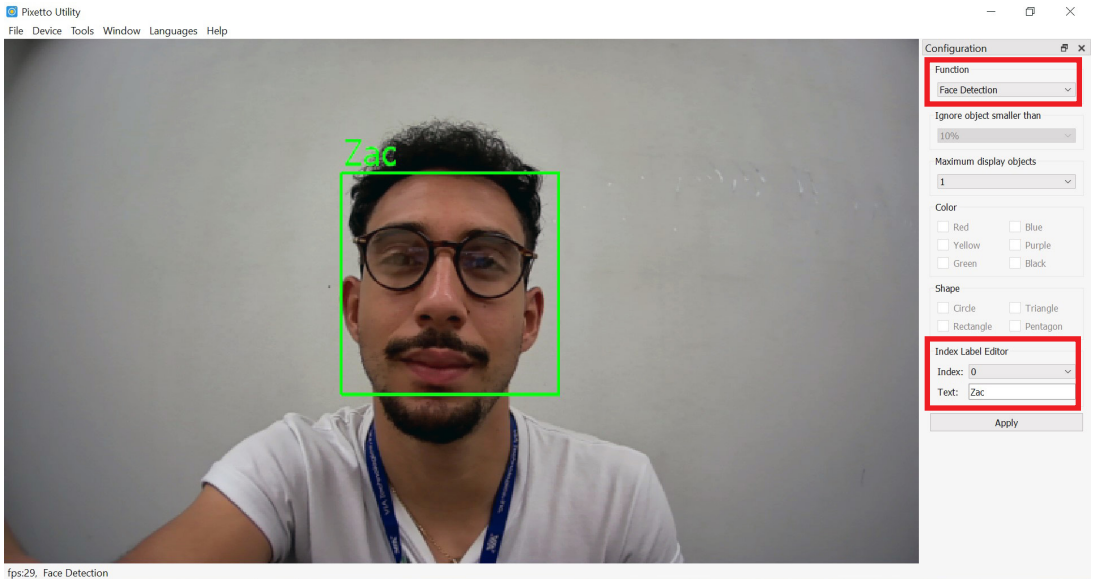


Figure 27: Face Detection diagram

Note:
The 'Maximum display objects' function can be used to set the number of objects the VIA Pixetto vision sensor can detect.

5. How to use the VIA Pixetto Machine Learning Accelerator

This section provides information on how to use the VIA Pixetto Machine Learning Accelerator. The Machine Learning Accelerator is a cloud server used for training the VIA Pixetto vision sensor to perform different Computer Vision and Neural Network tasks.

5.1 How to use Pre-trained Models

The VIA Pixetto Machine Learning Accelerator comes with three easy-to-download pre-trained models: Handwriting recognition for digits, Handwriting recognition for letters, and Traffic sign recognition. The following steps below will show you how to download and train the VIA Pixetto vision sensor with these models.

Step 1

Open the VIA Pixetto Machine Learning Accelerator at https://mls.pixetto.ai/

Figure 28: Machine Learning Accelerator diagram

Step 2

Click the 'Login' button to open the login screen. Log in by entering a user name, and click the 'Login' button.

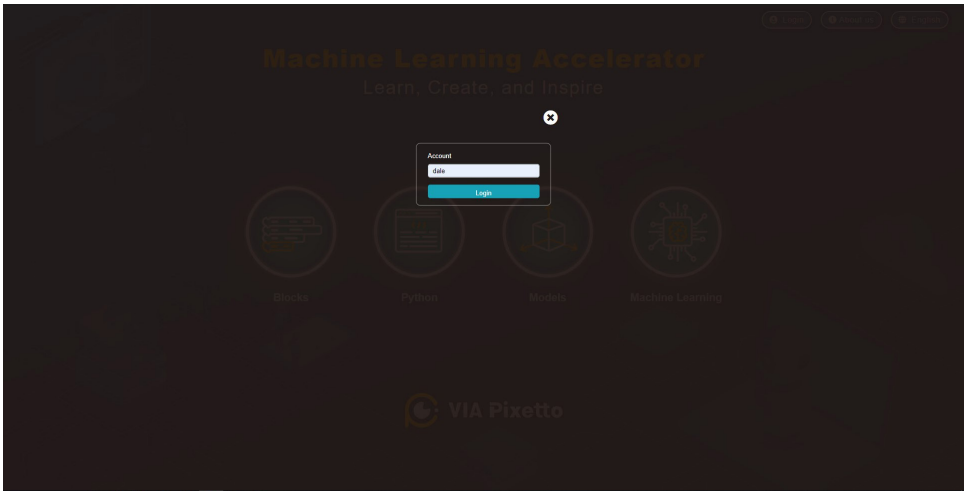


Figure 29: User Login diagram

Click the 'OK' button on the welcome pop-up message.

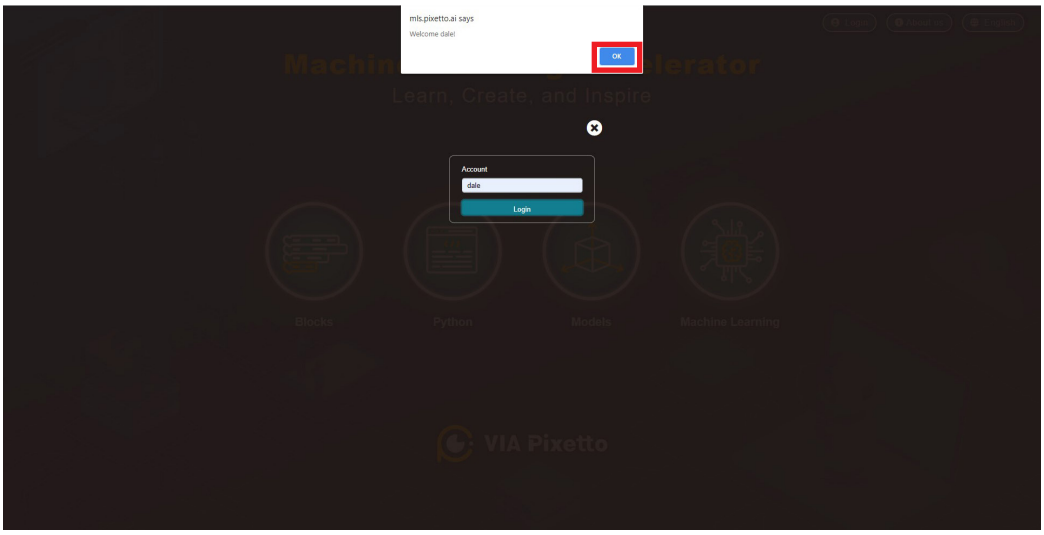


Figure 30: Login pop-up message diagram

Step 3

Click on the 'Models' icon.

Figure 31: Model icon diagram

Step 4

You will see the three available models; Handwriting recognition for digits, letters, and Traffic sign recognition.

Figure 32: Pre-trained models diagram

Note:
If this notification pops-up, make sure to open the Pixetto Link so the download can proceed. You can also use the cancel icon to stop the download process.

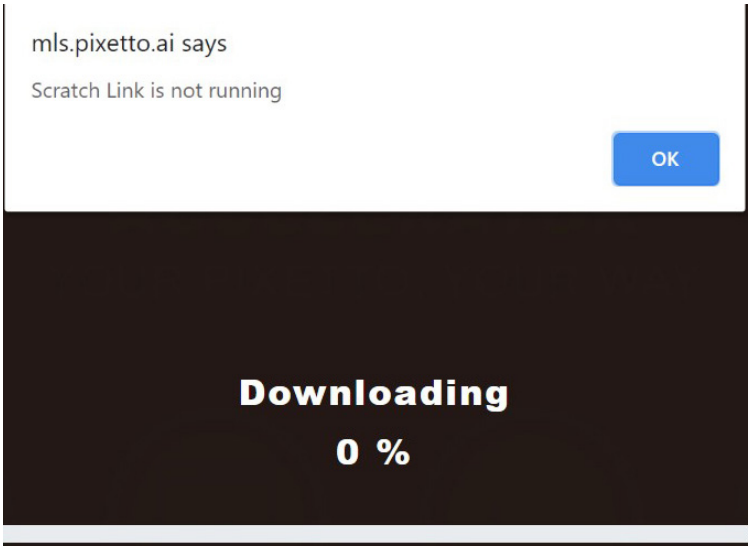


Figure 33: Pixetto Link Notification diagram

Step 5

Click on the 'Handwriting recognition for digits' icon to download the pre-trained model. You can also click on the other model icons to download them.

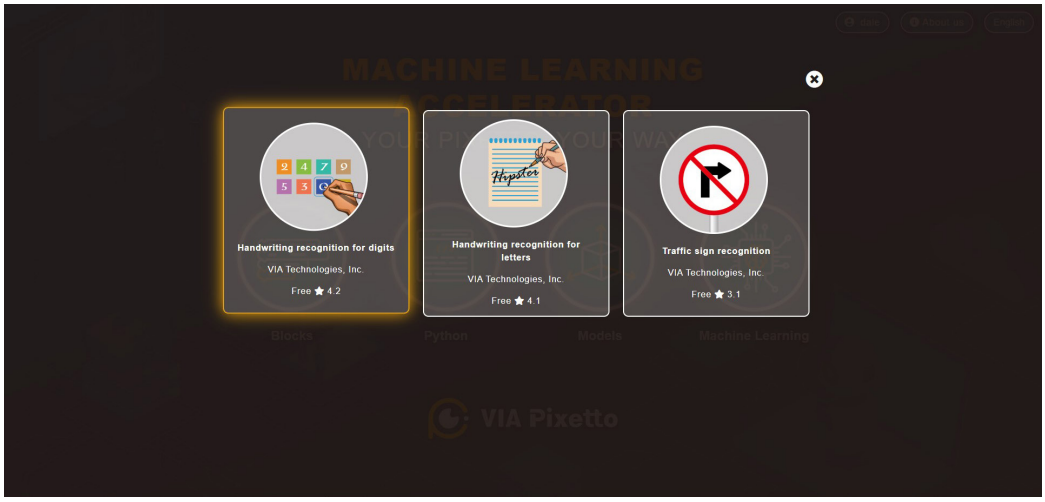


Figure 34: Handwriting recognition for digits icon diagram

Note:
Make sure that your VIA Pixetto vision sensor is connected to the device you are using. If it's not connected a pop-up notification will appear on your PC.

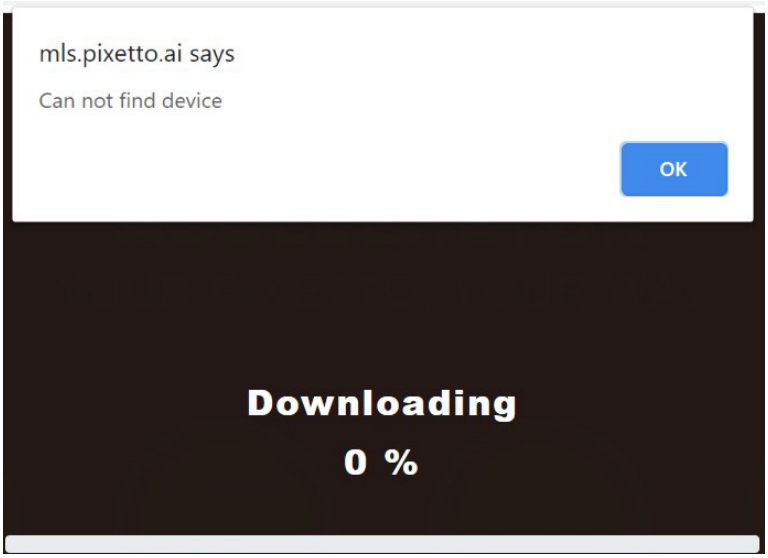


Figure 35: VIA Pixetto vision sensor notification diagram

Step 6

Open the VIA Pixetto Utility application and start identifying the model. When the model is downloaded, click on the cancel button to return to the model platform. The recognition results of the three models are shown below.

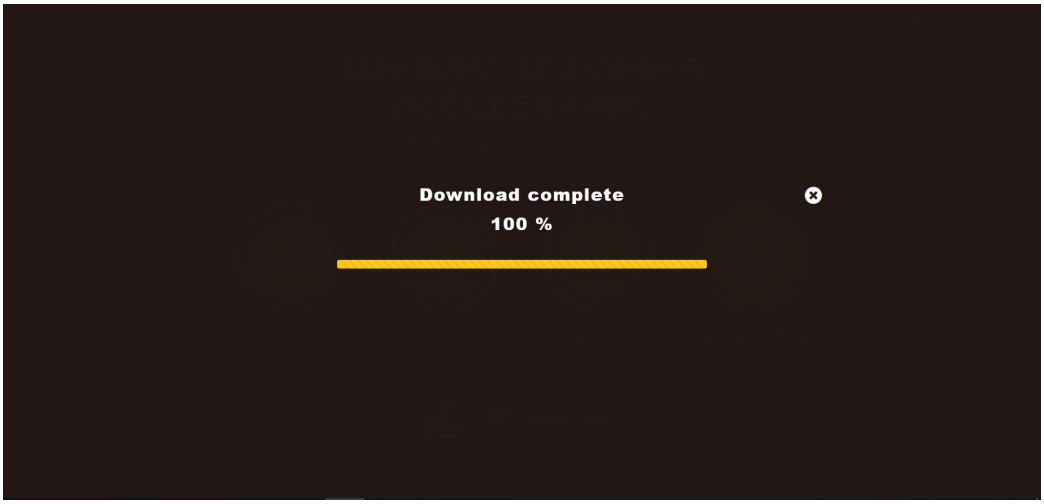


Figure 36: Handwriting digits recognition model downloaded diagram

Note:
If you can't download the other model and the notification below pops-up, its means that your VIA Pixetto Utility application is open. Simply close it to download the other models to the VIA Pixetto vision sensor.

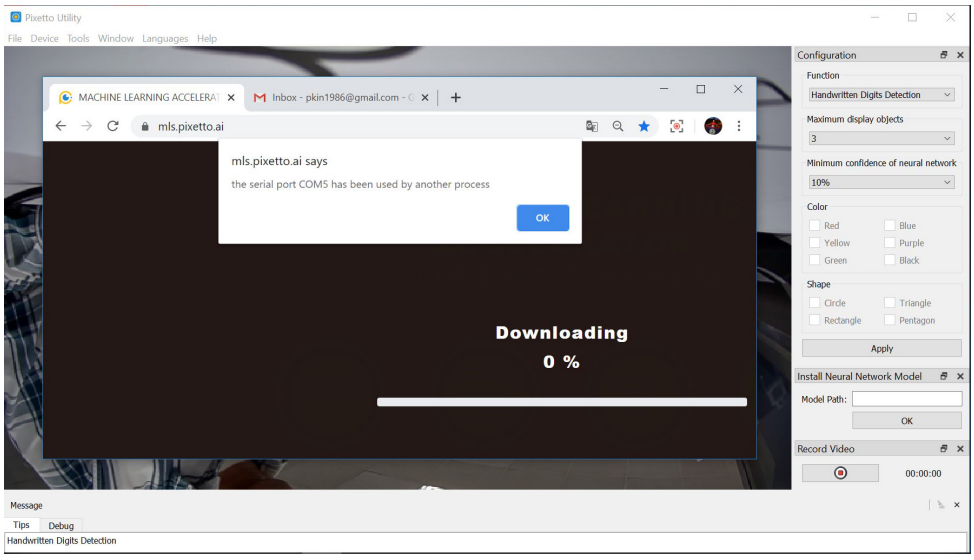


Figure 37: Serial port notification diagram

Notes:
1. The 'Maximum display of neural network' function can be used to set the VIA Pixetto vision sensor to disregard objects that are smaller than a specific size, ranging from 10-50 percent of the view-point.
2. Repeat step 4 and 5 to download the other two models.

