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D4.9

Demonstrator 3, Test Report



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1. DOCUMENT INFORMATION

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Dissemination Level	PU
Reviewed by	O. Deniz (UCLM)

2. DOCUMENT HISTORY

Person	Date	Comment	Version
A. Pagani	27.06.2018	Initial and delivered	1.0

3. ABSTRACT

This report shows our assessment of the EoT Portable Camera when all functionality was tested (see "Tests") and in 3 Pilot scenarios (see "Pilots").

The three Pilots were:

- Wearing the camera, like a lifelogging camera
- Office Monitoring camera, checking for motion
- Litter Detection Camera, checking for people leaving litter on the street

We tested the technical functionality, the user experience and the overall performance of the hardware and software unit.

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5. INTRODUCTION

All tests were conducted in or around the Evercam office in Dublin. This was recommended due to concerns raised by the Ethics Committee around consent as there was a risk, if used outdoors that people would be included who had not consented.

While the EoT hardware used in all 3 cases was identical, we decided to use three different form factors for the enclosure to suit the 3 different pilots.

For the wearable pilot, we used a soft fabric case with a clip that mounted easily to the wearer.

For the portable pilot (Office Camera), we used a cardboard box with a simple one button interface.

For the Litter Detection Pilot we used an outdoor waterproof box.

6. TESTS

The developed demonstrator has several key capabilities:

- Capture images on emotion detection
- Create alarms on emotion detection
- Capture images on motion detection
- Capture images every so often
- Set up a Wizard to send an email on emotion detected
- Implement Zapier to send data between EoT and another app, in that case with Google Sheet
- Integrate with Evercam for share and view the images on the Evercam website
- Integrating with Dropbox
- Create an animation. The EoT website create a time-lapse of the images selected from our device
- Create and share the public feed

In the following we describe a number of tests aimed at showing them.

1. Pairing a new device to my mobile phone

This test consists of connecting the device with our Mobile Phone to have a visual interface of our device and establish the operating mode.

Fist, we check that the device camera and the device is in good condition to work and there is nothing blocking the camera.

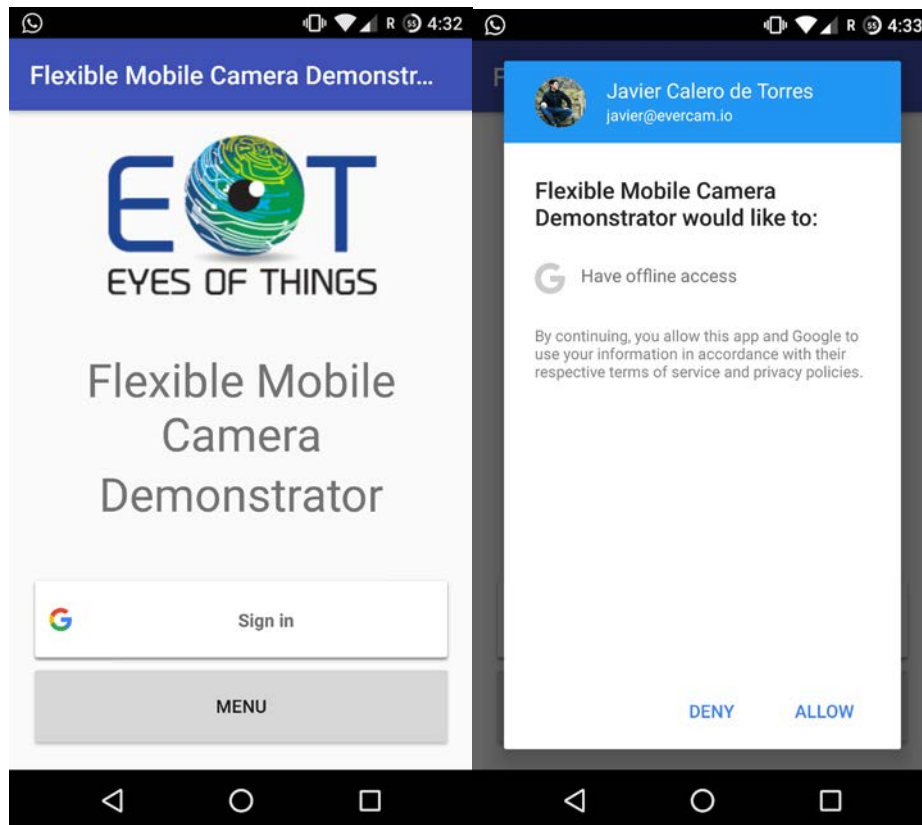




Now we power on the device clicking the fist button during 3 seconds, we see a red light indicate that our device is switch on.

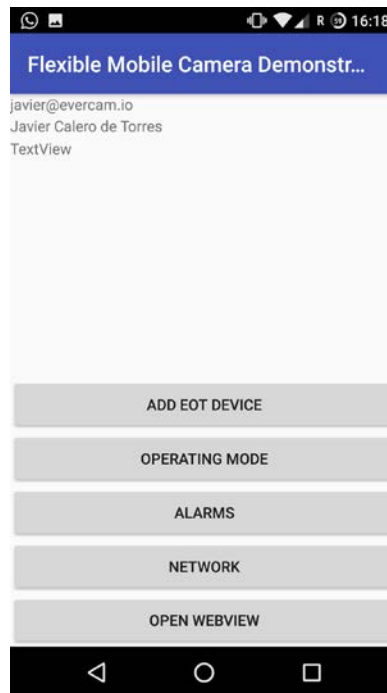


Once we have turned on the device, we open the Android app and login with our Google account



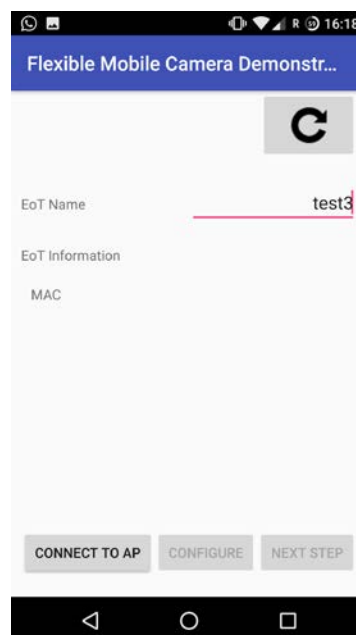
In the next screen you will have a list of your connection and a menu with the next options:

1. Add EoT Device: That options open the screen to connect a new device a create a new connection with this device.
2. Operating Mode: In the operating mode option you will configure the events that you want to capture, the frequency to capture an image and also to synchronize with the webapp.
3. Alarms: You can configure notifications on your mobile phone when an emotion is detected.
4. Network: Reset the network configuration.
5. Open Webview: Access to your images stored images.

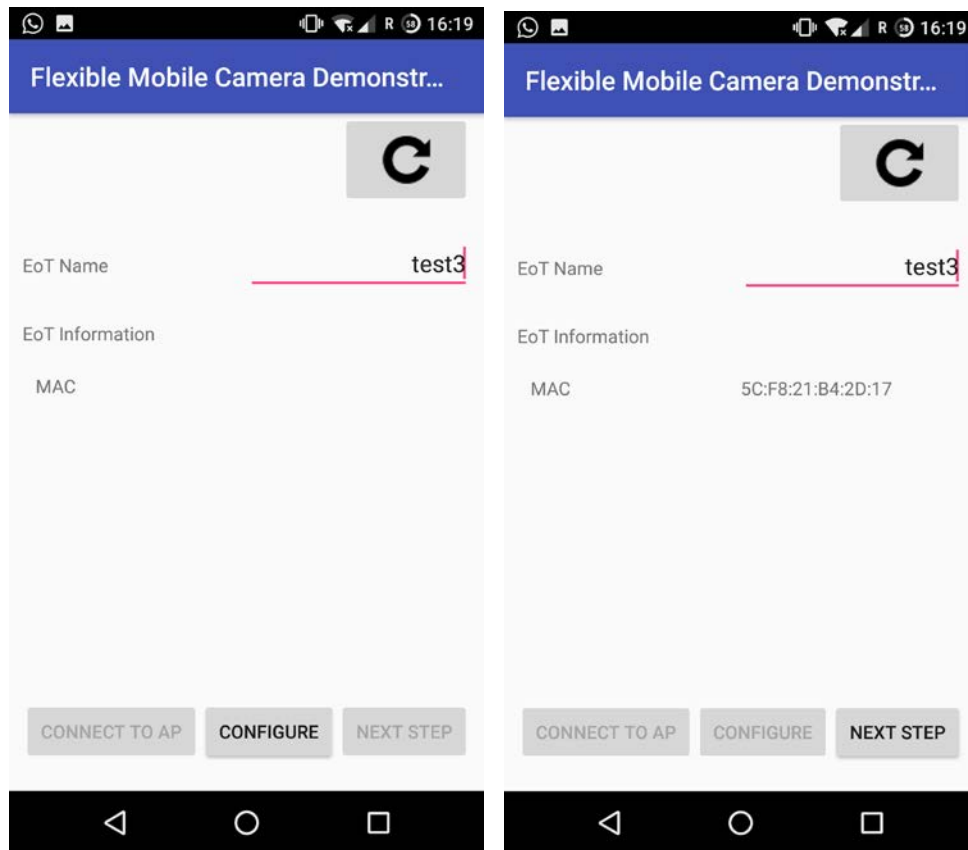


It is time to add a new device, we select "Add EoT Device" and we follow these steps to configure it:

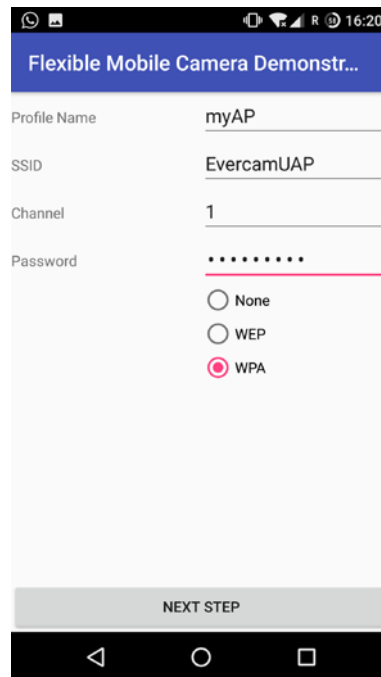
1. We enter our EoT name.



2. We click the button Connect to AP and we select the WIFI generated by the device named "EoTWiFi" and password "visilabap"
3. We click the button "Configure" and when we get the MAC address we can click "Next Step"



4. In the next screen we have to enter the following data and click "Next Step":
 - a. Profile name: The name that we want to recognize the connection.
 - b. SSID: The name of the Wifi that we are going to connect with internet access.
 - c. Channel: 1
 - d. Password: The password of our wifi.
 - e. And finally, we have to select the security of our wifi.



Flexible Mobile Camera Demonstr...

Profile Name myAP

SSID EvercamUAP

Channel 1

Password

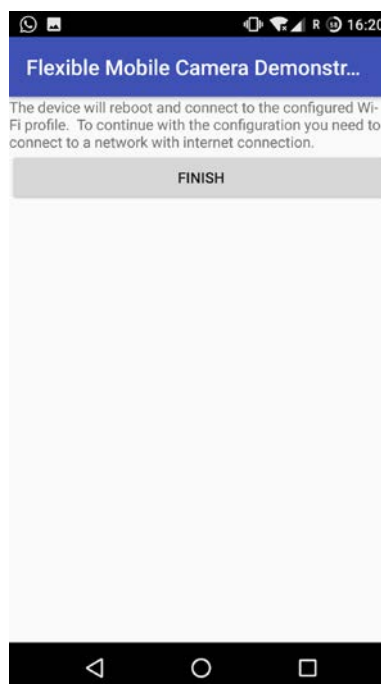
☐ None

☐ WEP

☒ WPA

NEXT STEP

5. Finally, we click “Finish” to get done the configuration.



Flexible Mobile Camera Demonstr...

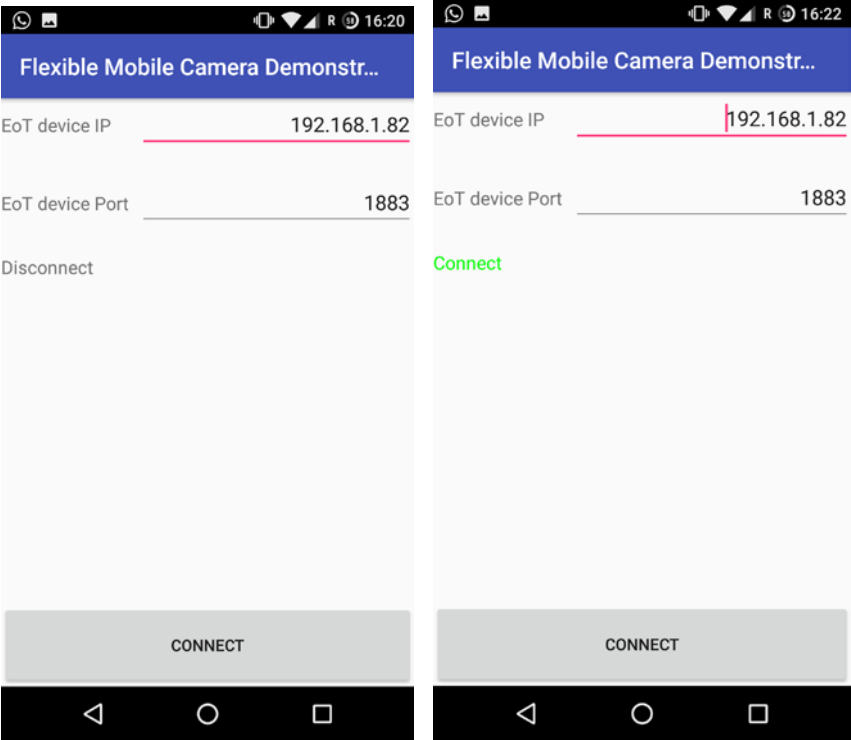
The device will reboot and connect to the configured Wi-Fi profile. To continue with the configuration you need to connect to a network with Internet connection.

FINISH

6. Now we have our device in the list and to connect the device we have to click the first button

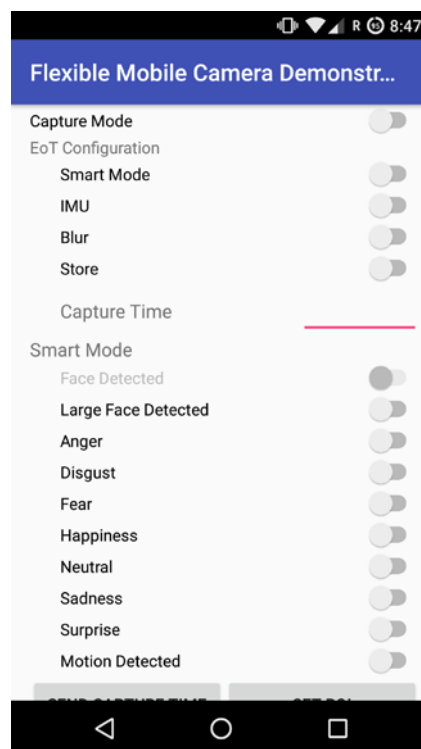


7. The IP and the port will be loaded automatically, we just have to click connect. We should see the word "Connect" in green, if the connection is wrong we would see "Error" in red.

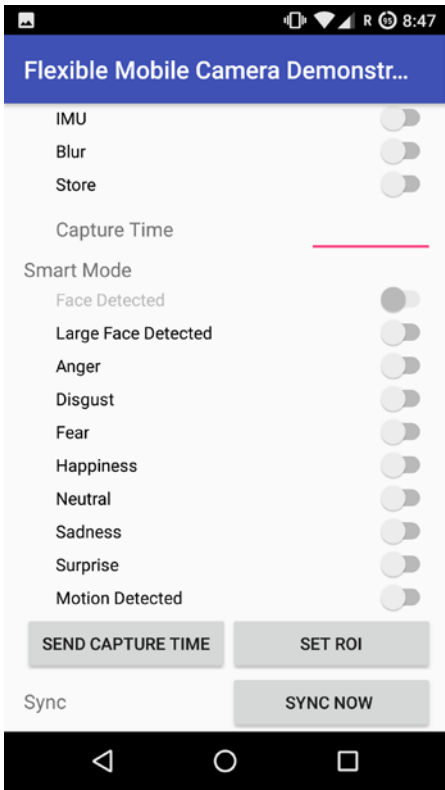


Once our device is connected, we can establish the operating mode. On that screen we have two options to configure, the EoT configuration and the Smart Mode.

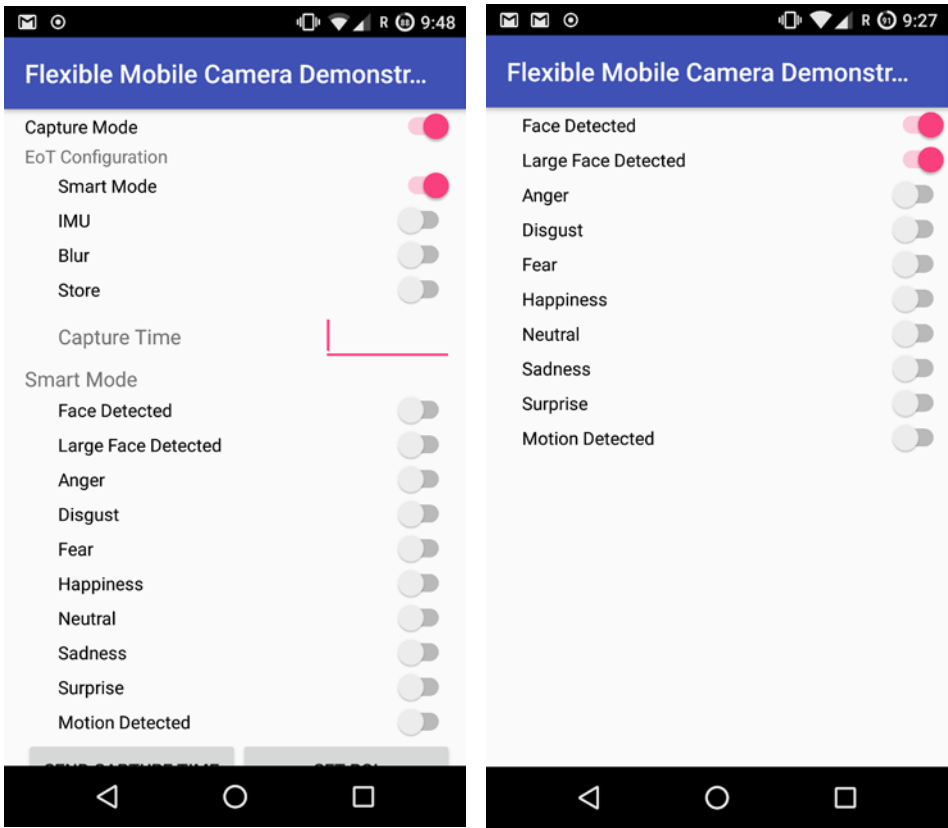
- a) EoT configuration have 4 options, if the Smart mode is disabled, we can establish the capture time in seconds and we are going to get an image those seconds and when it is enable, the device is going to be waiting to detect the emotion that we establish on Smart Mode configuration.



