



Introducing schools into STEAM with birds, IoT, AI and Fablabs

FAB16 - 10th August 2021

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Marc Pous

balena.io Developer Advocate

Co-Founder at thethings.iO & 1m1Labs
IoT Barcelona & IoT Munich

...

and father



Today

$\frac{1}{3}$ Stories about birds + AI + IoT + Fablabs

$\frac{2}{3}$ Let's build it together



Prerequisites

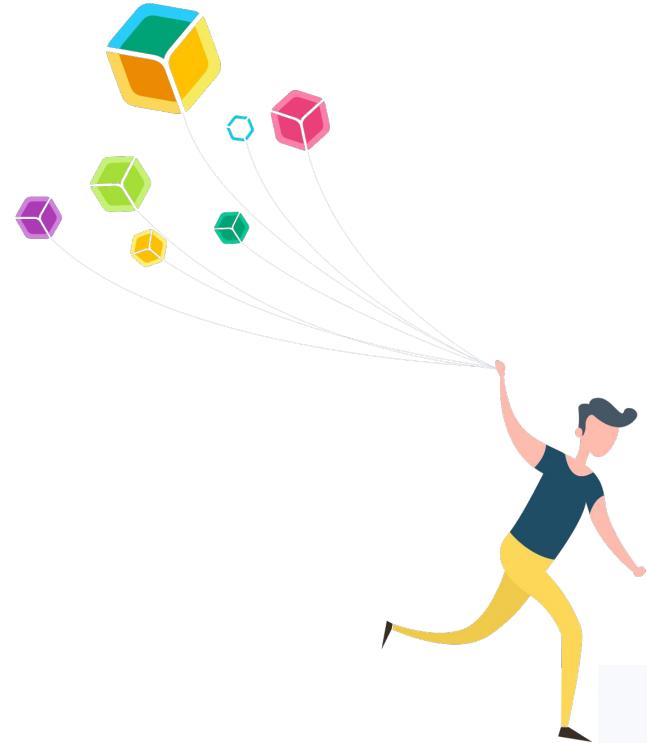
Raspberry Pi 3 / 4

USB Camera or Pi Camera

Telegram app

[balenaCloud](#) account

[Edge Impulse](#) account

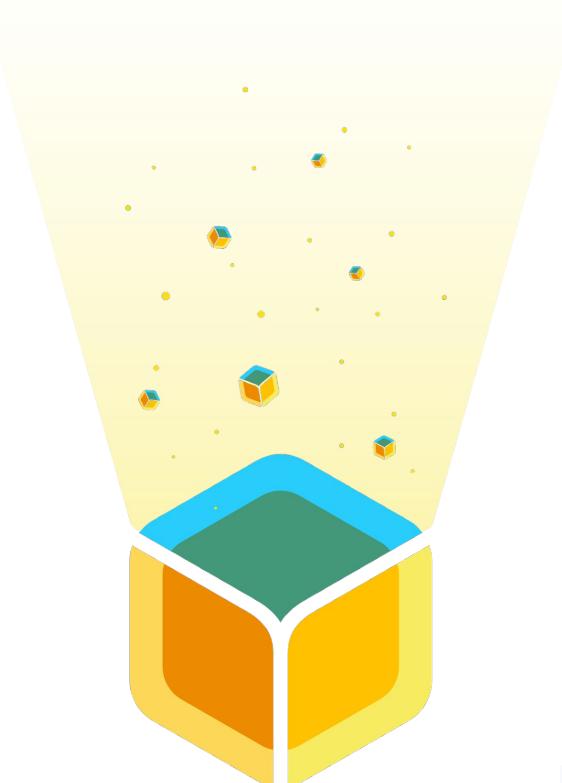


Goals

Learn about birds around us.

Introduce on IoT and AI.

Involve the community into the project.



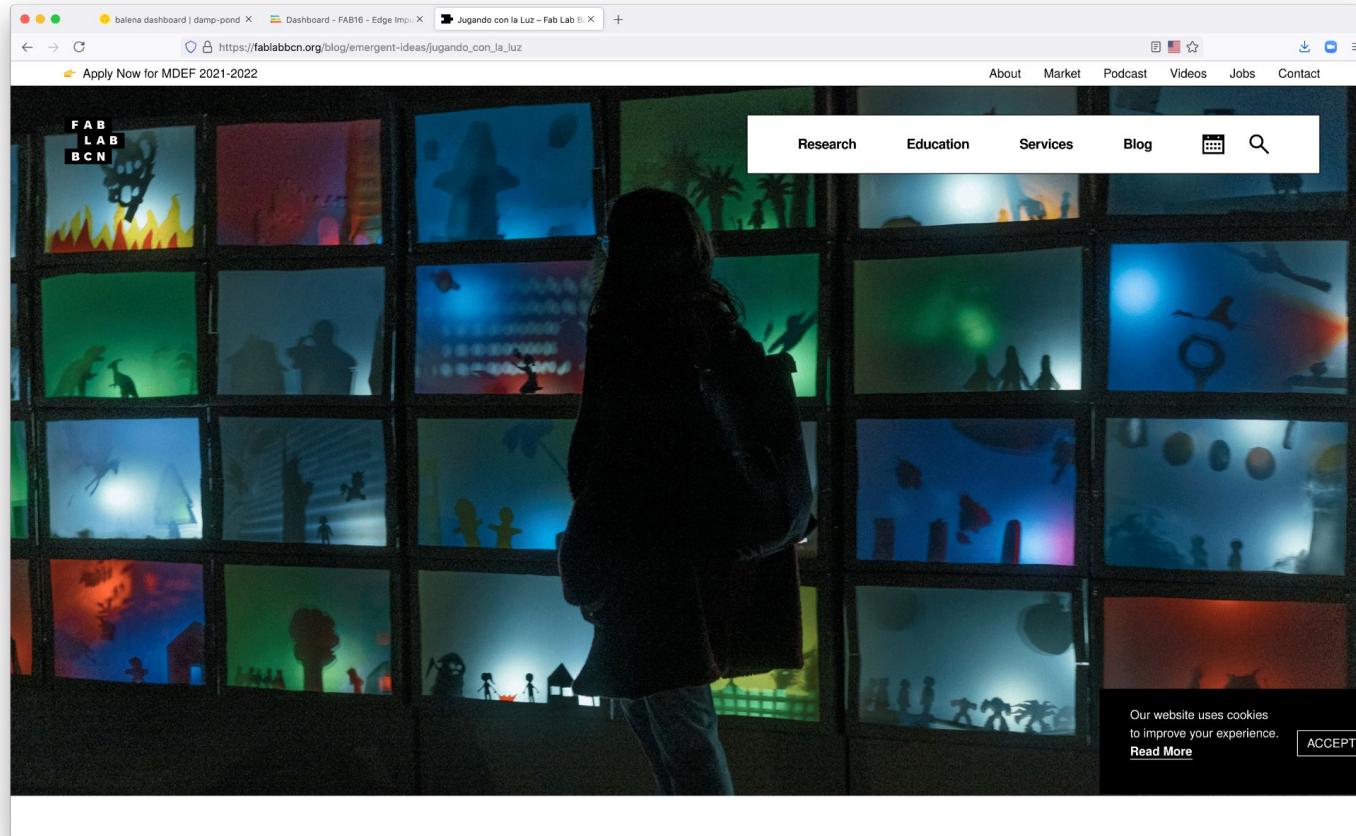
Let me tell you a
story...



Vilallonga de Ter



Escola Sant Martí Barcelona



https://fablabbcn.org/blog/emergent-ideas/jugando_con_la_luz



balena dashboard | damp-pond X Dashboard - FAB16 - Edge Imp. X Pájaros en la Nube: qué es el pro X +

https://pajarosenlanube.ibercivis.es/2020/11/09/pajaros-en-la-nube-proyecto/

Inicio Profesores Proyecto Blog de Actualidad Recursos del proyecto

Pájaros en la Nube: qué es el proyecto

por aembid | Nov 9, 2020 | blog | 0 Comentarios



Programa en tu casa una caseta sensorizada conectada a internet de las cosas y descubre los pájaros de tu entorno.

Pájaros en la nube

ibercivis

FECYT

Bienvenidos al proyecto Pájaros en la Nube que tiene como objetivo la monitorización de la fauna insectívora del entorno. Se trata de un proyecto inclusivo y dirigido a todas las edades en el ámbito de la educación tanto a nivel científico como tecnológico.

Metodología del proyecto Pájaros en la Nube:

Con Pájaros en la Nube, en el aula se aprenderá a crear una caseta y programarla mediante una placa de Arduino, para que, mediante el internet de las cosas y la computación en la nube, se podrá colocar dicha caseta en el exterior y recibir en el aula los datos científicos que se buscan obtener.

