



OBJECT DETECTION

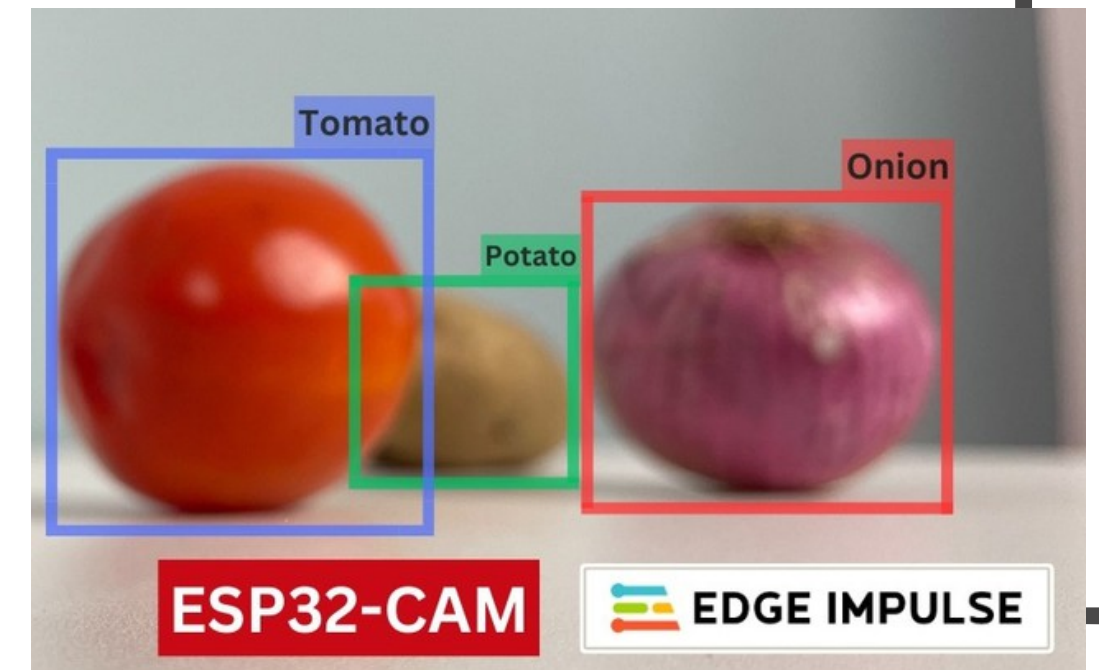


REAL WORLD APPLICATIONS

- **Smart Homes** – Control appliances by detecting objects like remotes, bottles, or specific gestures.
- **Retail & Inventory** – Detect and count products on shelves for stock management.
- **Security & Surveillance** – Identify people, vehicles, or suspicious objects in restricted areas.
- **Environmental Monitoring** – Recognize plants, animals, or waste materials for ecological studies.
- **Traffic Management** – Detect vehicles and pedestrians for smart city solutions.
- **Education & Learning** – Interactive tools where students learn through real-time object recognition.

WORKING OF THE PROJECT

- **The phone camera captures images or live video.**
- **Images are uploaded to Edge Impulse for data collection.**
- **Objects are labeled with bounding boxes to prepare training data.**
A YOLO model is trained to recognize and locate these objects.
- **The trained model is deployed back to the phone or device.**
- **In real time, the model detects objects and marks them with bounding boxes on the camera feed.**



STEP¹

STEPS

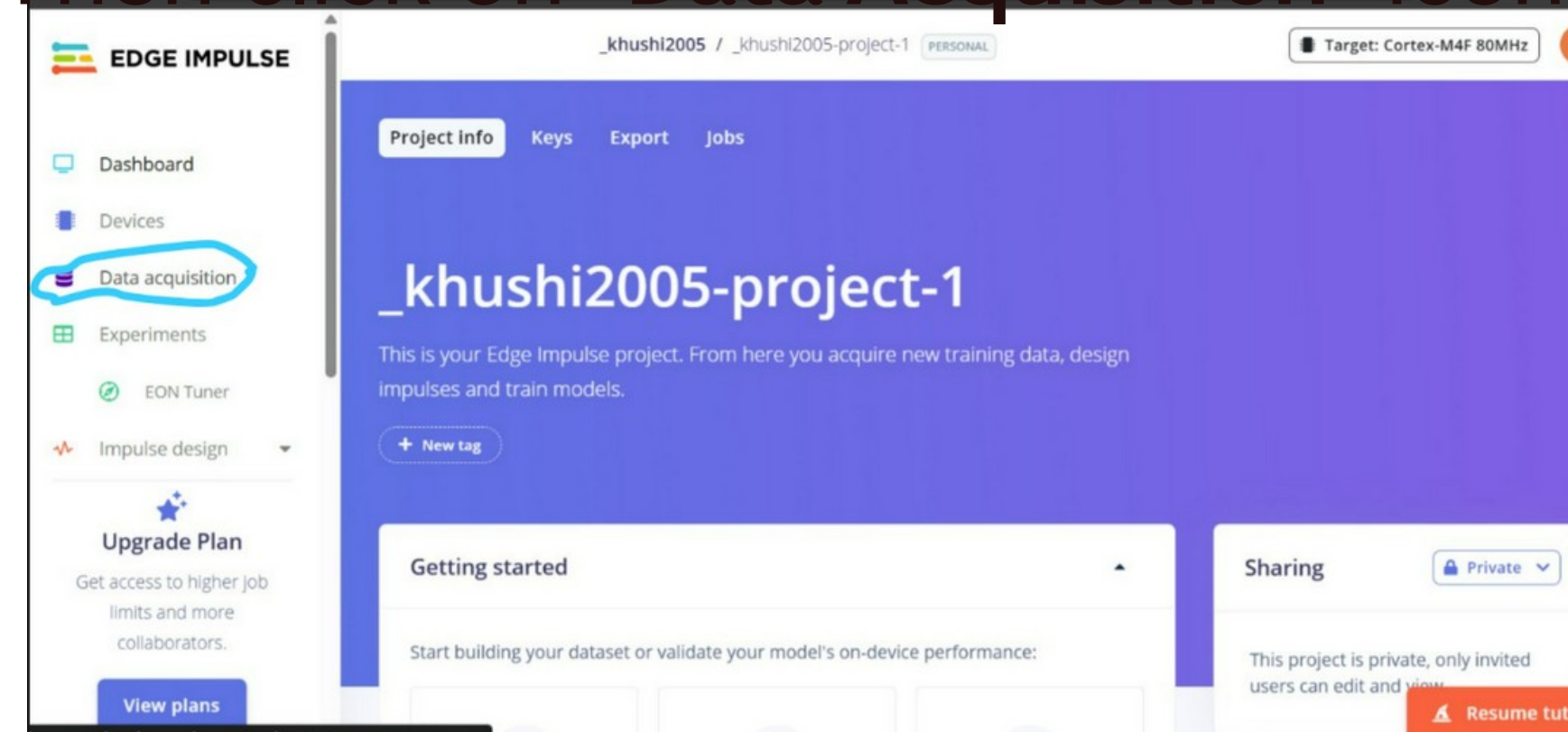
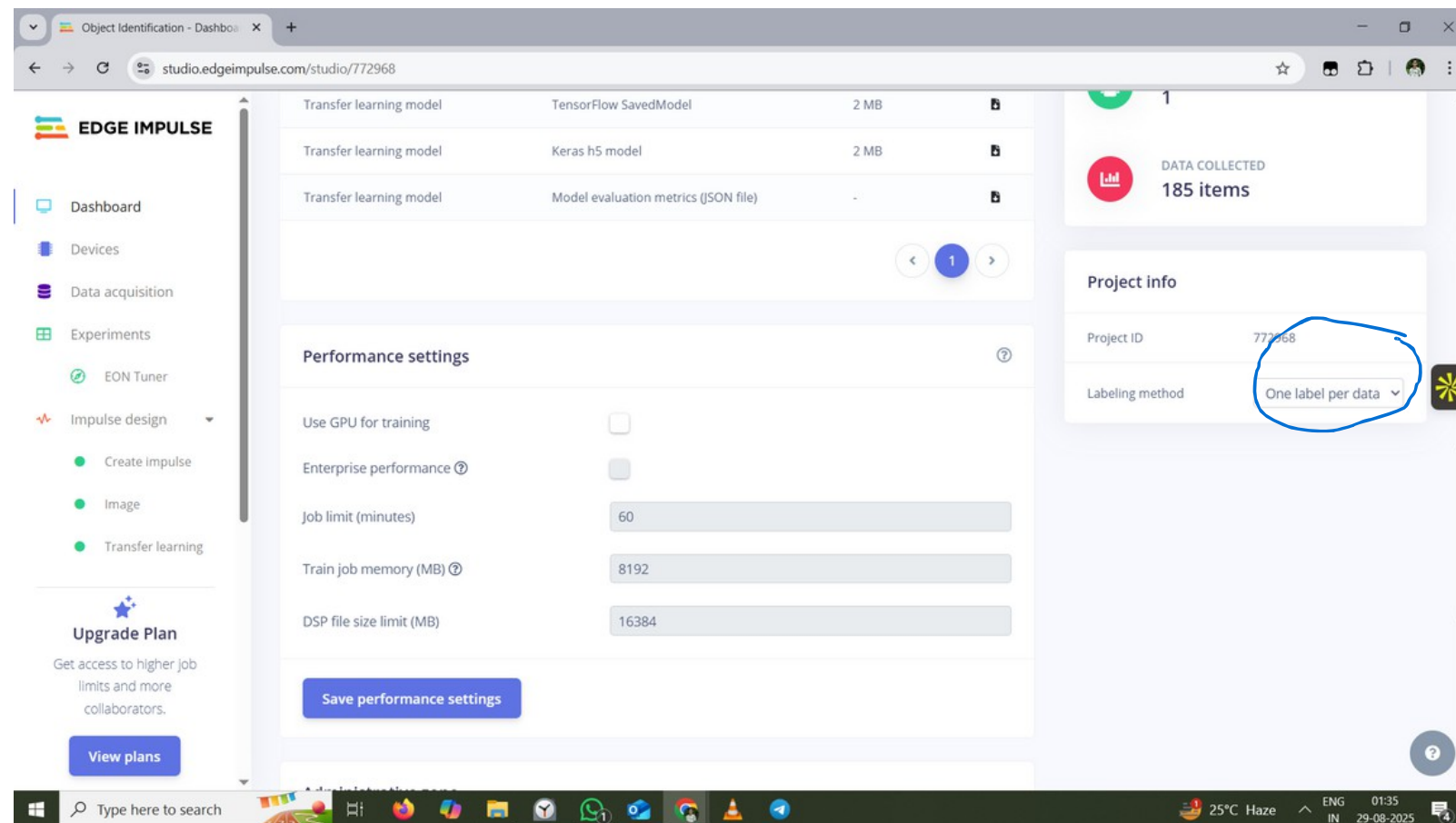
STEP²