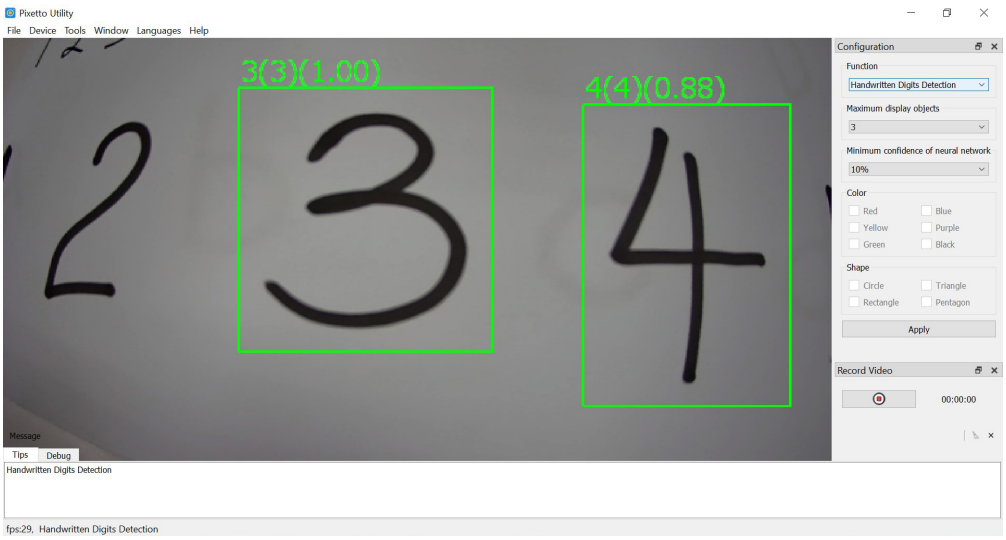


Figure 38: Handwriting digits recognition diagram

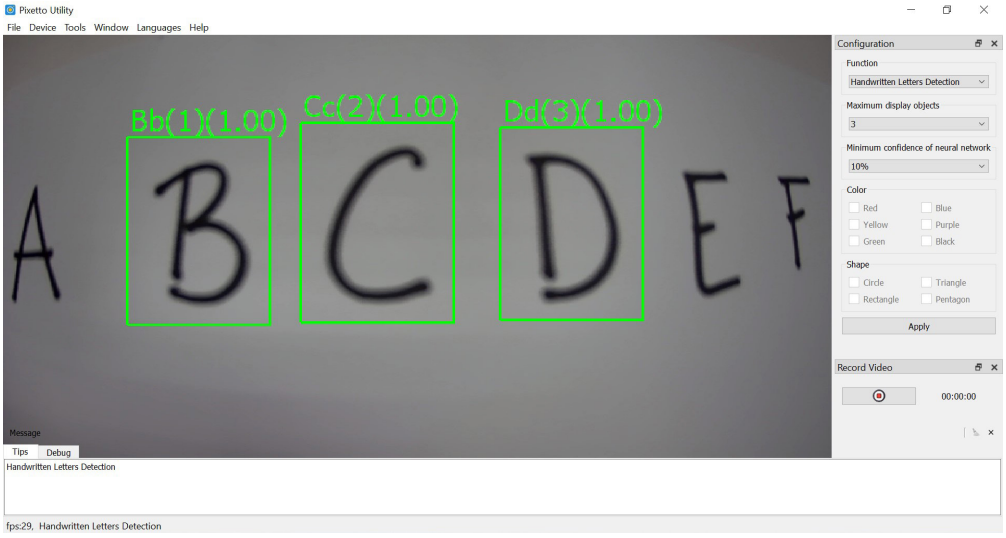


Figure 39: Handwriting letters recognition diagram

Figure 40: Traffic sign recognition diagram

5.2 How to use Blocks

The Blocks application is used to train your VIA Pixetto vision sensor to work with the Scratch online application. The VIA Pixetto extension has been embedded into the Scratch online application with different categories of blocks that allow easy programming to be done to the VIA Pixetto vision sensor.

> **Note**:
> Scratch is a programming language and an online community where children can program and share interactive media such as stories, games, and animations with people from all over the world

Step 1

Connect the VIA Pixetto vision sensor to the PC and open the VIA Pixetto Utility application.

Step 2

In the Function Settings (upper right), select the Color Detection function to configure the colors to be used in Scratch, then click the 'Apply' button.

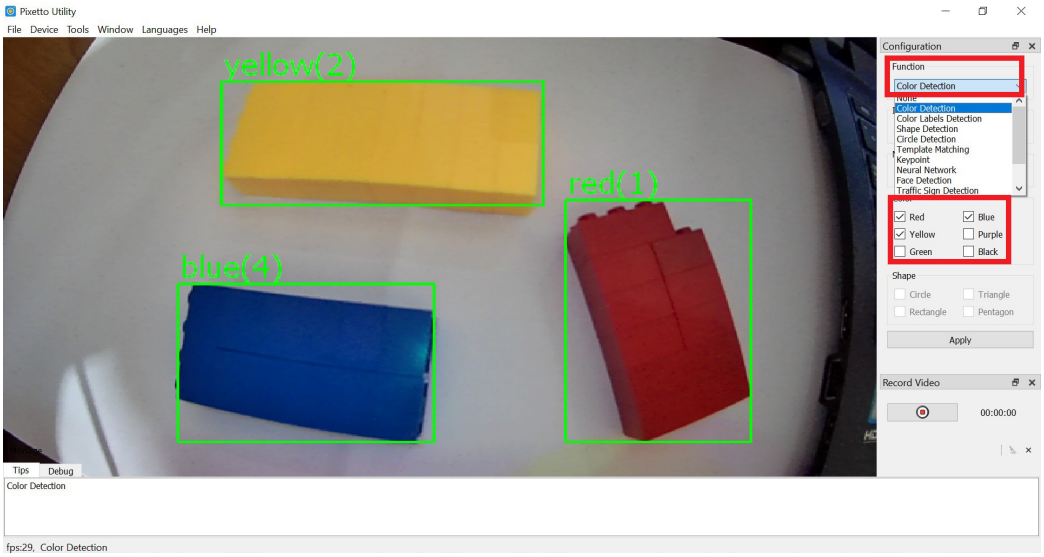


Figure 41: Scratch color detection diagram

Step 3

Close the VIA Pixetto Utility application.

Step 4

Go back to the VIA Pixetto Machine Learning Accelerator cloud home page. Click 'Blocks' to enter the Scratch application.

Figure 42: Login diagram

Step 5

You must click on the 'Add Extension' icon at the bottom left section of the Scratch application to open the extension application.

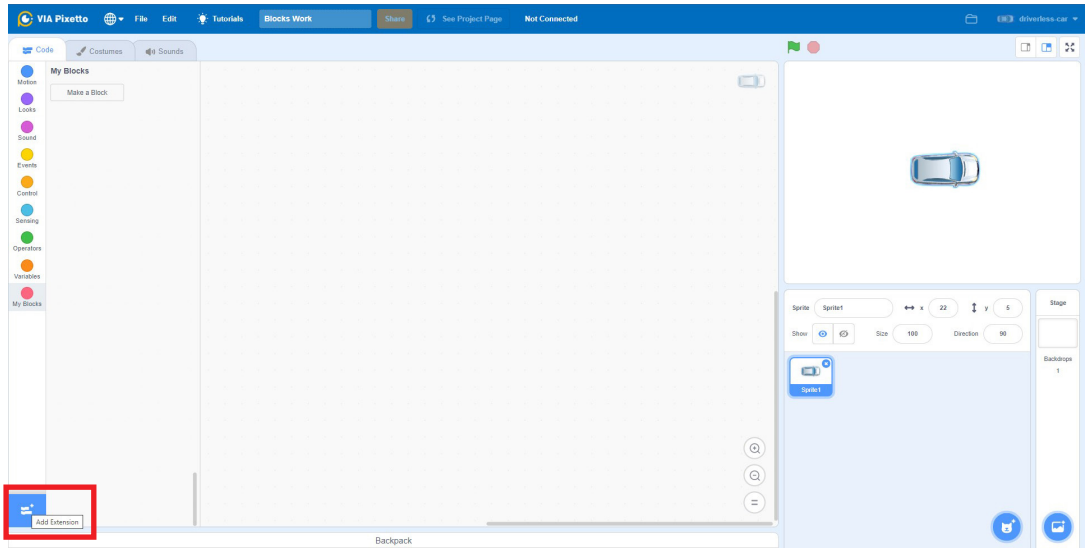


Figure 43: Add Extention icon diagram

The reason for opening the extension platform is to choose the VIA Pixetto extension which has been embedded into the Scratch application. Click on the 'VIA Pixetto extension' to open it. You will need these blocks to program the VIA Pixetto vision sensor to carry out different tasks.

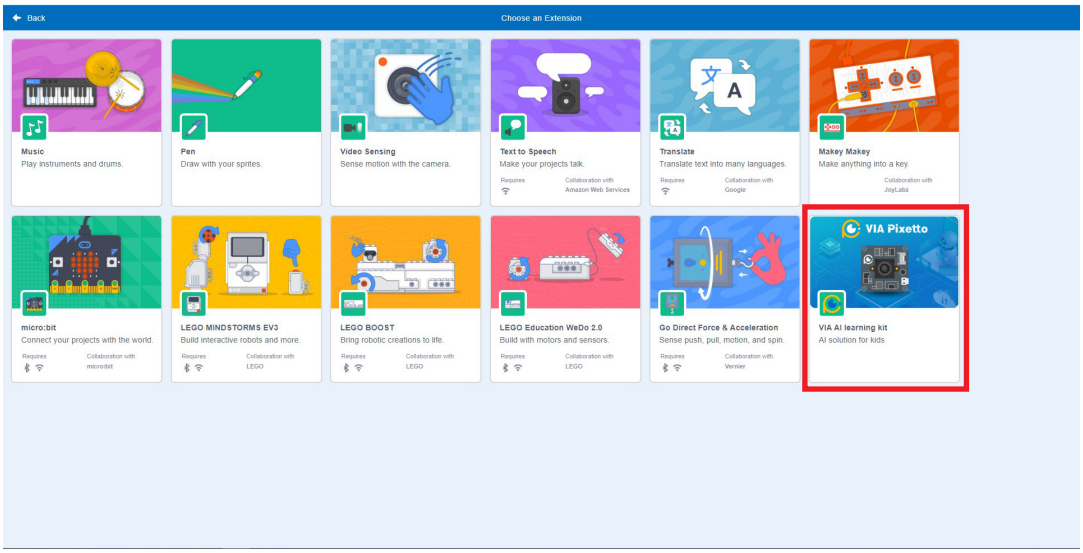


Figure 44: VIA Pixetto entension diagram

The VIA Pixetto extension will open on the Scratch application and you will be able to see the different categories of VIA Pixetto Blocks as shown below.

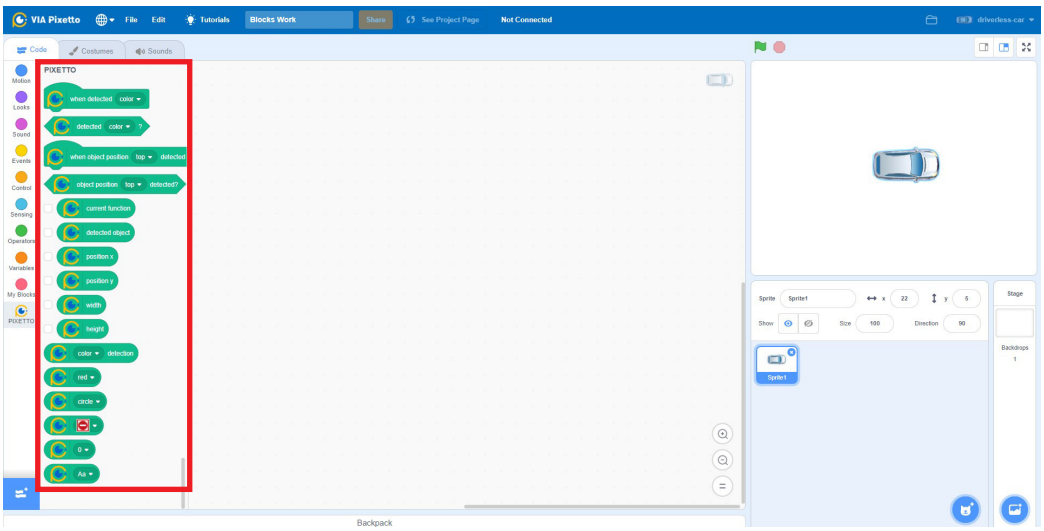


Figure 45: Scratch platform diagram

Step 6

We've created a sample that is named 'Chameleon' to be used as an example of how to upload your sample code to the VIA Pixetto vision sensor. The 'Chamelon' example has been created from VIA Pixetto Blocks and other categories of blocks from the Scratch application.

Click 'File', then select 'Load from your computer'. Locate the Scratch file on your PC, then select 'Open'.

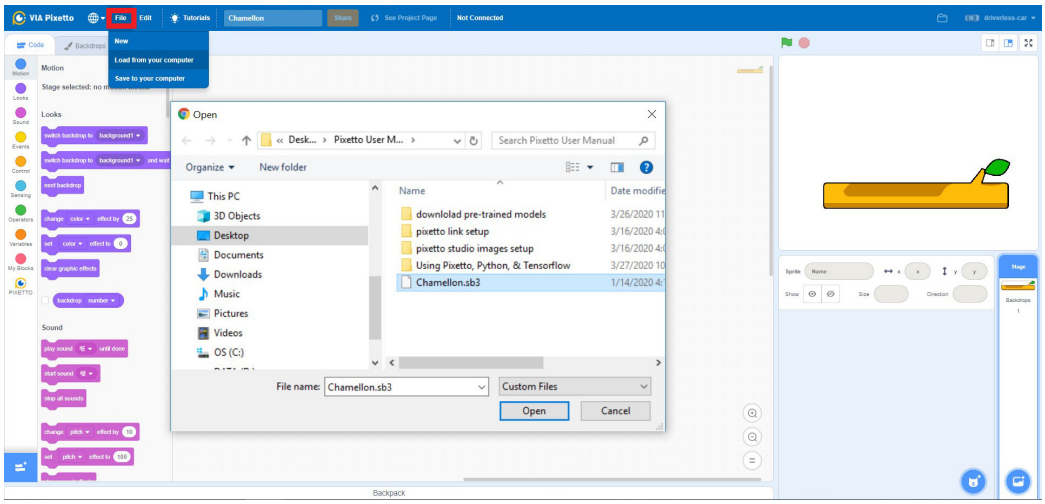


Figure 46: Locating scratch file diagram

The File will open as shown below.