Los datos científicos adquiridos muestran la diversidad de la fauna de la zona de los animales, sobre todo pájaros, que

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Cookie Settings Accept All

Buscar

Entradas recientes

Actividades realizadas en los centros participantes

Pájaros en la Nube: FAQS

Ya está lista la caja de Pájaros en La Nube

85 centros escolares participarán en Pájaros en la Nube 2020/21

Plazo de inscripción hasta el 20/01/2021

Comentarios recientes

Nuria Aliana Colomer en Pájaros en la Nube: FAQS

Belén Barbero en 85 centros escolares participarán en Pájaros en la Nube 2020/21

Miquel en 85 centros escolares participarán en Pájaros en la Nube 2020/21

<https://pajarosenlanube.ibercivis.es/2020/11/09/pajaros-en-la-nube-proyecto/>





Pájaros en la nube @ Escola Sant Martí Barcelona

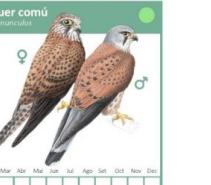
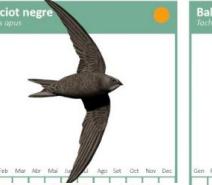
Mapatge d'ocells de Sant Cugat - 25 de març

Fitxa de camp:

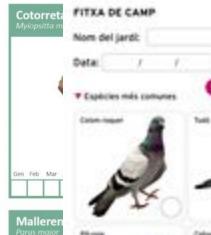
- 1 - Jardins
- 2 - Can Pon
- 3 - Parc del



Tu



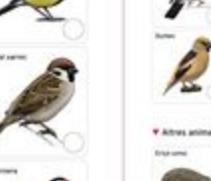
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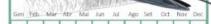
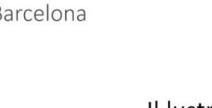
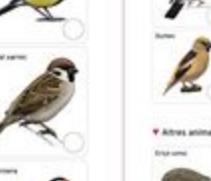
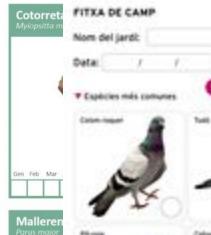
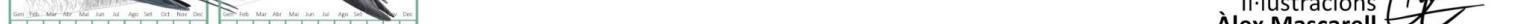
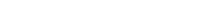
Mz



Cu



Brc



Si us plau entra les dades online a ocellsdeljardin.cat

ELS OCELLS DE LA NOSTRA ESCOLA

Institut Moisès Broggi
Barcelona

Resident

Hivernant

Estival

Il·lustracions
Àlex Mascarell





balena

Bird Buddy: A Smart Bird Feeder

<https://www.kickstarter.com/projects/mybirdbuddy/bird-buddy-a-smart-bird-feeder>

KICKSTARTER

Descubrir Empieza un proyecto Búsqueda Iniciar sesión

Bird Buddy: A Smart Bird Feeder



Bird Buddy notifies you of feathered visitors, captures their photos and organizes them in a beautiful collection!

Pre-order now!

Creado por
Bird Buddy

22.925 patrocinadores contribuyeron 4.190.158 € para que este proyecto se pudiera realizar.

Última actualización 4 de agosto de 2021

Campaña Preguntas frecuentes 6 Actualizaciones 16 Comentarios 1,631 Comunidad



Apoyar

Contribuir 1 € o más



balena dashboard | damp-pond X Dashboard - FAB10 - Edge Imp... X balenaHub: an easier way to fin... X +

https://hub.balena.io

What is balenaHub? Contribute Community

Fleets Projects Blocks

Submit a fleet Add filter

Search entries.

Views

balenaSound by balenat.labs

Build a single or multi-room streamer for an existing audio device using a Raspberry Pi! Supports Bluetooth, Airplay and Spotify Connect.

WORKS WITH Fin Nano

rosetta-at-home-arm by balenat.labs

Help fight the COVID-19 pandemic with your old laptop, Raspberry Pi, or other spare computer

WORKS WITH Nano

pihole by gh_klutchell's Organization

Pi-hole is a Linux network-level advertisement and Internet tracker blocking application!

WORKS WITH Fin Nano

Home_Assistant-AdGu... by github.com/abulaisik

A project to deploy Home Assistant and AdGuard Home on a single device

WORKS WITH Fin

balena-minecraft-server by AlexProgrammerDE

Build a Minecraft Server using a Raspberry Pi 4! Supports common Servers, SCP, RCON and Wifi Connect.

WORKS WITH Nano

rosetta-at-home-amd64 by balenat.labs

Help fight the COVID-19 pandemic with your old laptop, Raspberry Pi, or other spare computer

WORKS WITH Intel_NUC

balenaSense by balenat.labs

Take readings from a BME680 or similar sensors on a Raspberry Pi, store with InfluxDB and view with Grafana.

WORKS WITH Fin Nano

internetspeedtest by Will_Phillips

Periodically tests your internet speed, stores the result in InfluxDB and charts it in grafana.

WORKS WITH Fin

adguard by gh_klutchell's Organization

AdGuard Home is a network-wide software for blocking ads & tracking

WORKS WITH

led-pixel-controller by chrisys.world

Remotely control and program configurable RGB LED pixel matrices, strings, trees, and more with this handy all-in-one setup.

WORKS WITH

bookstack by gh_klutchell's Organization

BookStack is a simple and free, self-hosted, easy-to-use wiki platform for organising and storing information.

WORKS WITH

octoprint by balenat.labs

Remotely control your 3D-printer with Octoprint and balenal

WORKS WITH



<https://hub.balena.io>

balena dashboard | damp-pond X Dashboard - FAB16 - Edge Impulse X balenaHub: an easier way to find... +

https://hub.balena.io/projects

What is balenaHub? Contribute Community

Fleets Projects Blocks

Submit a project Add filter

Search entries...

Views

uk-train-departure-dis...

by chrisy's world

A balenaCloud Raspberry Pi app to display replica near real-time UK railway station departure data on SSD1322 screens.

WORKS WITH

gpsTime

by mall1's Organization

Uses attached GPS UART with PPS to provide accurate time via chrony ntp server

WORKS WITH

bird-watcher-balena-fin

by g_mithun_das's Organization

Build a Smart Bird Feeder powered by Edge Impulse and Balena

WORKS WITH

agriaiv-v2

by Arjit Das

Pest detection and classification made using Edge Impulse and balena.

WORKS WITH

basicstation-gateway-...

by Marc Pou

Deploys the Things Stack LoRaWAN gateway with Basics Station Packet Forward protocol on SX1301 or SX1302 LoRa concentrators.

WORKS WITH

balena-ads-b

by Ketil

Track the flight traffic over your head with a Raspberry Pi running balena and a cheap RTL-SDR USB dongle.

WORKS WITH

kerberos

by Kerberos.io

Video surveillance and video analytics for people and enterprises making this world a safer and smarter place.

WORKS WITH

home-urbit

by gh_0dyslam's Organization

Urbit is a new OS and peer-to-peer network that's simple by design, built to last forever, and 100% owned by its users. Urbit is your last computer.

WORKS WITH

TTS-network-server

by Xose Pérez

Deploys the Things Stack LoRaWAN Network Server Open Source Edition.

WORKS WITH

wifi-repeater

by balenalabs

Easily create a WiFi Access Point or WiFi repeater with balenaOS.

WORKS WITH

balenaLocating

by Will Phlion

Use Raspberry Pi's and Bluetooth BLE beacons to ensure you never lose your important stuff again.

WORKS WITH

TTS-network-server-ba...

by Xose Pérez

Deploys the Things Stack LoRaWAN Network Server alongside BasicStation Gateway Protocol.