Open the **Edge Impulse** platform

In the dashboard scroll down and in

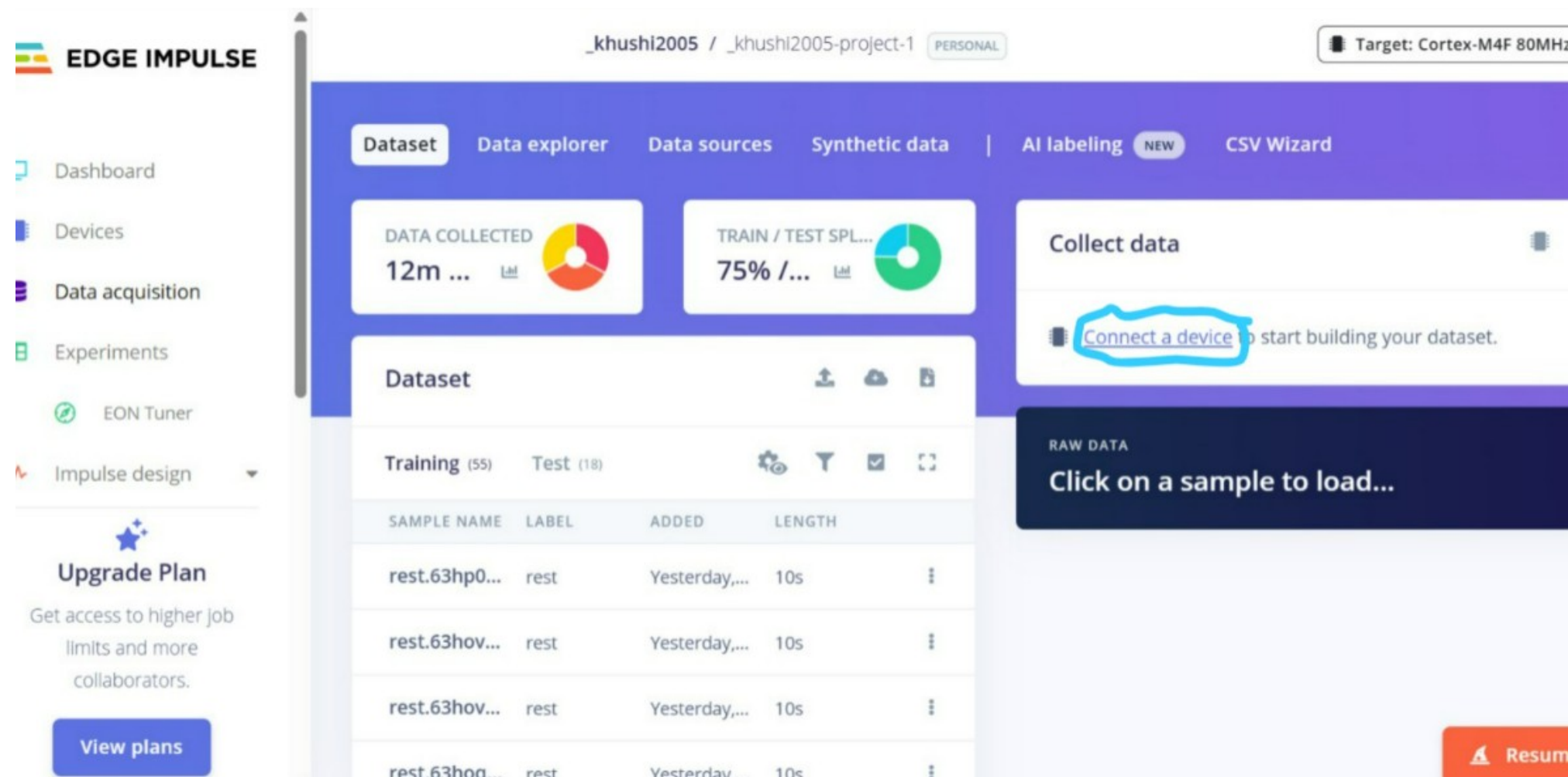
labelling method select one label per data

Then click on 'Data Acquisition' icon.



