

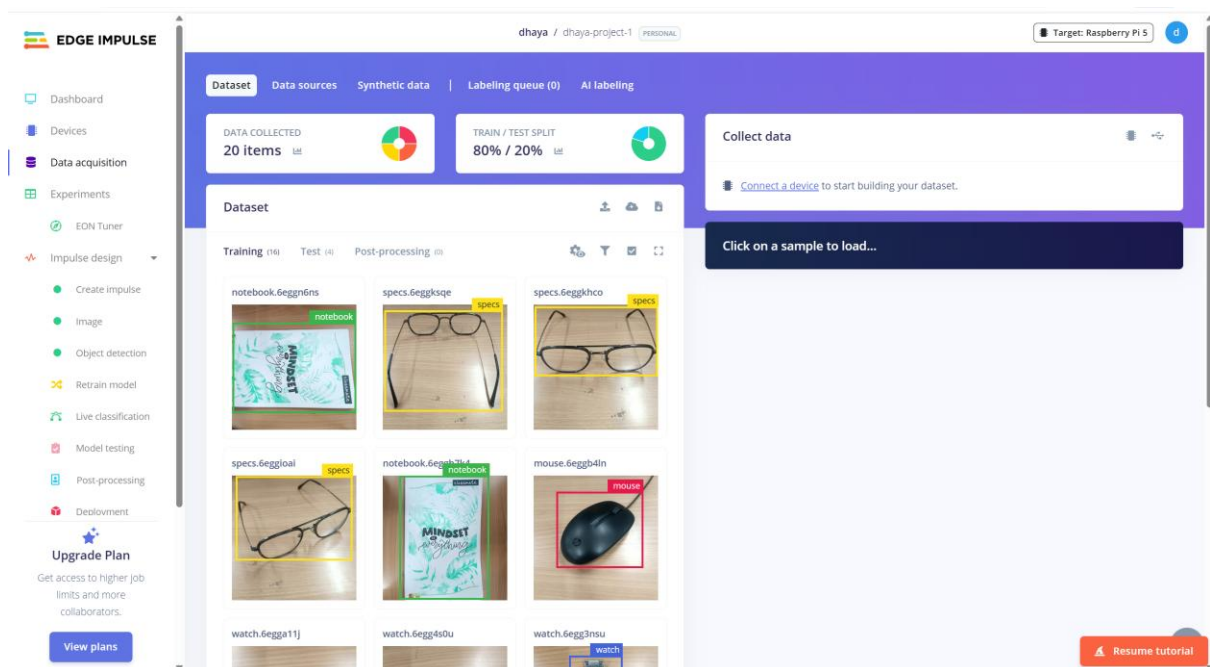
## EDGE LAB 5 (10/01/26)

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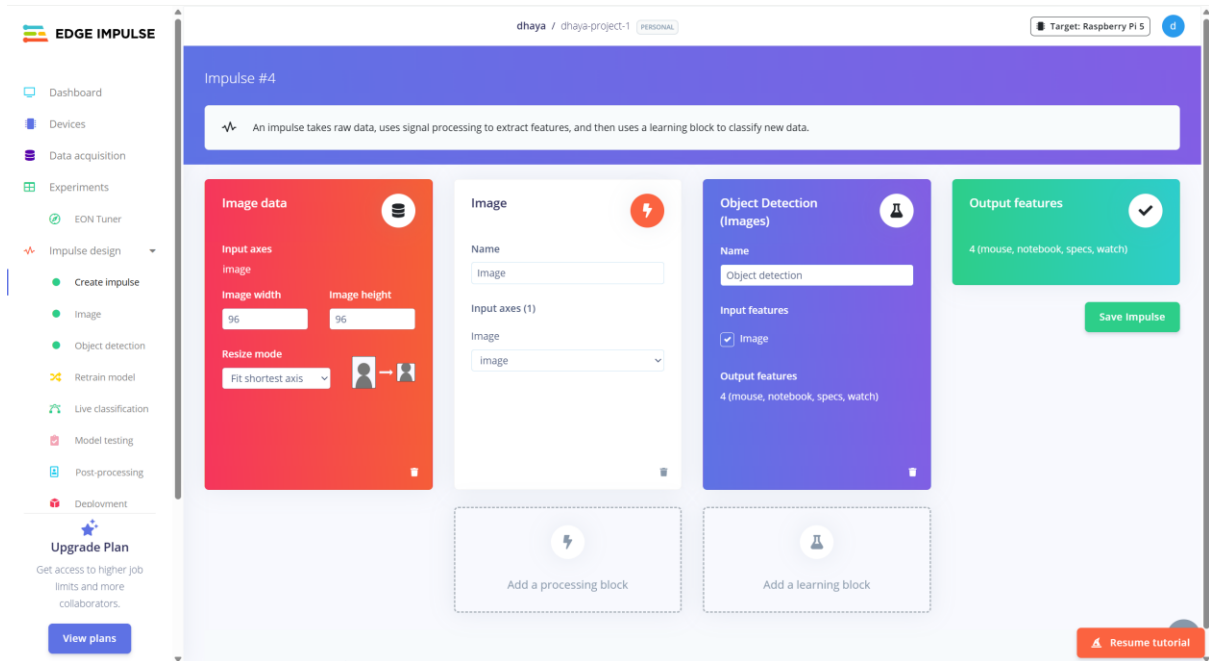
### DATA ACQUISITION:

I collected 20 images with 5 images in each of the 4 different classes. This is then split into 80-20 ratio with 16 images in training data and 4 images in the testing data.



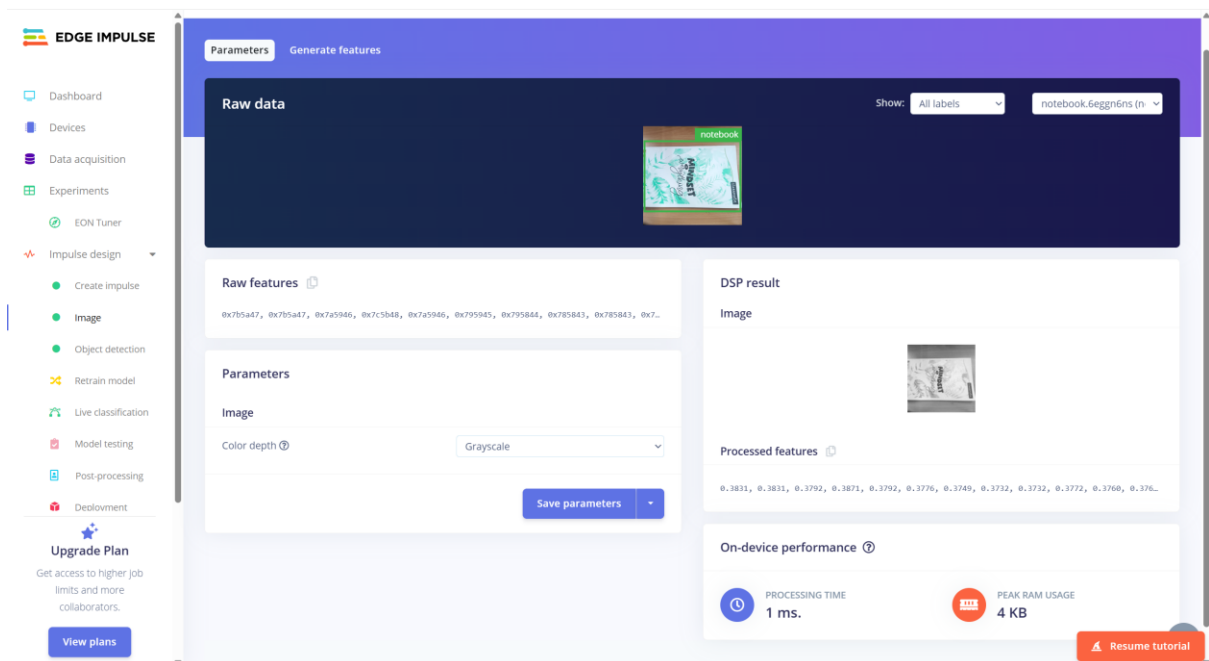
### CREATING IMPULSE:

Choose the Image for the Processing block and Object detection for the Learning block since I used the bounding boxes method in the data acquisition process to label the images.



## SAVING THE PARAMETERS:

Choose Grayscale and then saved the parameters.