WORKS WITH

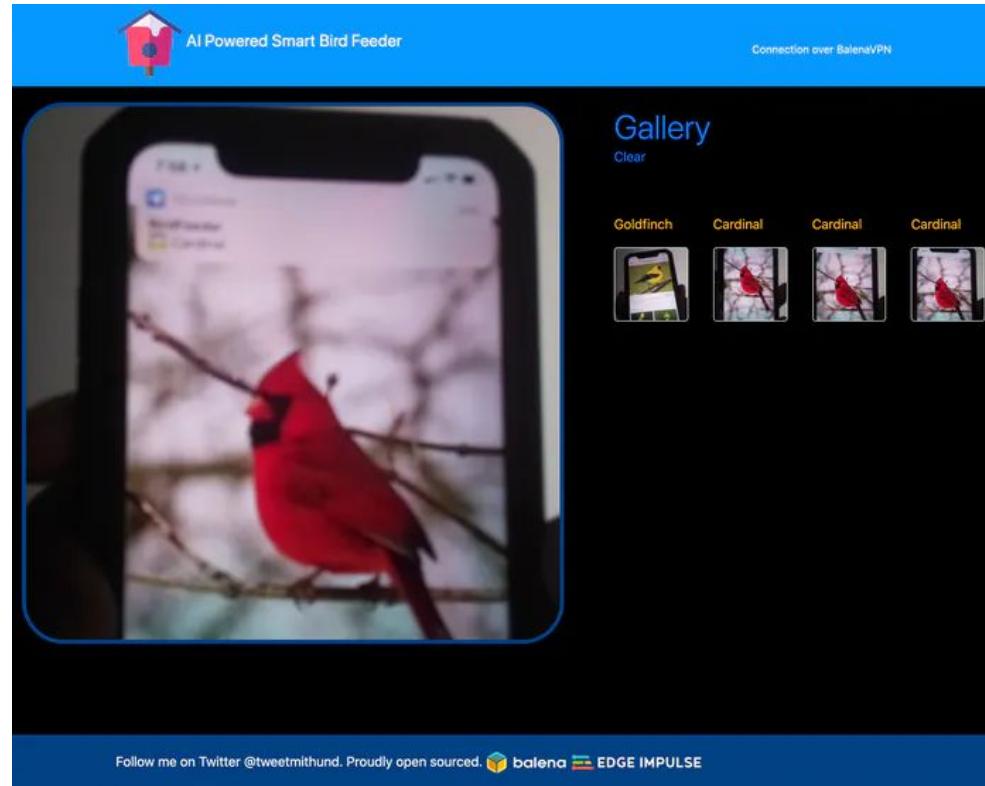
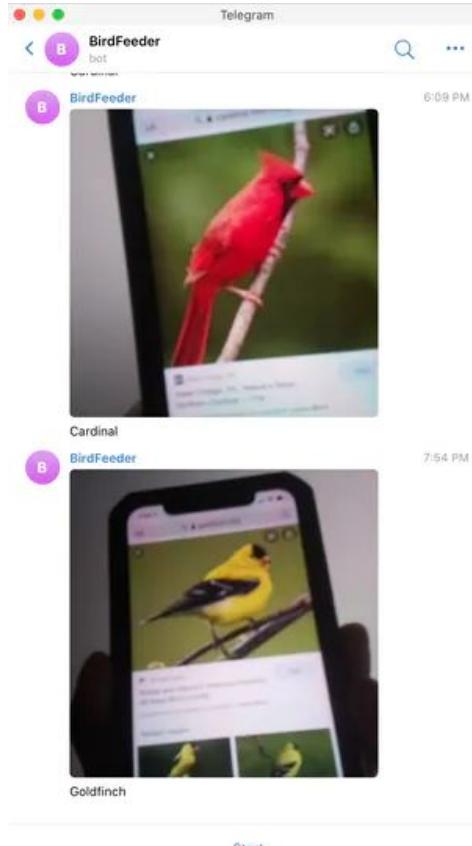
<https://hub.balena.io>



The screenshot shows a web browser window with the URL https://hub.balena.io/g_mithun_das/bird-watcher-balena-fin. The page is titled "balenaHub: an easier way to find..." and features a dark blue header with the balenaHub logo, a search bar, and links for "What is balenaHub?", "Contribute", and "Community". The main content area displays a project card for "bird-watcher-balena-fin" by g_mithun_das's Organization. The card includes a thumbnail of a birdhouse icon, a title, a description ("Build a Smart Bird Feeder powered by Edge Impulse and Balena"), a "Works With" section featuring icons for "Fin" and a raspberry pi, and a "Version" section with a "View code" link and a note about the last update on May 20, 2021. There are also "Fork this fleet" and "Report issue" buttons. On the left sidebar, there are buttons for "Fleets", "Projects", and "Blocks". At the bottom, there is a footer with the balenaHub logo, social media links (Twitter, Facebook, Instagram, YouTube), and a "Terms of use" link.

<https://hub.balena.io>







Project made by Mithun Das



Project made by @disk91

Goals of the project

How to introduce STEAM & citizen science into schools for all?



- Learn about birds around us
 - Birds sizes, birds migration, different species, food, stations and more.



- **Learn about birds around us**
 - Birds sizes, birds migration, different species, food, stations and more.
- **Experiment with different materials**
 - Make bird feeders using 3D printing, wood, and more.



- **Learn about birds around us**
 - Birds sizes, birds migration, different species, food, stations and more.
- **Experiment with different materials**
 - Make bird feeders using 3D printing, wood, and more.
- **Introduce IoT+AI to children**
 - Show to children how the system works and how to make it different (bird chirps detection?)
 - Make children understand that a camera sometimes is not just a camera.
 - Create a Machine Learning model to know what are the birds around them (local vs global).
 - Involve children, teachers and families into citizen science and STEAM.
 - Build communities and share knowledge.



How to build it?



Build it with me :-)

- 1 Prepare the camera + Raspberry Pi (or similar)
- 2 Train a ML model with Edge Impulse
- 3 Deploy the balena Fleet on the Pi
- 4 Make a bird feeder
- 5 Share it with everyone



1

Prepare the camera

Raspberry Pi



Hardware

Raspberry Pi 3 / 4 or balenaFin

USB Camera or Pi Camera

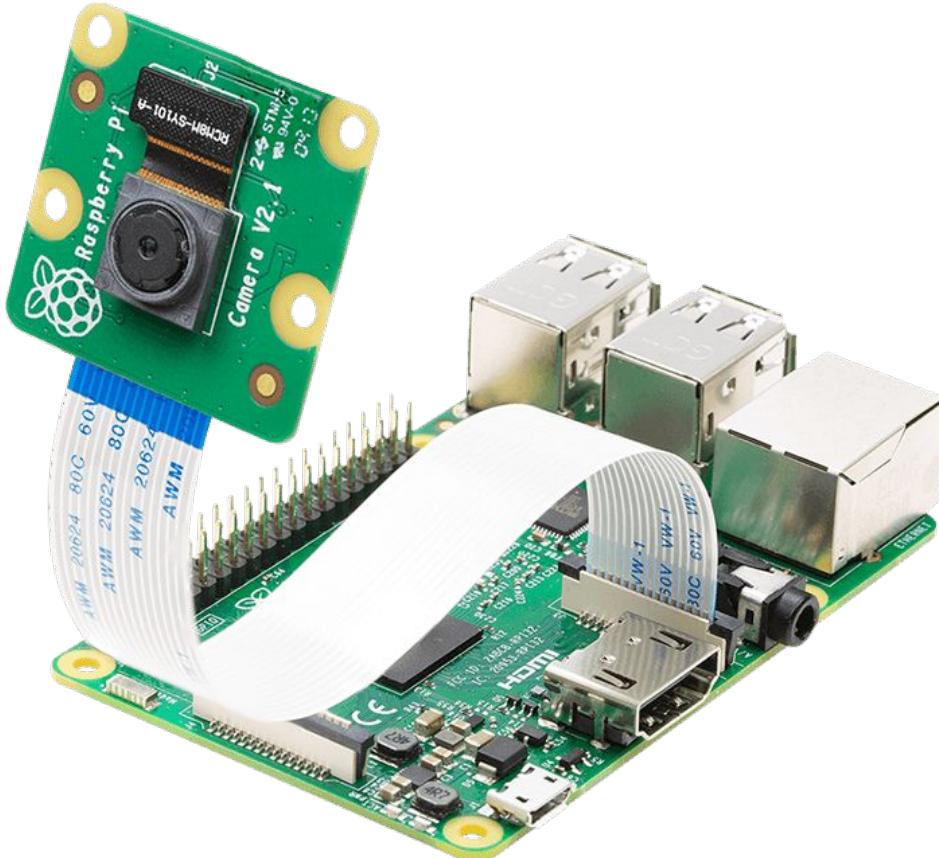
SD Card

Power Adapter

[balenaCloud](#)

[Edge Impulse](#)

[balenaEtcher](#)



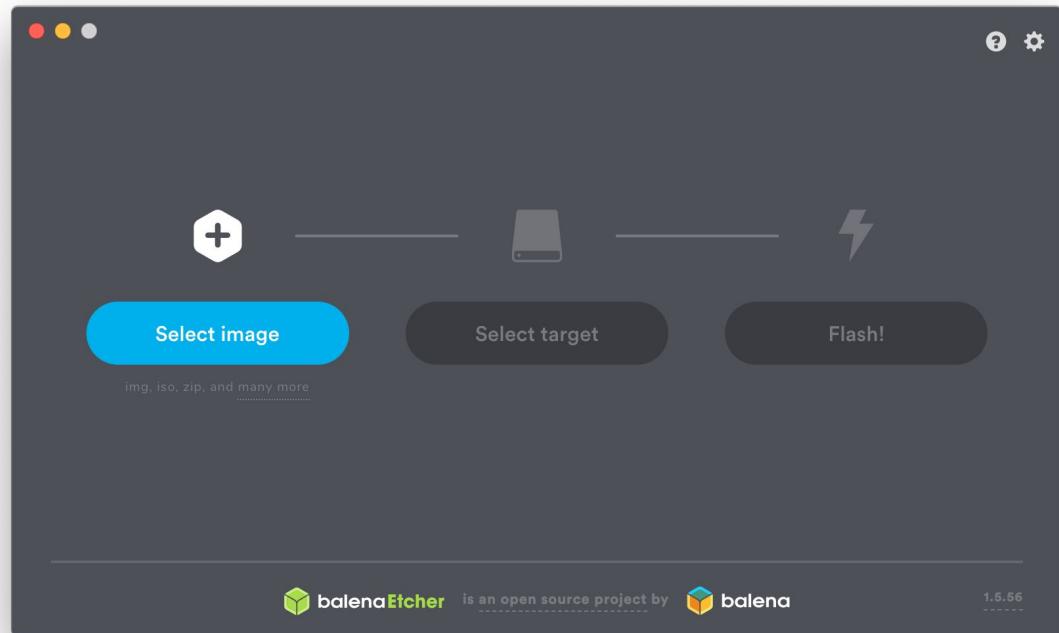
Software

[balenaCloud](#)