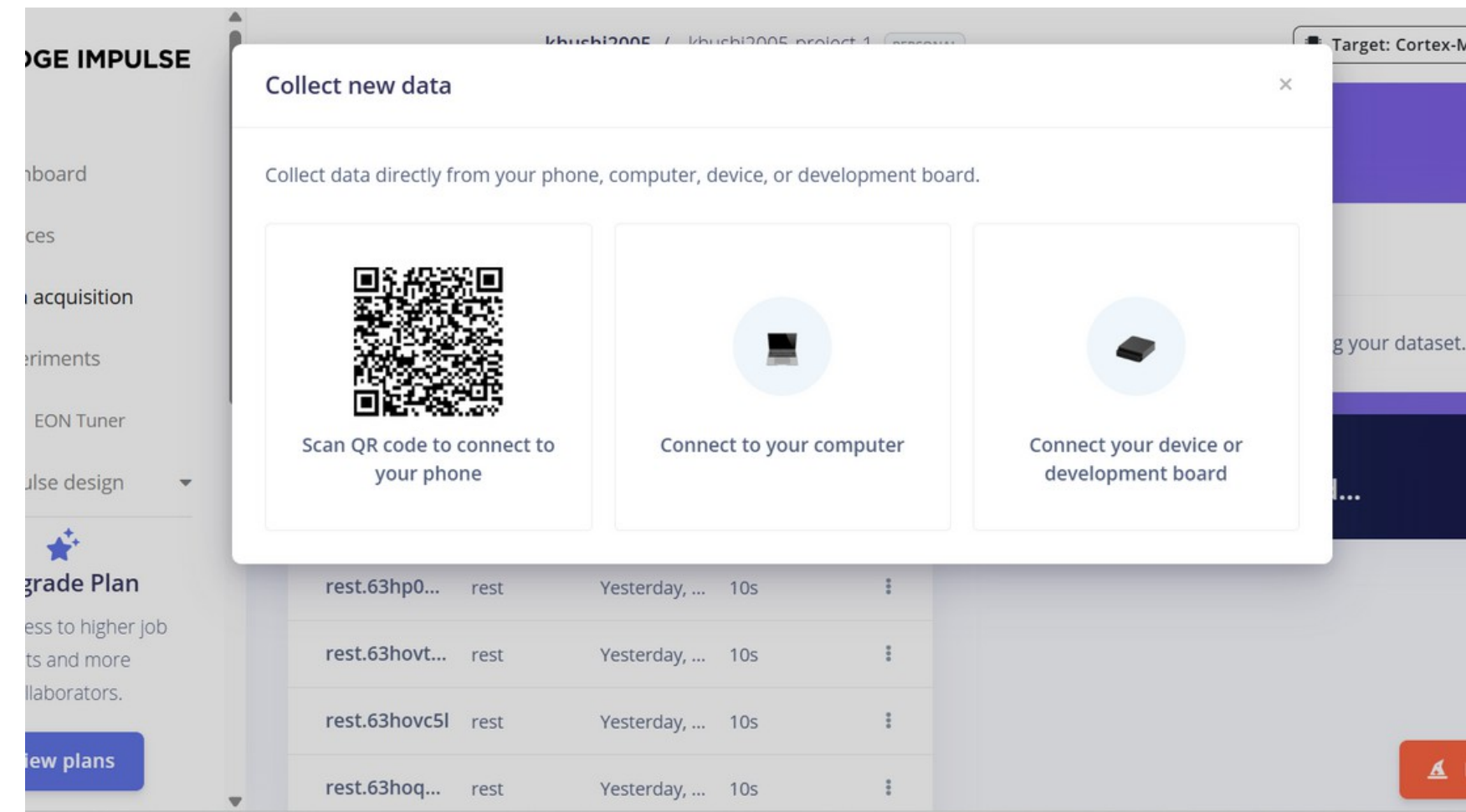
STEP 3

To click images using phone camera connect phone using 'Connect a Device'.



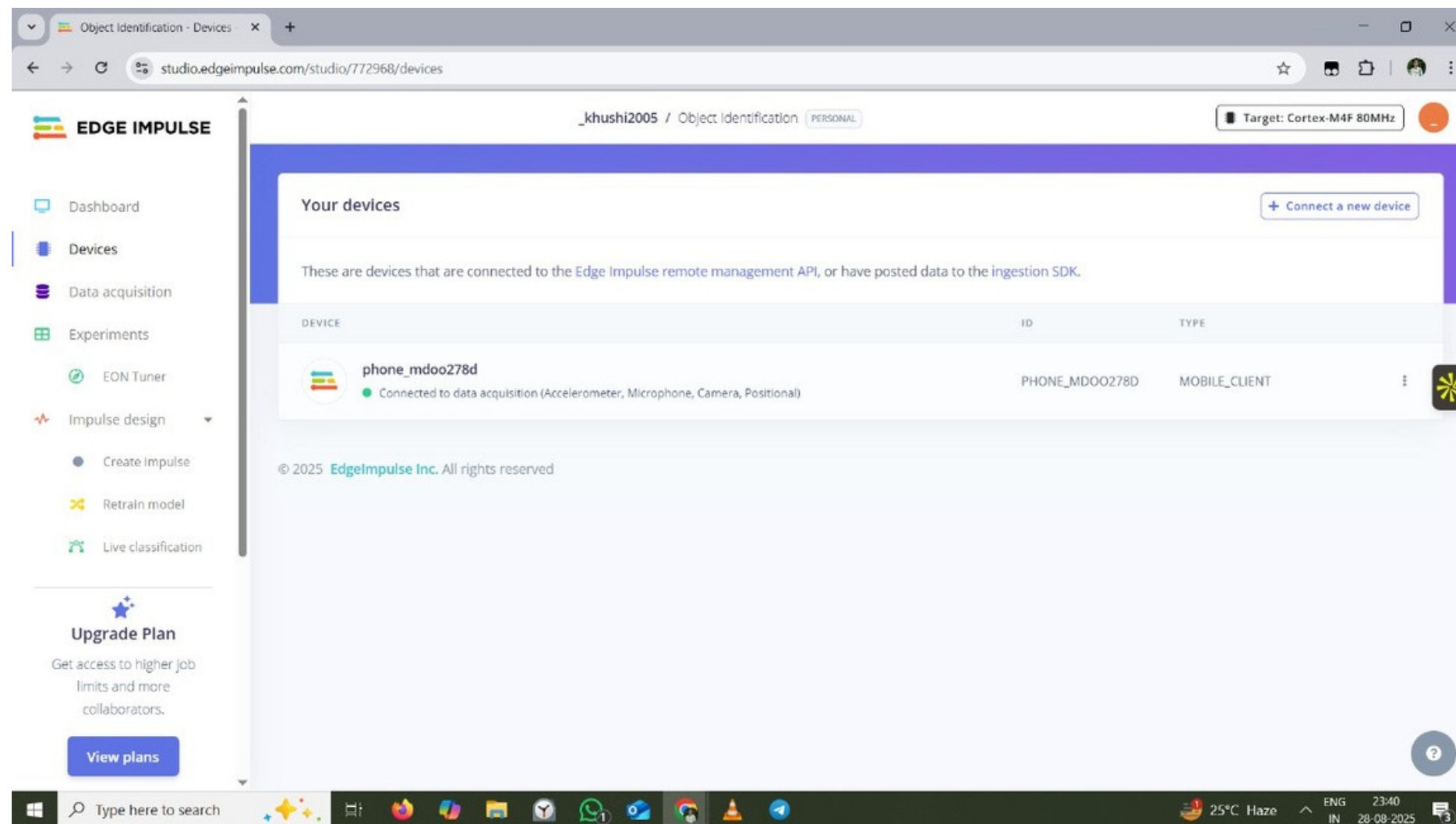
STEP 4

Scan QR Code using your phone to connect phone with Edge Impulse.