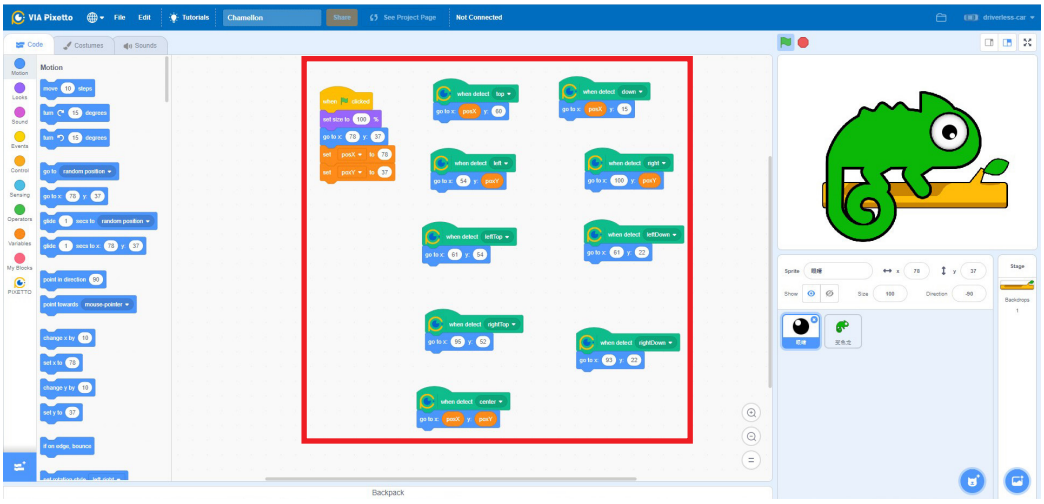


Figure 47: Chameleon example loaded diagram

Step 7

Check on the 'Not Connected' icon to open the connection.

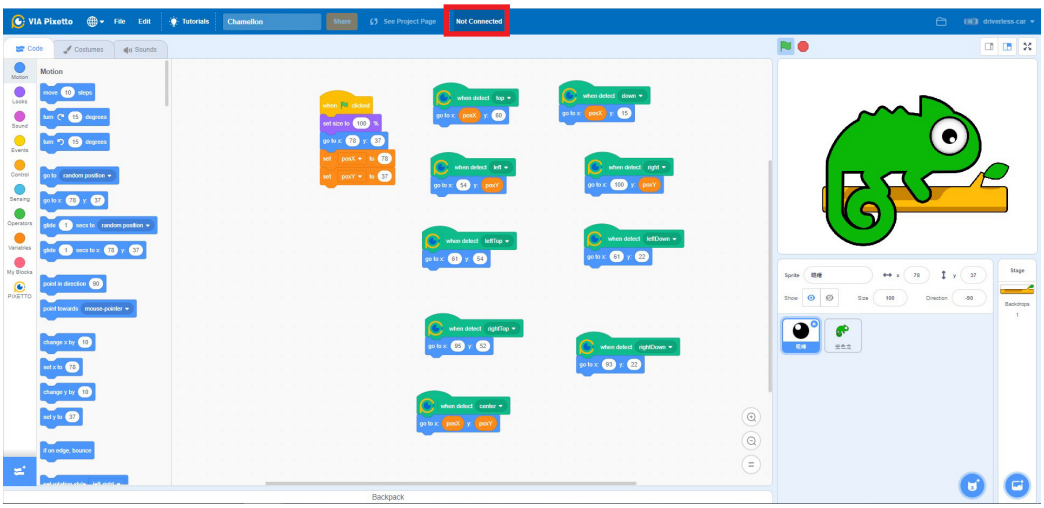


Figure 48: Not Connected icon diagram

Step 8

A pop-up notification will open, then a connection made between the VIA Pixetto vision sensor and the PC.

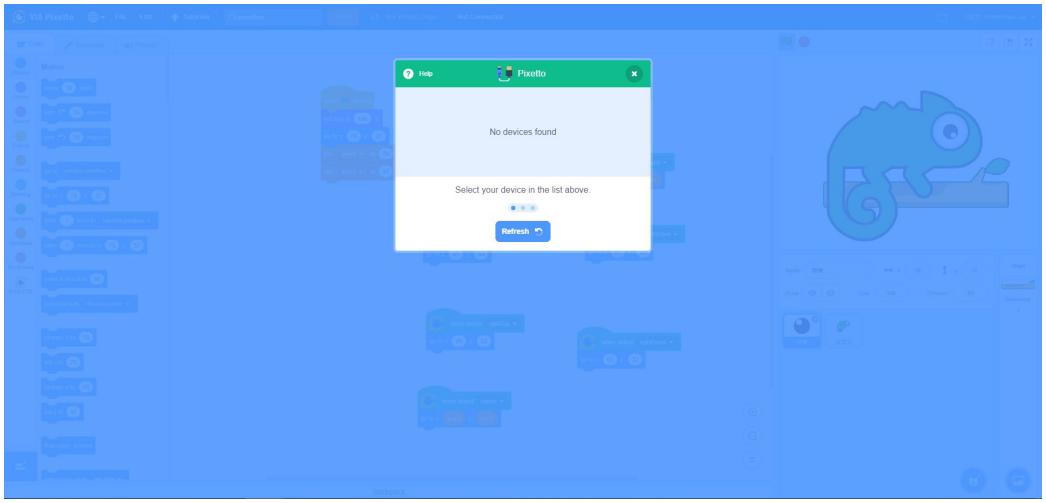


Figure 49: Pixetto Notification diagram

Step 9

Select the 'Connect' button to connect the VIA Pixetto vision sensor.

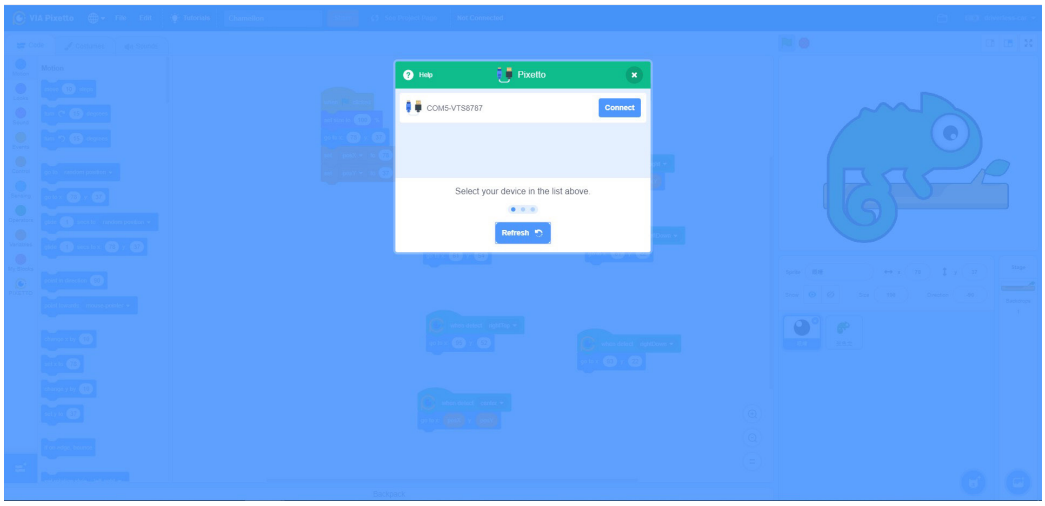


Figure 50: Connect button diagram

Once the VIA Pixetto vision sensor is connected, select 'Go to Editor' to return to the Scratch application.

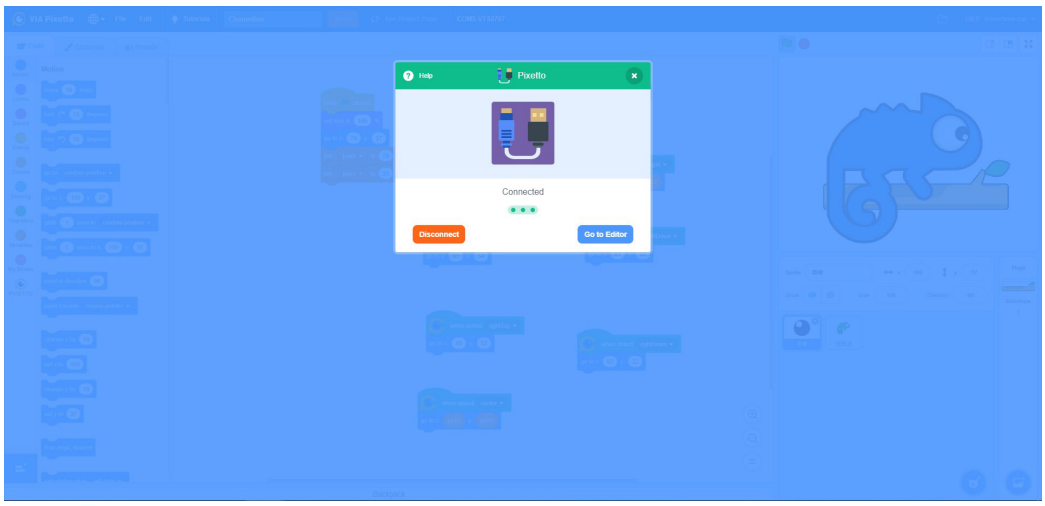


Figure 51: Go to Editor notification diagram

Step 10

Aim the VIA Pixetto vision sensor at the color, and the Chameleon will change color according to the color chosen, as shown below.

Yellow Chameleon

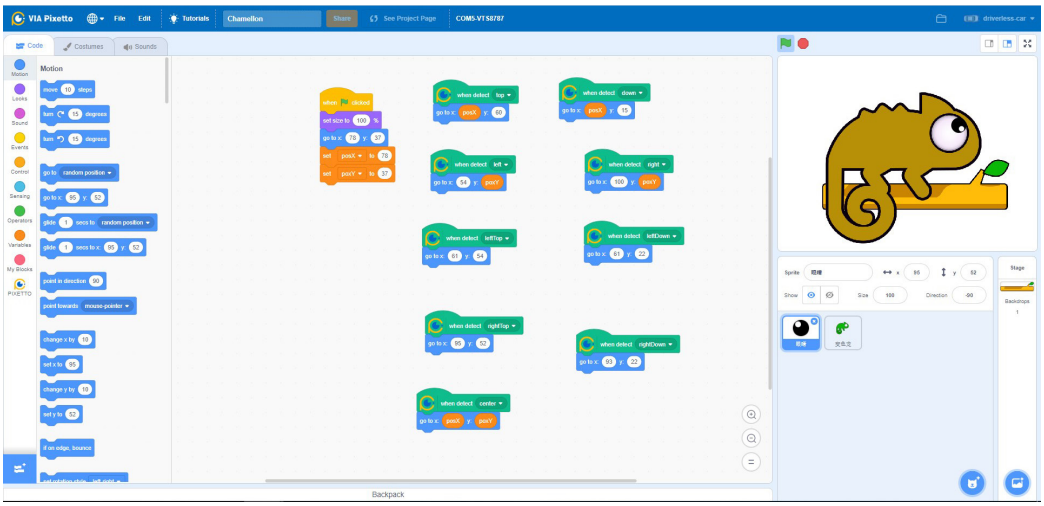


Figure 52: Yellow Chameleon diagram

Blue Chameleon

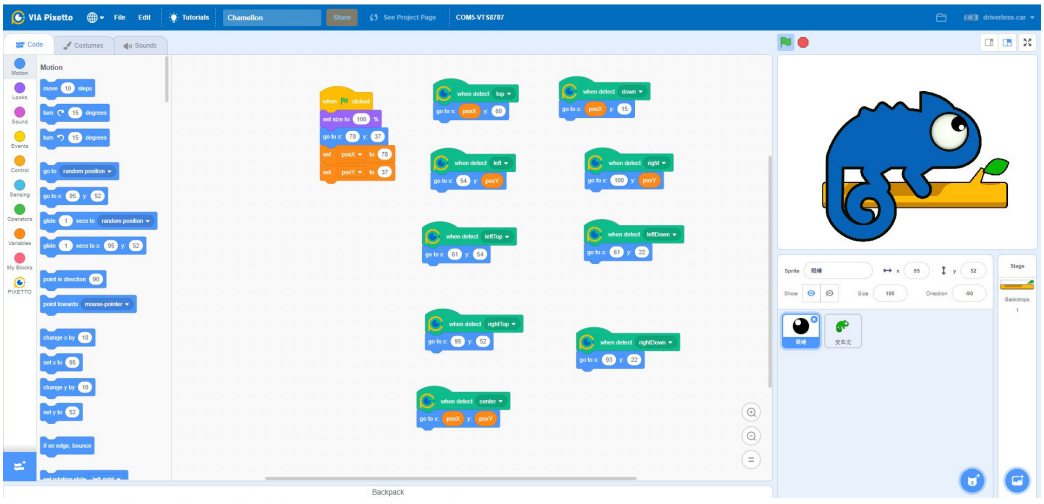


Figure 53: Blue Chameleon diagram

Red Chameleon

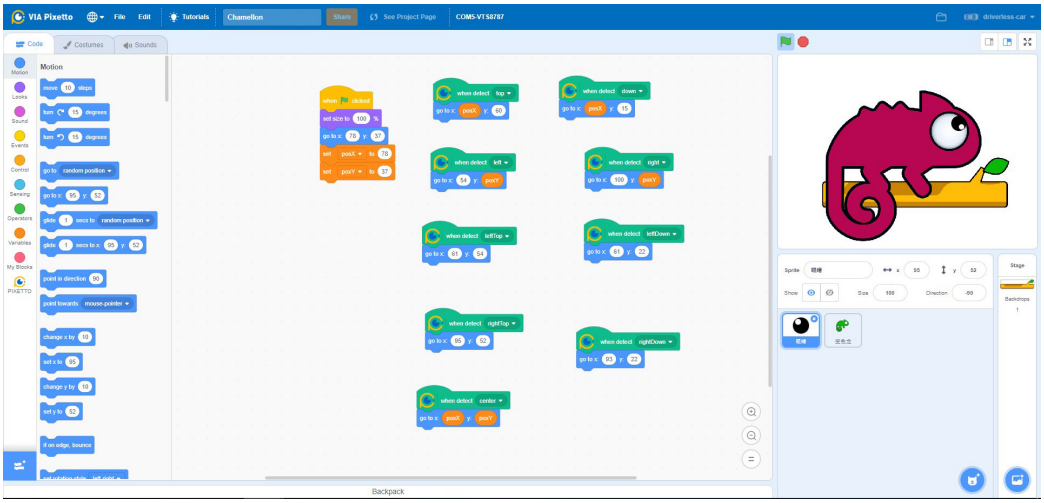


Figure 54: Red Chameleon diagram

Note:
Make sure to aim the VIA Pixetto vision sensor to one color at a time. You cannot aim it at multiple colors.

Step 11

When finished, click on the 'COM5-VTS8787' icon to disconnect the VIA Pixetto vision sensor.

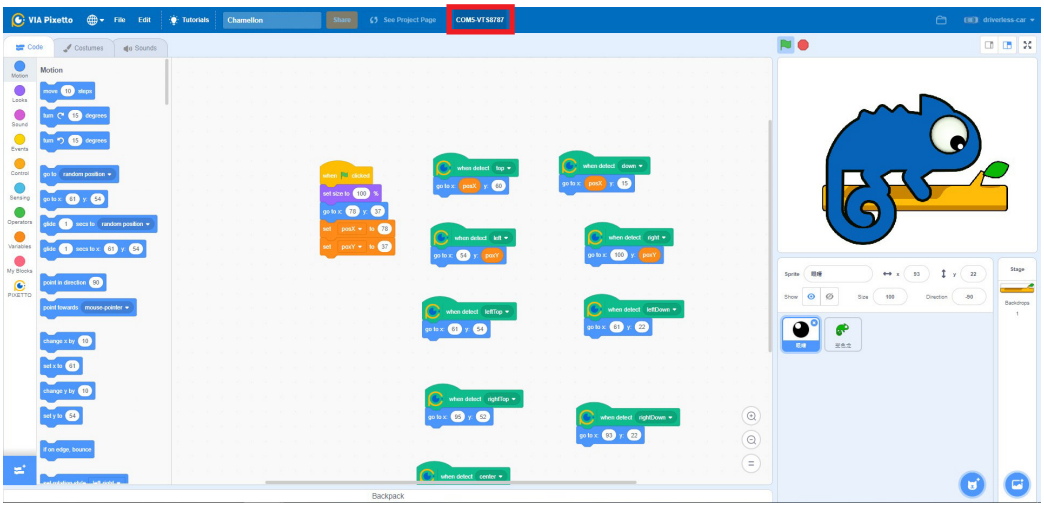


Figure 55: Disconnect from COM5-VTS8787 diagram

Select the ‘Disconnect’ icon to remove the VIA Pixetto vision sensor from the PC.