[Edge Impulse](#)

[balenaEtcher](#)

Telegram app



2

Train the ML model using Edge Impulse



k 275 Bird Species also see 73 Sp X +

← → C https://www.kaggle.com/gpiosenka/100-bird-species/version/43

Search

Dataset

275 Bird Species also see 73 Sports Dataset

39364 Train, 1375 Test, 1375 Validation images 224X224X3 jpg format

Gerry • updated a month ago (Version 43)

Data Tasks Code (98) Discussion (9) Activity Metadata Download (2 GB) New Notebook

Usability 8.5 License CC0: Public Domain Tags biology, image data, classification, computer vision, cnn and 1 more

Description

Data set of 275 bird species. 39364 training images, 1375 test images(5 per species) and 1375 validation images(5 per species). All images are 224 X 224 X 3 color images in jpg format. Data set includes a train set, test set and validation set. Each set contains 275 sub directories, one for each bird species. The data structure is convenient if you use the Keras ImageDataGenerator.flowfromdirectory to create your train, test and valid data generators. The data set also include a file birds.csv. This csv file contains three columns. The filepaths column contains the file path to an image file. The labels column contains the class name associated with the image file. The data.csv file if read in using df= pandas.read_csv('birds.csv') will create a pandas data frame which then can be split into traindf, testdf and validdf data frames to create your own partitioning of the data into train, test and valid data sets.

NOTE: The test and validation images in the data set were hand selected to be the "best" images so your model will probably get the highest accuracy score using those data sets versus creating your own test and validation sets. However the latter case is more accurate in terms of model performance on unseen images.

Images were gathered from internet searches by species name. Once the image files for a species was downloaded they were checked for duplicate images using python duplicate image detector program developed. All duplicates detected were deleted in order to prevent their being images common between the training, test

Data Explorer

1.82 GB

birds (3 directories, 1 files)

About this directory

This is the main folder that holds the trainset, testset and validation set. It also contains the birds.csv folder

View Active Events

<https://www.kaggle.com/gpiosenka/100-bird-species/version/43>



Dashboard - FAB16-demo - Edge Impulse

https://studio.edgeimpulse.com/studio/44781

Project info Keys Export gy4nt

EDGE IMPULSE

Dashboard Devices Data acquisition Impulse design Create impulse Retrain model Live classification Model testing Versioning Deployment

gy4nt / FAB16-demo

This is your Edge Impulse project!

Welcome to your new Edge Impulse project!

You're ready to add real intelligence to your edge devices. Let's set up your project. What type of data are you dealing with?

Creating your first project

Acquire data

Every Mac or PC can be a developer

LET'S GET STARTED

Design a machine learning model

Teach the model to recognize data. Use sensor readings.

GETTING STARTED

Documentation

Forums

Deploy

Package the complete impulse up, from signal processing code to trained model, and deploy it on your device. This ensures that the impulse runs with low latency and without requiring a network connection.

DEPLOY YOUR MODEL

Accelerometer data

Analyze movement of your device in real-time to predict machine failure, detect human gestures, or monitor rotating machines.

Audio

Listen to what's happening around you to create voice interfaces, listen to keywords, detect audible events, or to hear what's happening around your device.

Images

Add sight to your sensors with image classification or object detection - to detect humans and animals, monitor production lines or track objects.

Something else

Different sensor? No problem! You can collect and import data from any sensor, from environmental sensors to radars - and deploy your trained model back to virtually any device.

I know what I'm doing. Hide this wizard!

Sharing

Your project is private.

Make this project public

Summary

DEVICES CONNECTED 0

DATA COLLECTED -

Collaborators

gy4nt OWNER

Project info

The screenshot shows the Edge Impulse Studio interface. A central modal window titled 'Welcome to your new Edge Impulse project!' is displayed, prompting the user to choose the type of data they are dealing with. The options include 'Accelerometer data' (analyze movement), 'Audio' (listen to surroundings), 'Images' (image classification), and 'Something else' (collect data from various sensors). Below the modal, the main dashboard shows a summary of the project status: 0 devices connected and 0 data collected. The sidebar on the left provides navigation links for various project management tasks like 'Create impulse', 'Retrain model', and 'Deployment'. The overall theme is purple and blue.



Dashboard - FAB16-demo Edge X

https://studio.edgeimpulse.com/studio/44781

Project info Keys Export gy4nt

EDGE IMPULSE

Dashboard Devices Data acquisition Impulse design Create impulse Retrain model Live classification Model testing Versioning Deployment

gy4nt / FAB16-demo

This is your Edge Impulse project!

Welcome to your new Edge Impulse project!

Great! What do you want to detect?

Creating your first project

Acquire data

Every machine learning model needs data to learn. You can either upload a dataset or collect data from a connected device.

Design a machine learning model

Teach the machine learning model what it should look for in the data. Use the interface to get sensor readings.

Deploy

Package the complete impulse up, from signal processing code to trained model, and deploy it on your device. This ensures that the impulse runs with low latency and without requiring a network connection.

Classify a single object (image classification)

Detect one object in an image, for example whether you see a lamp or a plant. Image classification is efficient and can be ran on microcontrollers, including development boards from OpenMV, Arduino, Himax and Eta Compute.

Classify multiple objects (object detection)

Detect the location of multiple objects in an image, for example to detect how many apples you see. Object detection is a lot more compute intensive than image classification and currently only works on Linux-based devices like the Raspberry Pi 4 or Jetson Nano.

I know what I'm doing, hide this wizard!

DEPLOY YOUR MODEL

Sharing

Your project is private.

Make this project public

Summary

DEVICES CONNECTED 0

DATA COLLECTED -

Collaborators

gy4nt OWNER

Project info



Dashboard - FAB16 - Edge Impulse

https://studio.edgeimpulse.com/studio/44463

Project info Keys Export gy4nt

EDGE IMPULSE

Dashboard Devices Data acquisition Impulse design Create impulse Image Object detection Retrain model Live classification Model testing Versioning Deployment

gy4nt / FAB16

This is your Edge Impulse project. From here you acquire new training data, design impulses and train models.

Creating your first impulse (100% complete)

Acquire data

Every Machine Learning project starts with data. You can capture data from a development board or your phone, or import data you already collected.

LET'S COLLECT SOME DATA

Design an impulse

Teach the model to interpret previously unseen data, based on historical data. Use this to categorize new data, or to find anomalies in sensor readings.

GETTING STARTED: CONTINUOUS MOTION RECOGNITION
GETTING STARTED: RESPONDING TO YOUR VOICE
GETTING STARTED: ADDING SIGHT TO YOUR SENSORS

Deploy

Package the complete impulse up, from signal processing code to trained model, and deploy it on your device. This ensures that the impulse runs with low latency and without requiring a network connection.

DEPLOY YOUR MODEL

Sharing

Your project is private.

Make this project public

Summary

DEVICES CONNECTED 1

DATA COLLECTED 15 items

Collaborators

gy4nt OWNER

Project info



Workshop FAB16 - Introducing just4give/balena-ei-linux-bird → Data acquisition - FAB16 - Edge Impulse

https://studio.edgeimpulse.com/studio/44463/acquisition/training?page=1

gy4nt

EDGE IMPULSE

DATA ACQUISITION (FAB16)

Training data Test data Labeling queue (4)

Did you know? You can capture data from any device or development board, or upload your existing datasets - Show options

DATA COLLECTED
6 items

LABELS
2

Collected data

SAMPLE NAME	LABELS	ADDED	LENGTH
canary-1.jpg.2cfs4ju2	canary	Today, 17:53:26	-
robin-4.jpg.2cfs4j8l	robin	Today, 17:53:26	-
canary-5.jpg.2cfs4j2k	canary	Today, 17:53:25	-
canary-4.jpg.2cfs4ito	canary	Today, 17:53:25	-
robin-5.jpg.2cfs4isl	robin	Today, 17:53:25	-
canary-3.jpg.2cfs4idv	canary	Today, 17:53:25	-

Record new data

No devices connected to the remote management API.

RAW DATA
Click on a sample to load...

< 1 >

The screenshot shows the Edge Impulse Data Acquisition interface for a project titled "FAB16". The left sidebar contains navigation links for Dashboard, Devices, Data acquisition (selected), Impulse design, Create impulse, Retrain model, Live classification, Model testing, Versioning, Deployment, Getting Started, Documentation, and Forums. The main content area has a purple header "DATA ACQUISITION (FAB16)" with tabs for "Training data" (selected), "Test data", and "Labeling queue (4)". A "Did you know?" message is displayed. Below it, a summary shows "6 items" and "2" labels. A "Collected data" table lists six samples: "canary-1.jpg.2cfs4ju2" (canary, added today, length -), "robin-4.jpg.2cfs4j8l" (robin, added today, length -), "canary-5.jpg.2cfs4j2k" (canary, added today, length -), "canary-4.jpg.2cfs4ito" (canary, added today, length -), "robin-5.jpg.2cfs4isl" (robin, added today, length -), and "canary-3.jpg.2cfs4idv" (canary, added today, length -). A "Record new data" section indicates no devices are connected. A "RAW DATA" section with a button "Click on a sample to load..." is also present.