STEP 5

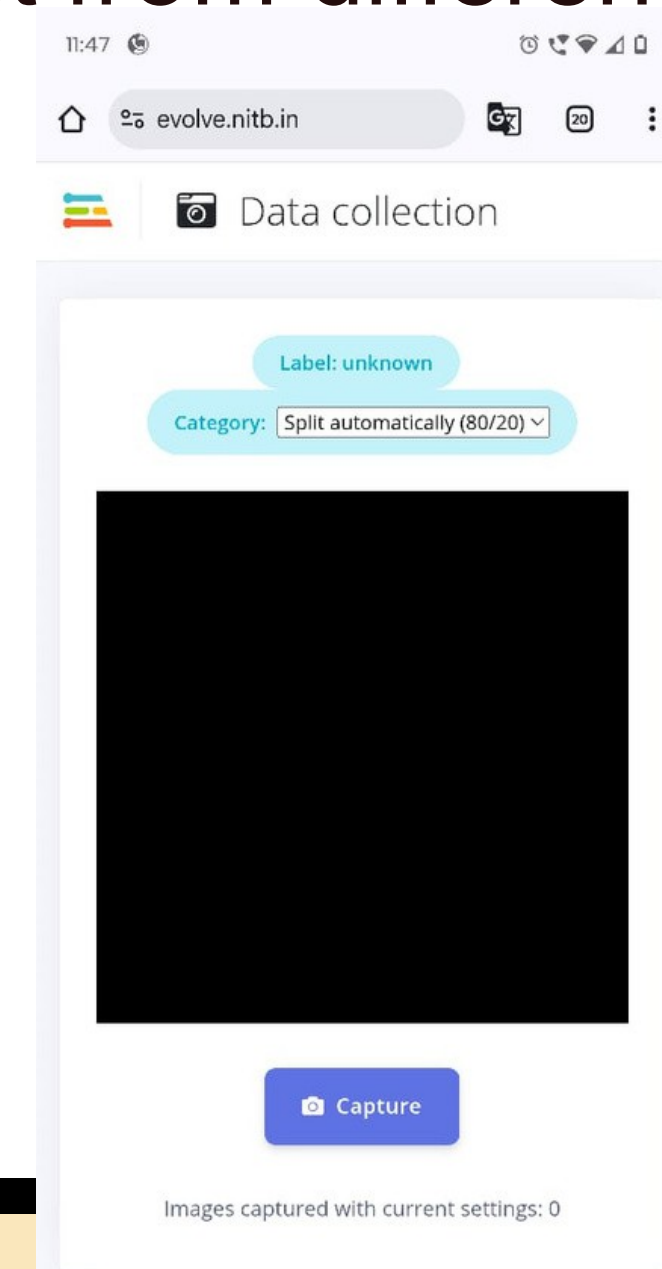
After connecting your device, it will be displayed in your tab.



STEP 6

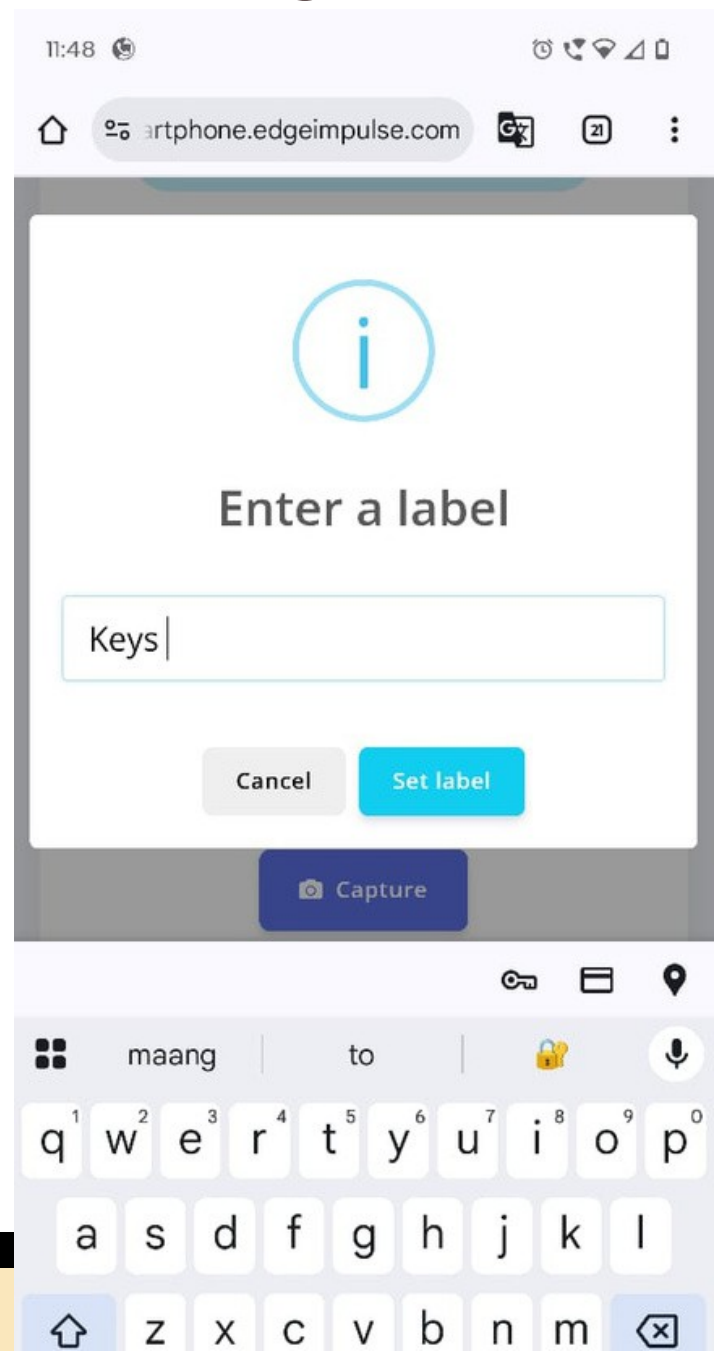
Capture and upload images using your

phone camera.(Upload minimum 50 images of one object from different angles)



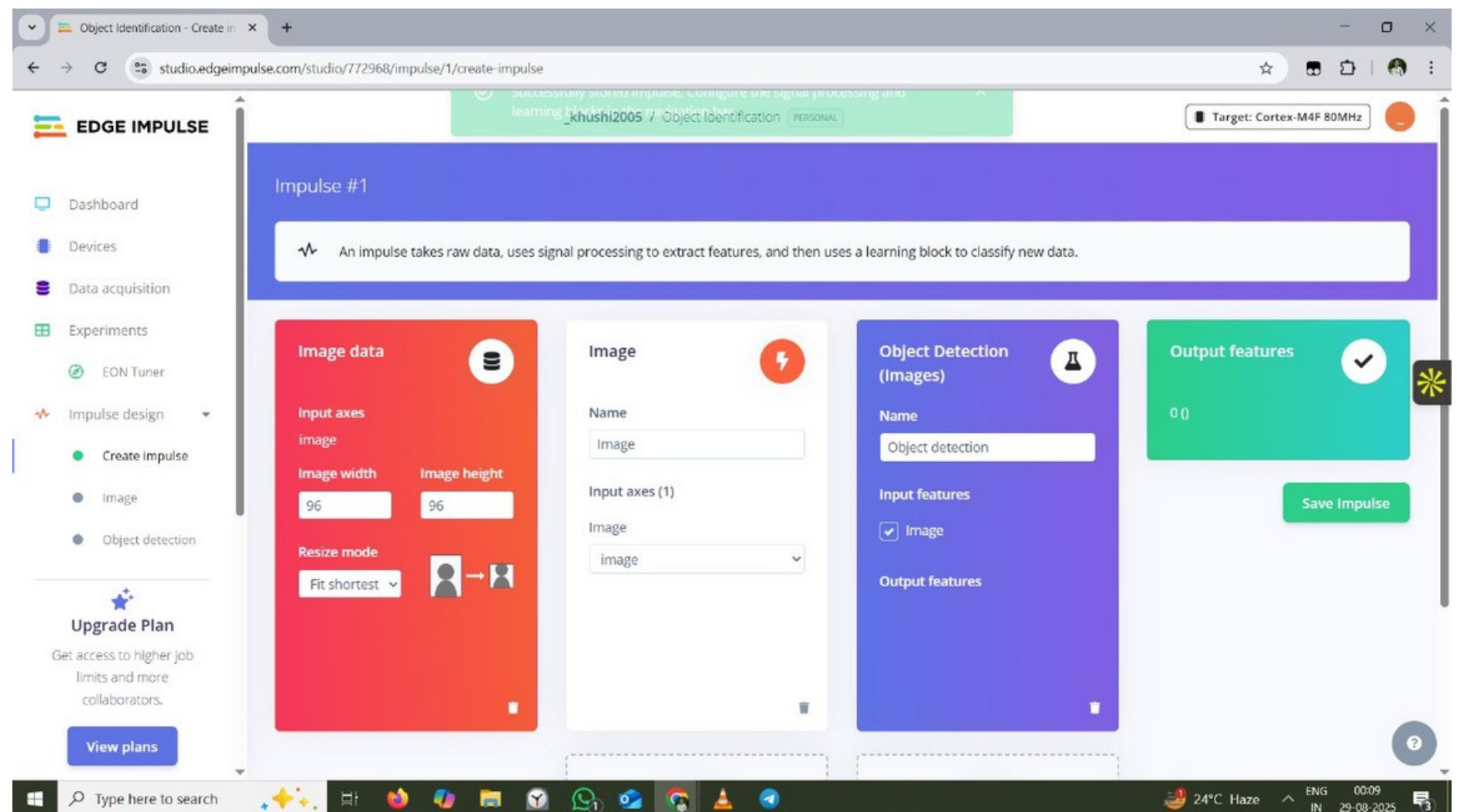
STEP 7

After the images are uploaded, adjust the frame using box and label the object. **Impulse**