- b) At the bottom of the screen:
- "Send capture time" establish the time to capture an image when Smart mode is disabled
 - "Set ROI" establish the area where our device are going to work on.
 - "Sync now" send all the images stored on the device to the webapp.

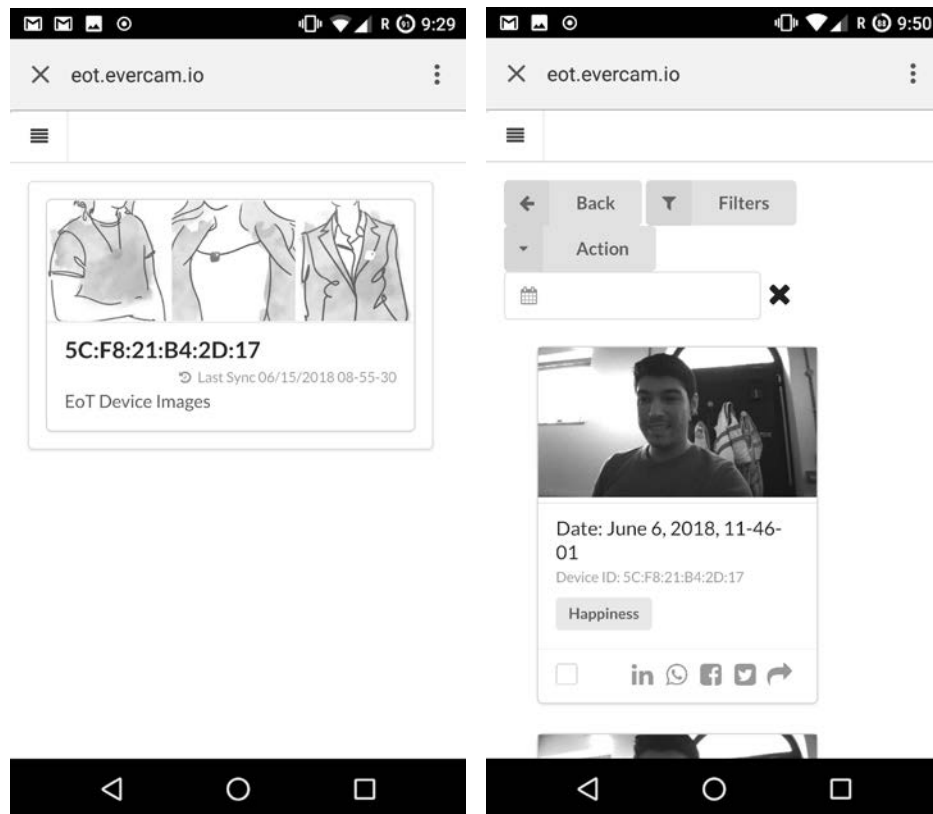


c) To configure the alarms, we connect “Capture mode” and “Smart mode” on the “Operating mode” menu.



d) Finally, we can see the synchronized images if we click on “Open webview”

in the main menu and select our device.



2. Wearing the device in our office to capture photos of people who know they are being photographed

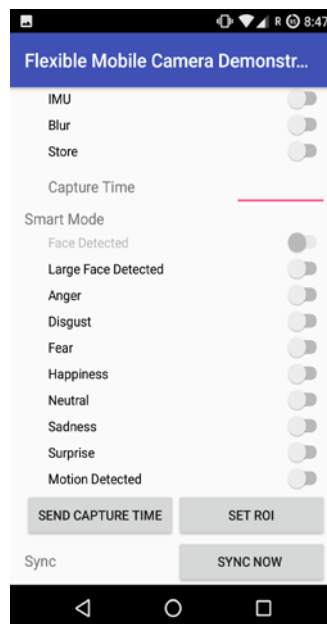
For this test, we are going to wear with us the device connected with the emotion detection operation mode and I am going to speak with my co-workers to detect their emotion during the conversation.



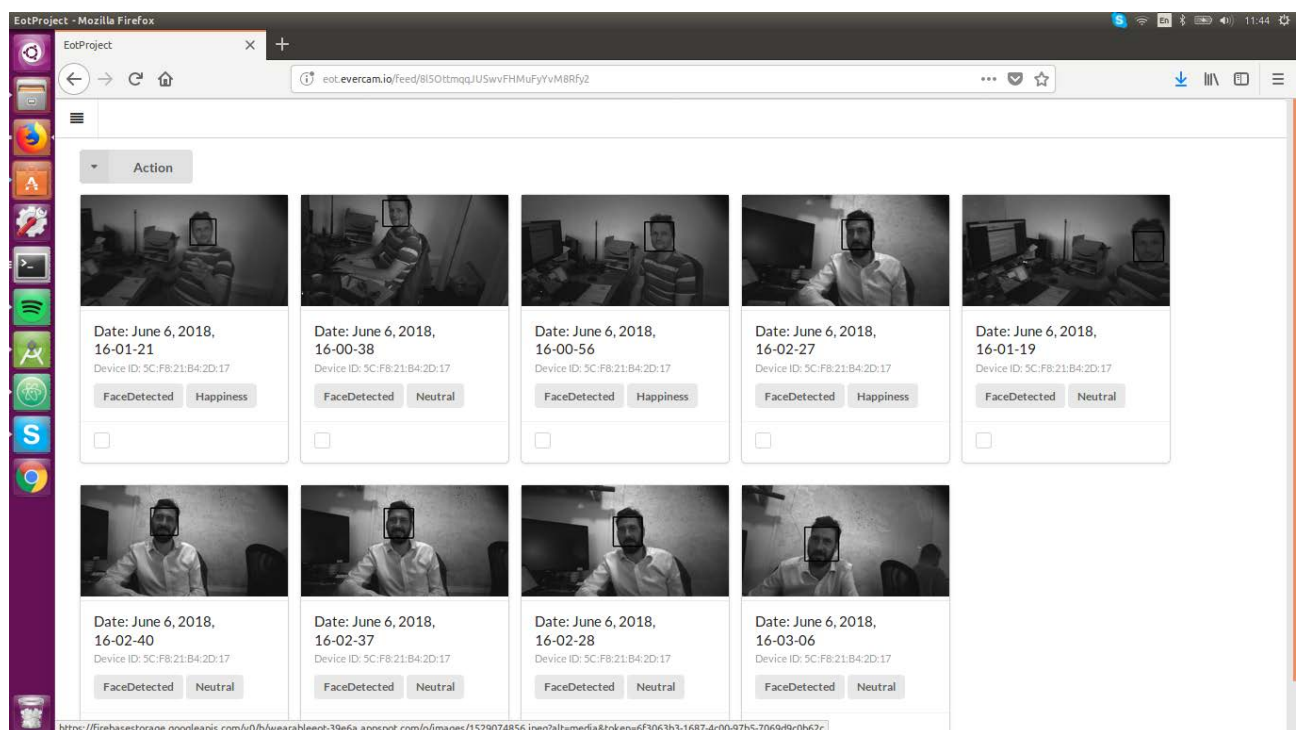
I walk around the office, we connect the alarm to know when the device captures an image



After sometime with the device connected and talking with the people normally, we open the app and click “Sync now” on the menu option “Operation Mode”

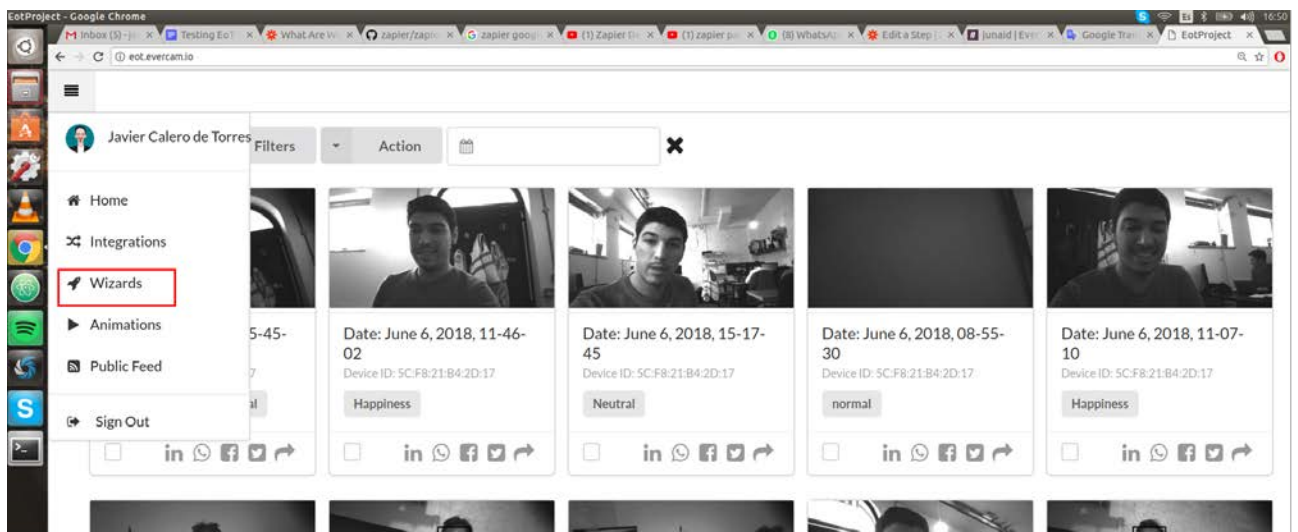


The images captured during this time will be upload to the server and we can check it on the webapp.

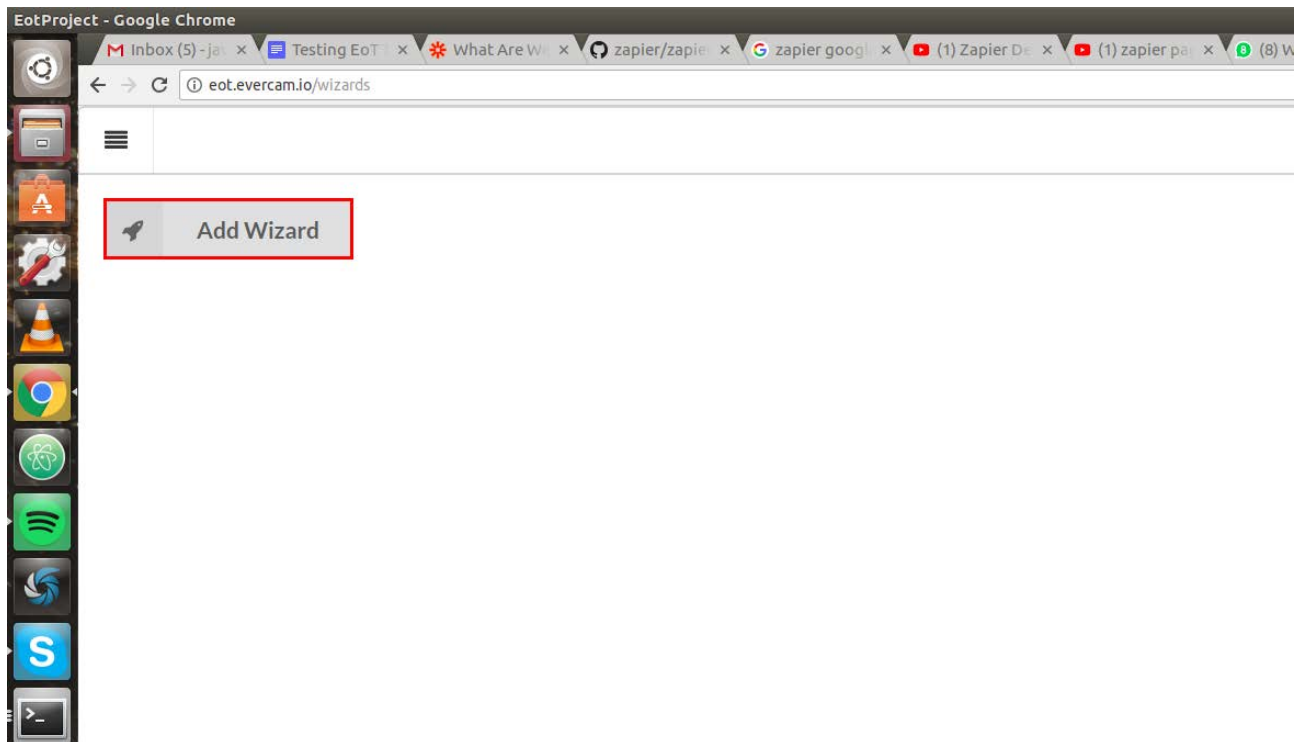


3. Setting up a Wizard to send an email on emotion detected

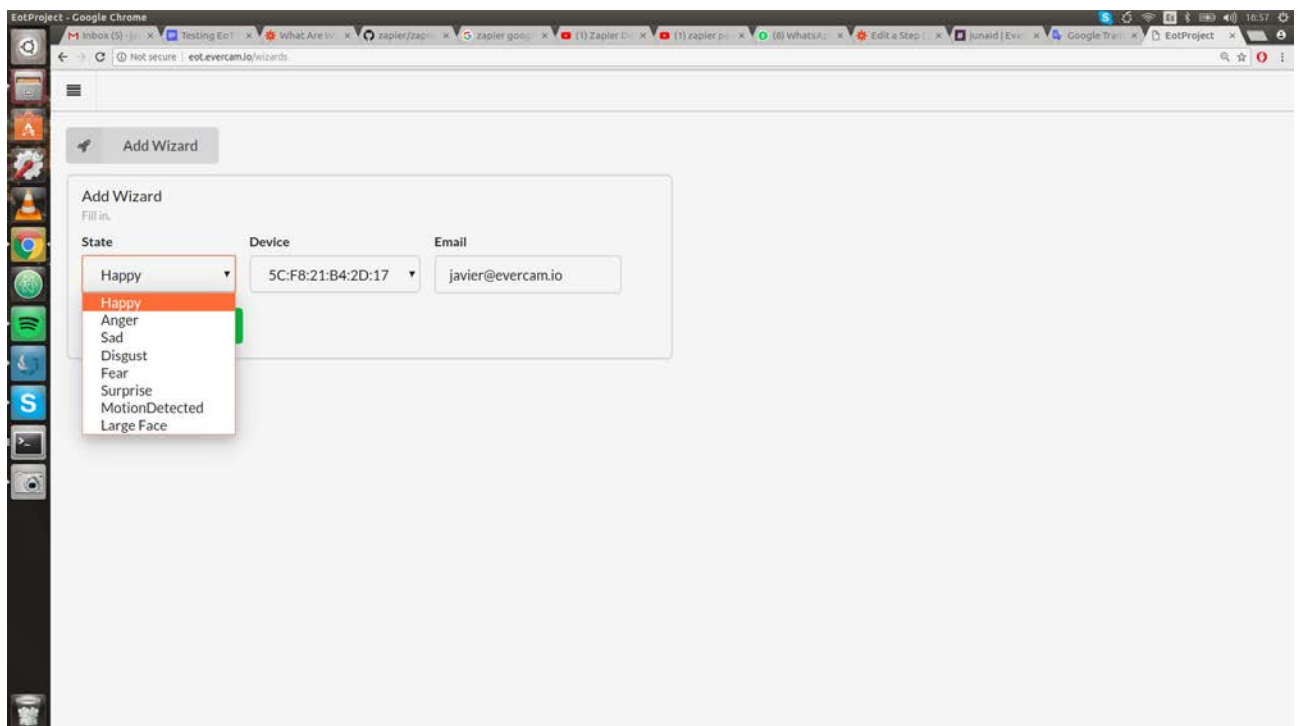
This test is essentially to configure a Wizard on emotion detected, in that case, EoT will send an email to javier@evercam.io when the device detects happiness. We have to login on the webapp eot.evercam.io and in the top left menu select "Wizard"



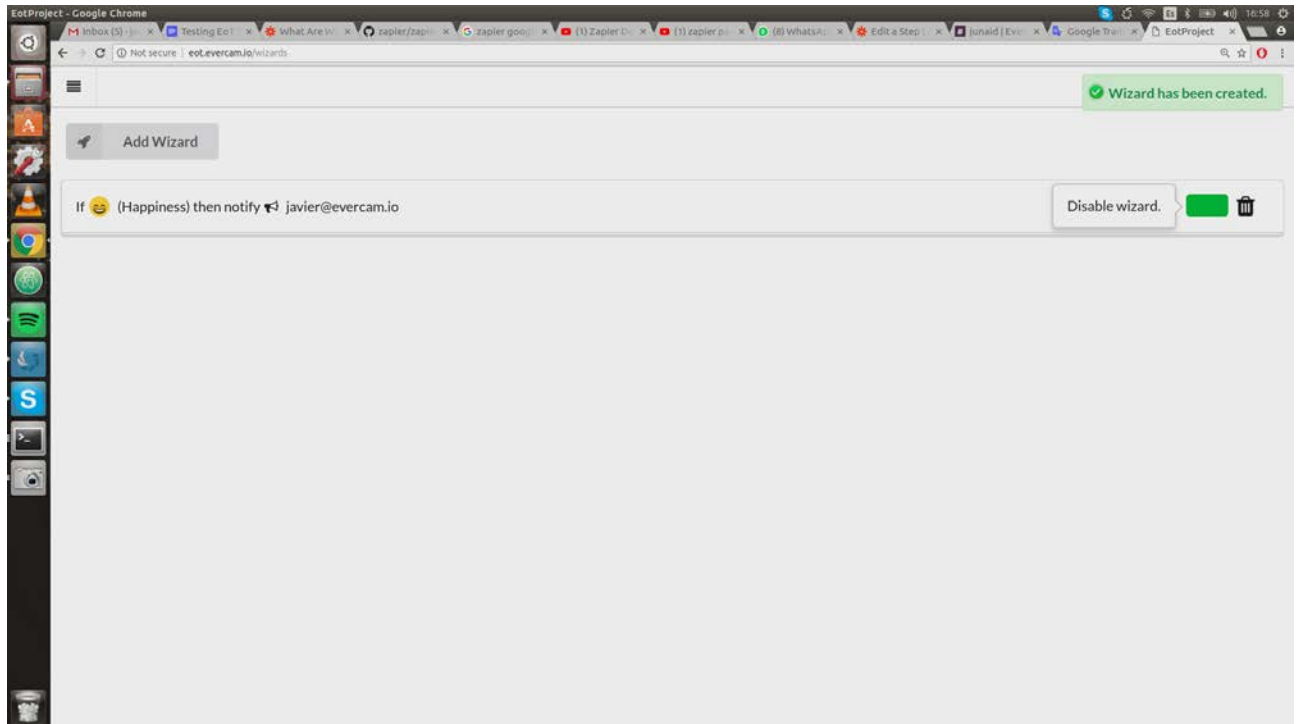
Now, we are going to select "Add Wizard"