Workshop FAB16 - Introducing ... just4give/balena-ei-linux-bird Create impulse - FAB16 - Edge

https://studio.edgeimpulse.com/studio/44463/create-impulse

CREATE IMPULSE (FAB16)

An impulse takes raw data, uses signal processing to extract features, and then uses a learning block to classify new data.

Image data

Axes
image

Image width 320 Image height 320

Resize mode Fit shortest axis

For object detection transfer learning blocks, use a 320x320 image size.

Image

Name Image

Input axes image

Object Detection (Images)

Name Object detection

Input features Image

Output features 2 (canary, robin)

Output features

2 (canary, robin)

Save Impulse

Add a processing block

Add a learning block

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Workshop FAB16 - Introducing just4give/balena-ei-linux-bird > Image - FAB16 - Edge Impulse

https://studio.edgeimpulse.com/studio/44463/dsp/image/3

gy4nt

IMAGE (FAB16)
#1 ▾ Click to set a description for this version

Parameters Generate features

Raw data

canary-1.jpg.2cfs4ju2 (canary)

Raw features

0x263032, 0x263032, 0x273133, 0x283234, 0x293335, 0x293335, 0x2a3435, 0x2a3435, 0x2...

Parameters

Image

Color depth RGB Save parameters

DSP result

Image

Processed features

0.1490, 0.1882, 0.1961, 0.1490, 0.1882, 0.1961, 0.1529, 0.1922, 0.2000, 0.1569, 0.1...

On-device performance



Workshop FAB16 - Introducing ... just4give/balena-ei-linux-bird ... Image - FAB16 - Edge Impulse

https://studio.edgeimpulse.com/studio/44463/dsp/image/3/generate-features

EDGE IMPULSE

IMAGE (FAB16)
#1 ▾ Click to set a description for this version

Parameters Generate features

Training set

Data in training set 6 items
Classes 2 (canary, robin)

Generating features...

Feature explorer

No features generated yet.

Feature generation output Cancel

Creating job... OK (ID: 1217971)
Scheduling job in cluster...
Job started
Creating windows from 6 files...

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Workshop FAB16 - Introducing ... just4give/balena-ei-linux-bird ... Image - FAB16 - Edge Impulse

https://studio.edgeimpulse.com/studio/44463/dsp/image/3/generate-features

gy4nt

IMAGE (FAB16)

#1 ▾ Click to set a description for this version

Parameters Generate features

Training set

Data in training set 6 items

Classes 2 (canary, robin)

Generate features

Feature generation output

```
Sun Aug 8 16:00:11 2021 Construct embedding
completed 0 / 500 epochs
completed 50 / 500 epochs
completed 100 / 500 epochs
completed 150 / 500 epochs
completed 200 / 500 epochs
completed 250 / 500 epochs
completed 300 / 500 epochs
completed 350 / 500 epochs
completed 400 / 500 epochs
completed 450 / 500 epochs
Sun Aug 8 16:00:13 2021 Finished embedding
Reducing dimensions for visualizations OK
Job completed
```

Feature explorer (6 samples)

X Axis Y Axis Z Axis

Visualization layer 1 Visualization layer 2 Visualization layer 3

canary robin

On-device performance

PROCESSING TIME 9 ms.

PEAK RAM USAGE 4 KB



3

Deploy the balena fleet in just one click



balena dashboard | damp-pond X Dashboard - FAB16 - Edge Impulse X balenaHub: an easier way to find... +

https://hub.balena.io/projects

What is balenaHub? Contribute Community

Fleets Projects Blocks

Submit a project Add filter

Search entries...

Views

uk-train-departure-dis...

by chrisy's world

A balenaCloud Raspberry Pi app to display replica near real-time UK railway station departure data on SSD1322 screens.

WORKS WITH

gpsTime

by mall1's Organization

Uses attached GPS UART with PPS to provide accurate time via chrony ntp server

WORKS WITH

bird-watcher-balena-fin

by g_mithun_das's Organization

Build a Smart Bird Feeder powered by Edge Impulse and Balena

WORKS WITH

agriaiv-v2

by Arjit Das

Pest detection and classification made using Edge Impulse and balena.

WORKS WITH

basicstation-gateway-...

by Marc Pou

Deploys the Things Stack LoRaWAN gateway with Basics Station Packet Forward protocol on SX1301 or SX1302 LoRa concentrators.

WORKS WITH

balena-ads-b

by Ketil

Track the flight traffic over your head with a Raspberry Pi running balena and a cheap RTL-SDR USB dongle.

WORKS WITH

kerberos

by Kerberos.io

Video surveillance and video analytics for people and enterprises making this world a safer and smarter place.

WORKS WITH

home-urbit

by gh_0dyslam's Organization

Urbit is a new OS and peer-to-peer network that's simple by design, built to last forever, and 100% owned by its users. Urbit is your last computer.

WORKS WITH

TTS-network-server

by Xose Pérez

Deploys the Things Stack LoRaWAN Network Server Open Source Edition.

WORKS WITH

wifi-repeater

by balenalabs

Easily create a WiFi Access Point or WiFi repeater with balenaOS.

WORKS WITH

balenaLocating

by Will Phlion

Use Raspberry Pi's and Bluetooth BLE beacons to ensure you never lose your important stuff again.

WORKS WITH

TTS-network-server-ba...

by Xose Pérez

Deploys the Things Stack LoRaWAN Network Server alongside BasicStation Gateway Protocol.

WORKS WITH

<https://hub.balena.io>



A screenshot of a GitHub repository page for "just4give/balena-ei-linux-bird-watcher".

The repository has 110% completion, 0 stars, 1 fork, and 1 watch.

Code tab is selected. The master branch has 1 commit from just4give, merged 11 days ago. The commit message is "Merge pull request #1 from mpous/patch-1". The commit includes changes to "ei-processing", "telegram", ".gitignore", "README.md", "balena.yml", "docker-compose.yml", and "logo.png".

The README.md file contains the following content:

```
Bird Watcher using Edge Impulse Linux SDK and BalenaOS

This project enables you to run Edge Impulse Linux SDK on balenaOS thus allowing you to manage a fleet of devices with the same software stack on them which can do various kinds of on-device Machine Learning applications.

Hardware
```

The Hardware section shows a small image of a device labeled "balenaFin".

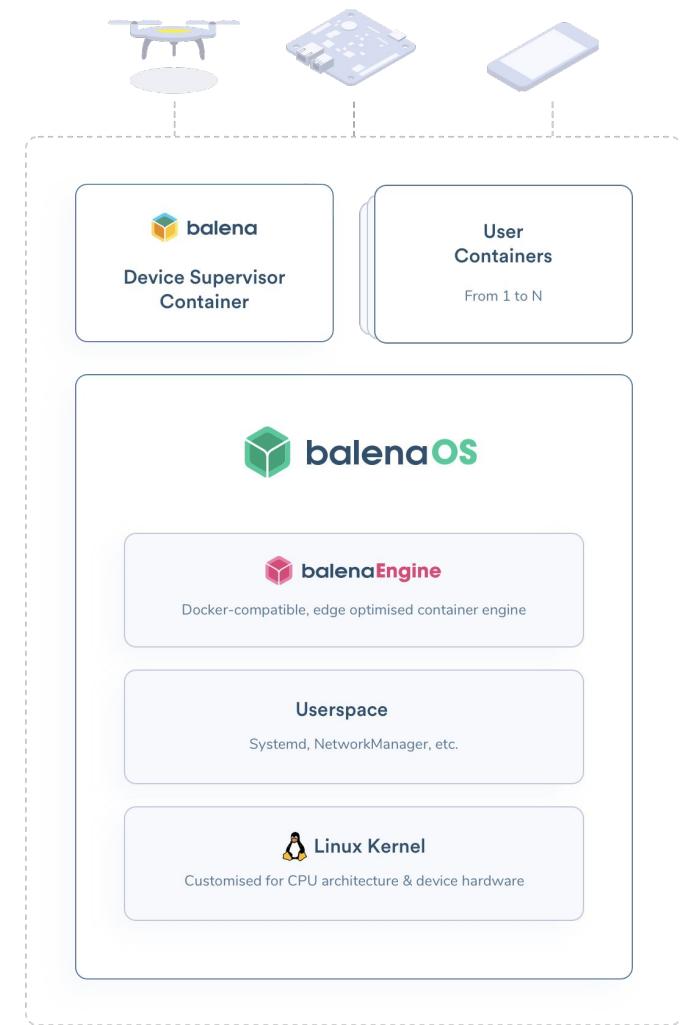
The repository has no releases or packages published.