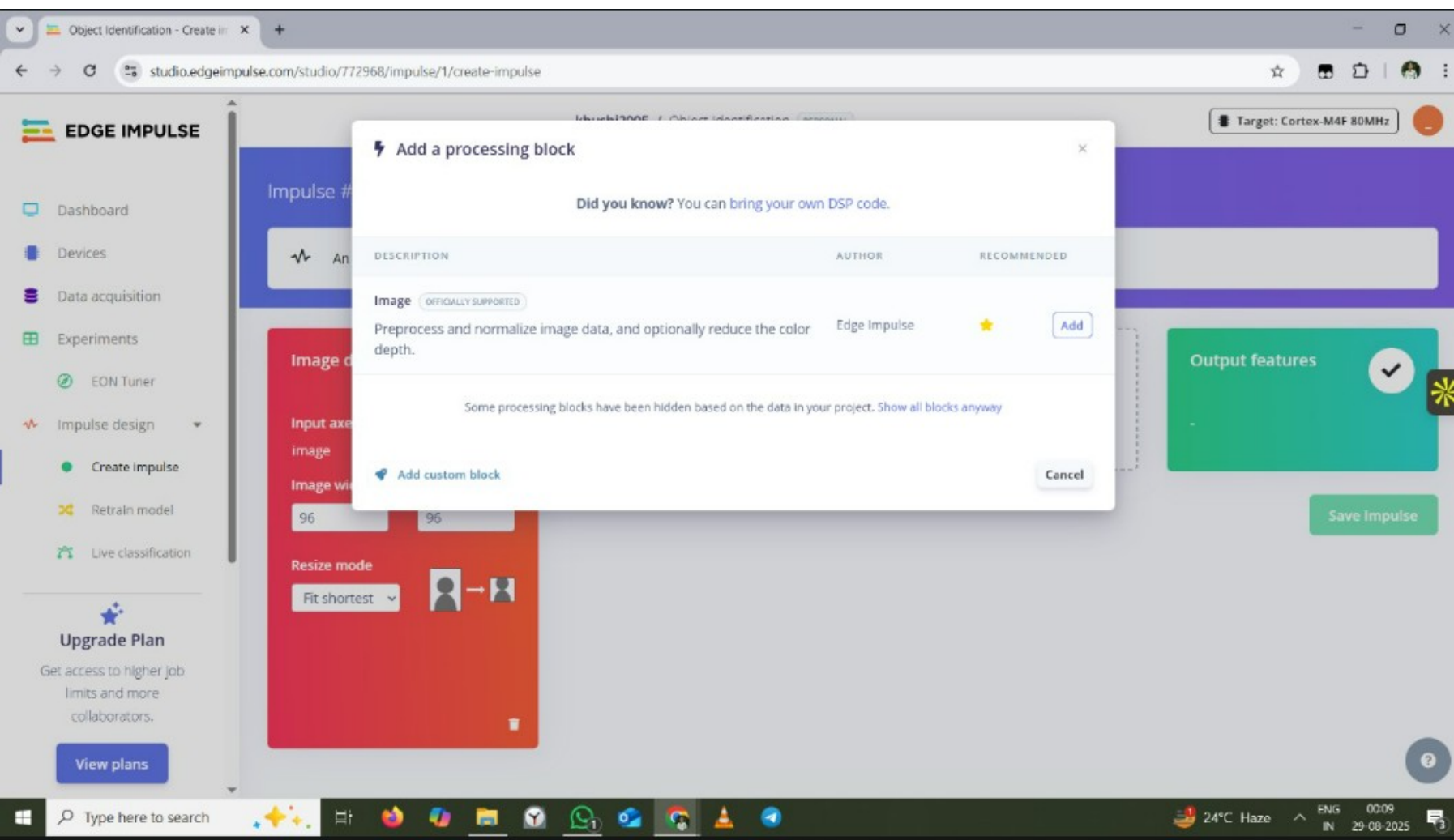
STEP 8

After labelling, click on 'Create Impulse' and adjust image height and image width to 96.



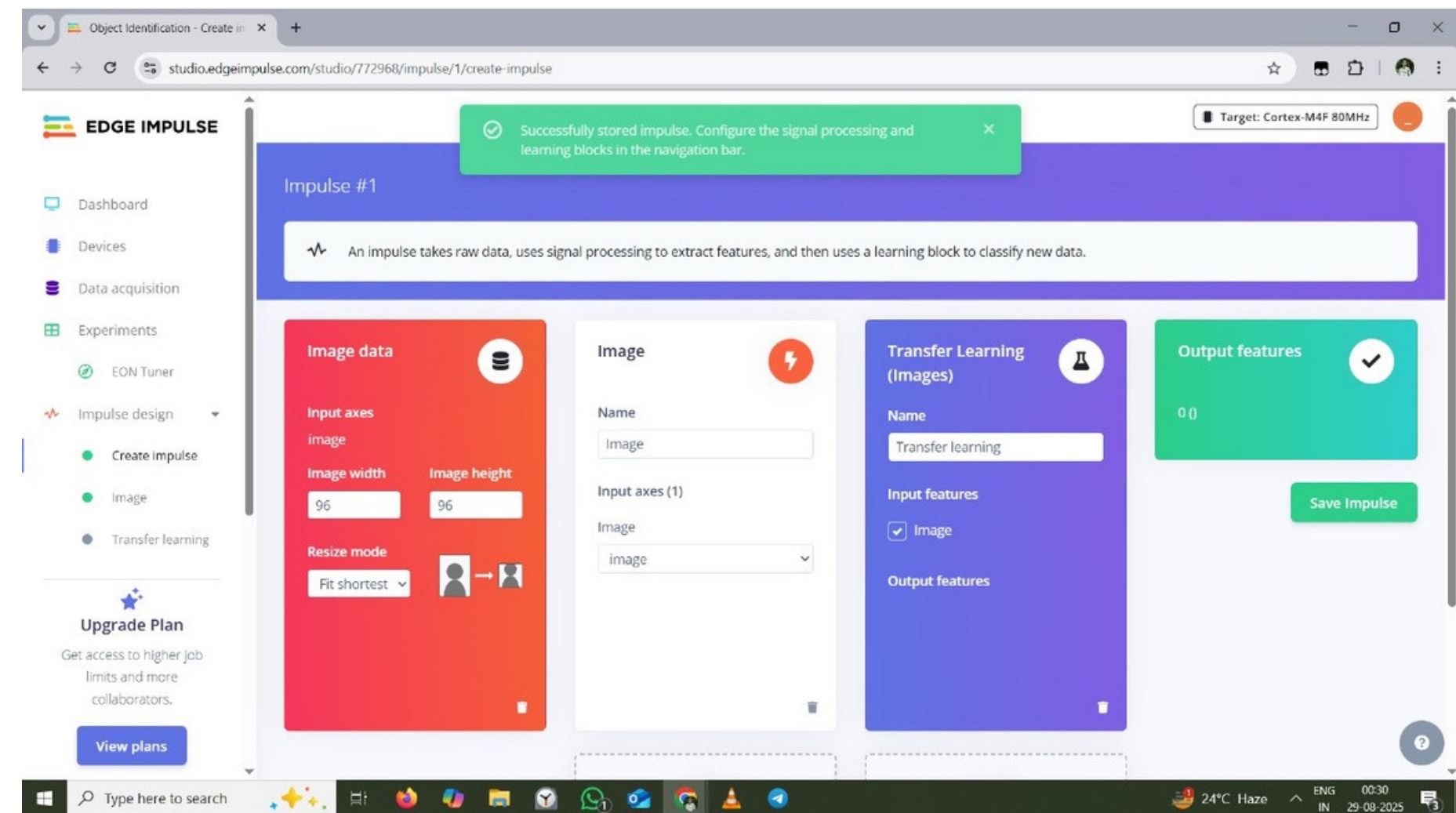
STEP 9

Add a Processing Block.