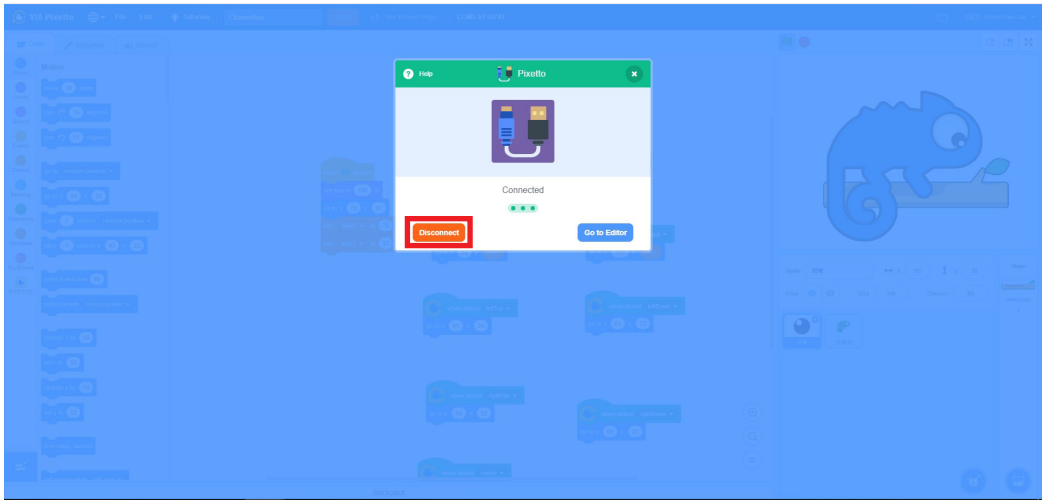


Figure 56: Disconnect pop-up icon diagram

When you click on the 'Disconnect' button, you will return back to the Editor application as shown below.

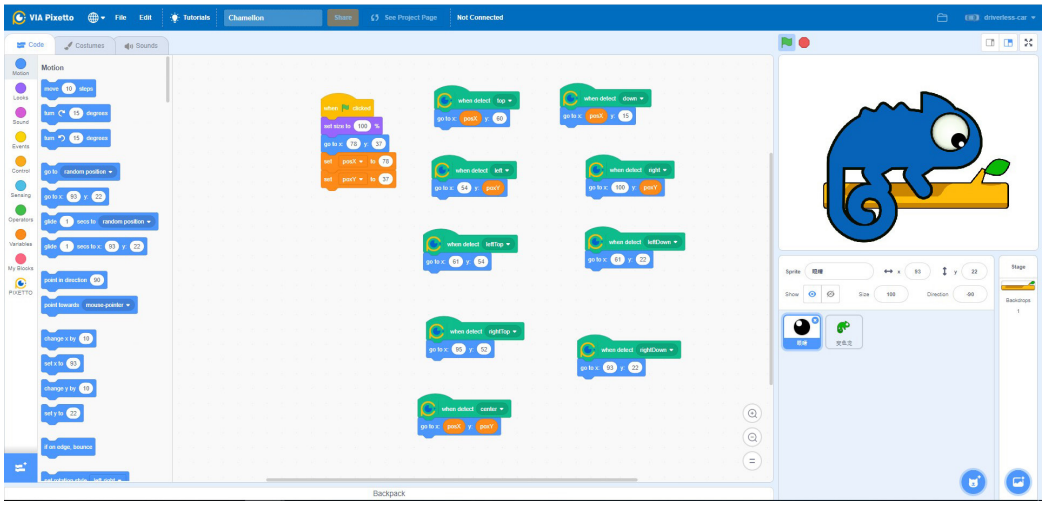


Figure 57: Editor application diagram

5.3 How to use Machine Learning

The Machine Learning application is used for building a Neural Network and training the VIA Pixetto vision sensor to recognize the newly created Neural Network.

Step 1

Open the VIA Pixetto Machine Learning Accelerator at https://mls.pixetto.ai/

Figure 58: Machine Learning Accelerator webpage diagram

Step 2

Click the 'Login' button to open the login screen. Log in by entering a user name, and click the 'Login' button.

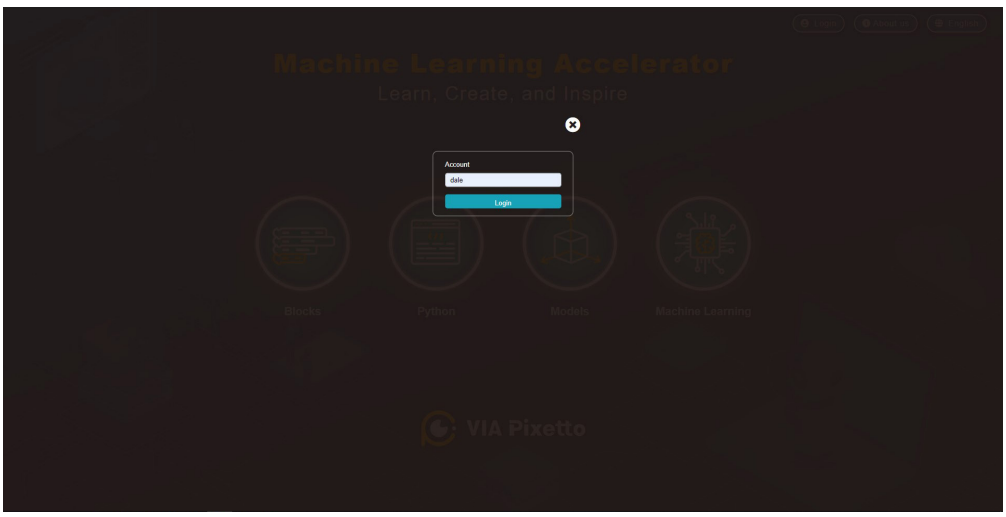


Figure 59: Login button diagram

Step 3

Click the '**OK**' button on the welcome pop-up message.

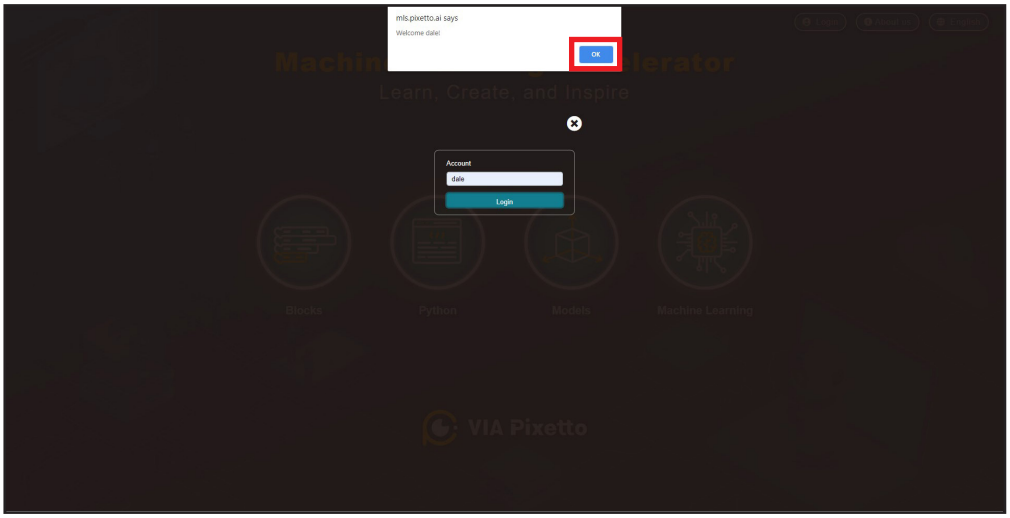


Figure 60: Login pop-up message diagram

Step 4

Enter the 'Machine Learning' section by clicking the 'Machine Learning' icon.

Figure 61: Machine learning icon diagram

Step 5

To record your video using VIA Pixetto Utility and the VIA Pixetto vision sensor, please refer to section 5.3.1.

Step 6

Click on the 'Upload Video' button to open the 'Add Label and Video' section. At the same time, you can also name the model by entering the name in the 'Enter Model Name' section in the top-left corner.

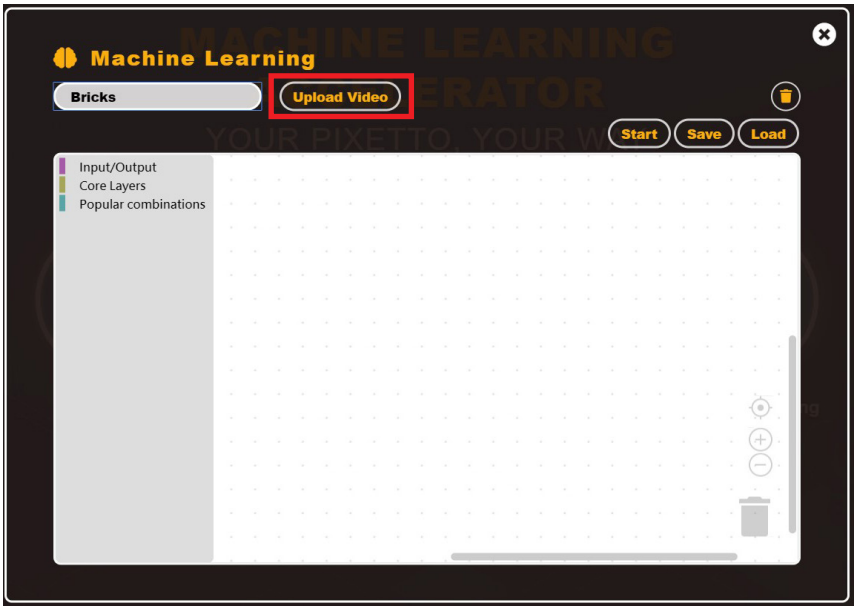


Figure 62: Upload Video platform diagram

Step 7

When the 'Add Label and Video' section is opened, you can label the video file with a name as shown below.

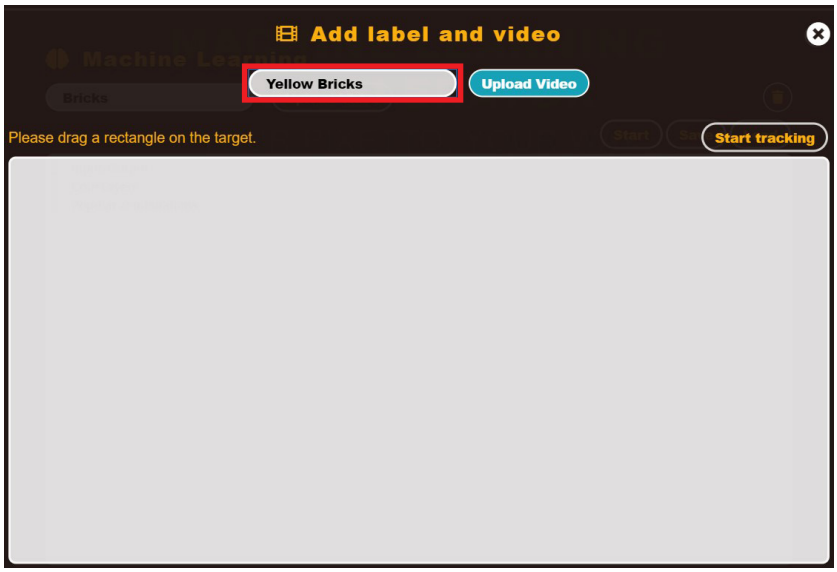


Figure 63: Add Label and Video platform naming diagram

Step 8

Click the upload video button and locate the video to be uploaded from your computer.

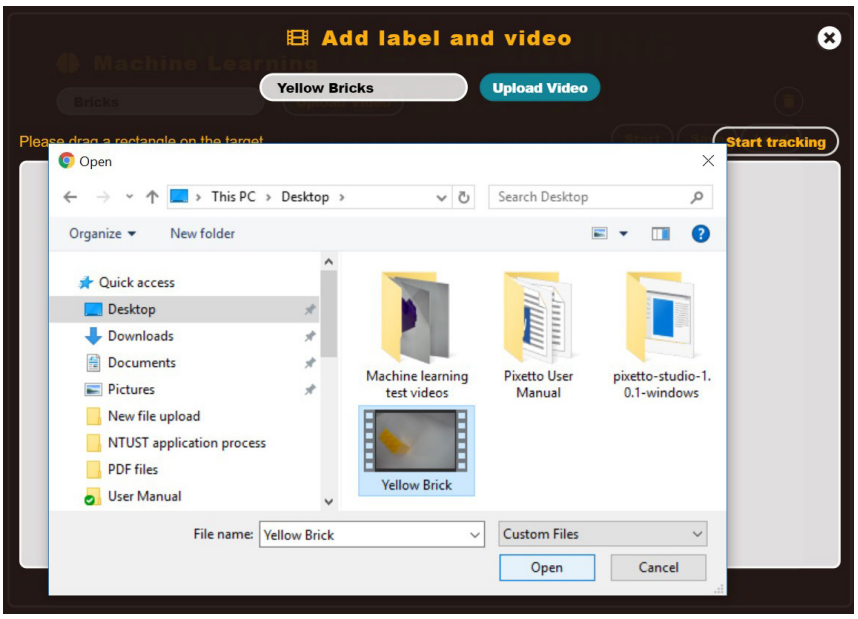


Figure 64: Add Label and Video uploading section diagram

Step 9

Use the mouse to frame the range of the object you want to train on the screen as shown in the green box below. Click 'Start tracking' to start uploading the file and tracking the object.

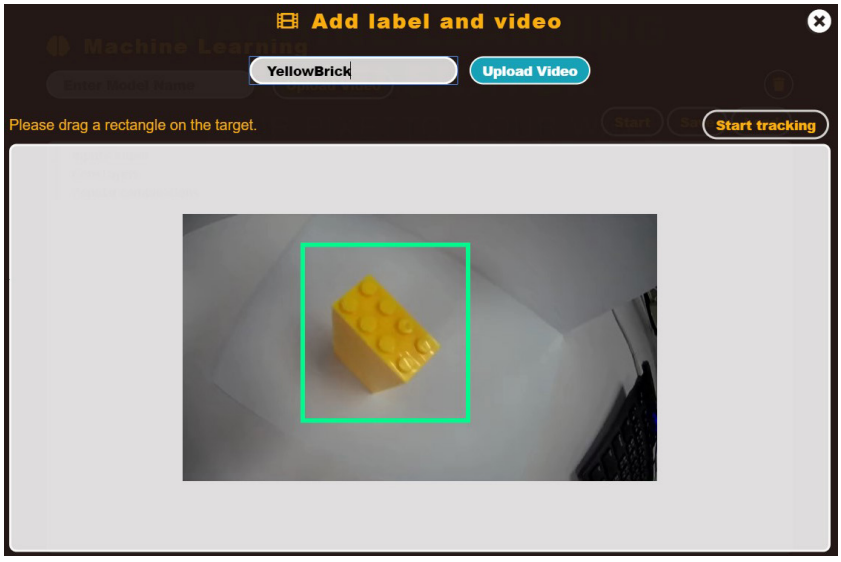


Figure 65: Framing the object diagram

Note:
Please review this notification and make the necessary changes to the naming of your video.