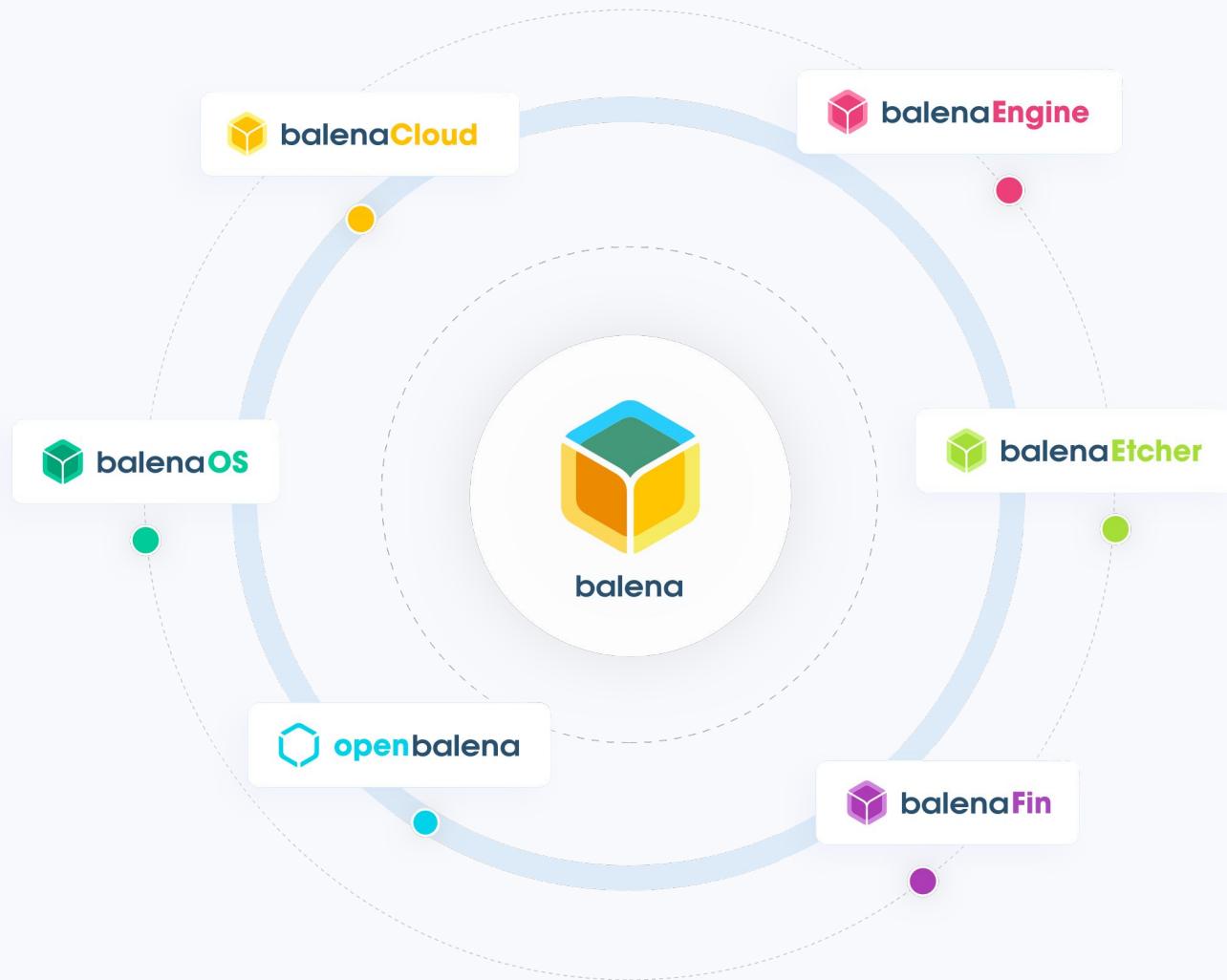
Contributors: just4give (Mithun Das) and mpous (Marc Pous).

Languages: Python (37.8%), JavaScript (27.3%), HTML (17.8%), CSS (16.5%), and Shell (0.6%).

<https://github.com/just4give/balena-ei-linux-bird-watcher>







just4give/balena-ei-linux-bird-watcher

110% ⚡ ☆ ↴ ↵ ⌂ ⌃

README.md

- Sign up for a free [Edge Impulse account](#)
- Sign up for a free [BalenaCloud account](#)
- [balenaEtcher](#)

Deploy using balenaCloud

Click on the *deploy-with-balena* button as given below, which will help you to deploy your application to balenaCloud and then to your Raspberry Pi in **one-click!**

 Deploy with balena

Else you can build your own release by cloning this repo on your primary machine (x86) and use the following commands :

```
$ git clone https://github.com/just4give/balena-ei-linux-bird-watcher.git  
$ cd balena-ei-linux-bird-watcher  
$ balena login  
$ balena push balena-ei-linux-bird-watcher
```

Data Collection Mode

Set the variable to 1 which will bring the application to data collection mode.

```
EI_COLLECT_MODE_IMAGE
```

and follow the instructions being laid down in the terminal.

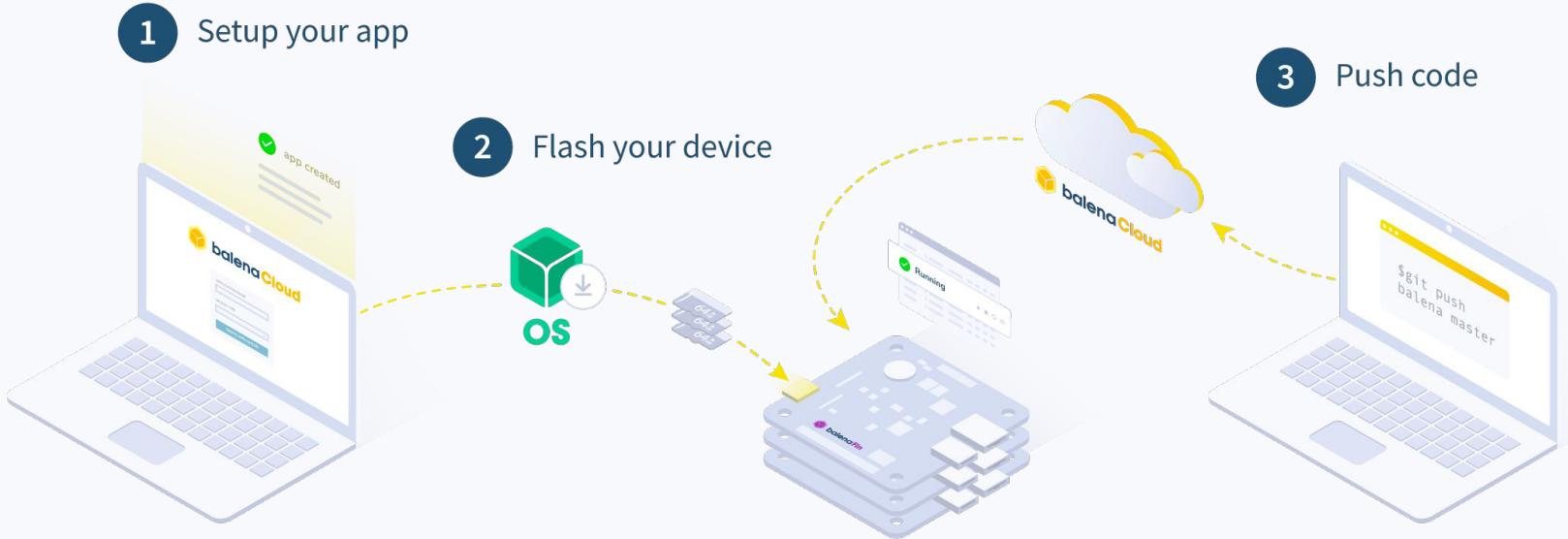
© 2021 GitHub, Inc. [Terms](#) [Privacy](#) [Security](#) [Status](#) [Docs](#) [!\[\]\(11480c5d3c1860b377b41048b888cc0d_img.jpg\)](#) [Contact GitHub](#) [Pricing](#) [API](#) [Training](#) [Blog](#) [About](#)

<https://dashboard.balena-cloud.com/deploy?repoUrl=https://github.com/just4give/balena-ei-linux-bird-watcher>

<https://github.com/just4give/balena-ei-linux-bird-watcher>



How it works



balena dashboard | bird-watcher X + https://dashboard.balena-cloud.com/fleets/1850718/summary

Marc Pous MP

Getting Started Docs Forums Status

bird-watcher-El-l... Summary Devices Releases

bird-watcher-El-l...
Architecture aarch64
Created Jul 30th 2021, 12:57 am

Microservices

Add device

Name	Status	Device type	Last seen	UUID	OS version	OS variant	Supervisor version	IP address	Actions
damp-pond	✓ Online	Raspberry Pi 4 (using 64bit OS)	Online (for 11 days)	7b7fa16	balenaOS 2.80.5+rev1	Production	12.8.7	192.168.1.44	2.
FAB16	✗ Offline	Raspberry Pi 4 (using 64bit OS)	3 days ago	a605363	balenaOS 2.82.10+rev1	Production	12.9.3	192.168.100.57	18

Tags Actions

Create release

Need help



balena dashboard | Applications +

https://dashboard.balena-cloud.com/devices/7b7fa1607916f85bee3ffaa46a4d4fae/summary

Getting Started Docs Forums Status Marc Pous MP ▾

damp-pond

[Reboot](#) [Restart Services](#) [💡](#) [▼](#)