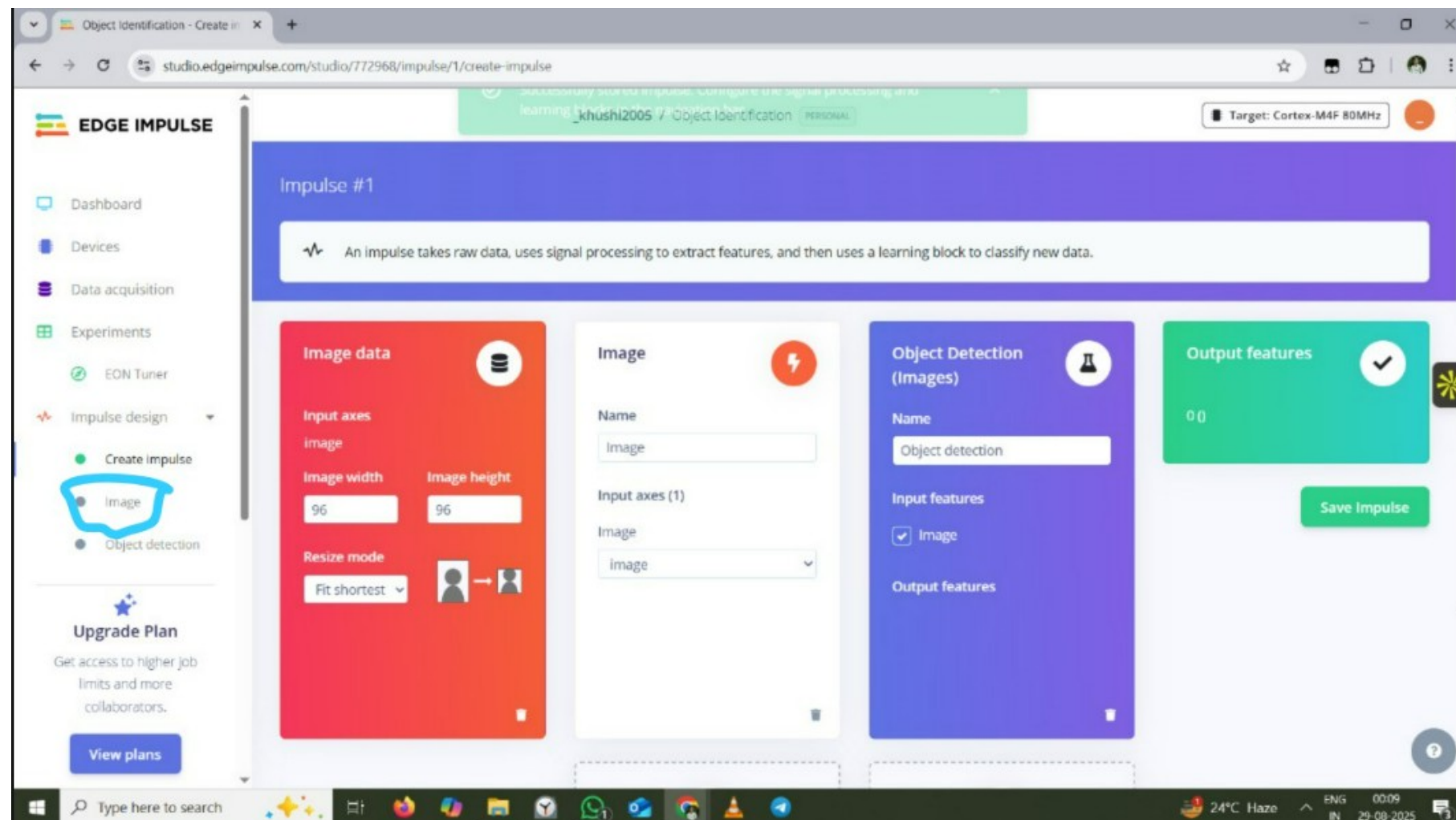
STEP 10

Add a Learning Block named as Transfer Learning. It will be shown in the all blocks option.



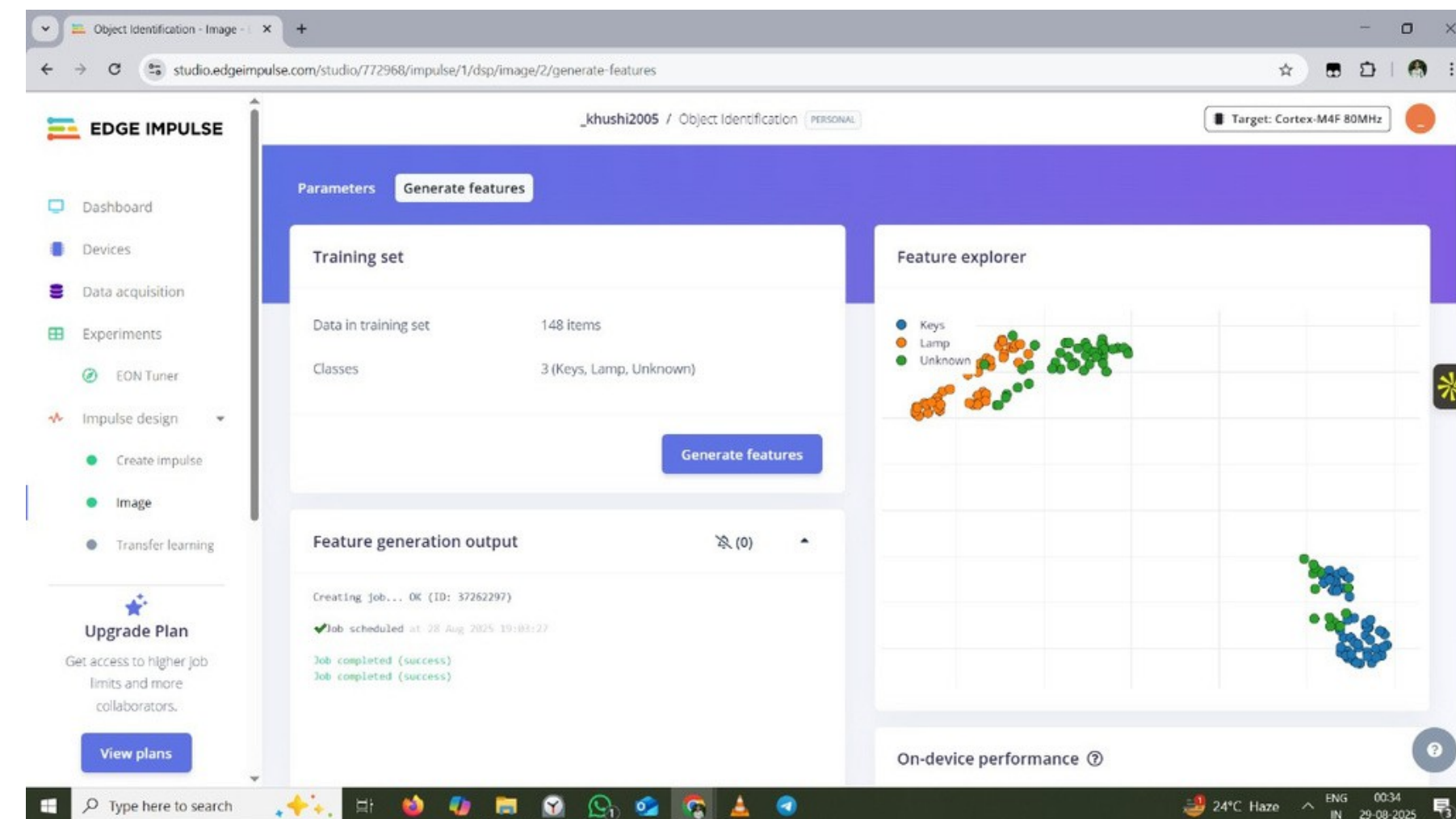
STEP 11

Click **Images** in the menu on the left to configure the processing block and change RGB to Gray Scale and save it.