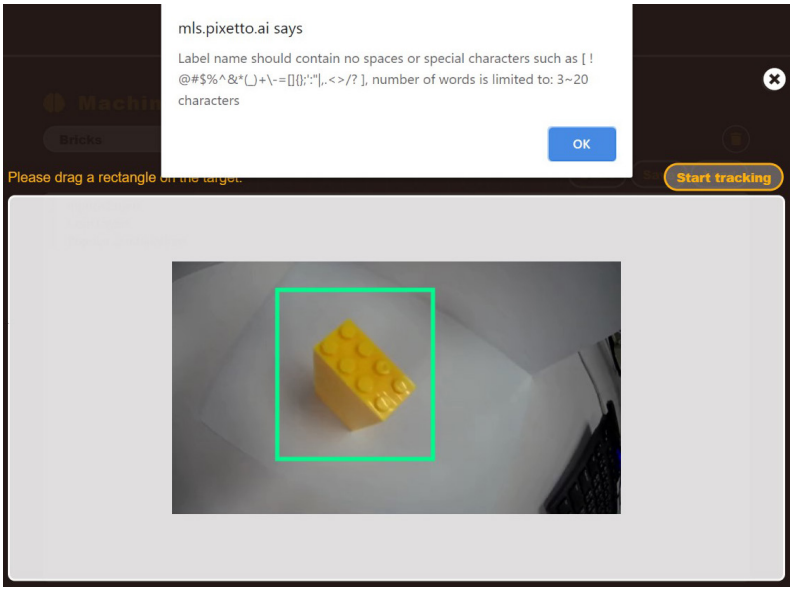


Figure 66: Video notification diagram

Step 10

Click the 'Yes' button to confirm storage of the object tracking results. You can also click the 'No' button to abandon the tracking results. To see the preview click on the 'Play' area.

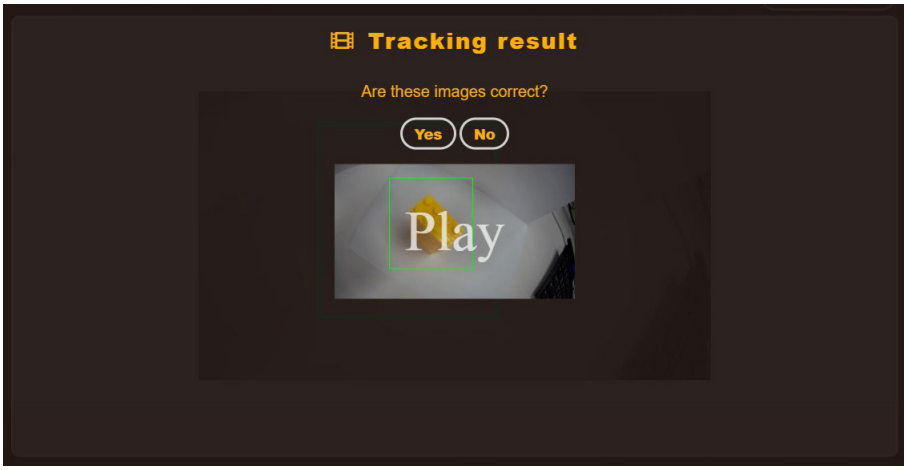


Figure 67: Play Tracking result diagram

Step 11

To upload the next video, repeat steps 6 - 10 to continue uploading the next file.

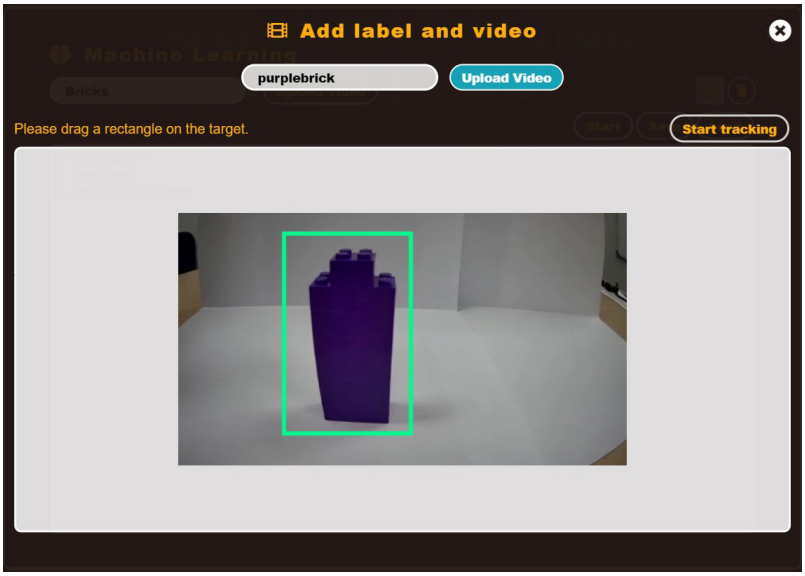


Figure 68: Uploading another video diagram

Step 12

The uploaded video file thumbnail images will be displayed in the upper right corner.

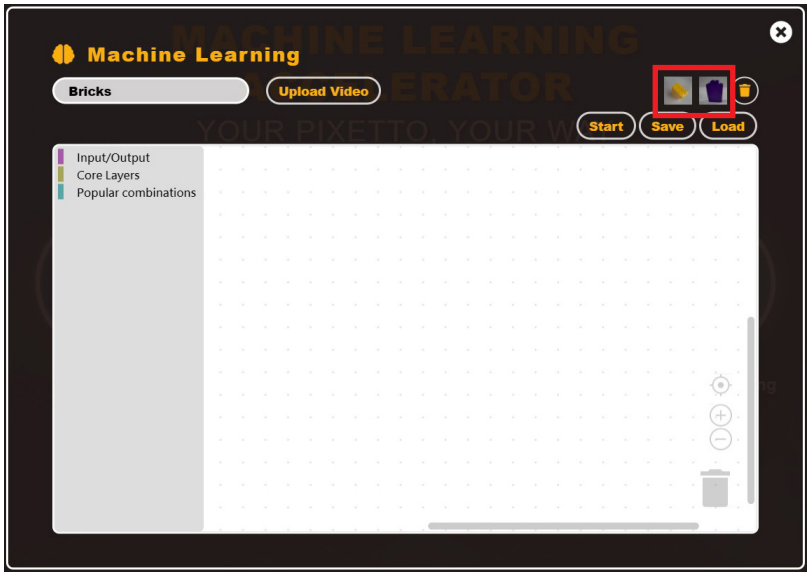


Figure 69: Video icons diagram

Step 13

Go to the platform and select 'Popular combinations' blocks to create a Neural Network as shown below. The number of objects to be trained (i.e. the number of uploaded files) is entered in the black box, as shown in the figure below. Click the 'Start' button to start training the network model.

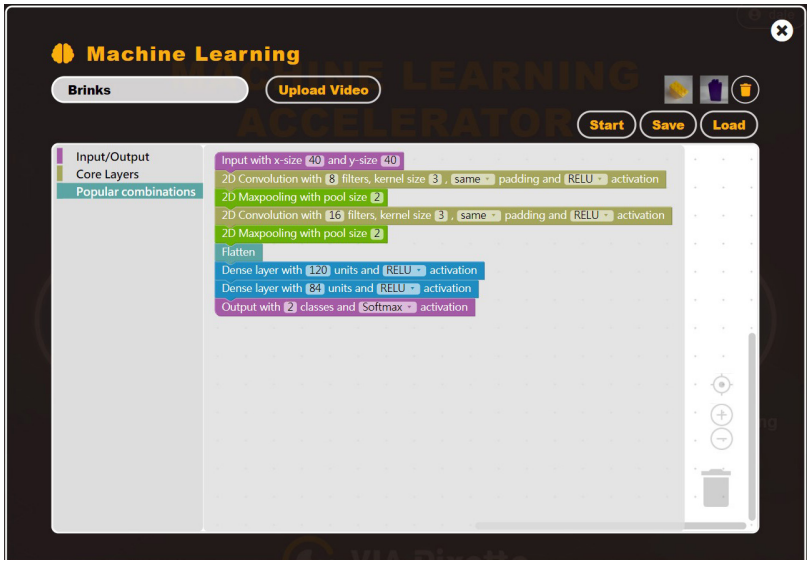


Figure 70: Popular combinations diagram

Step 14

Once started you will see the console page as shown below. The training process will be displayed here.

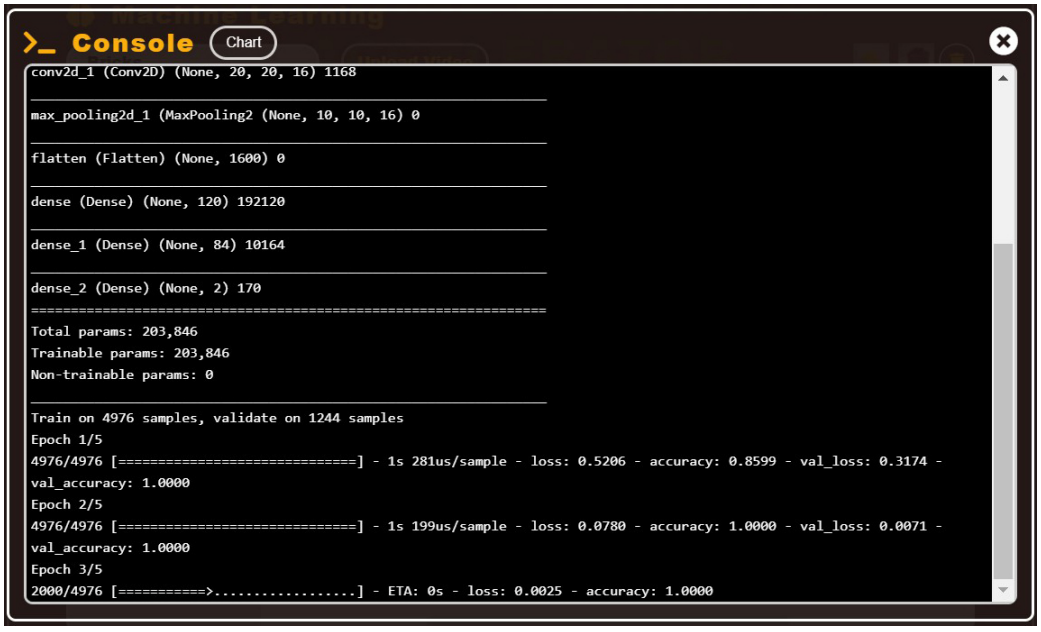


Figure 71: Console Training screen diagram

Step 15

When the word '===Finish===' appears, this means that training is completed.

Figure 72: Training Finished diagram

Step 16

To see an accuracy record of the training, click on the 'Chart' button. Click 'Console' to switch back to the original screen.

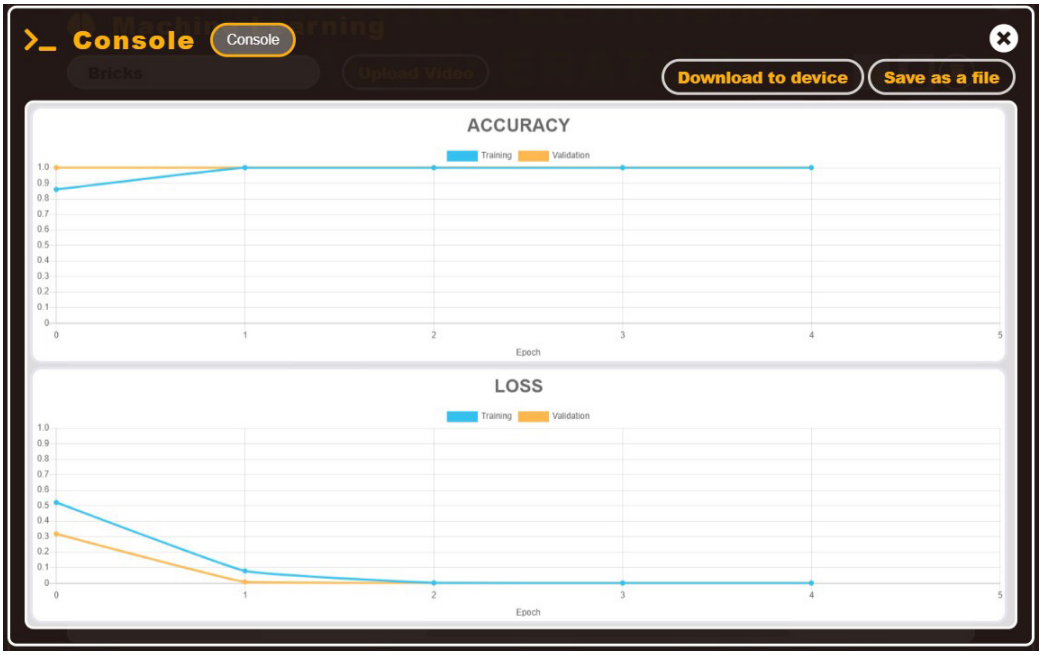


Figure 73: Console Chart diagram

Before downloading the trained model to the VIA Pixetto vision sensor, confirm that the VIA Pixetto Link has been executed , as shown on the bottom right corner of this image. Also make sure that the VIA Pixetto Utility application is closed.

Figure 74: VIA Pixetto Link icon diagram

Step 17

Click 'Download to device' to start downloading the trained model to your VIA Pixetto vision sensor. Download progress will be displayed during the download. Close the progress box when the download is complete.

Figure 75: Download to device button diagram

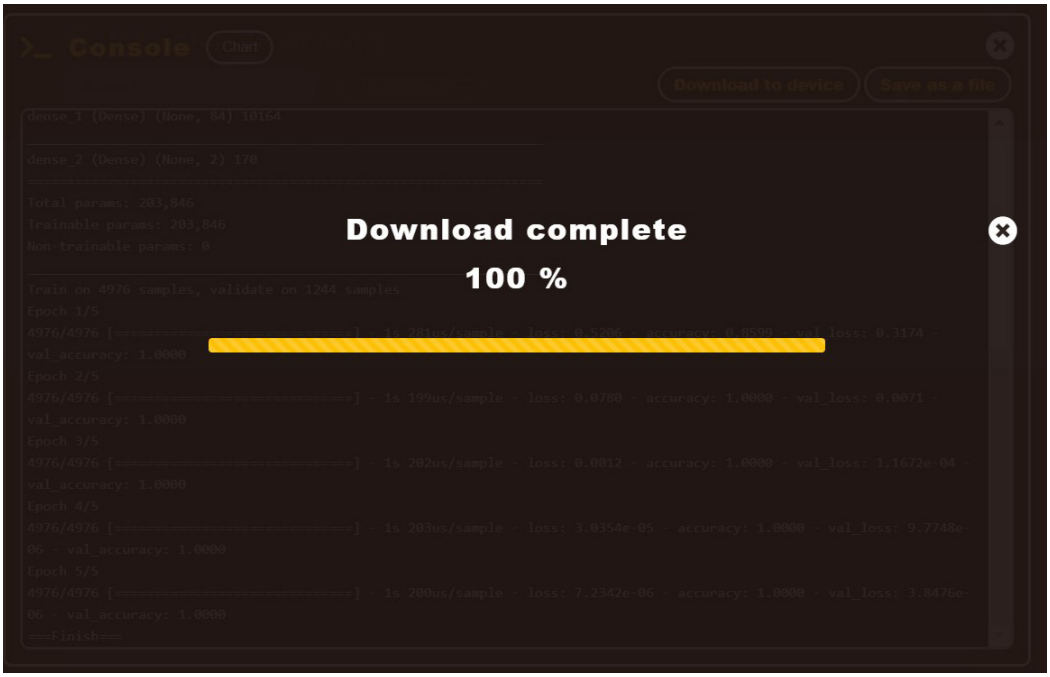


Figure 76: Download complete diagram

Step 18

Open the VIA Pixetto Utility application. The function setting will automatically be displayed as 'Neural Network Identification'. Aim the VIA Pixetto vision sensor at the object you recorded earlier. The identified objects on the screen will be marked with a green frame with an identification number, as shown below.