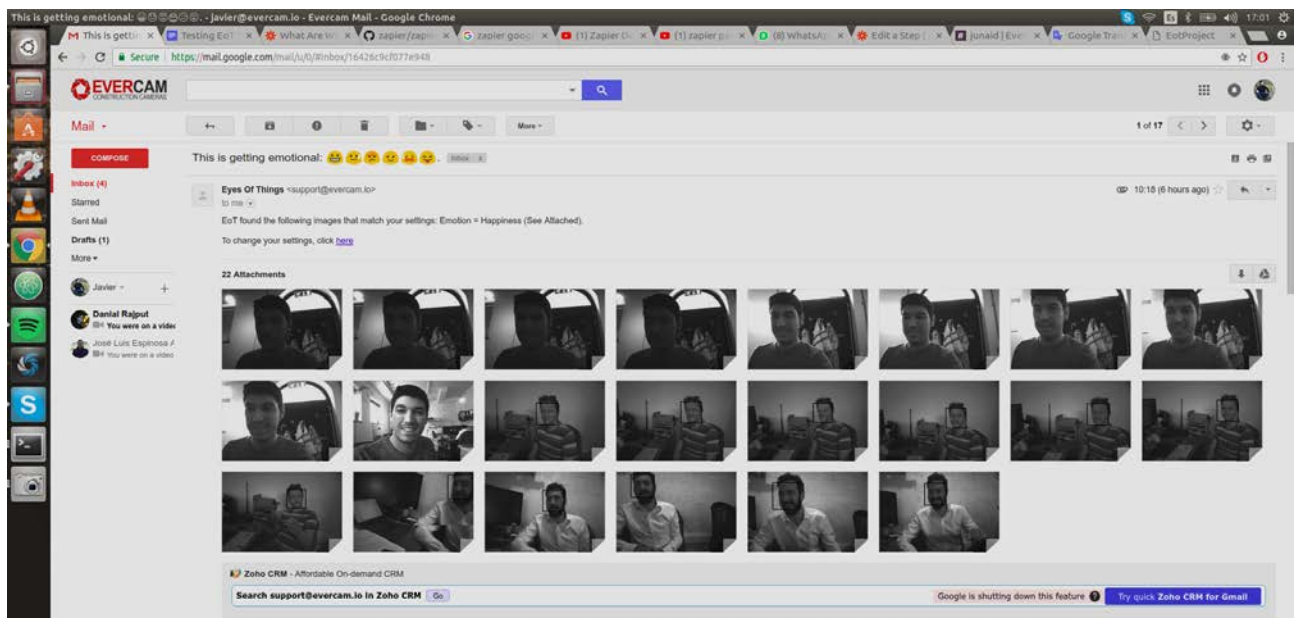
Select the State, the device and the email of the person that are going to receive the Wizard with the images:



Once we have created the new wizard, we are going to see that result. Here, on the green button on right we can enable or disable the wizard and remove it:



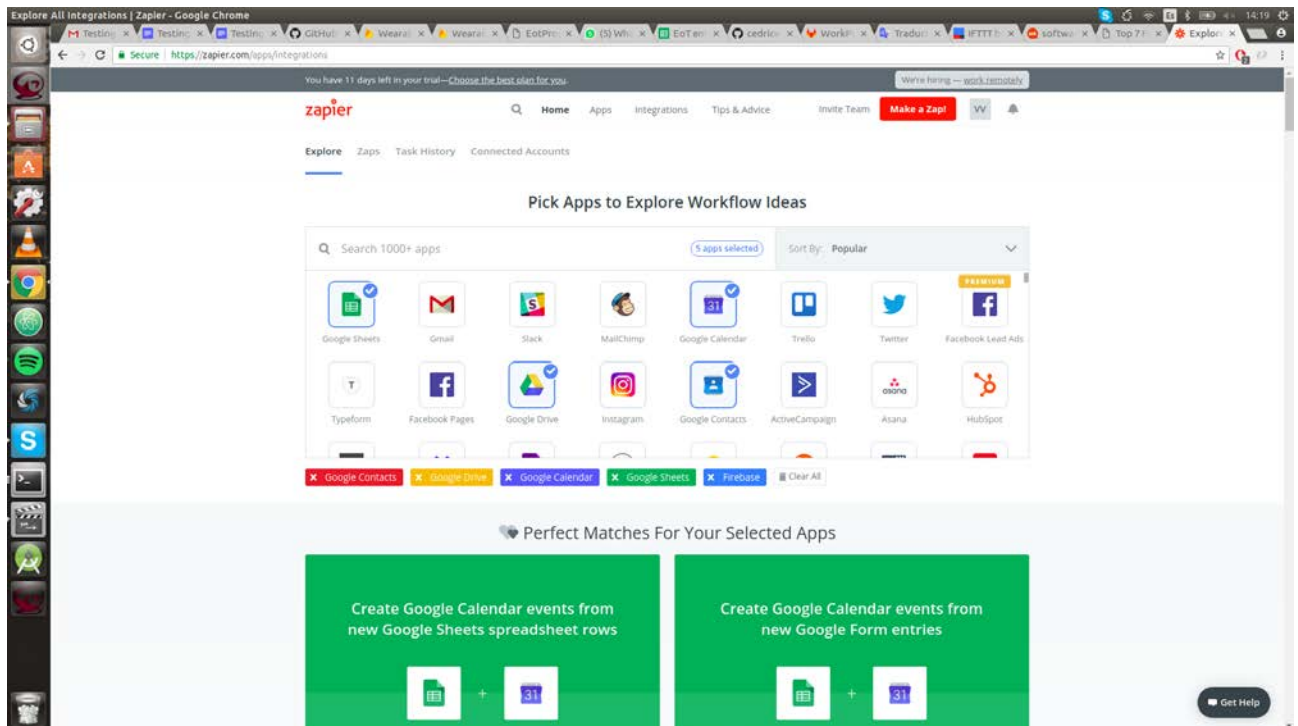
When we create the wizard and it is enable, we are going to receive the first email if there are some images with the emotion configured, after that, we are going to get an email every times that EoT detect the emotion happiness:



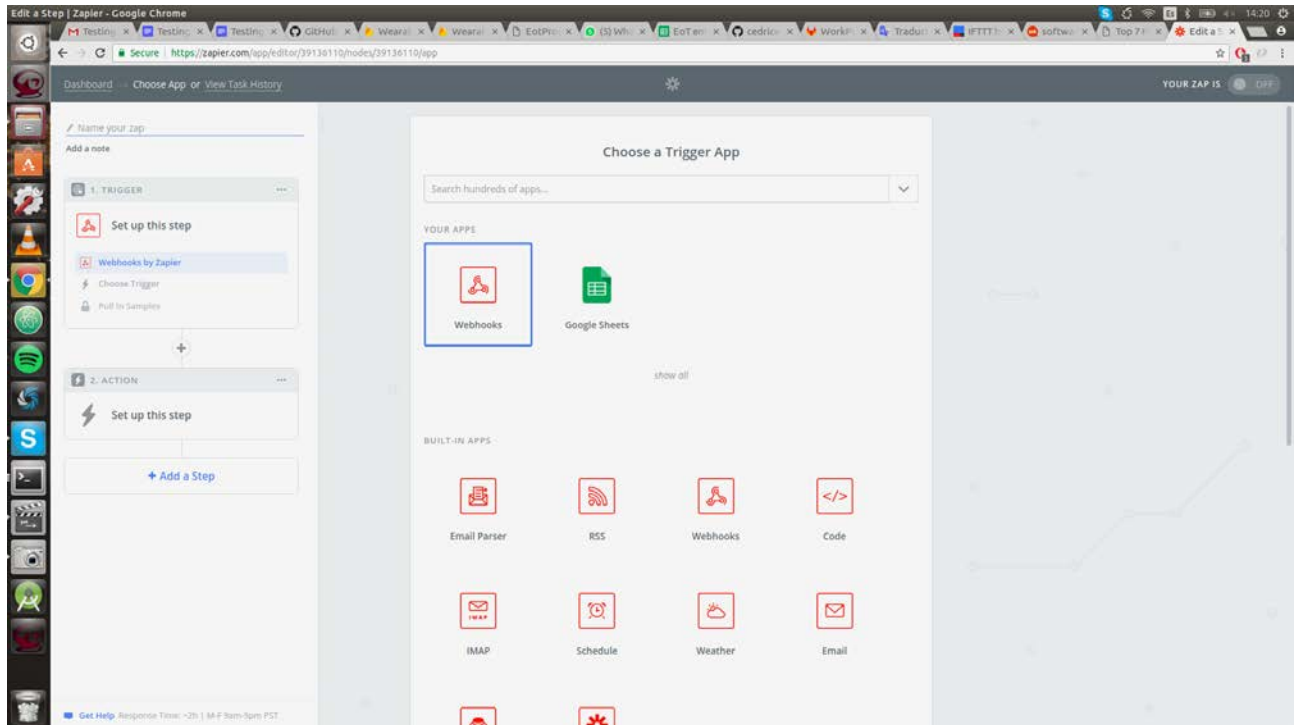
4. Using with Zapier

This test was created with the prospect of share the images captures by EoT with all possible platform. In this case, we choose store the data in a Google Sheet but we have the possibility to add more platform like Twitter, Slack, Trello...

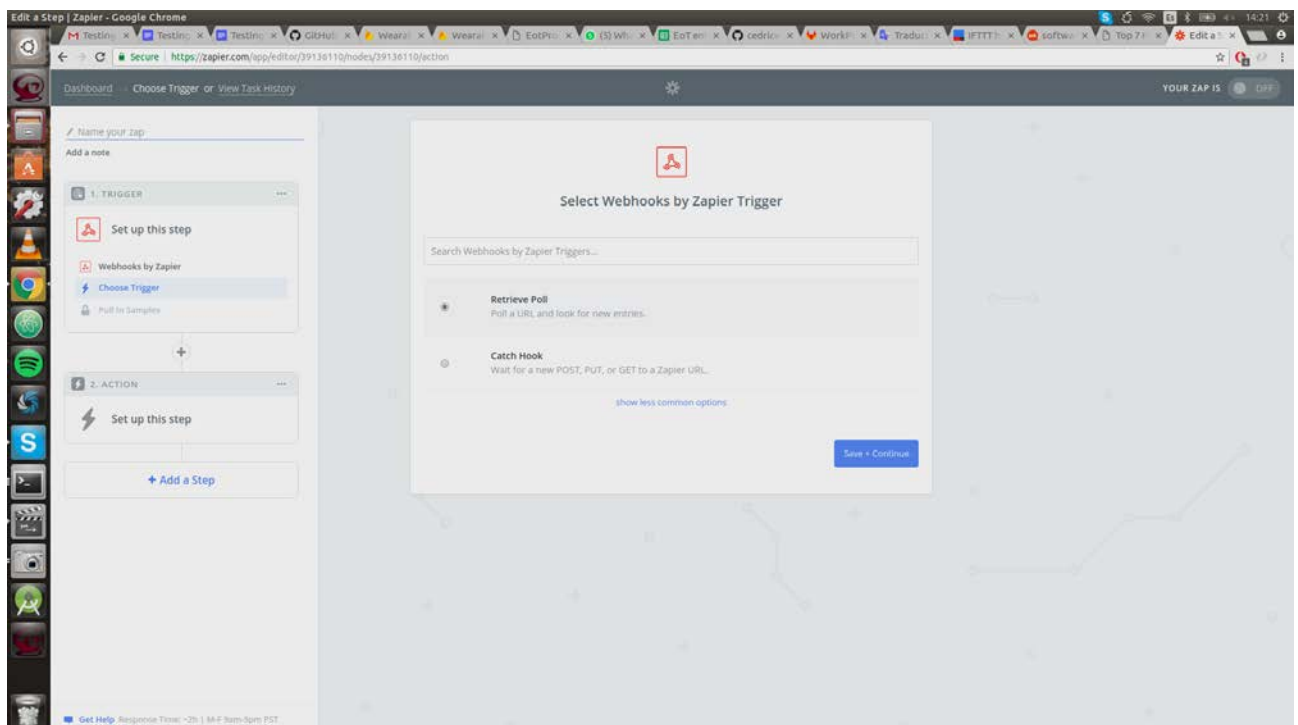
We are going to create a new account on Zapier and create a new Zap clicking on "Make a Zap!" button



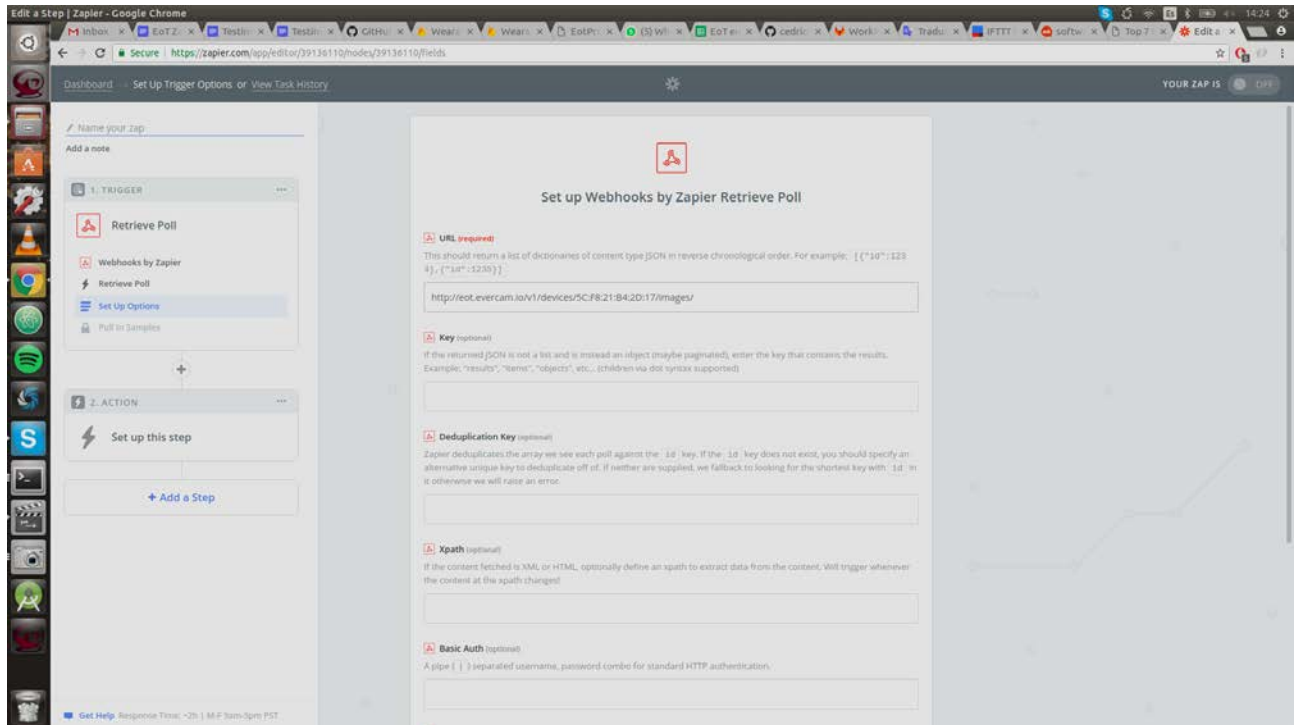
Now, we are going to choose "webhook" for the trigger app



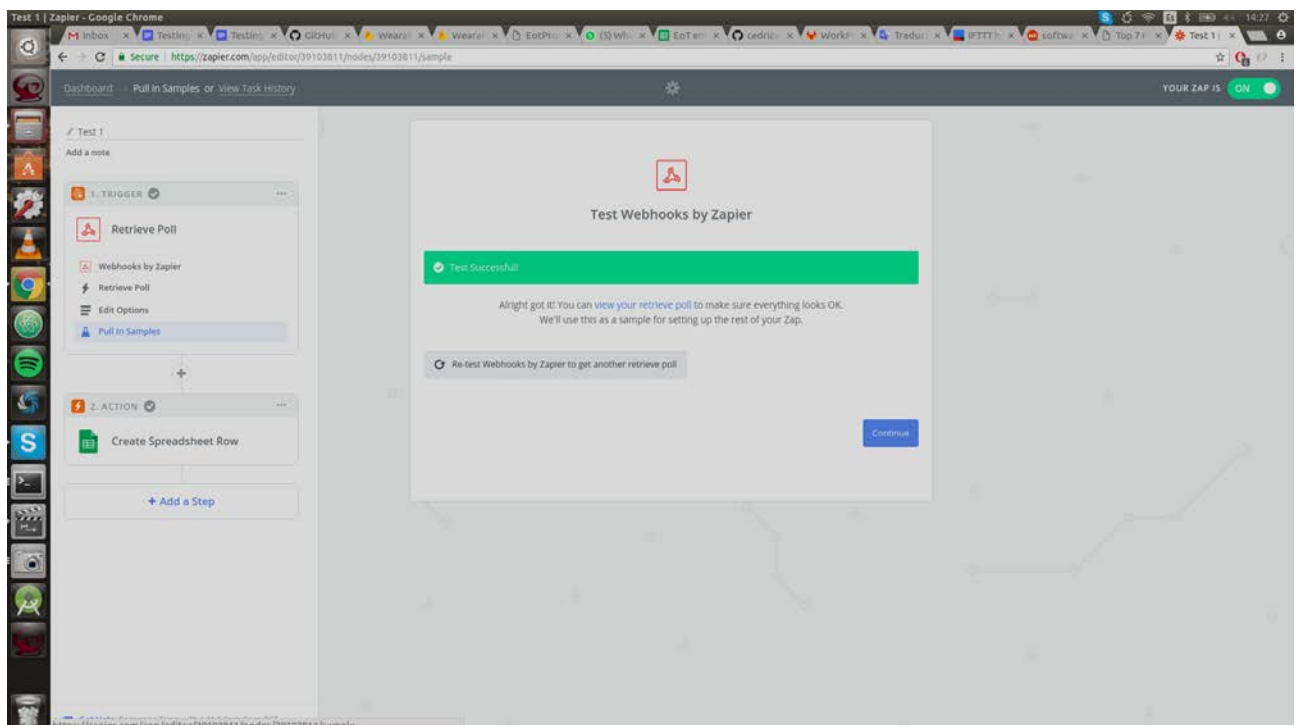
We are going to select “Retrieve Poll”. That option will update our Zap when we get a new image in our webapp