## GENERATING FEATURES:

Now, generated the features

The screenshot shows the 'Generate features' interface in the Edge Impulse dashboard. The left sidebar contains navigation links: Dashboard, Devices, Data acquisition, Experiments, EON Tuner, Impulse design (with sub-links: Create impulse, Image, Object detection, Retrain model, Live classification, Model testing, Post-processing, Deployment), Upgrade Plan, and View plans. The main area has a 'Parameters' tab and a 'Generate features' button. Below this, the 'Training set' section shows 'Data in training set' as 16 items and 'Classes' as 4 (mouse, notebook, specs, watch). The 'Feature generation output' section shows 0 items. The 'Feature explorer' section displays a scatter plot with points colored by class: mouse (blue), notebook (orange), specs (green), and watch (red). The 'On-device performance' section shows 'PROCESSING TIME' as 1 ms and 'PEAK RAM USAGE' as 4 KB. The bottom right has a 'Resume tutorial' button.

EDGE IMPULSE

dhaya / dhaya-project-1 PERSONAL Target: Raspberry Pi 5

Parameters Generate features

Training set

Data in training set 16 items

Classes 4 (mouse, notebook, specs, watch)

Generate features

Feature generation output 0

Feature explorer

On-device performance

PROCESSING TIME 1 ms. PEAK RAM USAGE 4 KB

Resume tutorial

## OBJECT DETECTION:

Choose the FOMO Object detection model since this works well for very small dataset and then trained for 60 epochs.

The screenshot shows the 'Neural Network settings' interface in the Edge Impulse dashboard. The left sidebar is the same as the previous screenshot. The main area has a 'Neural Network settings' tab. The 'Training settings' section includes 'Number of training cycles' (60), 'Use learned optimizer' (unchecked), 'Learning rate' (0.001), 'Training processor' (CPU), and 'Data augmentation' (checked). The 'Advanced training settings' section is collapsed. The 'Neural network architecture' section shows an 'Input layer (9,216 features)' and an 'Output layer (4 classes)'. The 'FOMO (Faster Objects, More Objects) MobileNetV2 0.35' model is selected. The 'Training output' section shows 'Model version' as 'Quantized (int8)' and 'Last training performance (validation set)' with an 'F1 SCORE' of 40.0%. The 'Confusion matrix (validation set)' is displayed as a table. The 'Metrics (validation set)' section shows 'Precision (non-background)' as 1.00, 'Recall (non-background)' as 0.25, and 'F1 Score (non-background)' as 0.40. The 'On-device performance' section shows 'INFERENCE TIME' as 2 ms, 'PEAK RAM USAGE' as 119.4K, and 'FLASH USAGE' as 81.2K. The bottom right has a 'Resume tutorial' button.

EDGE IMPULSE

dhaya / dhaya-project-1 PERSONAL Target: Raspberry Pi 5

Neural Network settings

Training settings

Number of training cycles 60

Use learned optimizer

Learning rate 0.001

Training processor CPU

Data augmentation

Advanced training settings

Neural network architecture

Input layer (9,216 features)

FOMO (Faster Objects, More Objects) MobileNetV2 0.35

Choose a different model

Output layer (4 classes)

Save & train

Training output 0

Model Model version: Quantized (int8)

Last training performance (validation set)

F1 SCORE 40.0%

Confusion matrix (validation set)

	BACKGROUND	MOUSE	NOTEBOOK	SPECS	WATCH
BACKGROUND	100%	0%	0%	0%	0%
MOUSE	0%	100%	0%	0%	0%
NOTEBOOK	0%	0%	100%	0%	0%
SPECS	100%	0%	0%	100%	0%
WATCH	100%	0%	0%	0%	100%
F1 SCORE	1.00	1.00	1.00	1.00	1.00

Metrics (validation set)

METRIC	VALUE
Precision (non-background)	1.00
Recall (non-background)	0.25
F1 Score (non-background)	0.40

On-device performance

Engine: EON™ Compiler (RAM optimized)

INFERENCE TIME 2 ms. PEAK RAM USAGE 119.4K FLASH USAGE 81.2K

Resume tutorial

## MODEL TESTING:

Testing of the model on the test set gave me an **50% Accuracy** which may be later optimized by various preprocessing of the dataset.