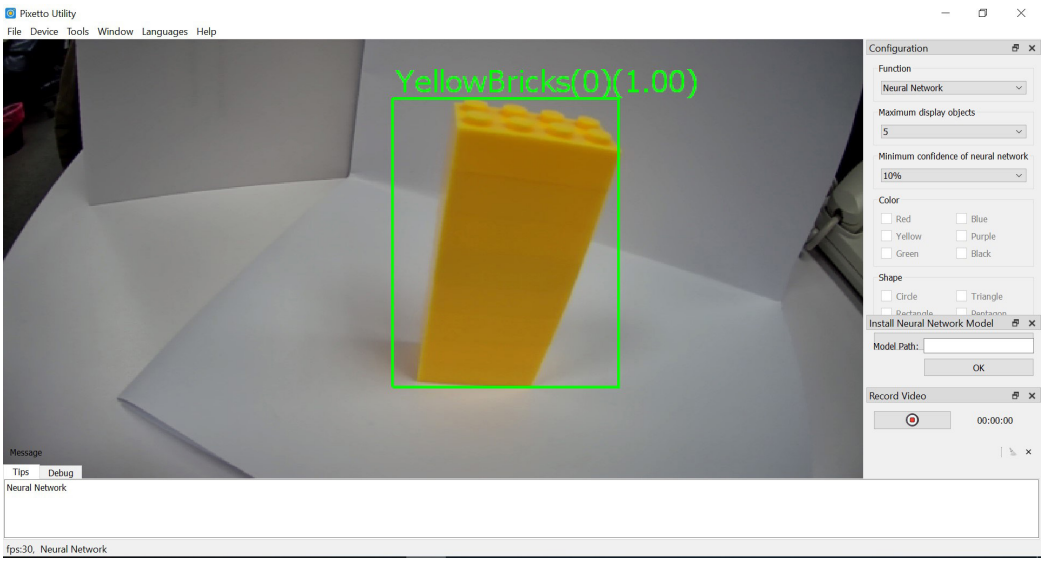


Figure 77: Yellow Brick diagram

Figure 78: Purple Brick diagram

5.3.1 How to use VIA Pixetto Utility to create videos

The VIA Pixetto Utility can be used to create videos by connecting it to the VIA Pixetto vision sensor. These videos can be used to create a Neural Network using the Machine Learning platform.

Step 1

Connect the VIA Pixetto vision sensor to a PC and open VIA Pixetto Utility.

Step 2

Click the 'Record Video' button located on the bottom right side of VIA Pixetto Utility.

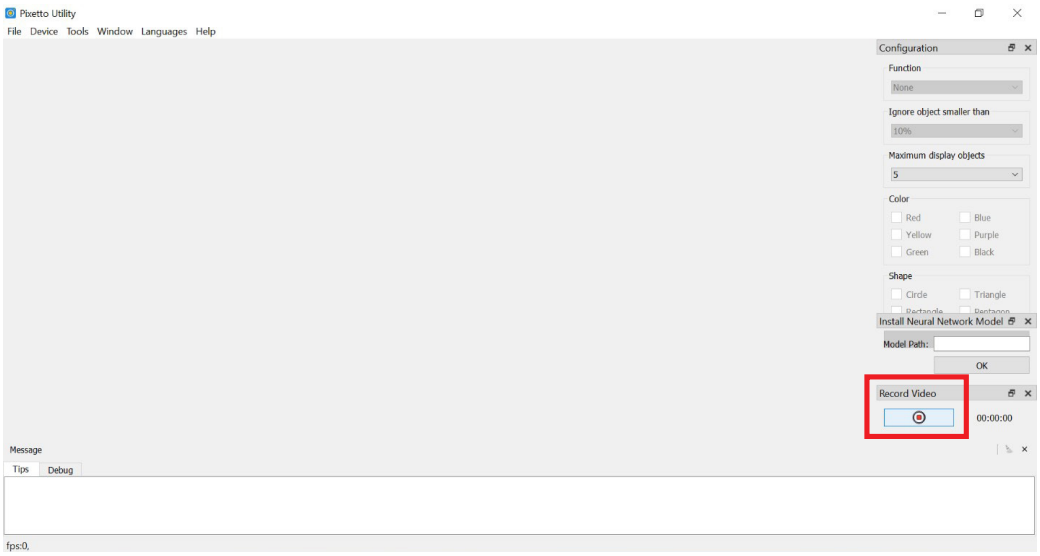


Figure 79: Pixetto Utility Record button diagram

Step 3

Aim the VIA Pixetto vision sensor directly at the object you want to record. When you click the 'Record Button', the time clock will start to run.

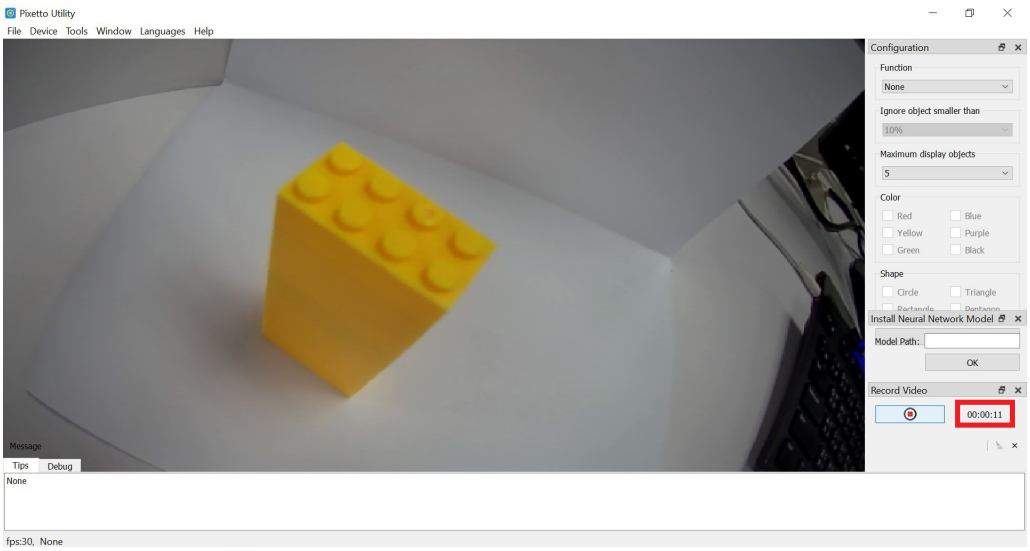


Figure 80: Record Timer diagram

Note:
When recording the video, make sure to move the VIA Pixetto camera 360° around the object.

Step 4

Click the 'Record Video' button again when you've finished recording your video.

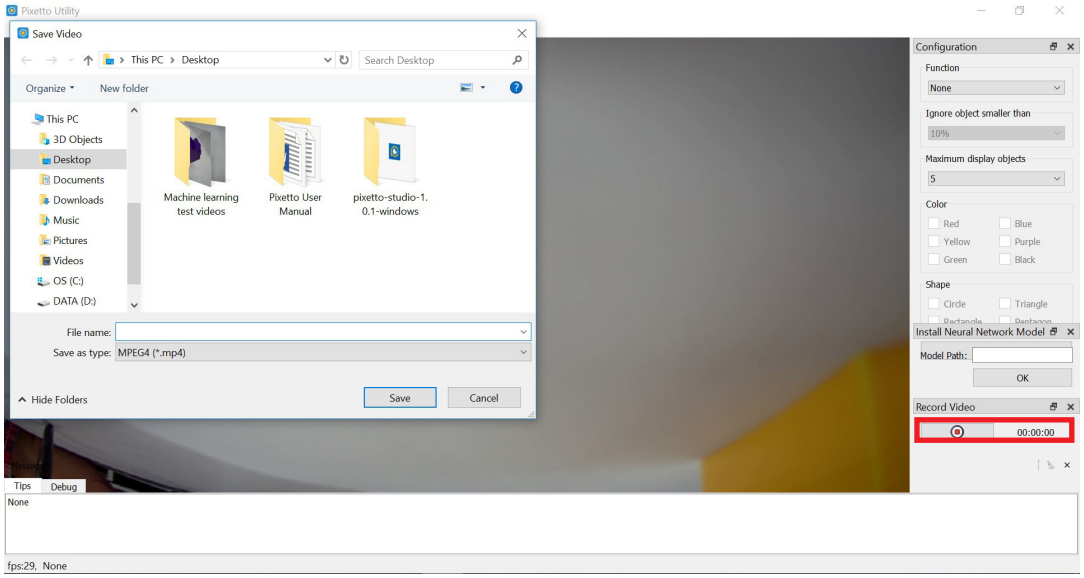


Figure 81: Pop-up Window folder diagram

Step 5

A pop-up window file will be displayed. You can name the video and find a suitable place to save it on your PC.

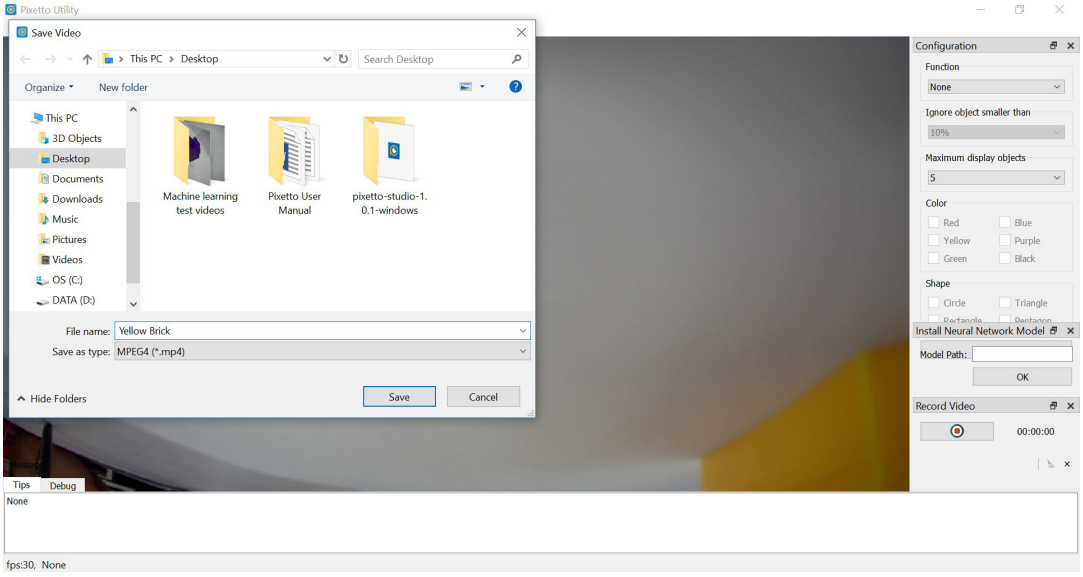


Figure 82: Video Name diagram

The video file below was saved on the desktop.

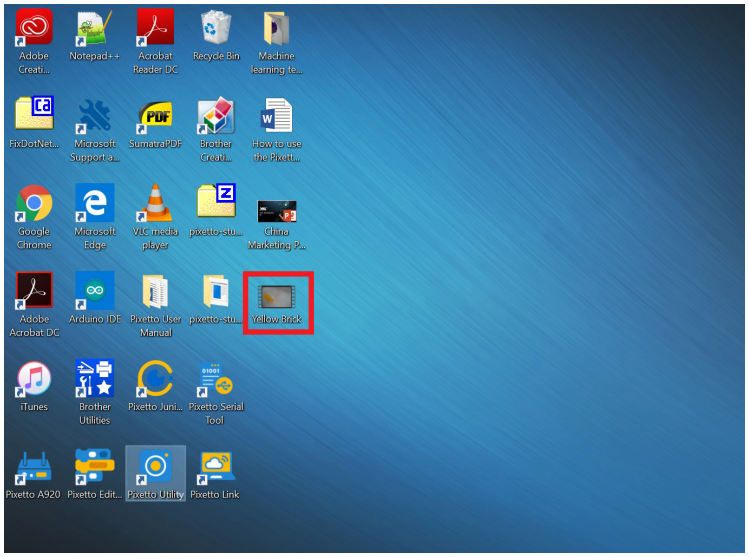


Figure 83: Video file diagram

5.4 How to use Python

The Python application can be used to write or upload codes created. The data created can be uploaded to train the VIA Pixetto vision sensor via the Pixetto Utility application.

Step 1

Login to the VIA Pixetto Machine Accelerator cloud home page. Click on the Python icon to enter the Jupyter Notebook page.

Figure 84: Python Login diagram

Step 2

In the upper right corner of the Jupyter Notebook home page, click the 'Upload' button to upload the Python file.

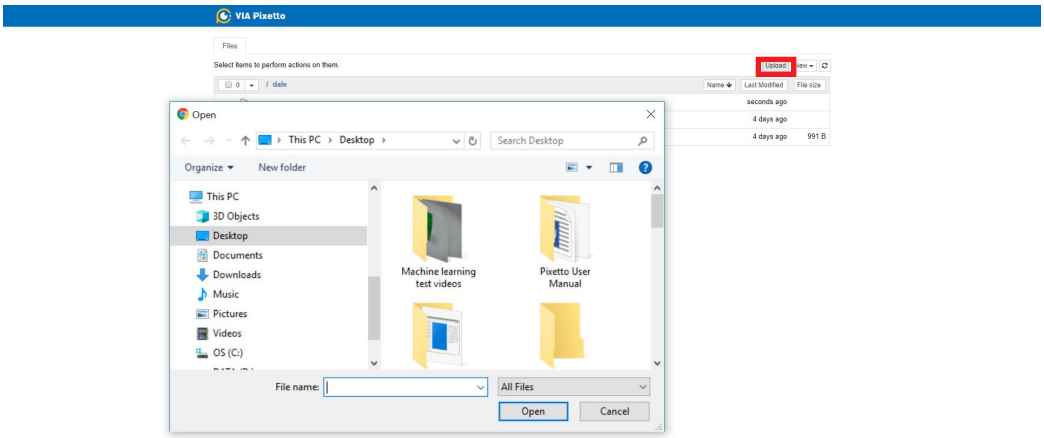


Figure 85: Upload button diagram

Step 3

We've created a sample that is named ' HandwritingDigitsInPython.ipynb' to be used as an example of how to upload your 'Python code' to the Python online application.

Locate the file on your PC and open it.