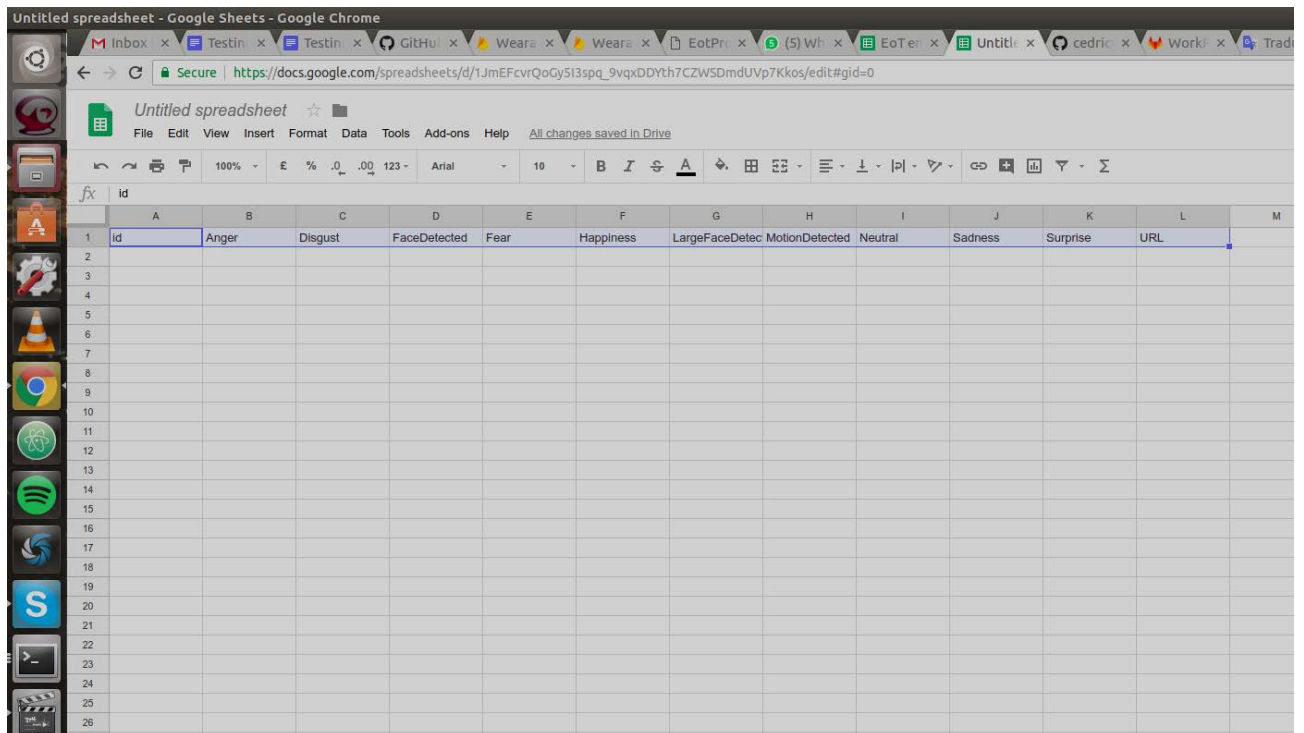
We should enter the new URL: <http://eot.evercam.io/v1/devices/5C:F8:21:B4:2D:17/images/>. That URL give us the list of images in our device



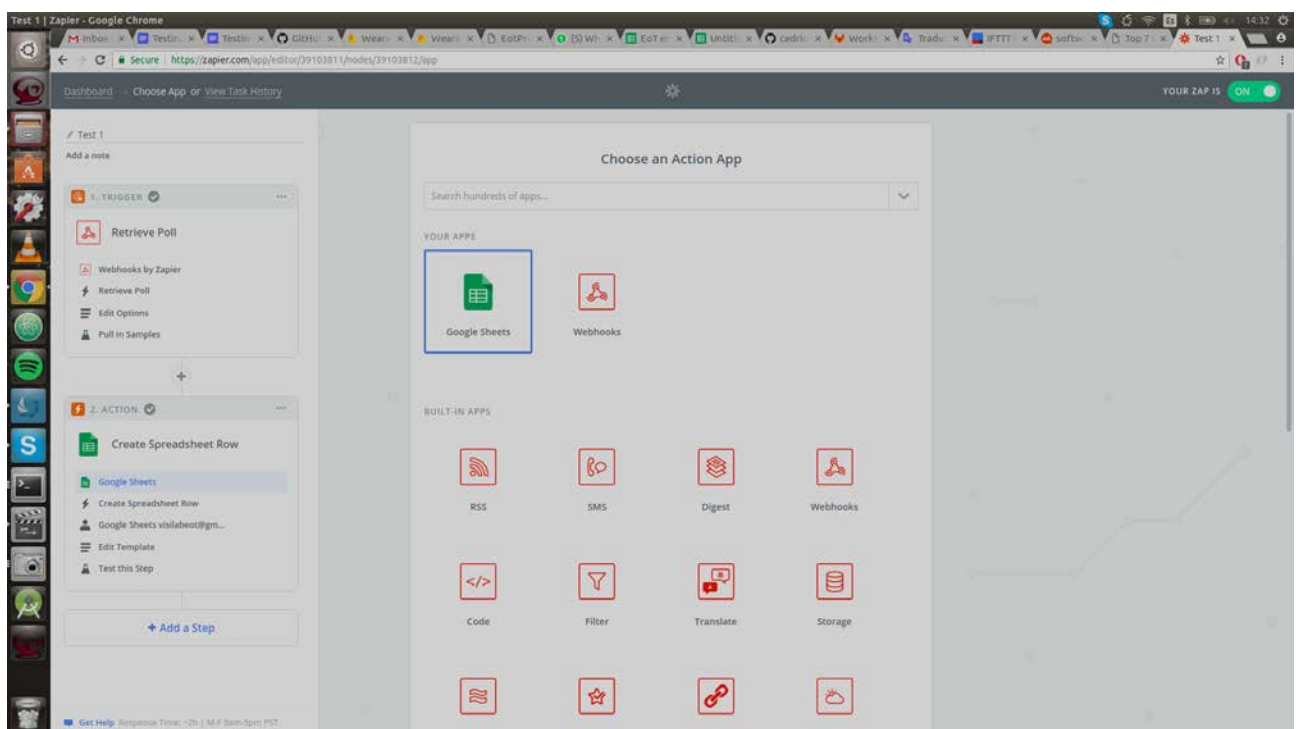
We have to click on “Next” and “Finish” and we are going to be connected with our website



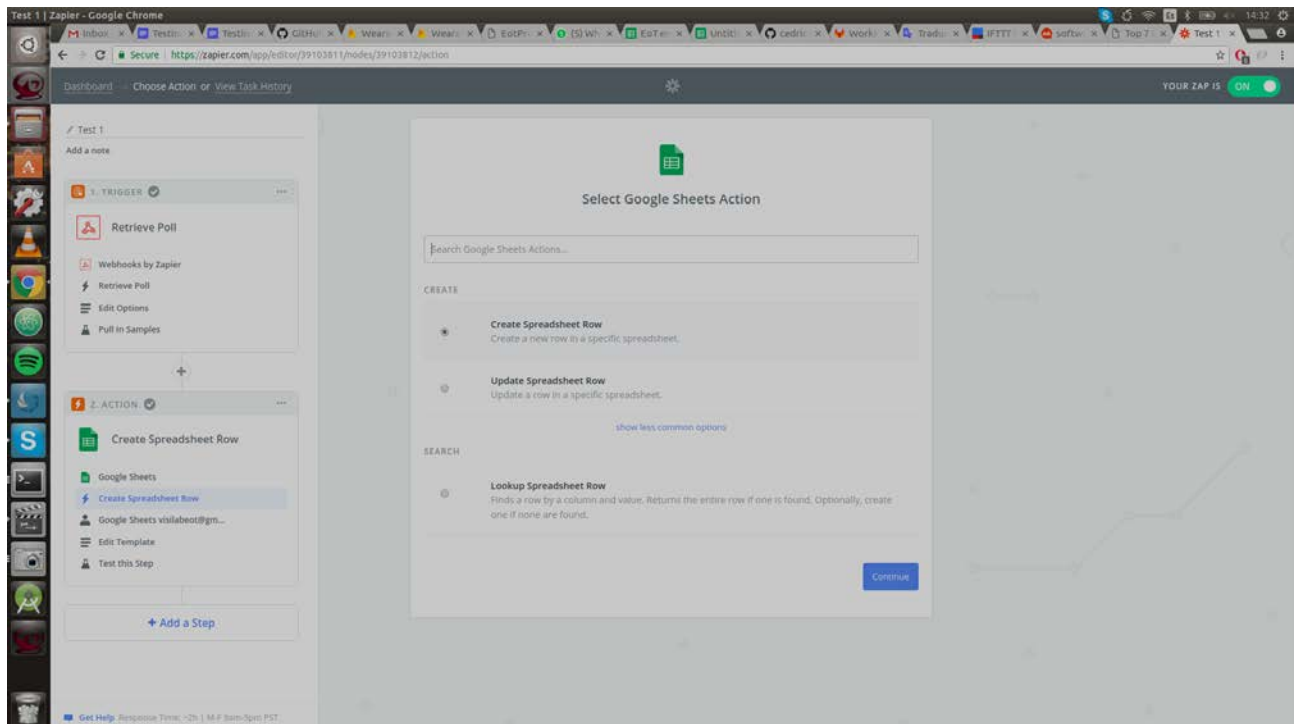
The next step is to create an action, in that case, we are going to create a new row in a google sheet. We should create the document with this format:



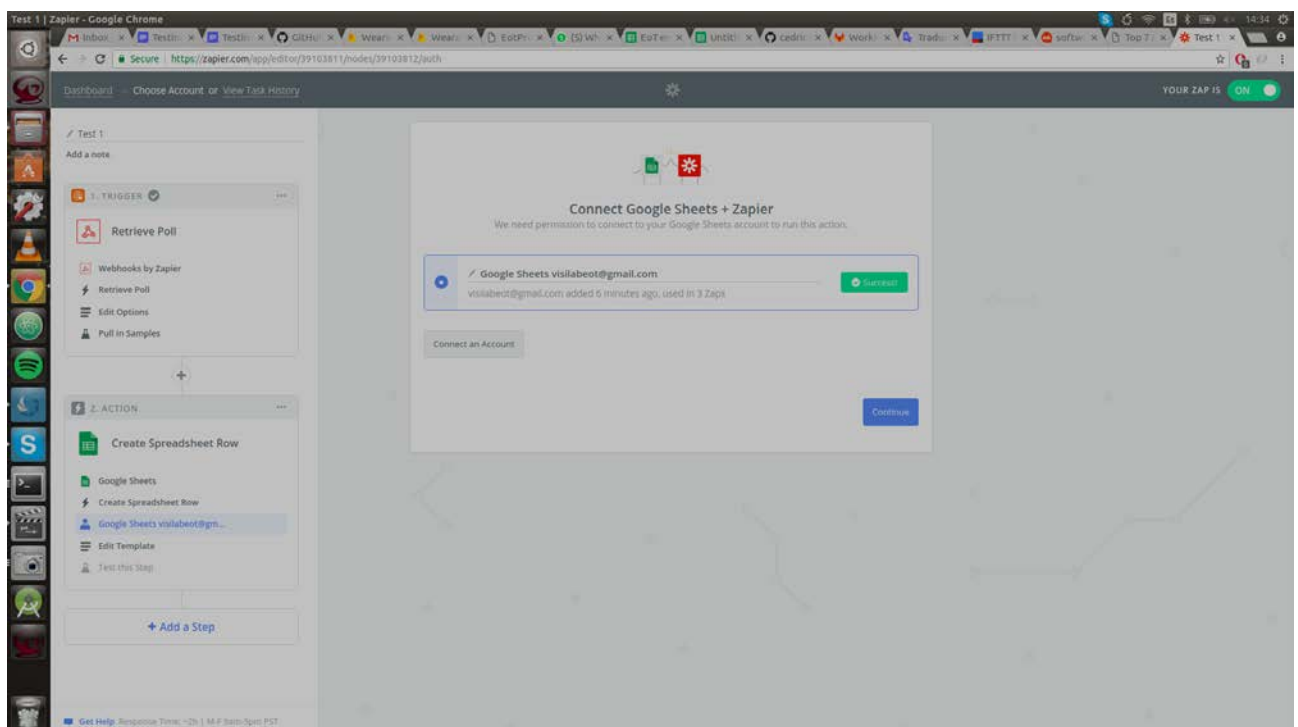
Once it is created, we are going to create the action. Select "Google Sheet":



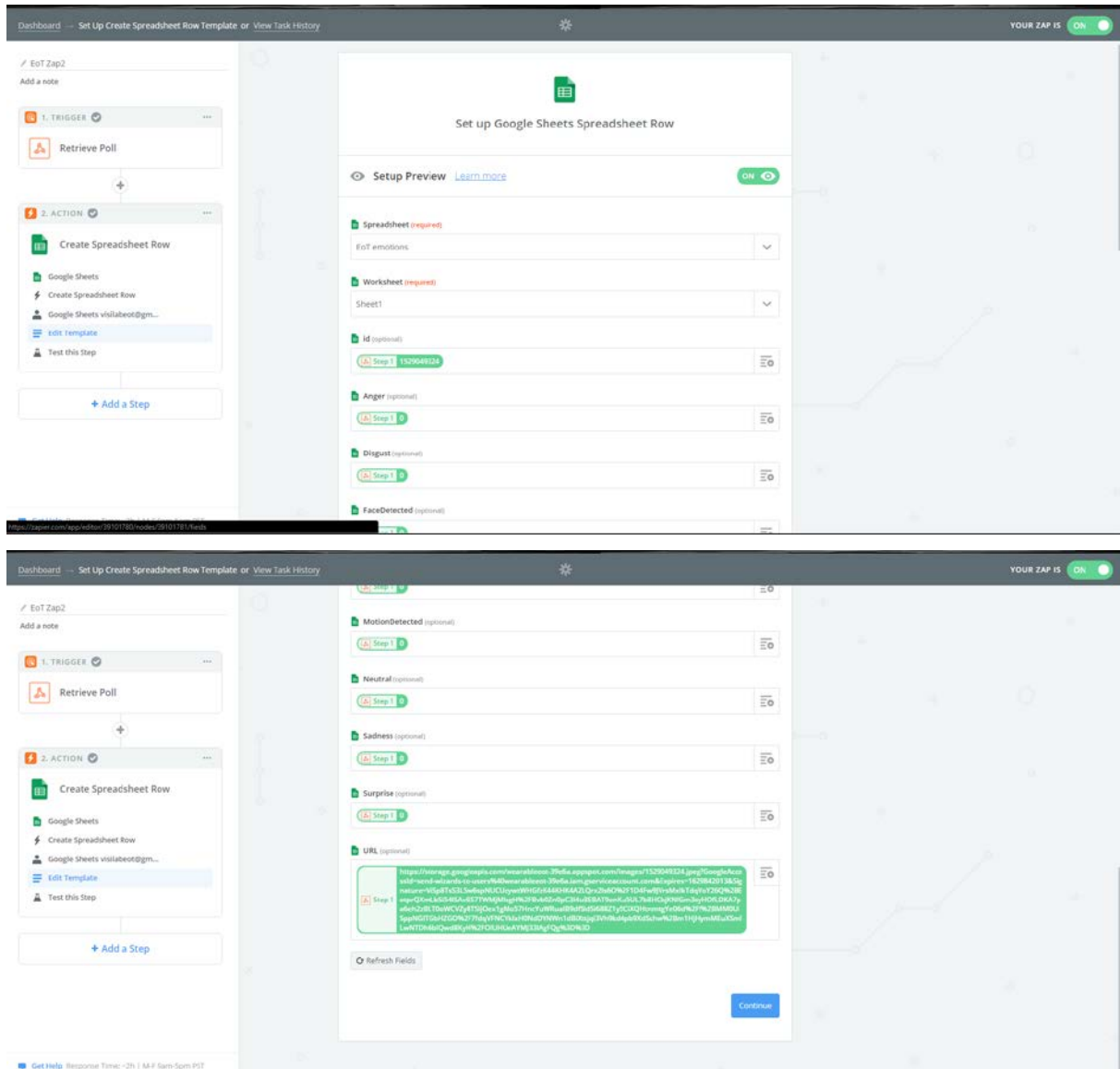
Now, we are going to select "Create Spreadsheet Row"



Check if you have connection with the account where you have the document:

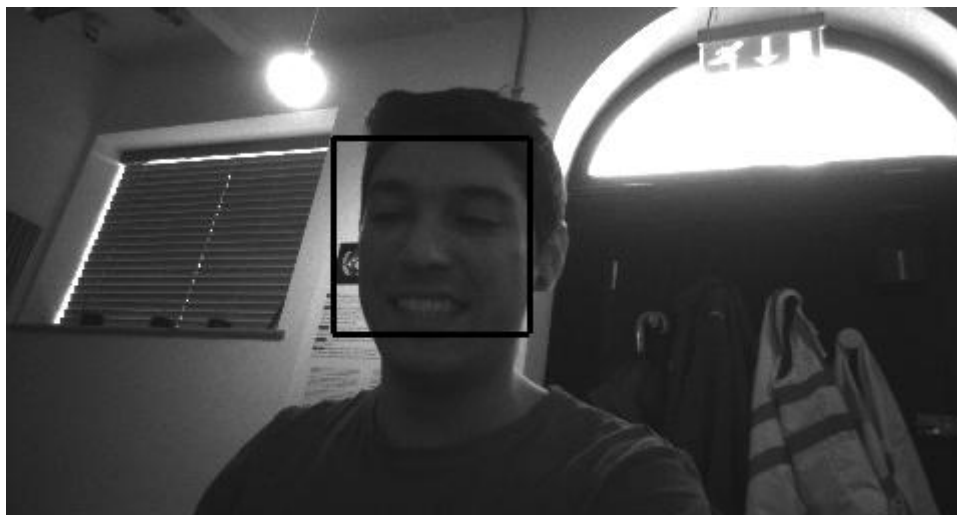


We should select the template to store the new entries. We are going to relate the images with the columns of the document.



Finally, will be configured, the document will receive the data from the EoT website and store it with the link to the images when a new entry is detected.