STEP 12

You will be send to the 'Feature generation' screen. Click on 'Generate Features'.



STEP 13

Go to the 'transfer learning option' and select the MobileNetV12 in choose another model option and set training cycles as 20.

STEP 14

You will be presented with data training outputs which can be analysed.

EDGE IMPULSE

Object Identification - Transfer

studio.edgeimpulse.com/studio/772968/impulse/1/learning/keras-transfer-image/4

_khushi2005 / Object Identification PERSONAL

Target: Cortex-M4F 80MHz

Neural Network settings

Training settings

Number of training cycles 20

Use learned optimizer ☐

Learning rate 0.0005

Training processor CPU

Data augmentation ☐

Advanced training settings

Neural network architecture

Input layer (9,216 features)

Training output

Cancel (0)

Creating job... OK (ID: 37262324)

Job scheduled at 28 Aug 2025 19:05:38

Job started at 28 Aug 2025 19:05:41

EDGE IMPULSE

Object Identification - Transfer

studio.edgeimpulse.com/studio/772968/impulse/1/learning/keras-transfer-image/4

Training settings

Number of training cycles 20

Use learned optimizer ☐

Learning rate 0.0005

Training processor CPU

Data augmentation ☐

Advanced training settings

Neural network architecture

Input layer (9,216 features)

MobileNetV2 96x96 0.35 (final layer: 16 neurons, 0.1 dropout)

Choose a different model

Output layer (3 classes)

Model

Model version: Quantized (int8)

Last training performance (validation set)

ACCURACY 100.0%

LOSS 0.01

Confusion matrix (validation set)

KEYS	KEYS	LAMP	UNKNOWN
KEYS	100%	0%	0%
LAMP	0%	100%	0%
UNKNOWN	0%	0%	100%
F1 SCORE	1.00	1.00	1.00

Metrics (validation set)

METRIC	VALUE
Area under ROC Curve	1.00
Weighted average Precision	1.00
Weighted average Recall	1.00
Weighted average F1 score	1.00

Data explorer (full training set)

Keys - correct

Lamp - correct

Unknown - correct

STEP 15

Go to the 'Model Testing' and click on the classify all button to test your model which will give your model test results.

This lists all test data. You can manage this data through Data acquisition.

Test data Classify all

Set the 'expected outcome' for each sample to the desired outcome to automatically score the impulse.

SAMPLE NAME	EXPECTED OUTC...	ACCURACY	RESULT
Unknown.63...	Unknown	100%	1 Unknown
Lamp.63ljrh0r	Lamp	0%	1 Unknown
Lamp.63ljrf1r	Lamp	0%	1 Unknown
Lamp.63ljrf1i	Lamp	0%	1 Unknown
Lamp.63ljq6...	Lamp	100%	1 Lamp
Lamp.63ljq4...	Lamp	100%	1 Lamp
Lamp.63ljp9...	Lamp	100%	1 Lamp

Model testing output

Classifying data for Transfer learning...
Classifying data for float32 model...
Job scheduled at 28 Aug 2025 19:19:18
Job started at 28 Aug 2025 19:19:19
INFO: Created TensorFlow Lite XNNPACK delegate for CPU.
Classifying data for Transfer learning OK
Generating model testing summary...
Finished generating model testing summary
Job completed (success)

Results Model version: Unoptimized (float32)

ACCURACY 91.89%

Metrics for Transfer learning

METRIC	VALUE
Area under ROC Curve	0.95
Weighted average Precision	0.94

STEP 16

Deploy the model by scanning QR.

EDGE IMPULSE _khushi2005 / Object Identification PERSONAL Target: Cortex-M4F 80MHz

Configure your deployment

You can deploy your impulse to any device. This makes the model run without an internet connection, minimizes latency, and runs with minimal power consumption. Read more.

Search deployment options

DEFAULT DEPLOYMENT

C++ library
A portable C++ library with no external dependencies, which can be compiled with any modern C++ compiler.


MODEL OPTIMIZATIONS
Model optimizations can increase on-device performance but may reduce accuracy.

EON™ Compiler
Same accuracy, 17% less RAM, 22% less ROM.

Quantized (int8)