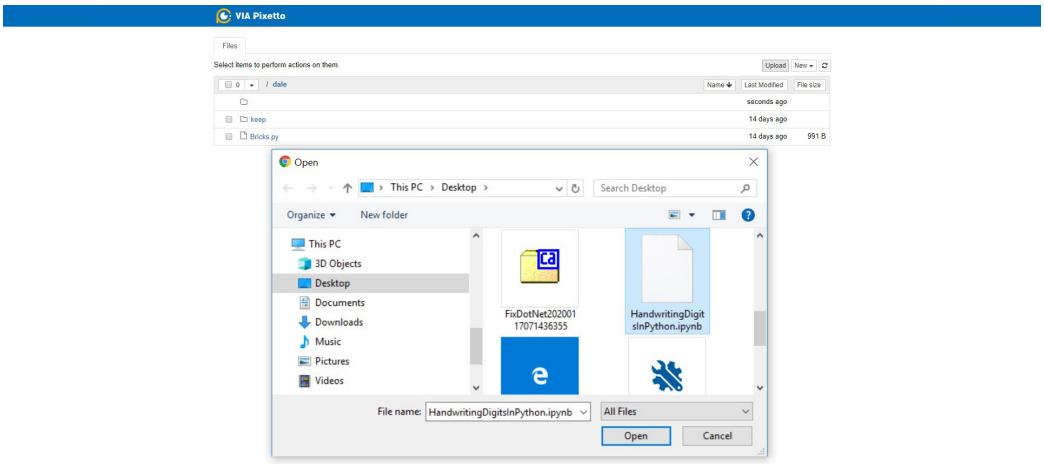


Figure 86: Handwriting file located diagram

The file can then be added to the Jupyter Notebook application. Click the 'Upload' button to continue the process.

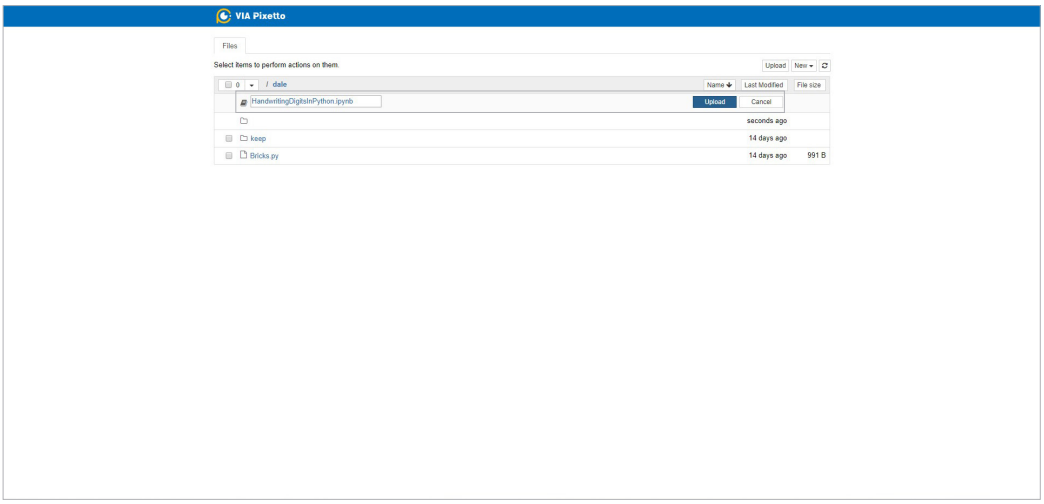


Figure 87: Upload file diagram

Note:
The cancel button can be used to cancel the file from uploading.

The file is uploaded.

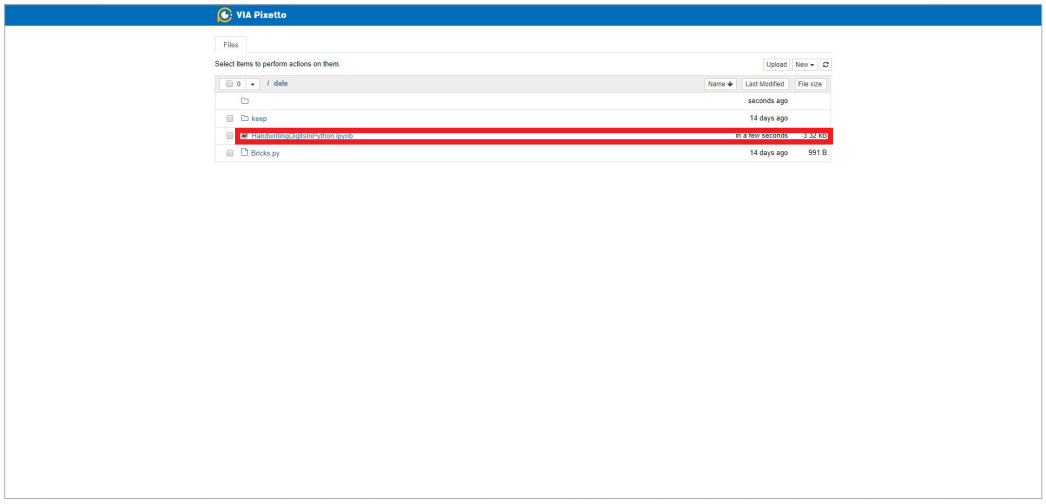


Figure 88: Handwriting file uploaded diagram

Step 5

Double click on the 'HandwritingDigitsInPython.ipynb' file and a new window will open. Click 'Run' to execute this Python program.

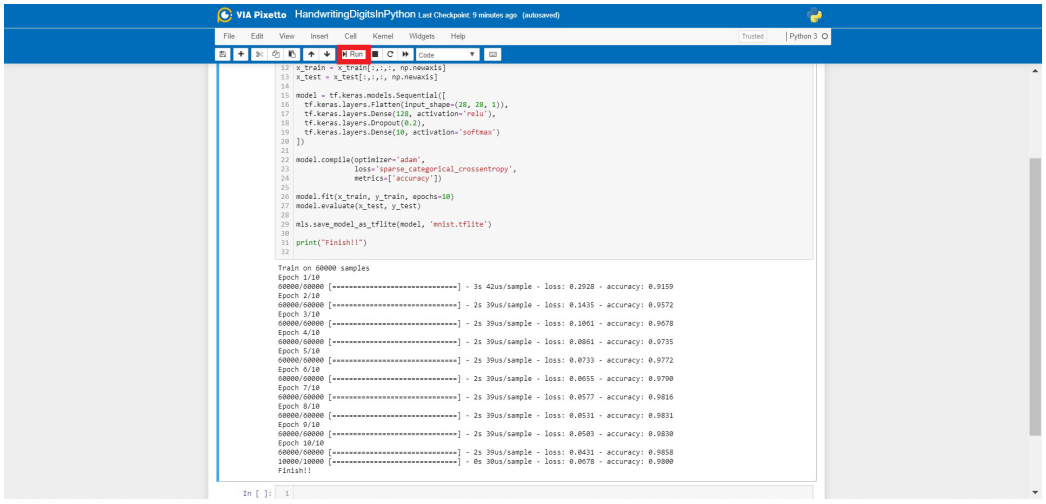


Figure 89: Handwriting file window diagram

Note:
You can use the stop button to stop the process from continuing. You can also edit the code by clicking on the keyboard icon on the right side of the platform.

Step 6

Go back to the Juypter Notebook navigation page where you will see the Python file. Click on the check box next to the 'minst.tflite' file then select the download button.

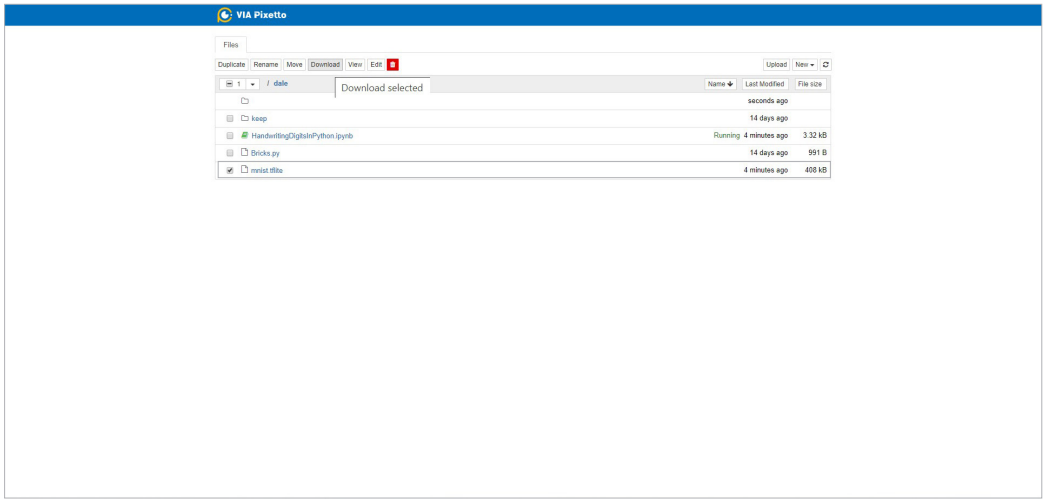


Figure 90: Minst download button diagram

The file is downloading.

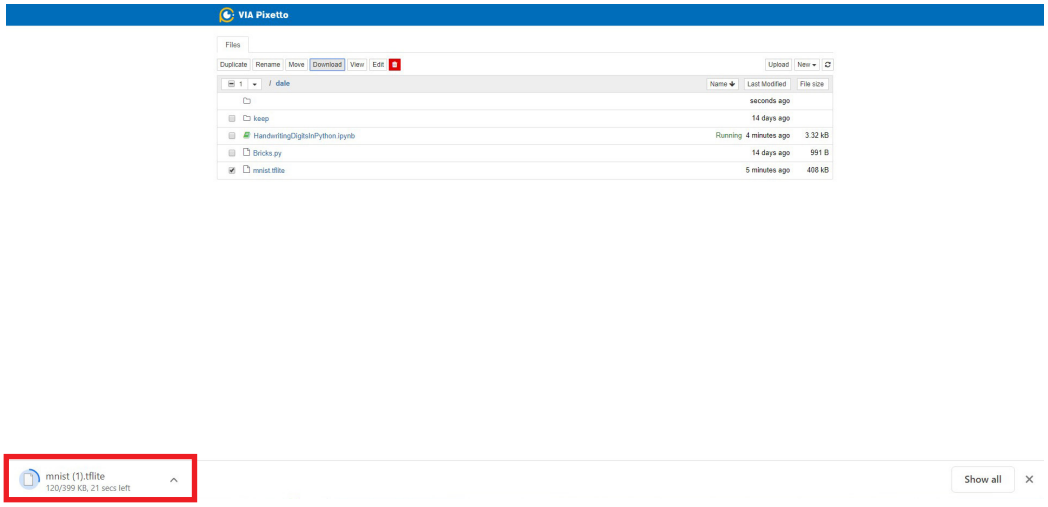


Figure 91: Mnist downloading diagram

Step 7

Connect the VIA Pixetto vision sensor to your PC, then open VIA Pixetto Utility to upload the file to your VIA Pixetto vision sensor. Select 'Install Neural Network Model'.

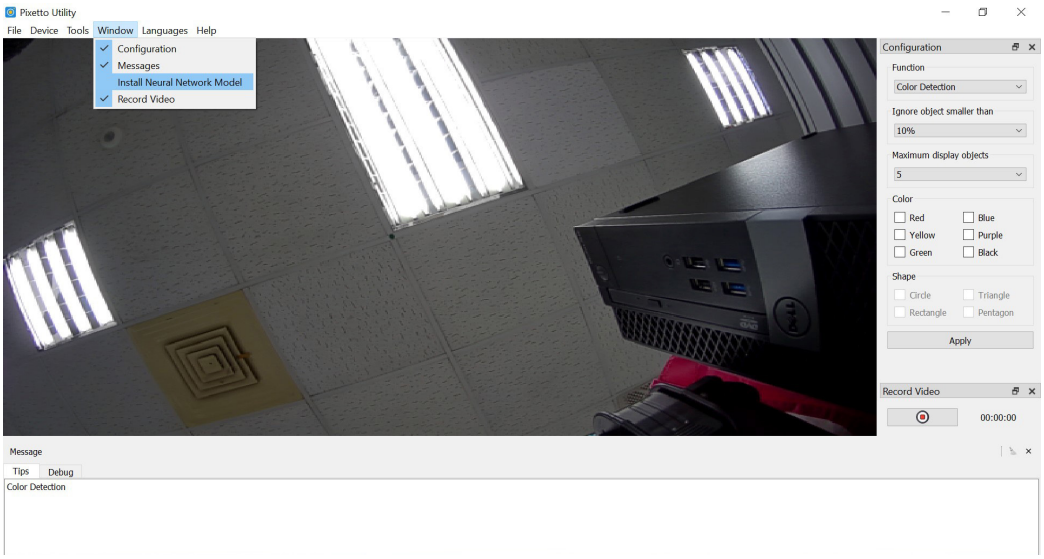


Figure 92: Install Neural Network Model diagram

Step 8

Click on the 'Model Path' to open a window and upload the file located on your PC, then click the 'Open' button.

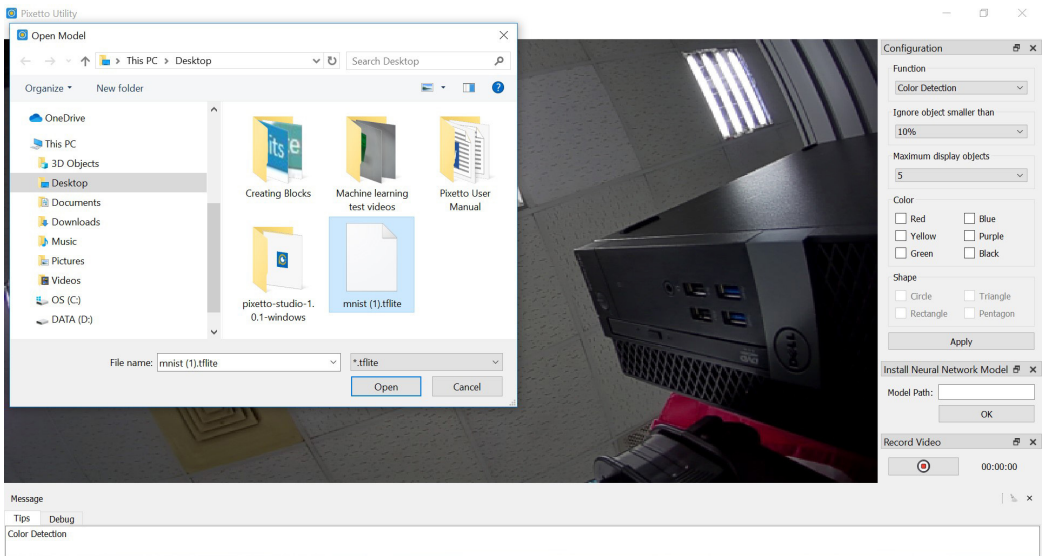


Figure 93: Model Path diagram

Click the 'Ok' button to finish the process.