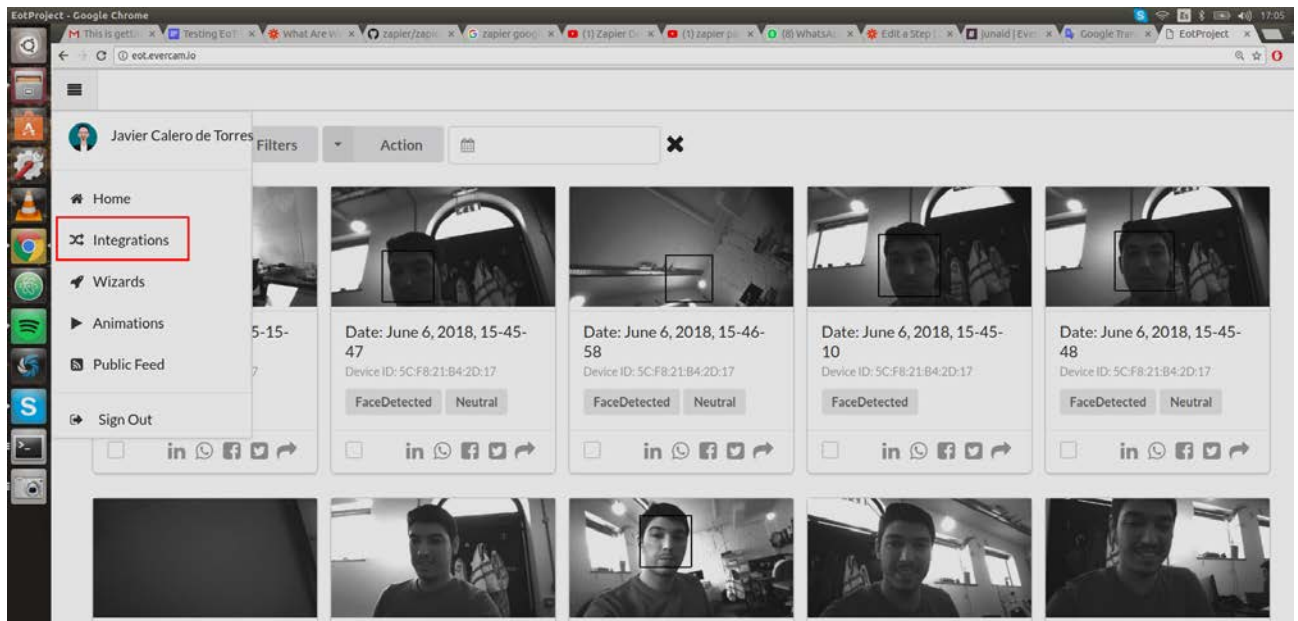
	A	B	C	D	E	F	G	H	I	J	K	L
	id	Anger	Disgust	FaceDetected	Fear	Happiness	LargeFaceDetected	MotionDetected	Neutral	Sadness	Surprise	URL
1	1529049324	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529049324.png?GoogleAccessId=...
2	1529053775	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053775.png?GoogleAccessId=...
3	1529053774	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053774.png?GoogleAccessId=...
4	1529053776	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053776.png?GoogleAccessId=...
5	1529053777	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053777.png?GoogleAccessId=...
6	1529053778	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053778.png?GoogleAccessId=...
7	1529053779	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053779.png?GoogleAccessId=...
8	1529053780	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053780.png?GoogleAccessId=...
9	1529053781	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053781.png?GoogleAccessId=...
10	1529053782	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053782.png?GoogleAccessId=...
11	1529053774	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053774.png?GoogleAccessId=...
12	1529053775	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053775.png?GoogleAccessId=...
13	1529053776	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053776.png?GoogleAccessId=...
14	1529053777	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053777.png?GoogleAccessId=...
15	1529053778	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053778.png?GoogleAccessId=...
16	1529053779	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053779.png?GoogleAccessId=...
17	1529053780	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053780.png?GoogleAccessId=...
18	1529053781	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053781.png?GoogleAccessId=...
19	1529053782	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053782.png?GoogleAccessId=...
20	1529053783	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053783.png?GoogleAccessId=...
21	1529053784	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053784.png?GoogleAccessId=...
22	1529053785	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053785.png?GoogleAccessId=...
23	1529053786	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053786.png?GoogleAccessId=...
24	1529053787	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053787.png?GoogleAccessId=...
25	1529053788	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053788.png?GoogleAccessId=...
26	1529053789	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053789.png?GoogleAccessId=...
27	1529053790	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053790.png?GoogleAccessId=...
28	1529053791	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053791.png?GoogleAccessId=...
29	1529053792	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053792.png?GoogleAccessId=...
30	1529053793	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053793.png?GoogleAccessId=...
31	1529053794	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053794.png?GoogleAccessId=...
32	1529053795	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053795.png?GoogleAccessId=...
33	1529053796	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053796.png?GoogleAccessId=...
34	1529053797	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053797.png?GoogleAccessId=...
35	1529053798	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053798.png?GoogleAccessId=...
36	1529053799	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053799.png?GoogleAccessId=...
37	1529053800	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053800.png?GoogleAccessId=...
38	1529053801	0	0	0	0	0	0	0	0	0	0	https://storage.googleapis.com/everatreeot-3beria.appspot.com/images/1529053801.png?GoogleAccessId=...



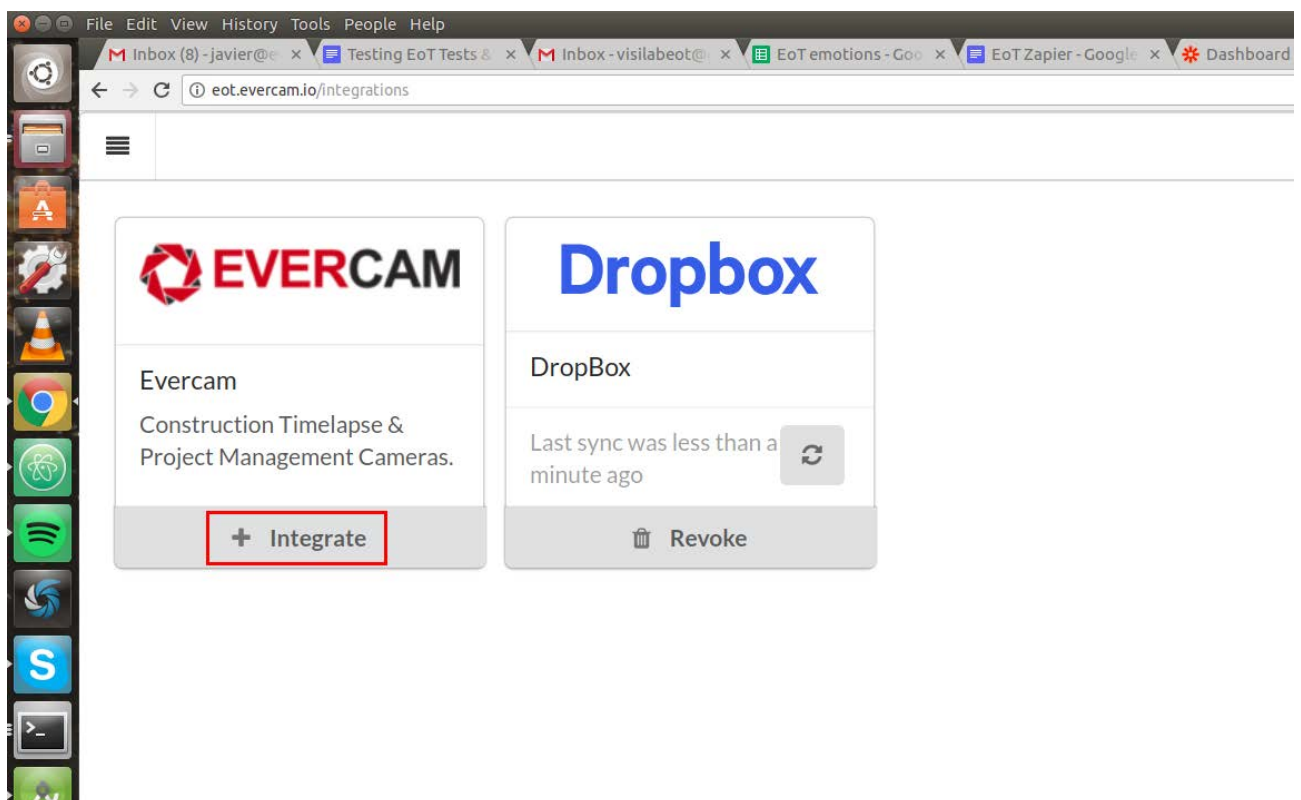
5. Integrating with and viewing my images in Evercam

The Evercam web site basically administrate all function of a camera, whit this test we want to add the EoT device like another camera in Evercam website where we can select a date and show the images captured by the EoT that day.

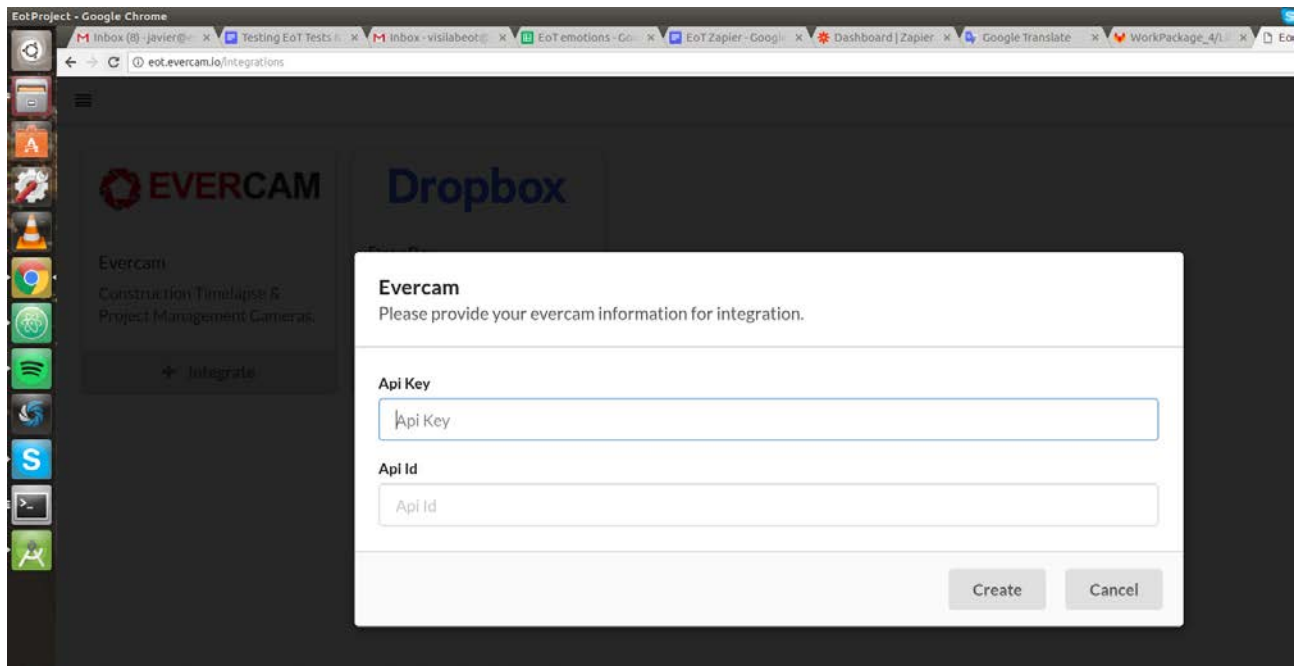
To configure the integration with Evercam we have to login on the webapp eot.evercam.io and in the top left menu select "Integrations"



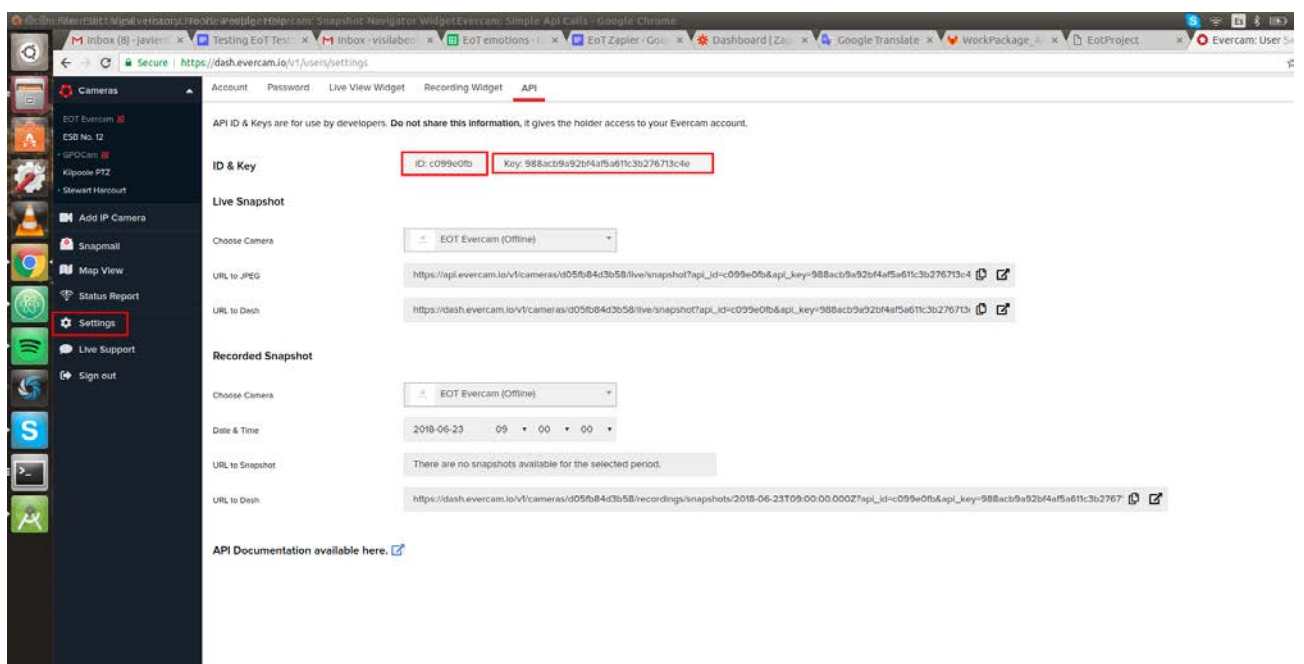
We select integrate on Evercam box.

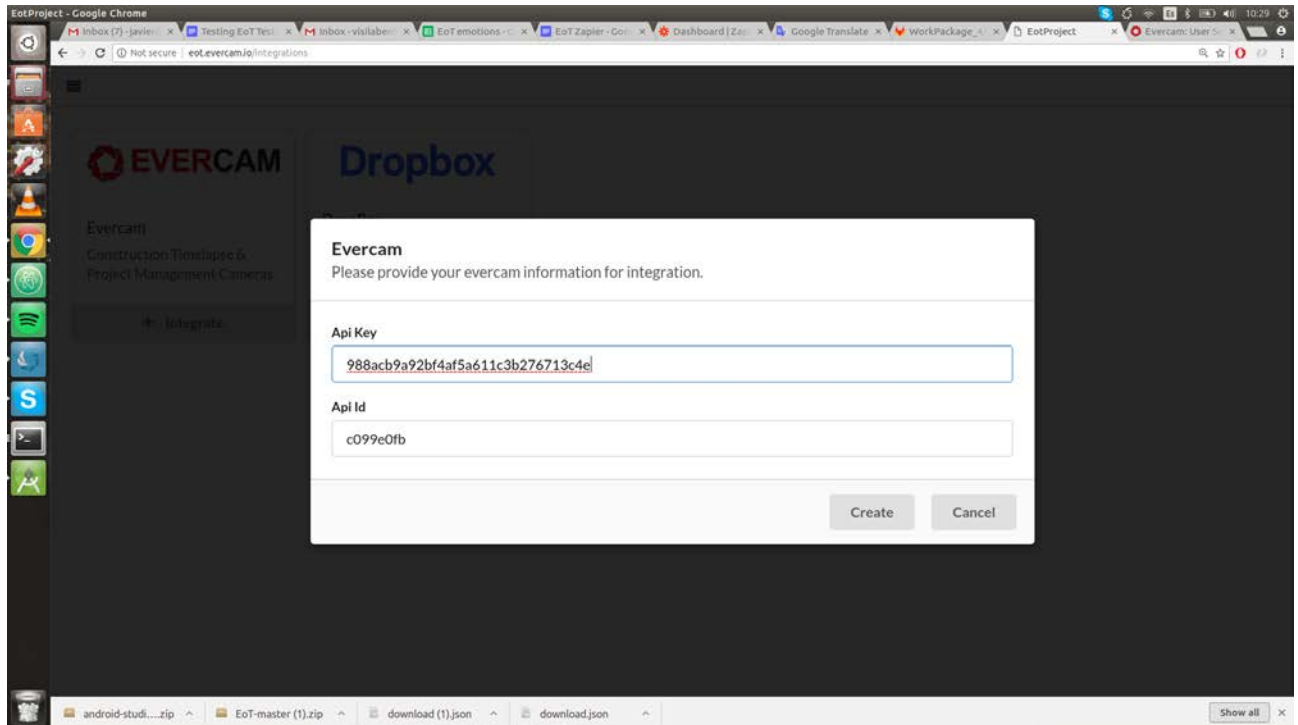


We need our Evercam ID and KEY

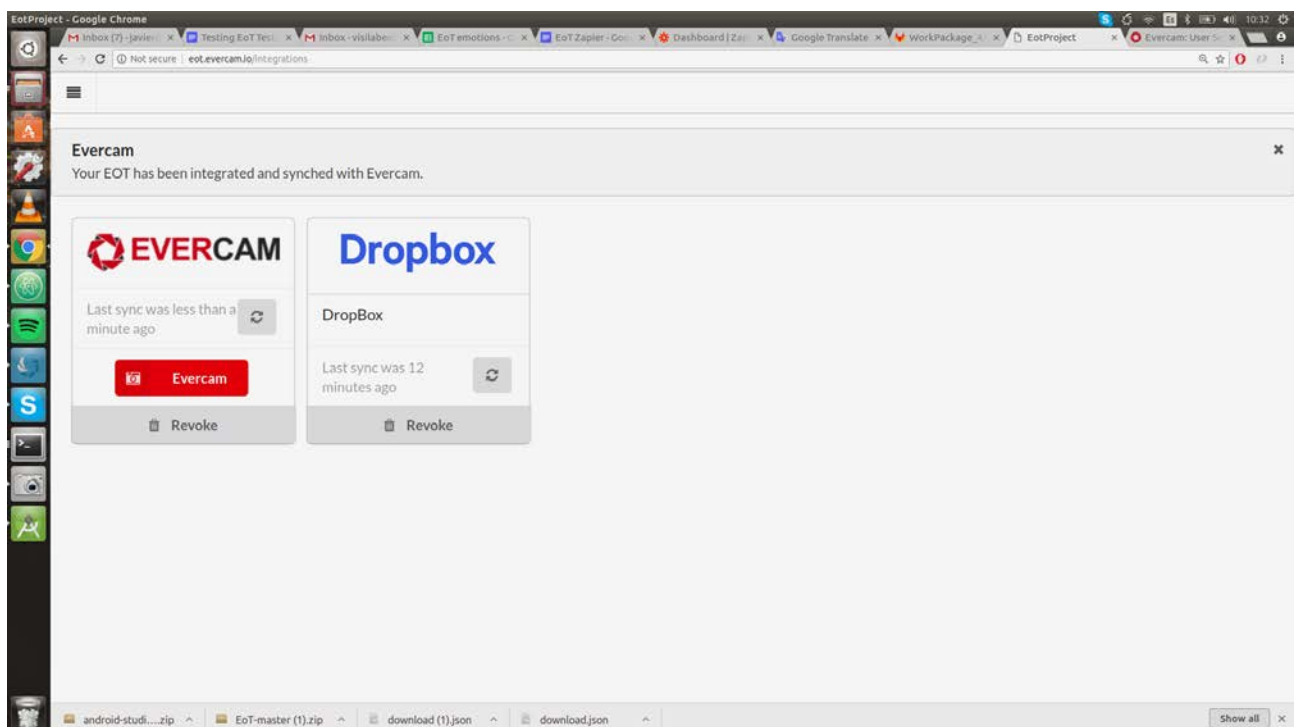


We should login the Evercam website and go to "Settings" >> "API", copy our ID and KEY and paste on the EoT website