STATUS Online **UUID** 7b7fa16 [🔗](#) **TYPE** Raspberry Pi 4 (using 64bit OS)

ONLINE FOR 11 days **HOST OS VERSION** balenaOS 2.80.5+rev1 **SUPERVISOR VERSION** 12.8.7 [production](#)

CURRENT RELEASE 521b6f3 [🔗](#) **TARGET RELEASE** 521b8f3 [🔗](#)

LOCAL IP ADDRESS 192.168.1.44 [🔗](#) **PUBLIC IP ADDRESS** 2.137.81.41 [🔗](#) **MAC ADDRESS** DC:A6:32:43:E5:7A [🔗](#)
DC:A6:32:43:E5:7B [🔗](#)

TAGS (0) [🔗](#) No tags configured yet **PUBLIC DEVICE URL** [🔗](#)

NOTES

SERVICES

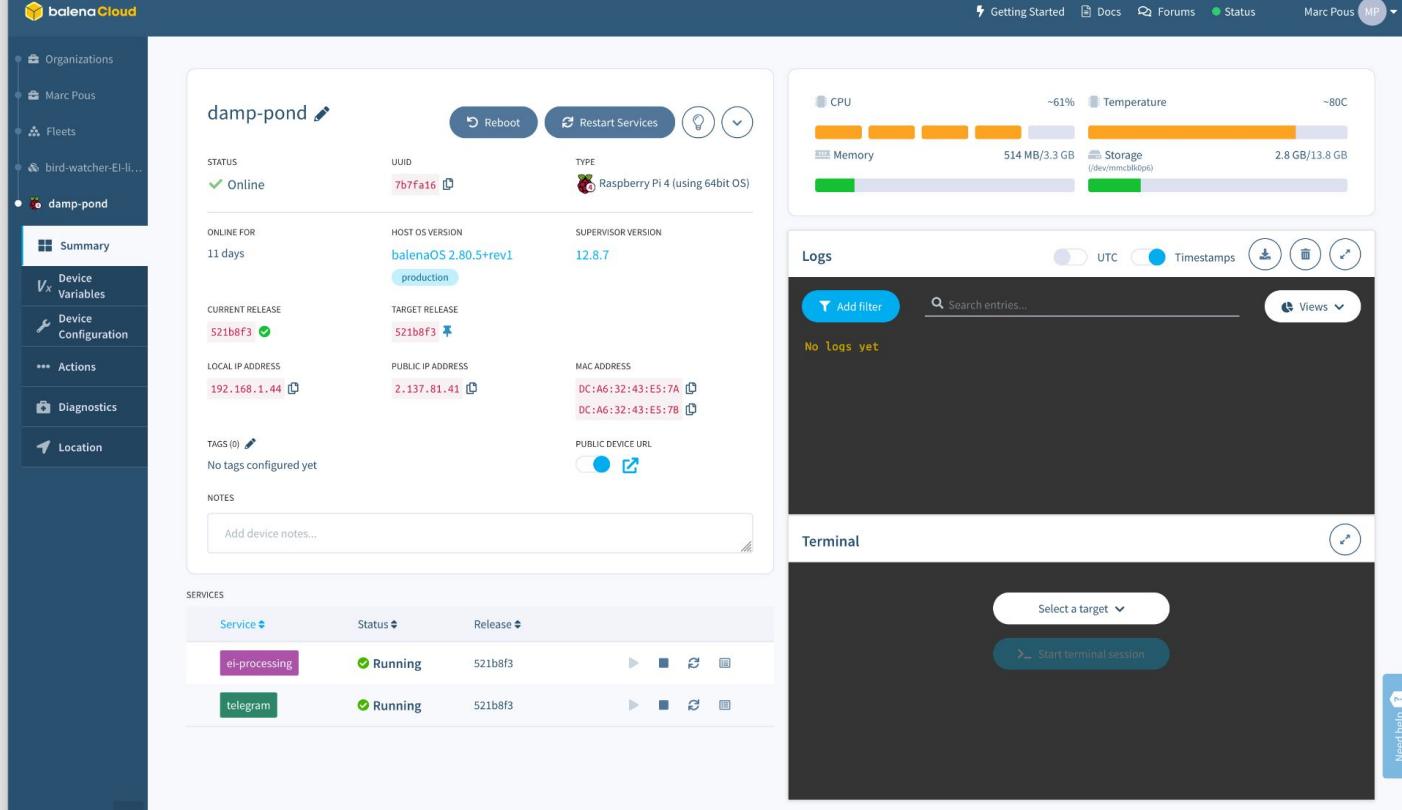
Service	Status	Release	Actions
ei-processing	Running	521b8f3	▶ ■ ⟳ ☰
telegram	Running	521b8f3	▶ ■ ⟳ ☰

CPU ~61% **Temperature** ~80C
Memory 514 MB / 3.3 GB **Storage** 2.8 GB / 13.8 GB

Logs UTC Timestamps [🔗](#) [🔗](#) [🔗](#) [🔗](#)
[Add filter](#) Views [🔗](#)
No logs yet

Terminal
Select a target [🔗](#)
Start terminal session [🔗](#)

Need help [🔗](#)



balena dashboard | damp-pond +

https://dashboard.balena-cloud.com/devices/7b7fa1607916f85bee3ffaa46a4d4fae/envvars

Getting Started Docs Forums Status Marc Pous MP ▾

Add variable

Name	Fleet value	Device Value	Service name	Actions
EI_API_KEY_IMAGE	not defined	ei_52e9e2c16407b65bcd99650b0caa38be5abb4...	All services	edit delete
EI_COLLECT_MODE_IMAGE	not defined	0	All services	edit delete
EI_PROJECT_ID	not defined	40986	All services	edit delete
TG_CHAT_ID	not defined	256949909	All services	edit delete
TG_TOKEN	not defined	1415420286:AAFK9eESCPbAUwwjwwWqAt7wqK...	All services	edit delete

Vx Device Variables

Device Configuration

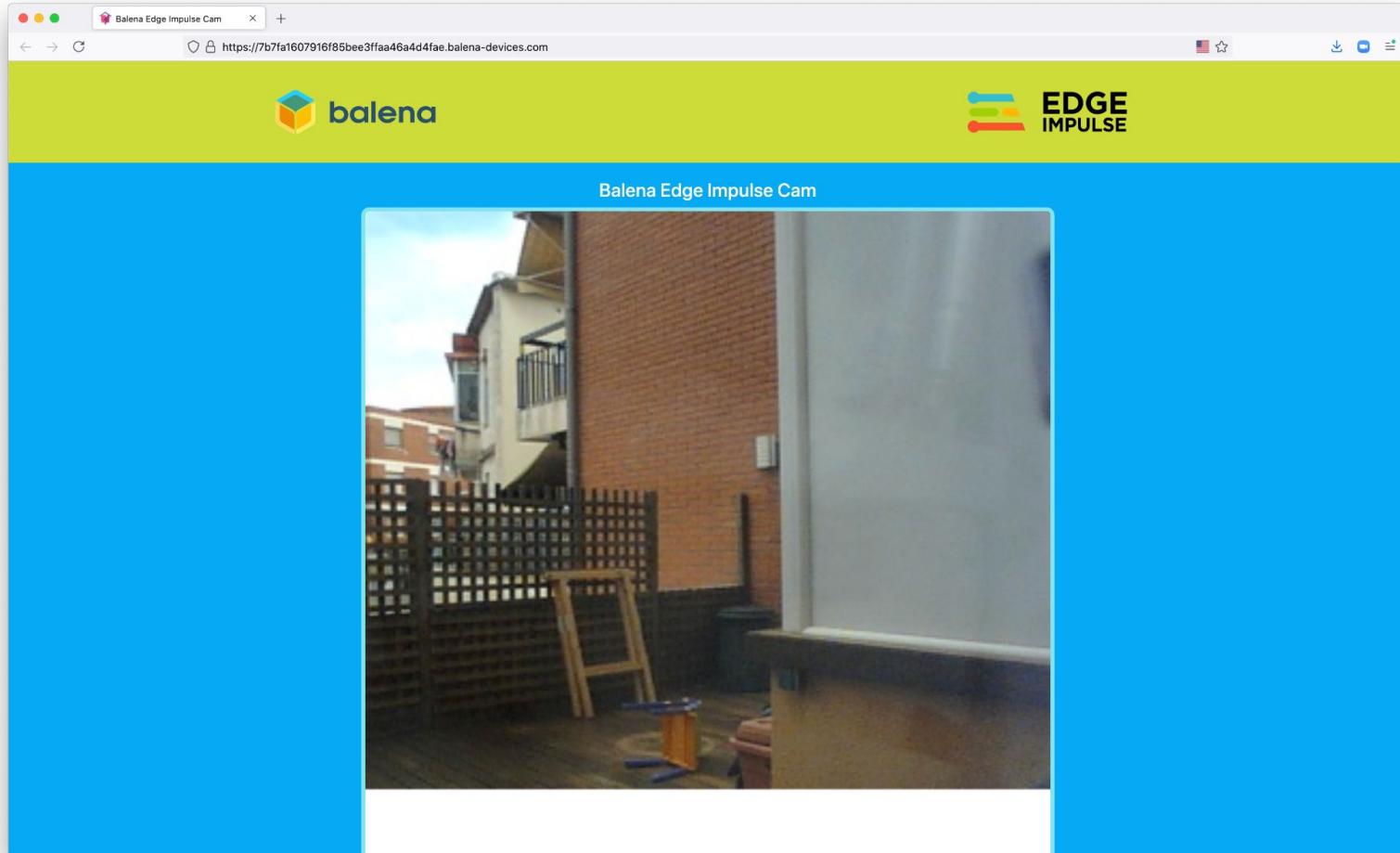
Actions

Diagnostics

Location

Need help ?