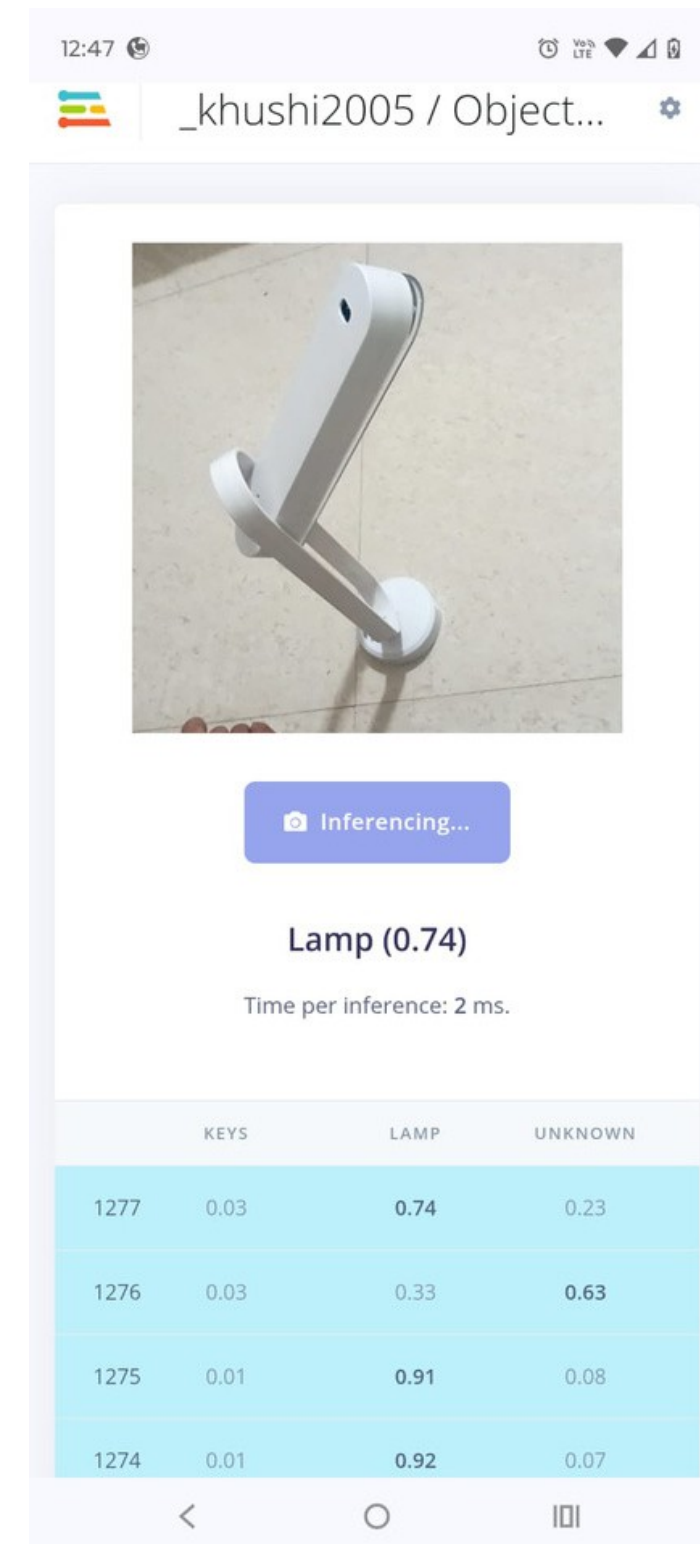
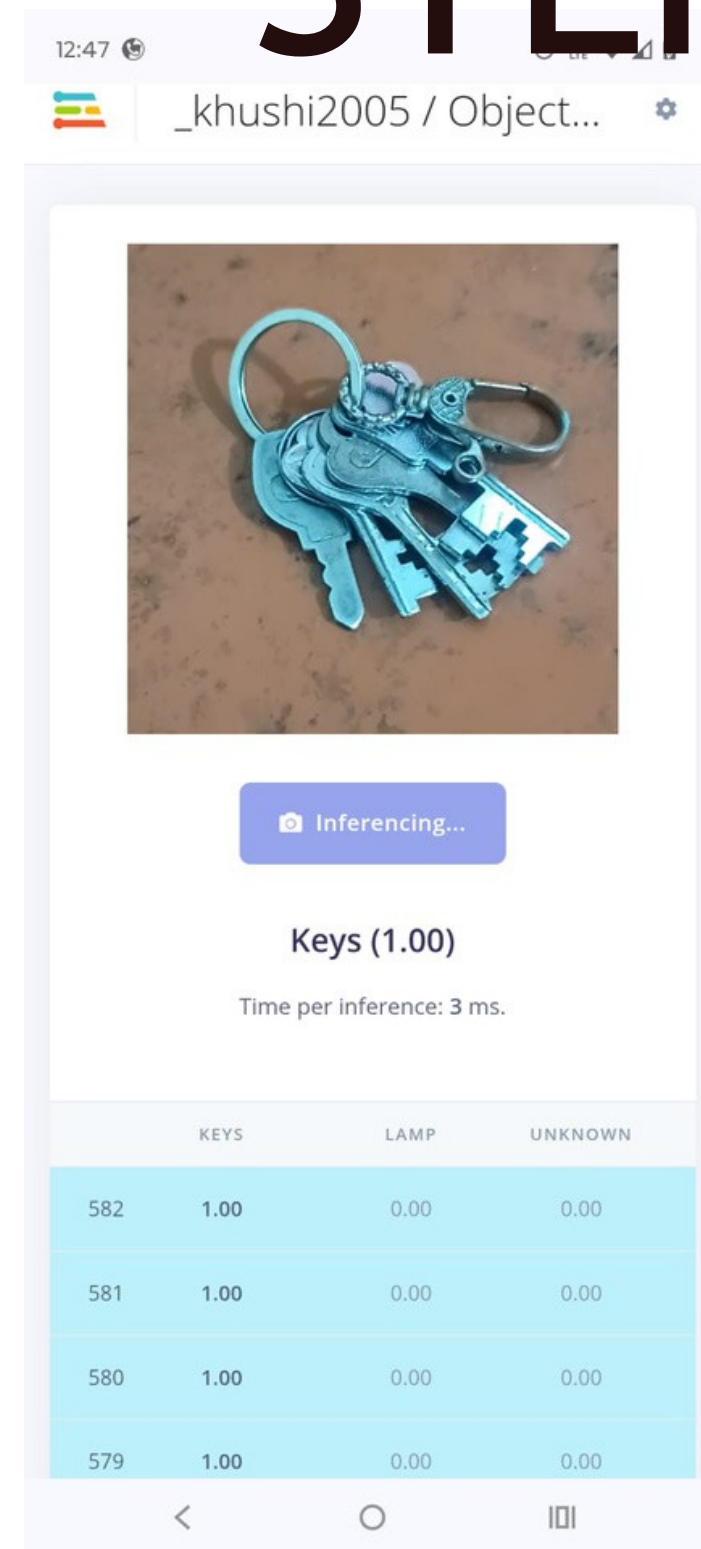
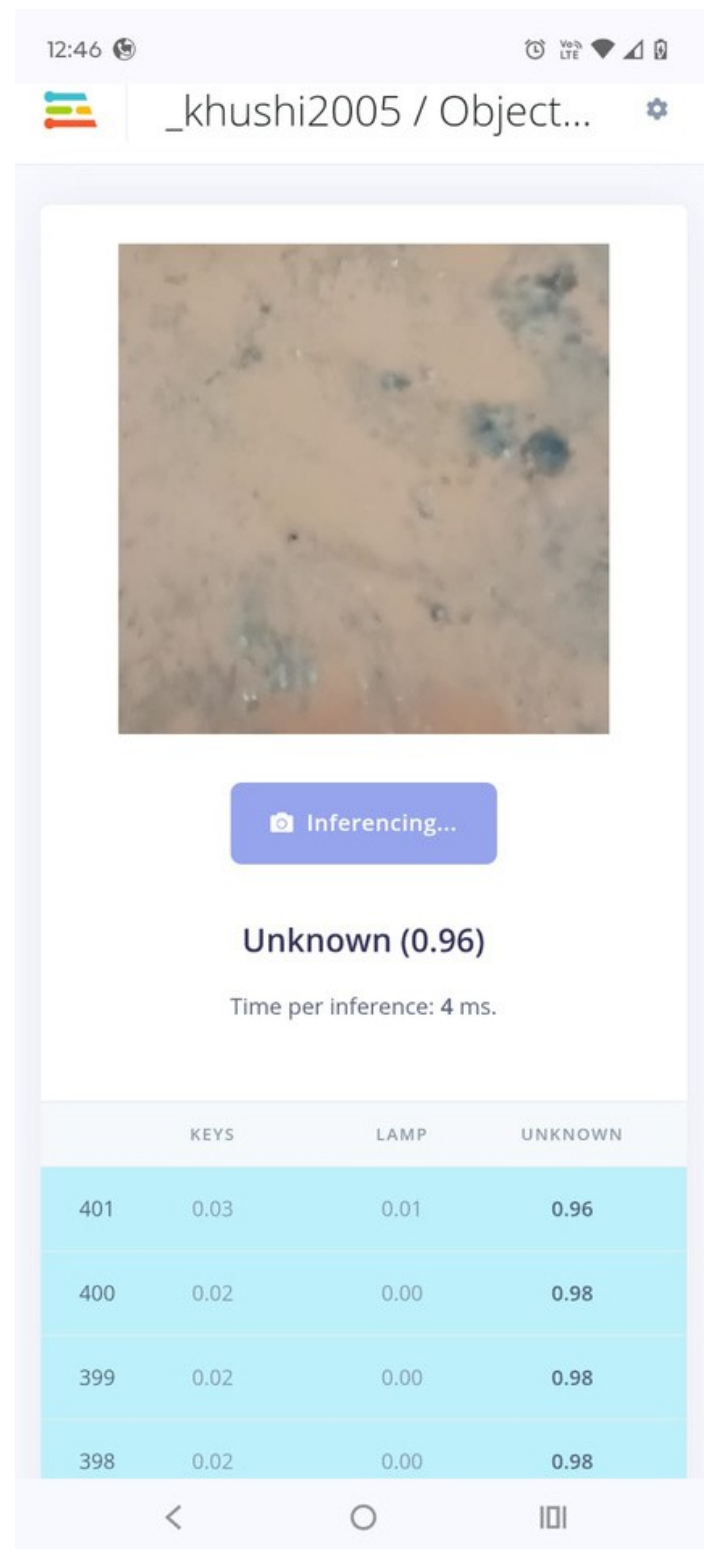
	IMAGE	TRANSFER LEARNI...	TOTAL
LATENCY	7 ms.	1.123 ms.	1.130 ms.

Run this model
Scan QR code or launch in browser to test your prototype



[Launch in browser](#)

STEP 17



Now scan with your phone and see your model detecting the objects. .



THANK YOU!!