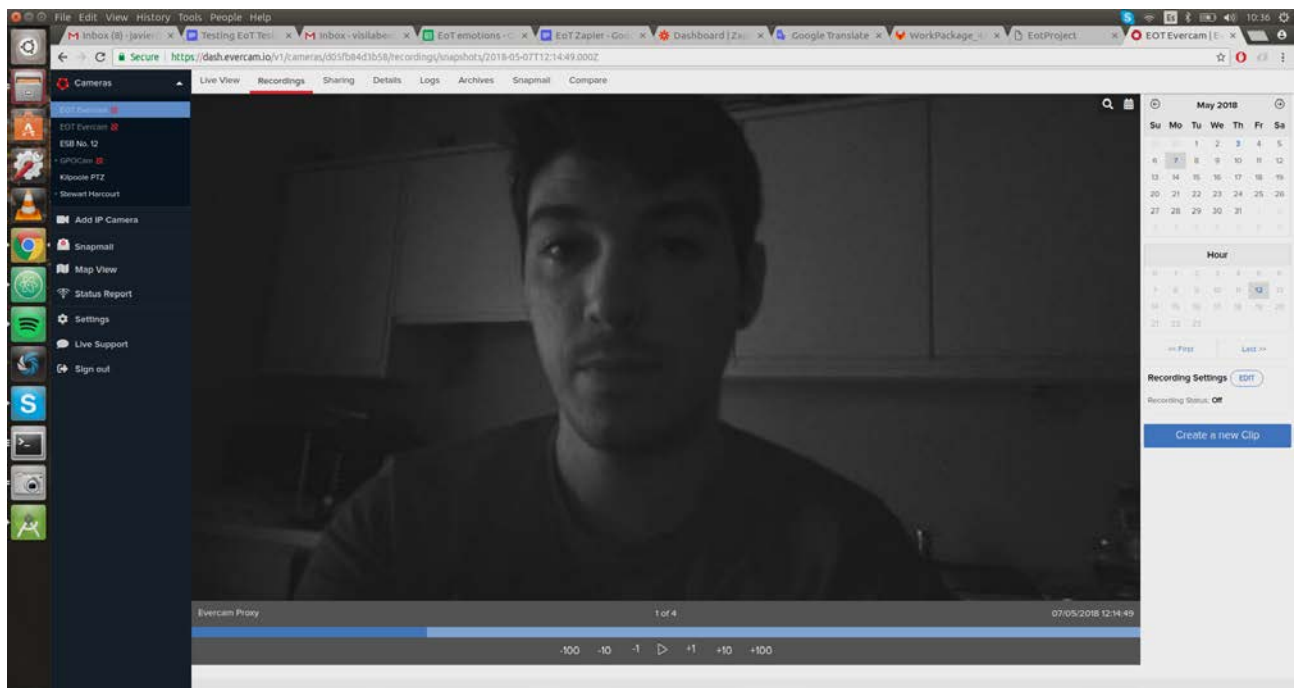
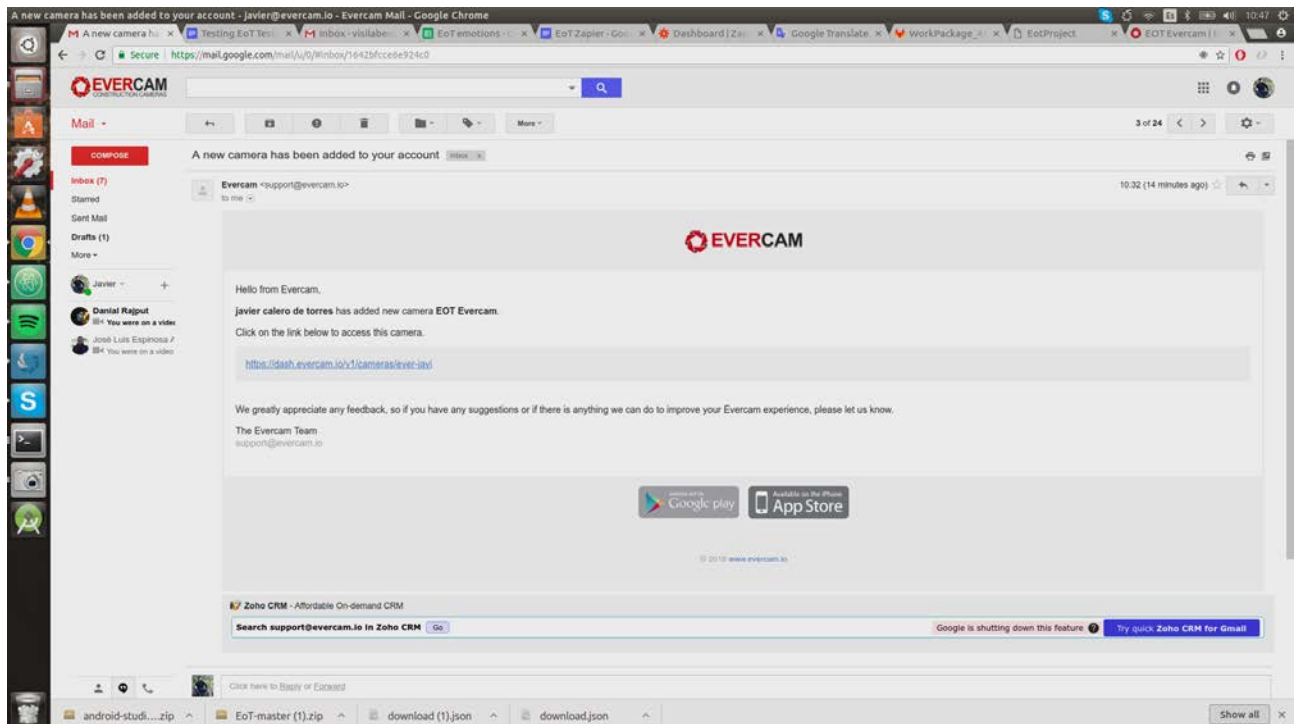




Once we click on “Create”, Evercam is integrated with EoT



Now, we can show our captured images on the Evercam website, we have a new camera called “EOT Evercam”. We can show the stored images in the tag “Recordings” and select a specific date and hour

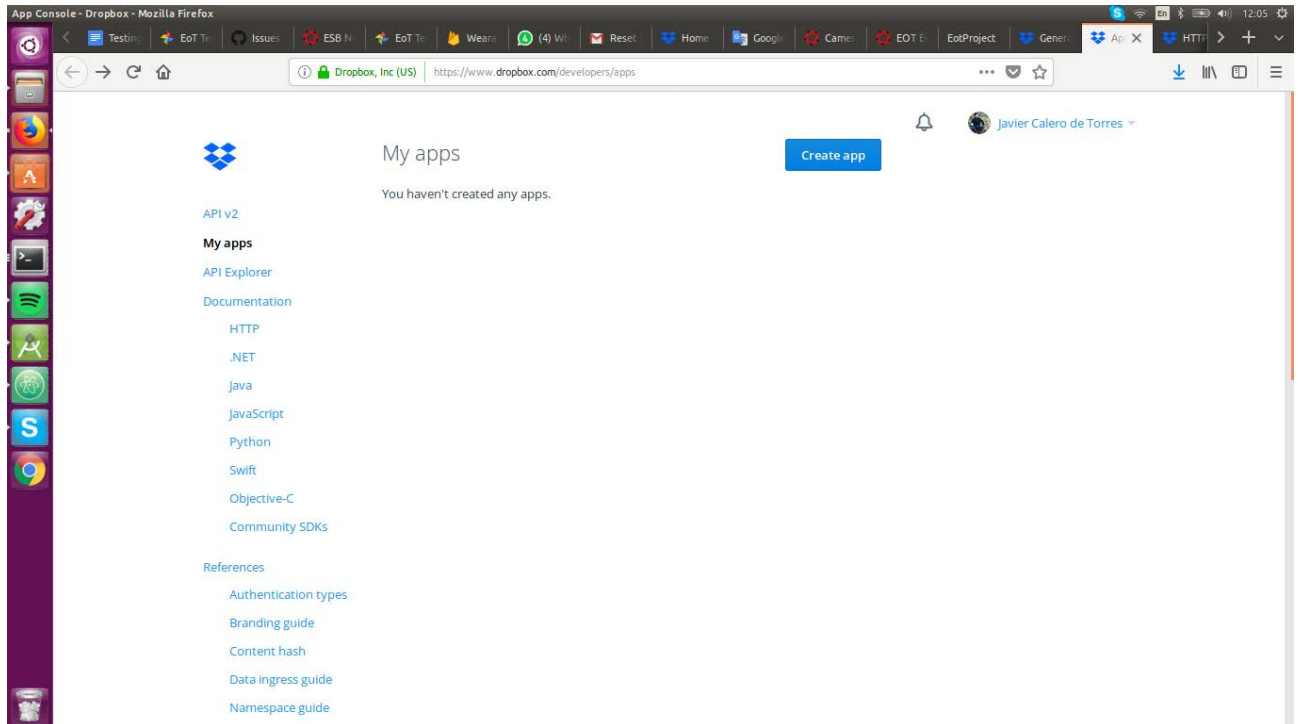


6. Integrating with Dropbox

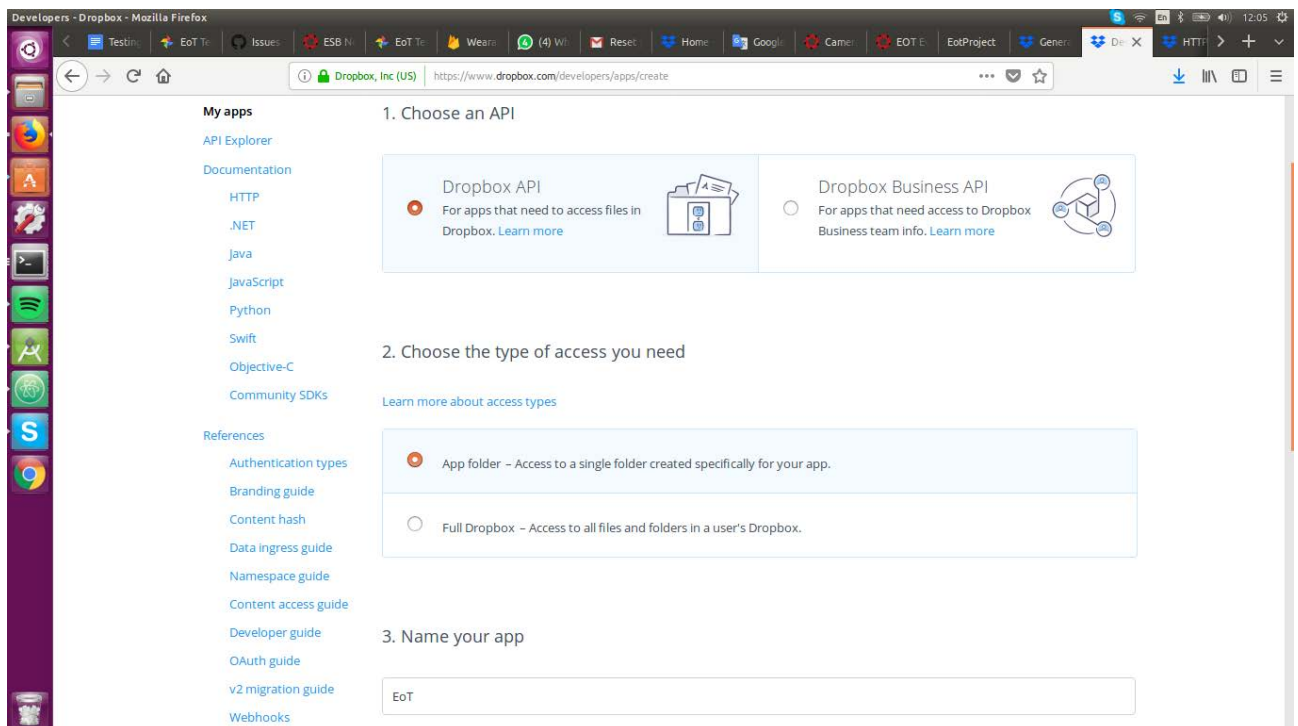
With this test we are going to store the images captured in our account of Dropbox, the EoT website are going to create a new folder where are going to store the images automatically.

In our account of Dropbox, we should create a new app, for it, we follow this link:

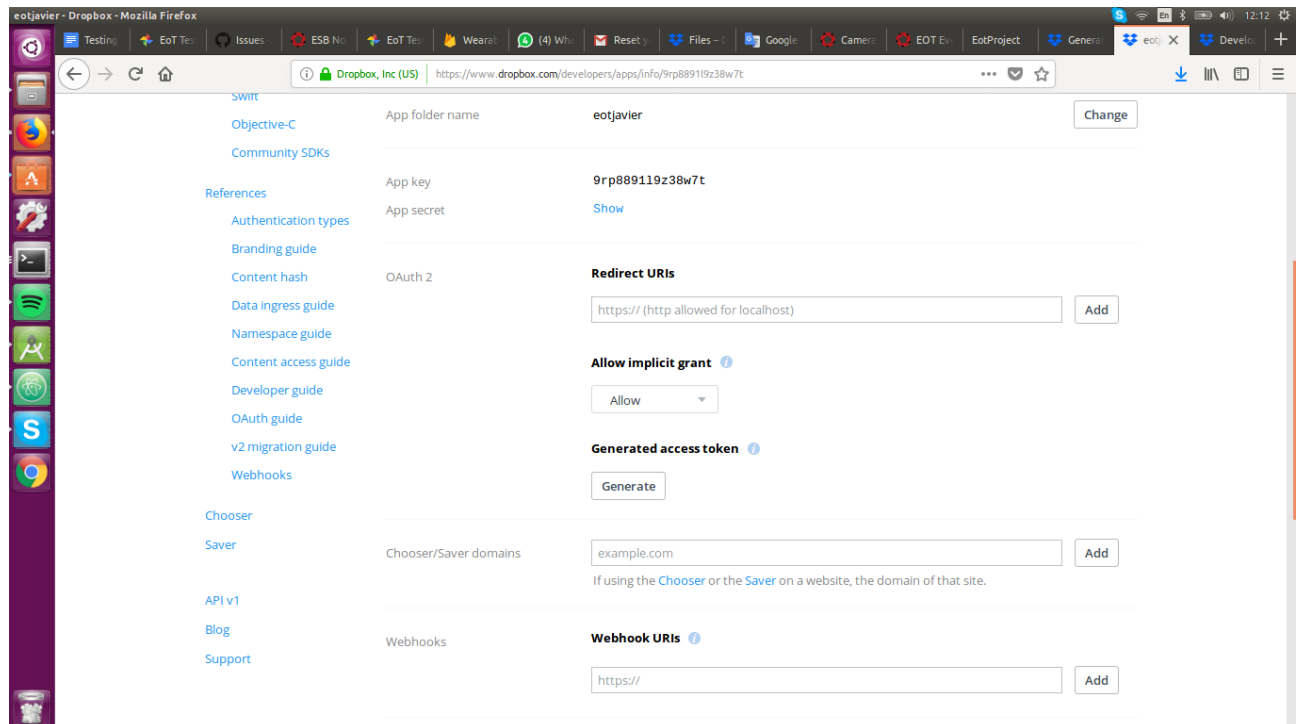
<https://www.dropbox.com/developers/apps> and click on “Create app”



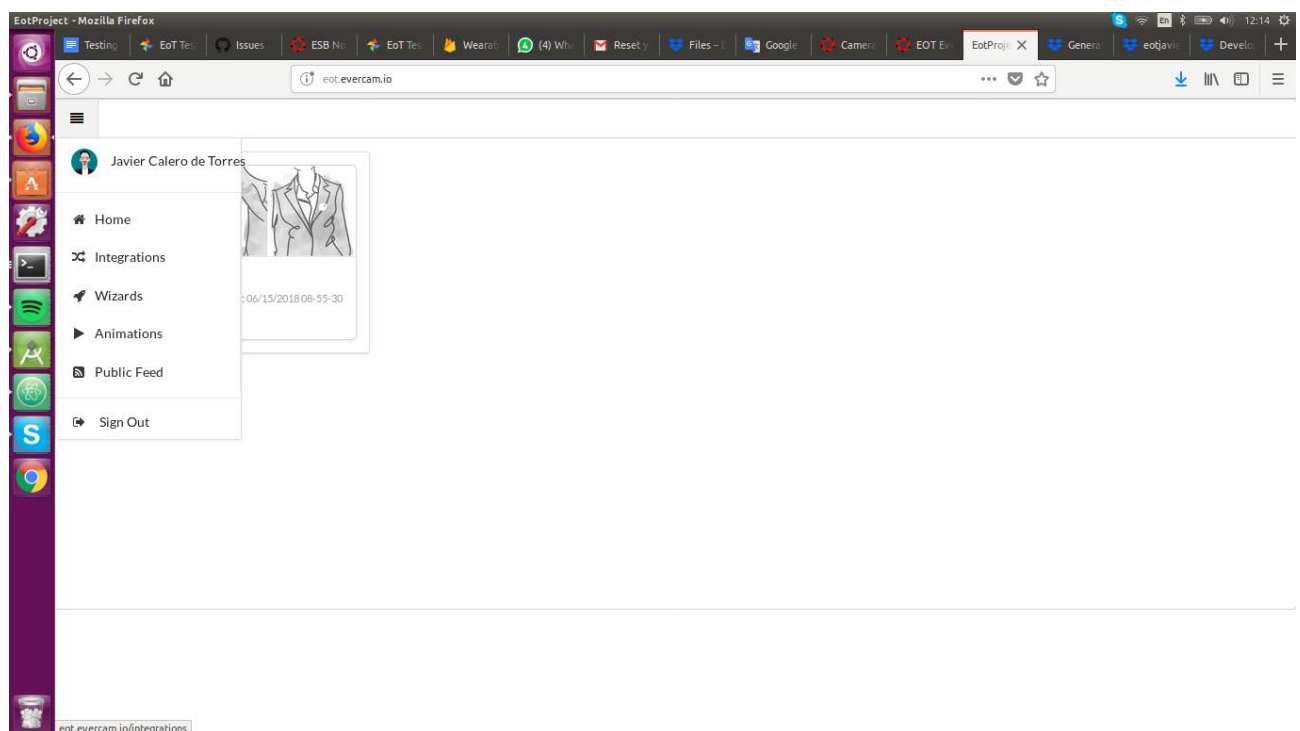
Now, we should select “Dropbox API”, “App Folder” and insert the name of our app