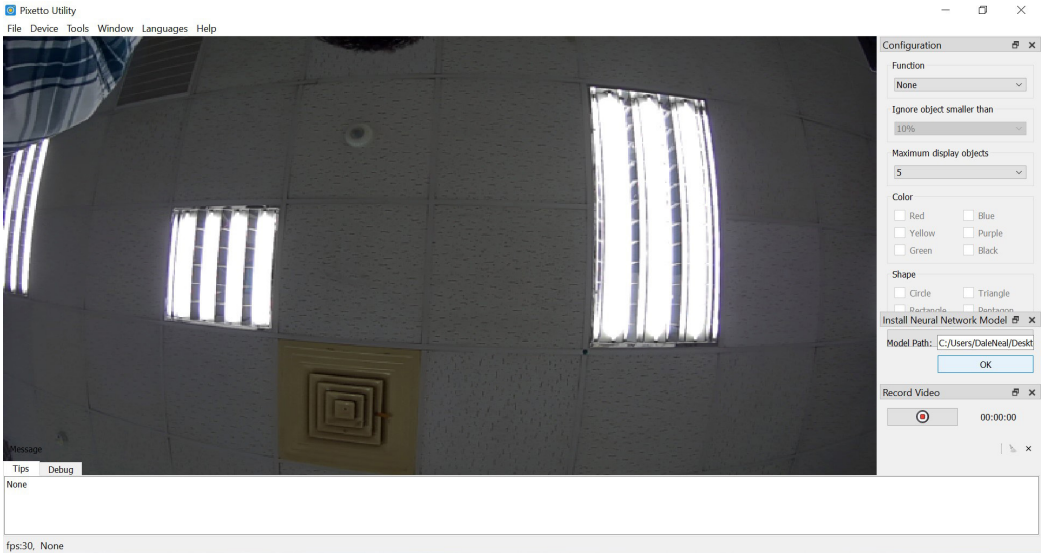


Figure 94: Uploading Mnist file diagram

When the file is uploaded, 'Neural Network' will be displayed in the function section.

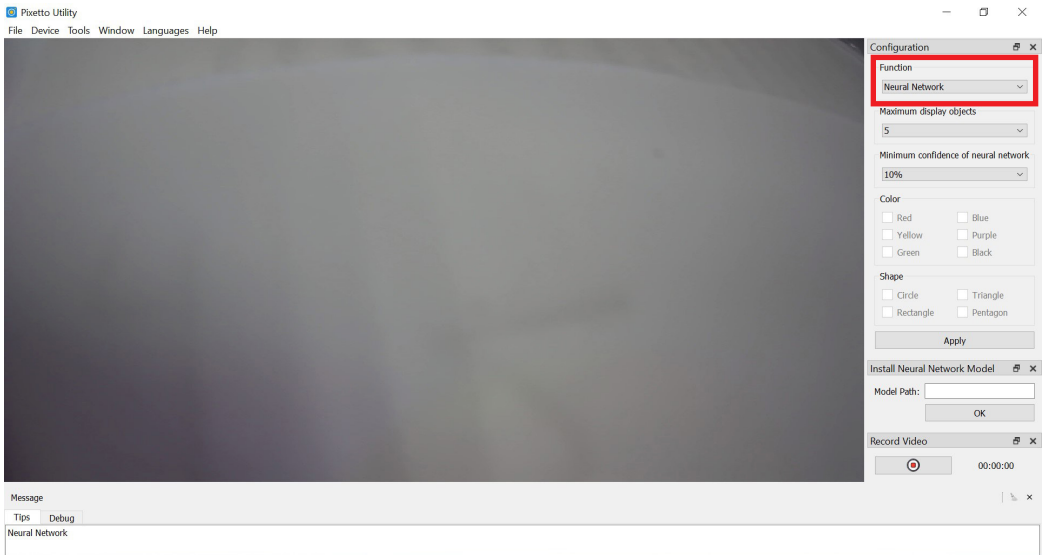


Figure 95: Neural Network diagram

Step 9

Aim the VIA Pixetto vision sensor at the Handwritten Digits.

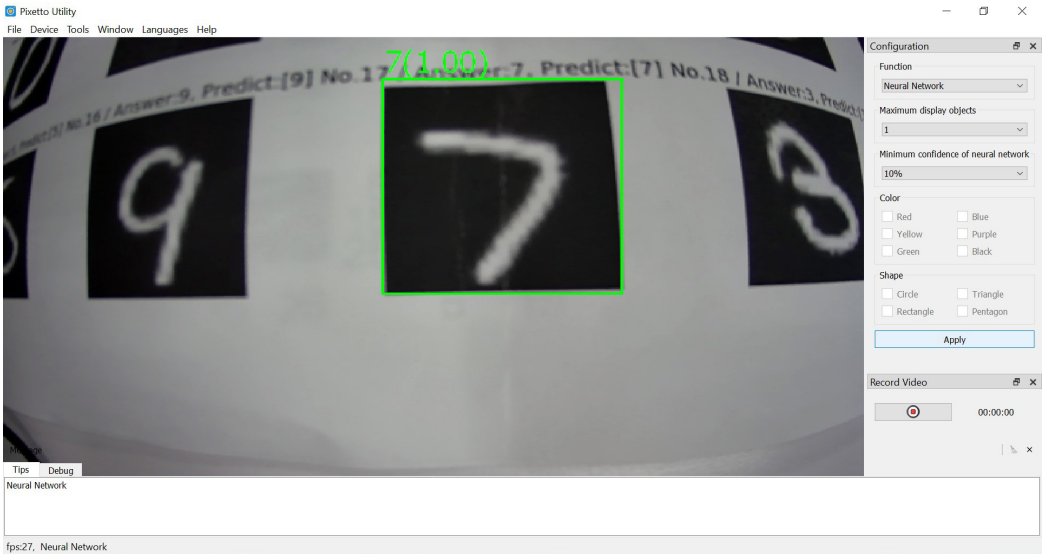


Figure 96: Handwritten digits recognition diagram

6. Grove Connectors

This section shows you how to connect an Arduino board using Grove connector pinouts to the VIA Pixetto vision sensor.

Pin	UART mode
1	GND
2	VCC
3	TX
4	RX

Table 2: Grove connector pinouts

6.1 How to connect the Grove cable to an Arduino board

To enable UART communication, connect pin 3 and pin 4 to D0 and D1 for hardware serial, or any two pins in D2-D12 for software serial.

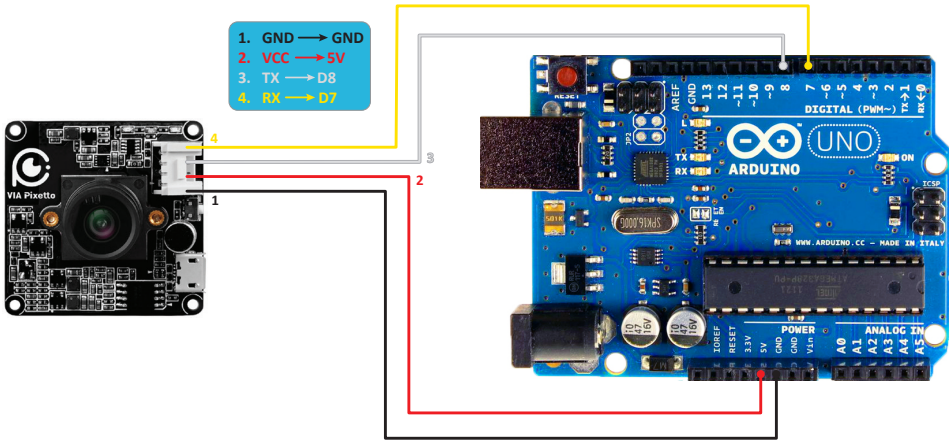


Figure 97: Grove connector connectivity diagram

The Seeeduino Lotus is recommended to make a connection with a Grove 4 pin cable connector.

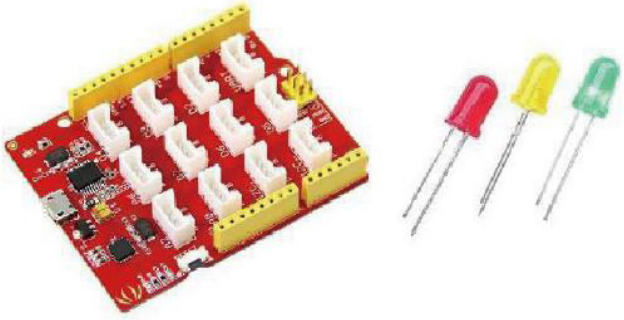


Figure 98: Expansion board diagram

Appendix A. How to update Firmware

This chapter provides information on how to download and update the firmware of the VIA Pixetto vision sensor.

A.1. How to update Firmware manually

Step 1

Connect the VIA Pixetto vision sensor to a PC and wait until all three LEDs are lit.

Step 2

Wait until all three LEDs on the VIA Pixetto vision sensor are lit. This means the VIA Pixetto vision sensor has finished booting up and is ready to use.

Step 3

Open the VIA Pixetto Utility application. Go to the 'Help' tab, and select 'Update Device' to update the firmware. Wait until updating is 100% completed.

Caution:

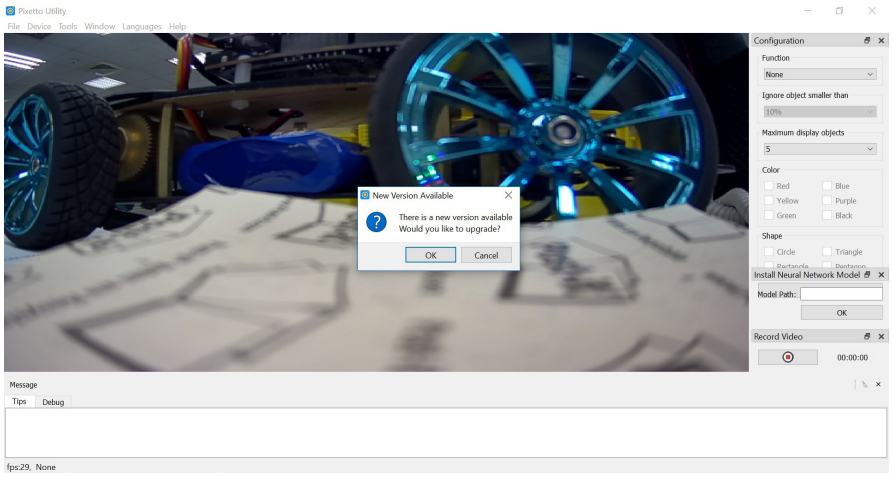
Do not close the VIA Pixetto Utility application or unplug the VIA Pixetto vision sensor during the update to avoid any damage to the device.

A.2. Automatic Firmware Updates

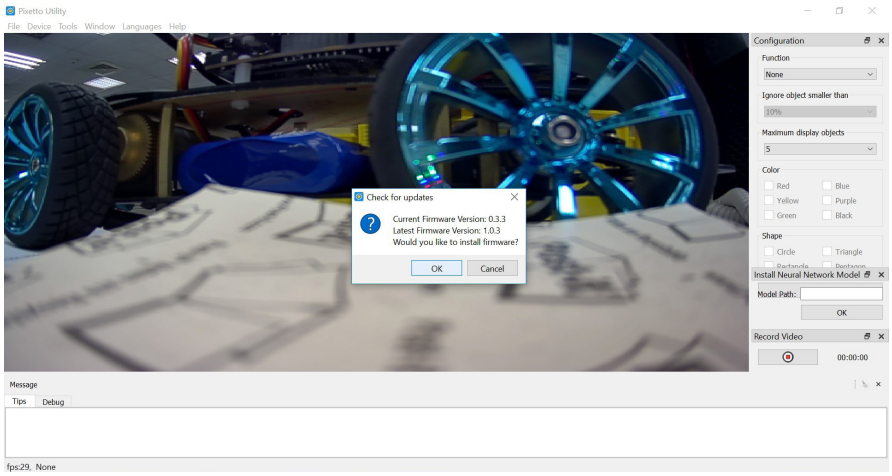
This chapter provides information on how to automatically update the firmware of the VIA Pixetto vision sensor.

Step 1

If you have just installed VIA Pixetto Studio on your computer, when you connect the VIA Pixetto vision sensor to the computer, and open the Pixetto Utility application, the following pop-up message will be shown on your screen. The pop-up will inform you that there's a new version of the firmware to be updated.



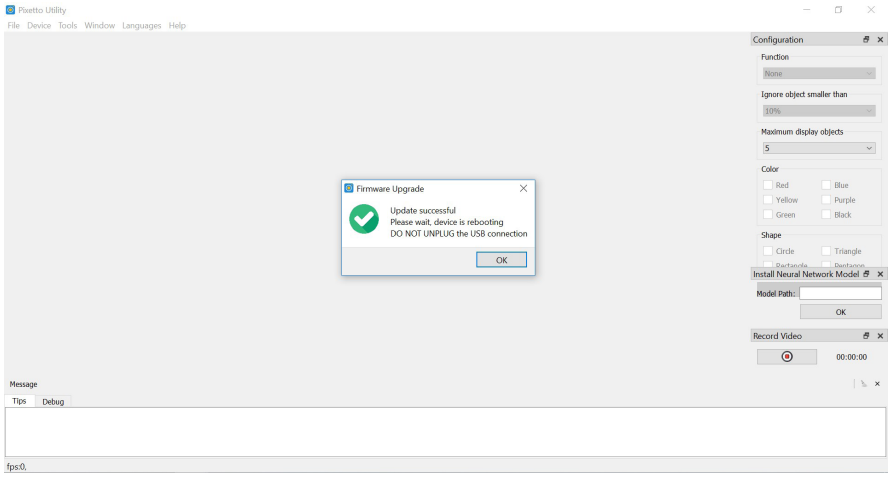
The pop-up will show the firmware version of your VIA Pixetto vision sensor and the newest version. Click on the 'OK' button to update the firmware.



Caution:
Do not close the VIA Pixetto Utility application or unplug the VIA Pixetto vision sensor during the update to avoid any damage to the device.

Step 2

When the firmware is successfully updated, click on the 'OK' pop-up screen to finish the process.



Appendix B. Tips on how to maintain the VIA Pixetto vision sensor

1. Check the electronic components, cables and charger regularly to determine if they are damaged. Cease use immediately if damage is detected and do not use again until the damaged component is repaired or replaced.

2. Update to the latest version of the software applications and firmware regularly. Visit the official VIA Pixetto website to download software and firmware update installation packages.

3. It's important to notice that all three LEDs light on the Pixetto Smart Sensor Camera are working properly. If they aren't working please visit us at www.viapixetto.com.

4. Definition of the three LEDs: Red light, Green Light and Blue light.
   - The green is the power LED.
   - The blue means the VIA Pixetto vision sensor OS boots correctly.
   - The red means that the object is detected by the VIA Pixetto vision sensor.

5. Avoid touching the PCB board of the camera. If possible, it is recommended to use a grounded wrist strap before handling the camera. Electrostatic discharge (ESD) can damage some components.

VIA Pixetto

www.pixetto.ai

Taipei Headquarters

8F, 533 Zhongzheng Rd.,
Xindian Dist. New Taipei City,
231, Taiwan

Tel: +886-2-2218-5452
Fax: +886-2-2218-5453
Email: embedded@via.com.tw

USA

940 Mission Court
Fremont, CA 94539
USA

Tel: +1-510-687-4688
Fax: +1-510-687-4699
Email: embedded@viatech.com

Japan

3-15-7 Hulic Ebisu bldg. 6F
Higashi, Shibuya-ku
Tokyo, Japan 150-0011

Tel: +81-3-5466-1637
Fax: +81-3-5466-1638
Email: embedded@viatech.co.jp

China

Tsinghua Science Park Building 7
1 Zhongguancun E. Rd. Haidian Dist.
Beijing, China – 100084

Tel: +86-10-5985-2288
Fax: +86-10-5895-2299
Email: embedded@viatech.com.cn

Europe

Tel: +39-342-5754296 (8:30-17:30)
Email: viaeurope@via.com.tw