<https://core.telegram.org/bots>

The screenshot shows a web browser window with the URL <https://core.telegram.org/bots>. The page title is "Bots: An introduction for developers". The main content area has a heading "Bots: An introduction for developers" followed by a paragraph about what bots are and how they work. Below this, there are several numbered sections: "1. What can I do with bots?", "2. How do bots work?", "3. How do I create a bot?", "4. How are bots different?", "5. Bot perks", and "6. BotFather". Each section contains a brief description and a link to more information. To the right of the main content, there is a sidebar with a list of links. At the bottom of the page, there is a note about the Bot API and a link to its detailed description.

Bots: An introduction for developers

Bots are third-party applications that run inside Telegram. Users can interact with bots by sending them messages, commands and [inline requests](#). You control your bots using HTTPS requests to our [Bot API](#).

1. What can I do with bots?

To name just a few things, you could use bots to:

- Get customized notifications and news. A bot can act as a smart newspaper, sending you relevant content as soon as it's published.
- Integrate with other services. A bot can enrich Telegram chats with content from external services.
[Gmail Bot](#), [GIF bot](#), [IMDB bot](#), [Wiki bot](#), [Music bot](#), [Youtube bot](#), [GitHubBot](#)
- Accept payments from Telegram users. A bot can offer paid services or work as a virtual storefront. [Read more](#) >
[Demo Shop Bot](#), [Demo Store](#)
- Create custom tools. A bot may provide you with alerts, weather forecasts, translations, formatting or other services.
[Markdown bot](#), [Sticker bot](#), [Vote bot](#), [Like bot](#)
- Build single- and multiplayer games. A bot can offer rich [HTML5 experiences](#), from simple arcades and puzzles to 3D-shooters and real-time strategy games.
[GameBot](#), [Games](#)
- Build social services. A bot could connect people looking for conversation partners based on common interests or proximity.
- Do virtually anything else. Except for dishes — bots are terrible at doing the dishes.

2. How do bots work?

At the core, Telegram Bots are special accounts that do not require an additional phone number to set up. Users can interact with bots in two ways:

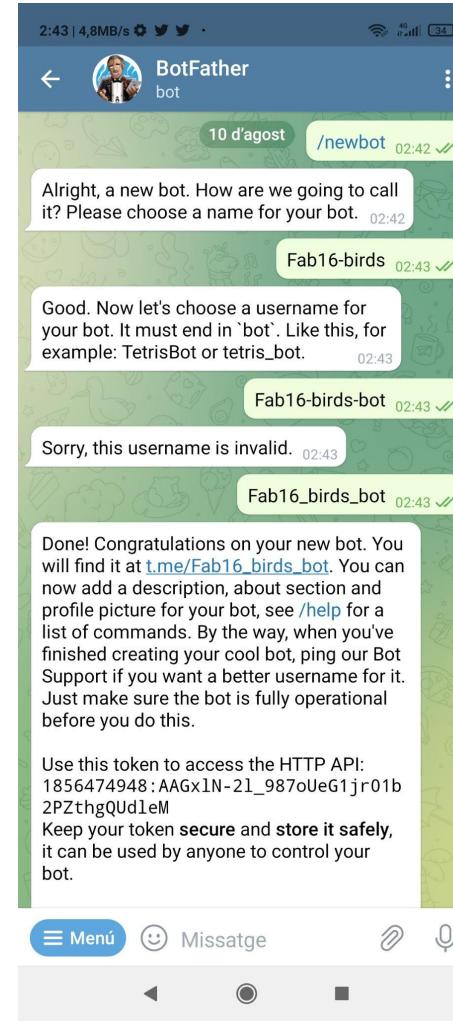
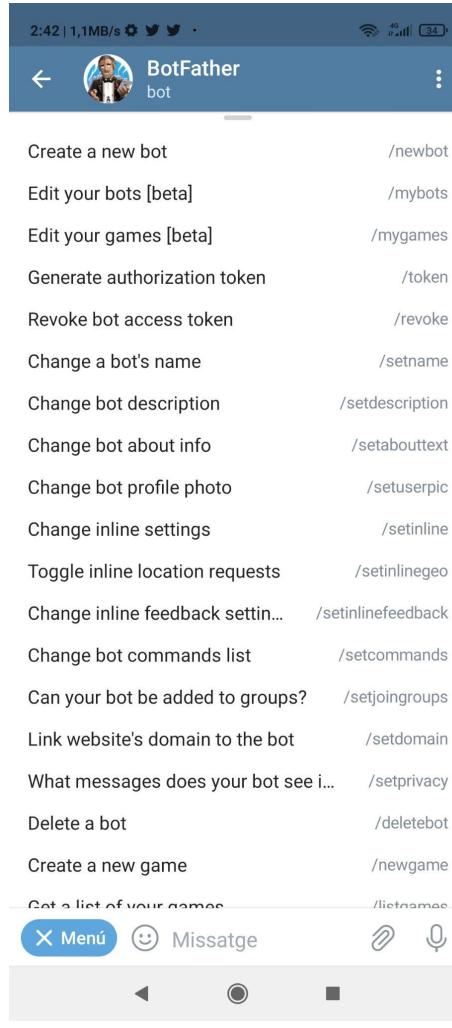
- Send messages and [commands](#) to bots by opening a chat with them or by adding them to groups.
- Send requests directly from the input field by typing the bot's @username and a query. This allows sending content from [inline bots](#) directly into any chat, group or channel.

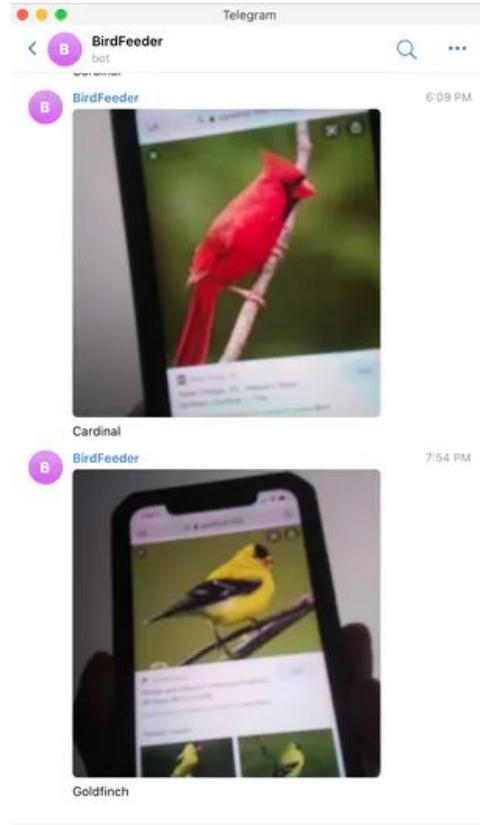
Messages, commands and requests sent by users are passed to the software running on our servers. Our intermediary server handles all encryption and communication with the Telegram API for you. You communicate with this server via a simple HTTPS-interface that offers a simplified version of the Telegram API. We call that interface our [Bot API](#).

A detailed description of the Bot API is available on [this page](#) »

1. What can I do with ...
2. How do bots work?
3. How do I create a b...
4. How are bots differ...
5. Bot perks
6. BotFather







4

Make a bird feeder with your local Fablab





Escola Sant Martí & FabLab Barcelona

A group of children are gathered around a cardboard mailbox toy. The toy is a small wooden structure with a white roof and two grey vertical supports. It has a slot on top and a slot on the side. A child in a blue sweater is reaching into the side slot. Another child in a purple shirt is reaching into the top slot. A child in a white shirt with 'Timberland' on it is sitting to the left. A child in a yellow shirt is partially visible behind the purple shirt child. A child in a grey shirt is partially visible on the right. The background shows a wooden wall.

Timberland



Fablab Aldeias do Xisto

5

Share it with everyone!

and inspire others



Time to install it :-)
Tree? Wall? Lessons learnt?



Time to connect with the bot



Time to share with the community,
learn and re-train the model!



Contribute on the open source project!

<https://github.com/just4give/balena-ei-linux-bird-watcher>



Ok! Let's wrap-up!

Take aways

- Learn about birds/nature around us.
- Collaborate with the Fablab and involve teachers, parents and more.
- Introduce STEAM to children and collateral technologies on the experiment.
- Share with more schools and communities.



Questions?



Introducing schools into STEAM with birds, IoT, AI and Fablabs

FAB16 - 10th August 2021

marc@balena.io