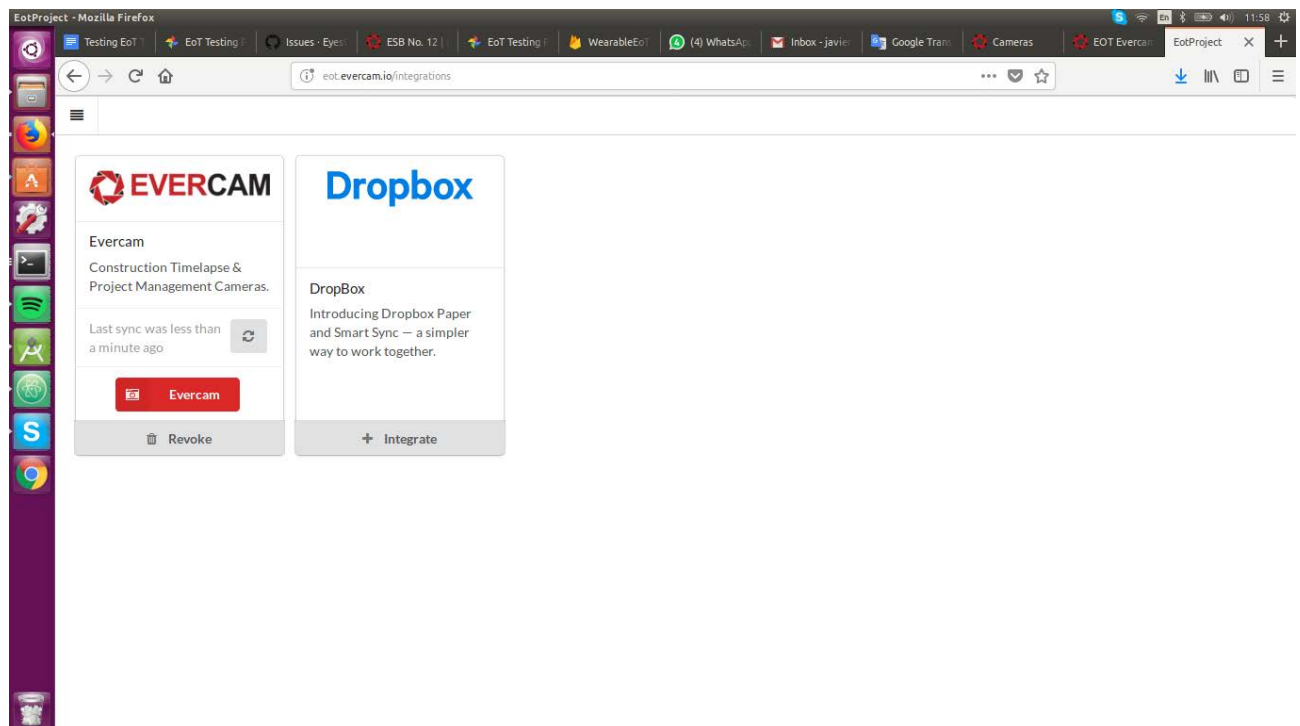
Once created the app, we generated the Dropbox Access Token



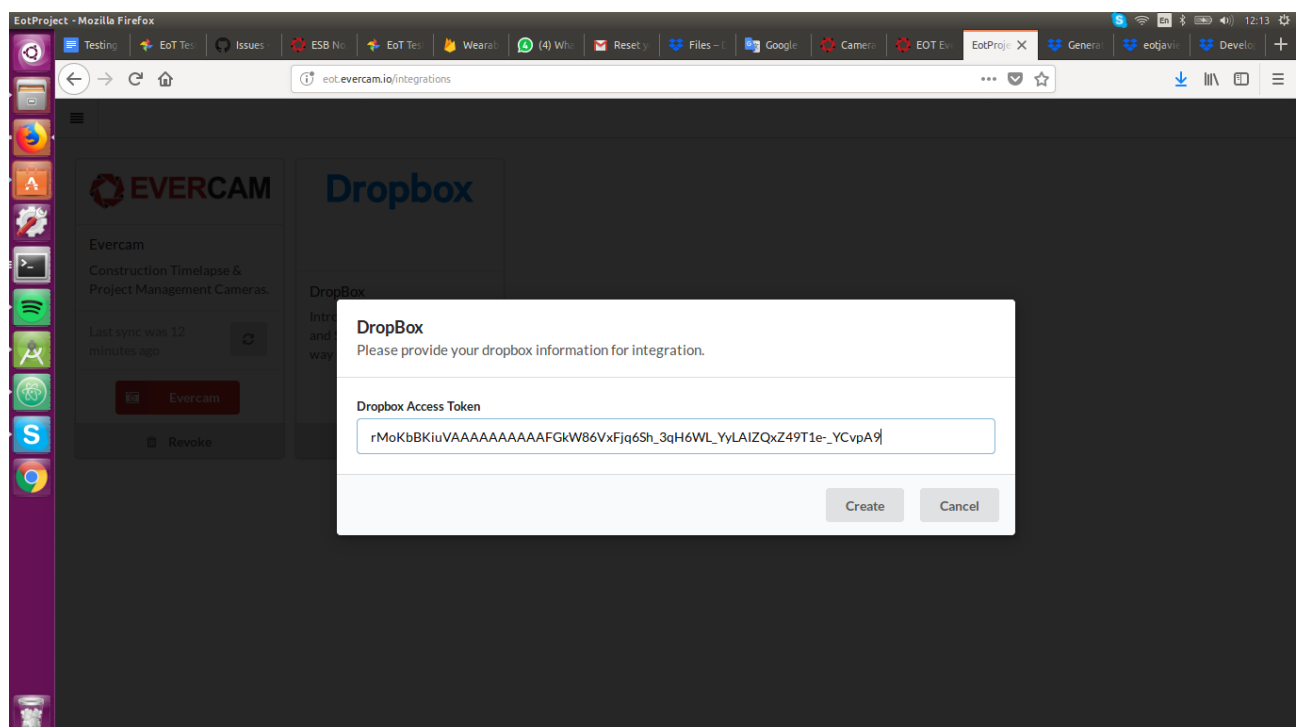
Copy this Access Token and go to the webapp of EoT, display the menu on the top right and select "Integrations"



On the next screen, click "Integrate" on dropbox

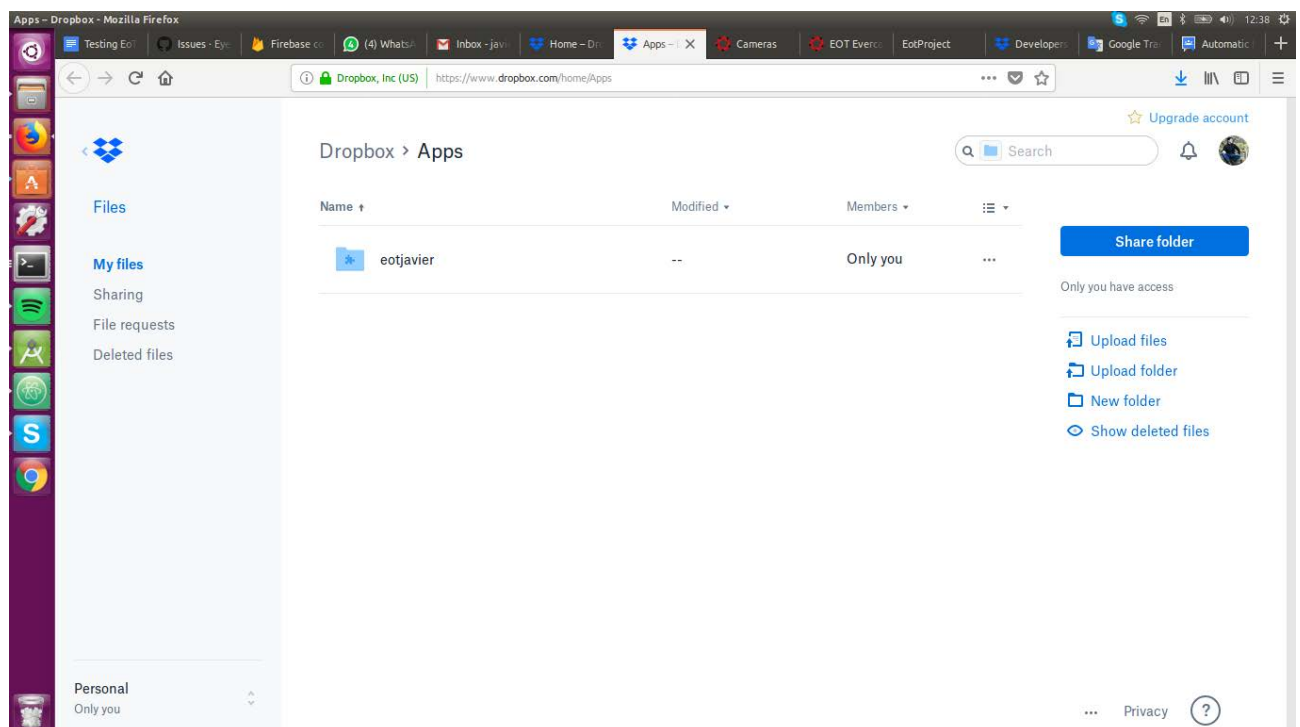
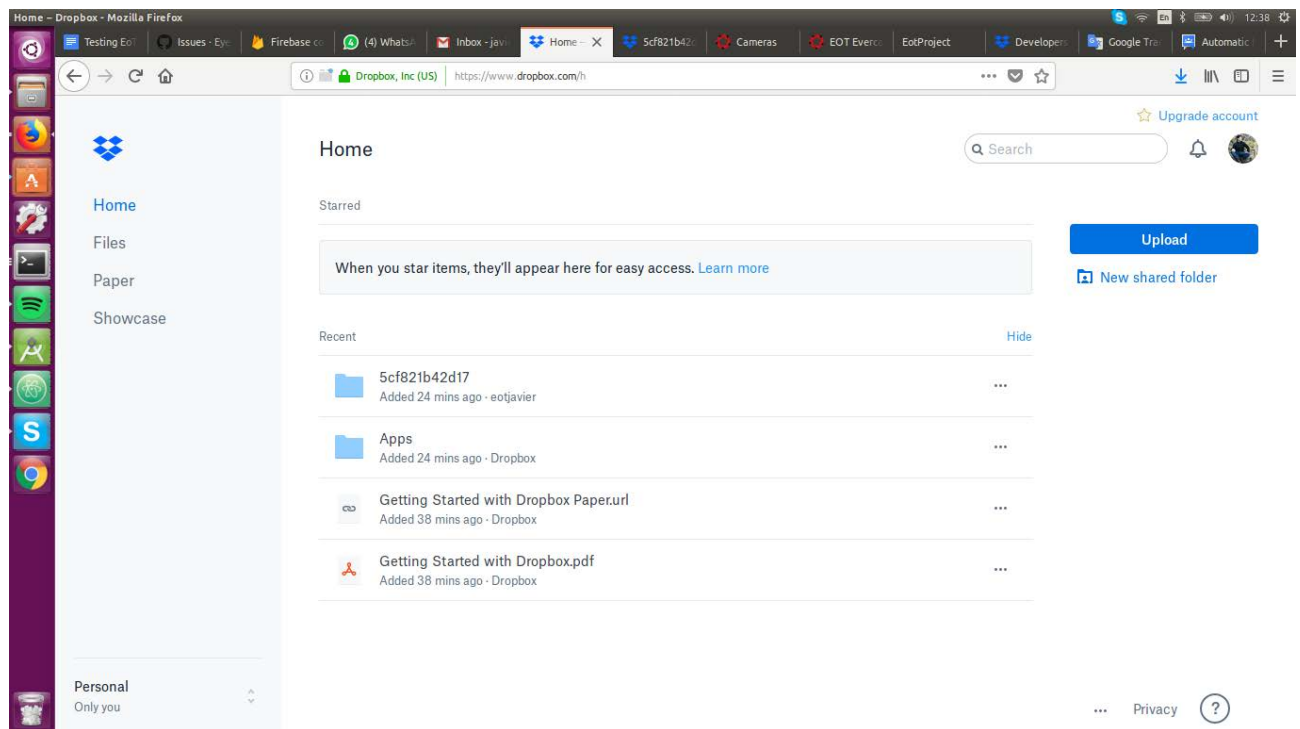


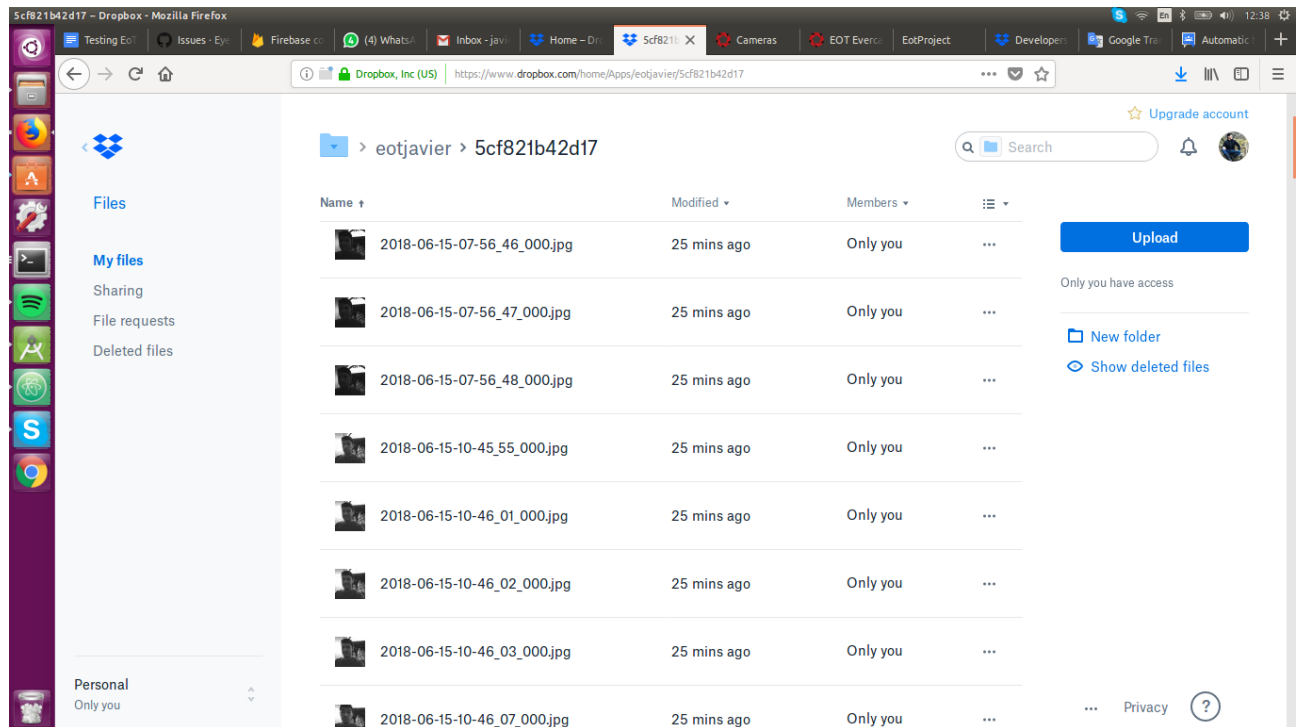
And paste the access token



Now we check our inbox on dropbox, it should create a new folder with our app

and inside it the pictures generated in our EoT webapp

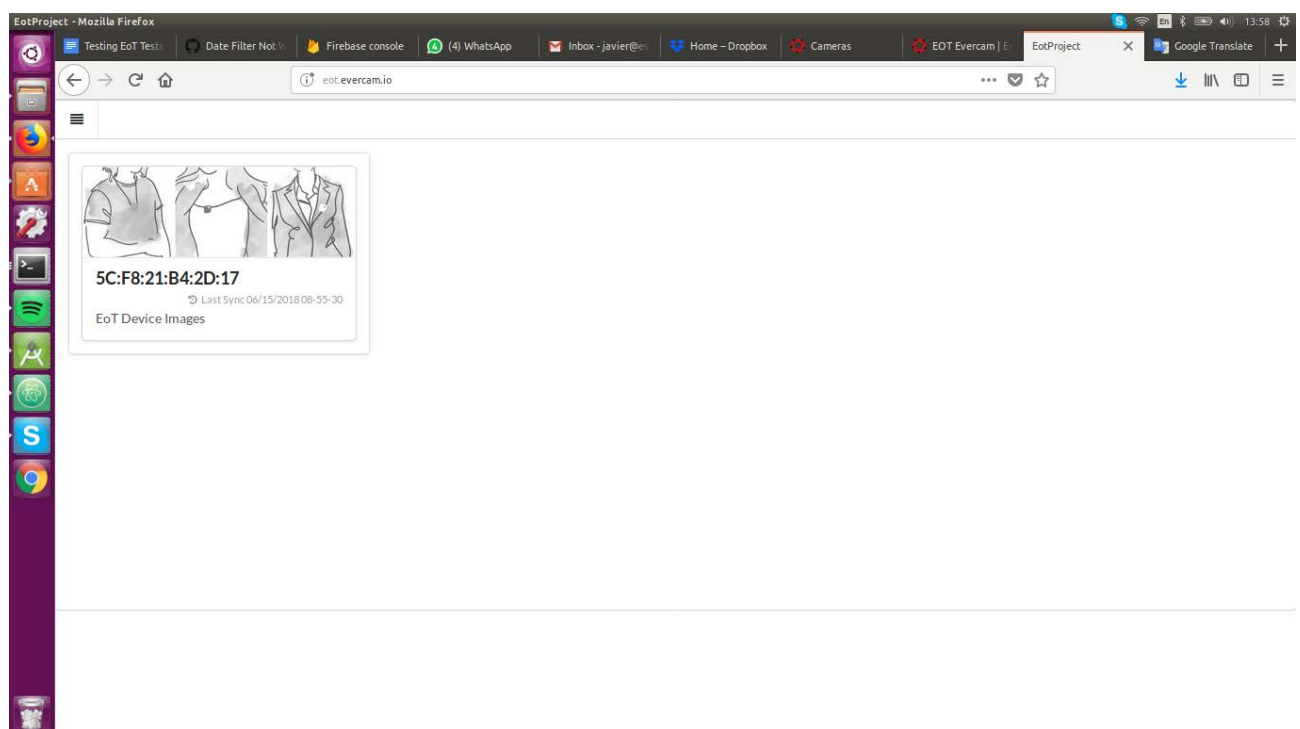




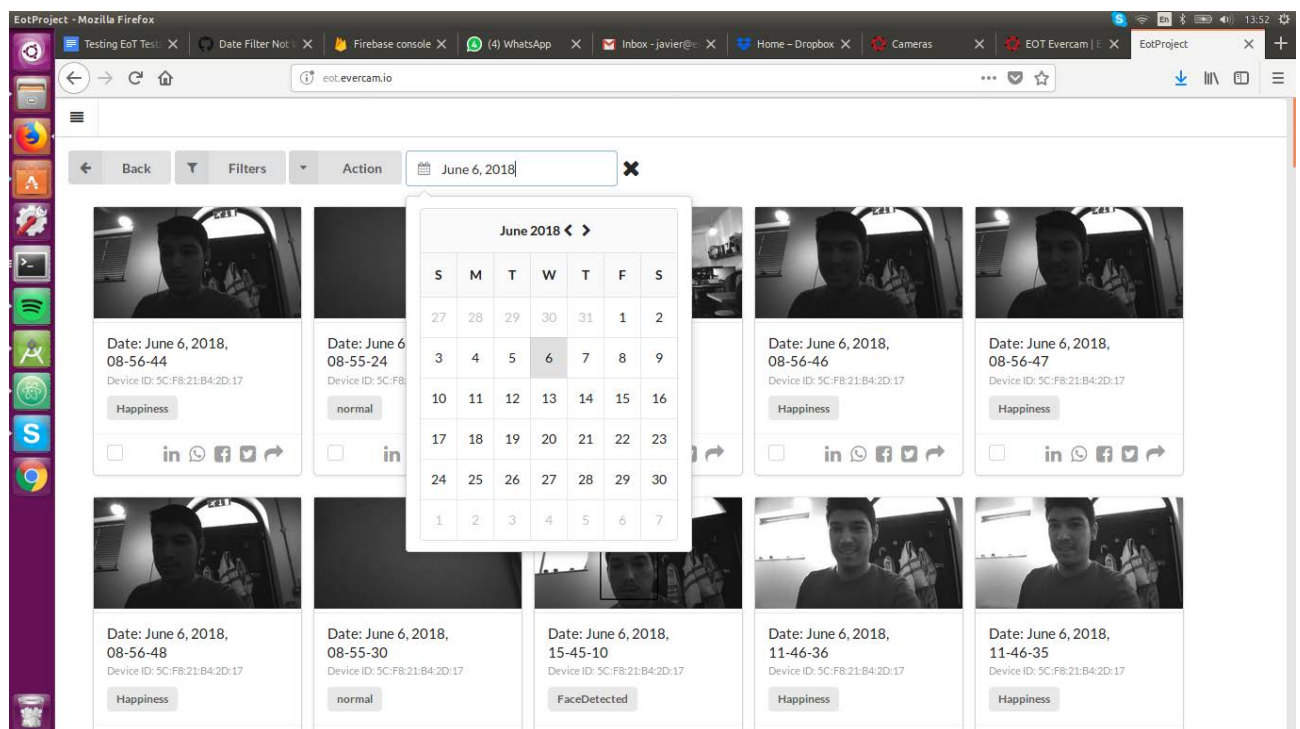
7. Creating an animation

The animation of EoT consists in a video generated automatically with the images that we are select from the website.

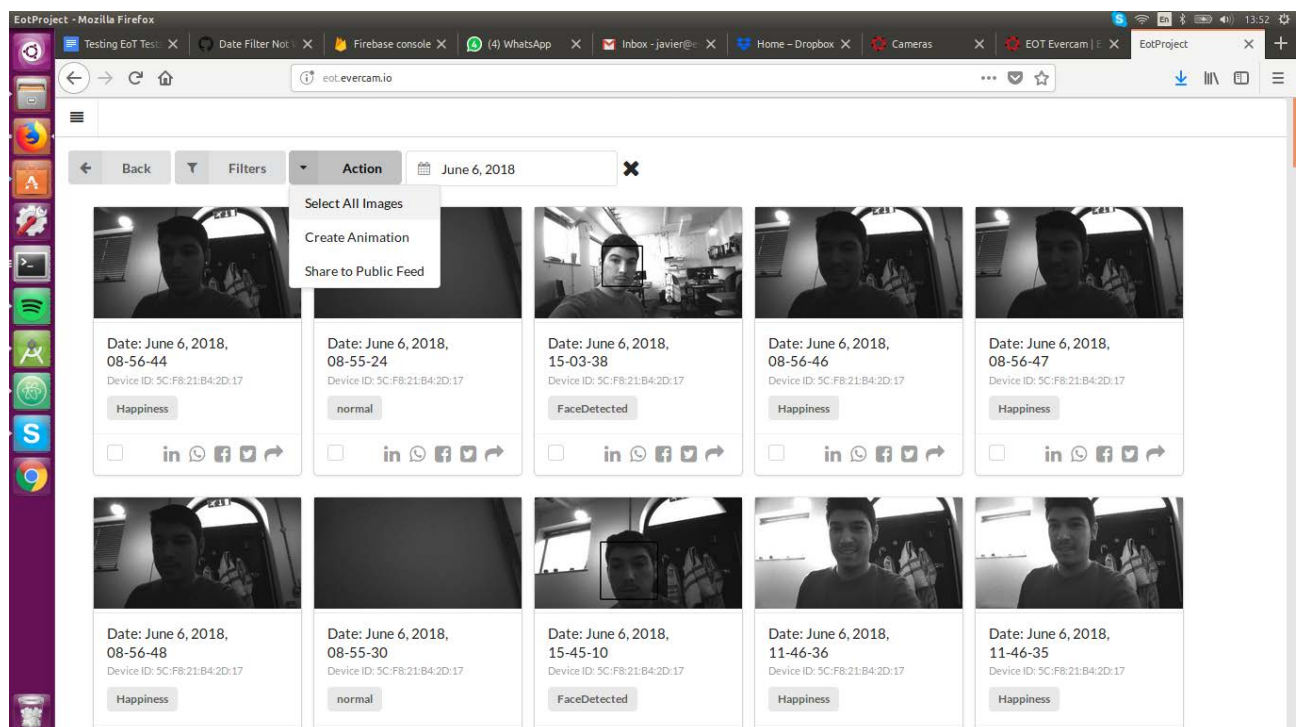
To create an animation, we login on the webapp with our user and we select the device that we were using



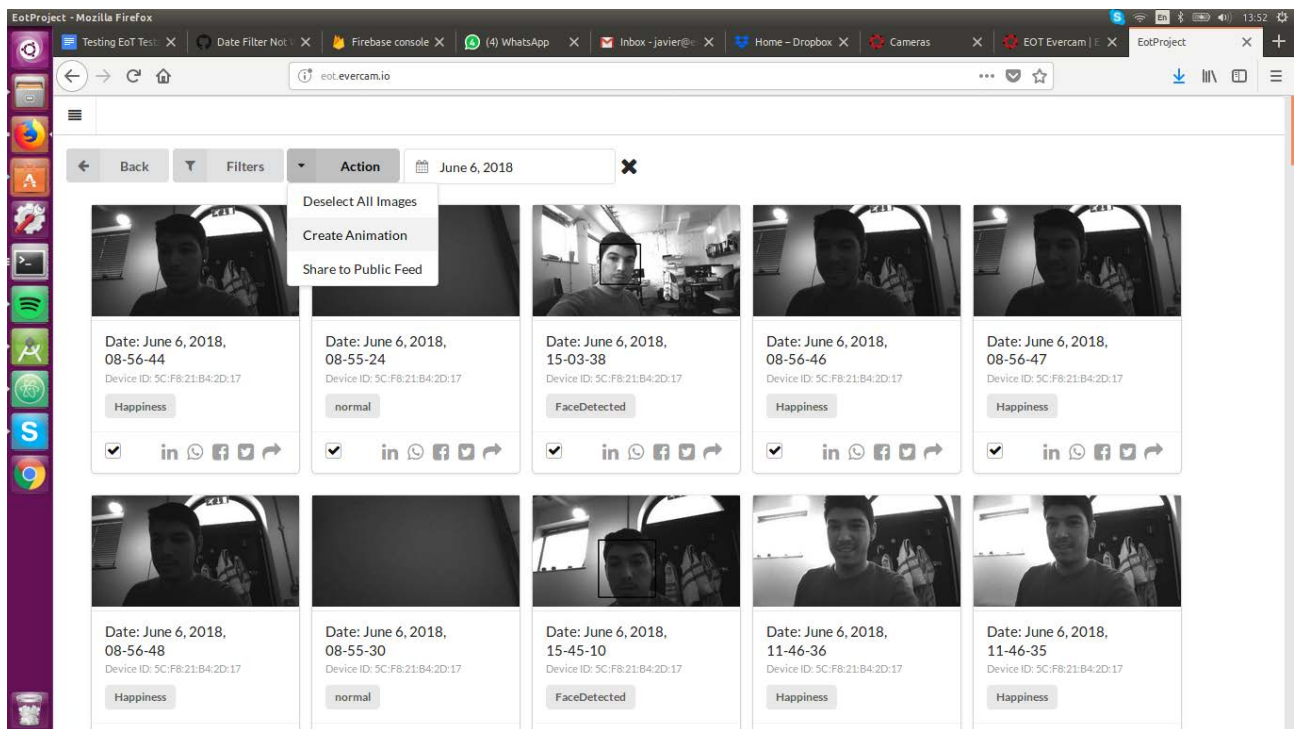
We create a new filter selecting the images saved the day we want



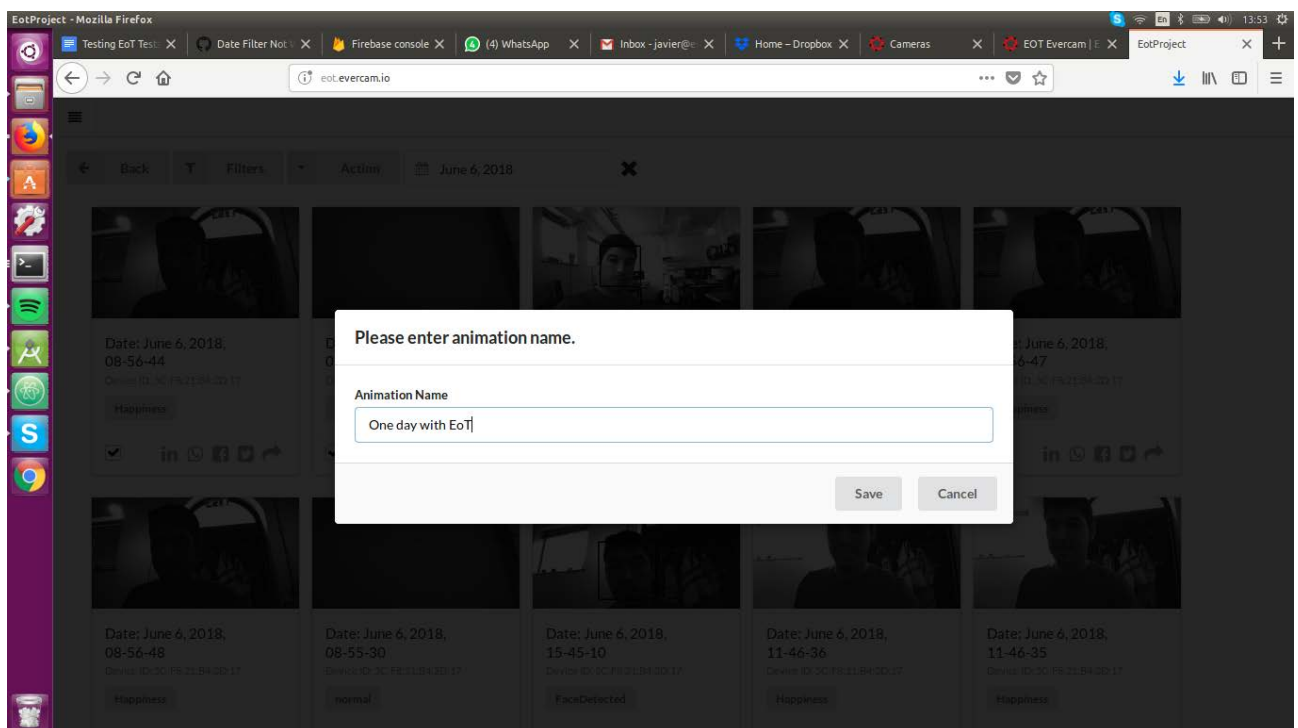
Click on "Action" > "Select all images"



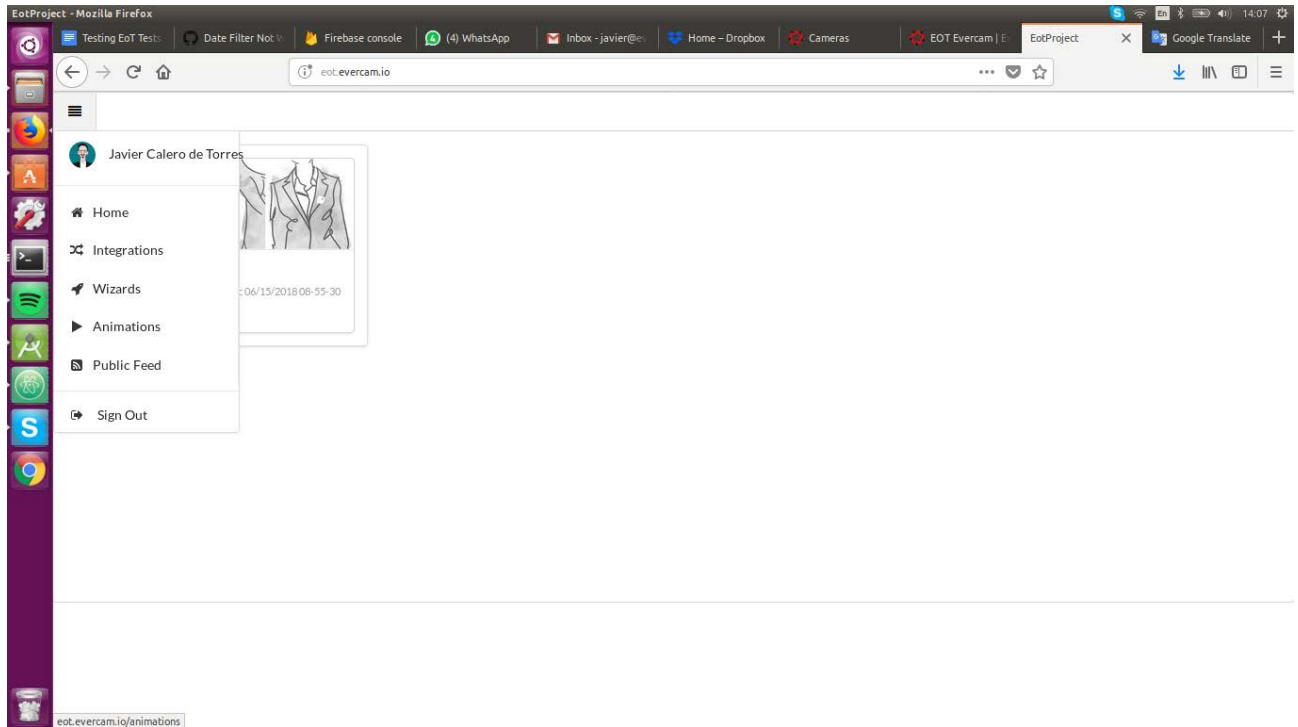
Click on "Action" > "Create animation"



Insert the name of the animation and click on "Save"

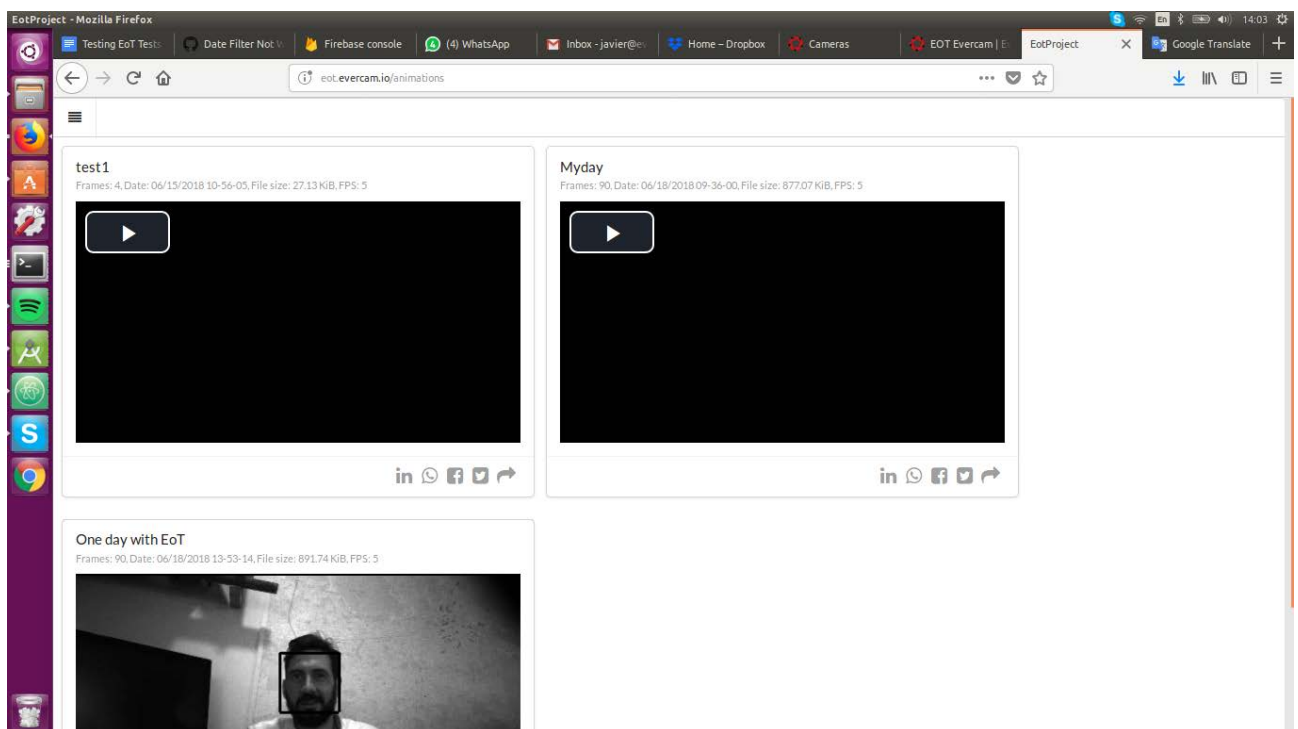


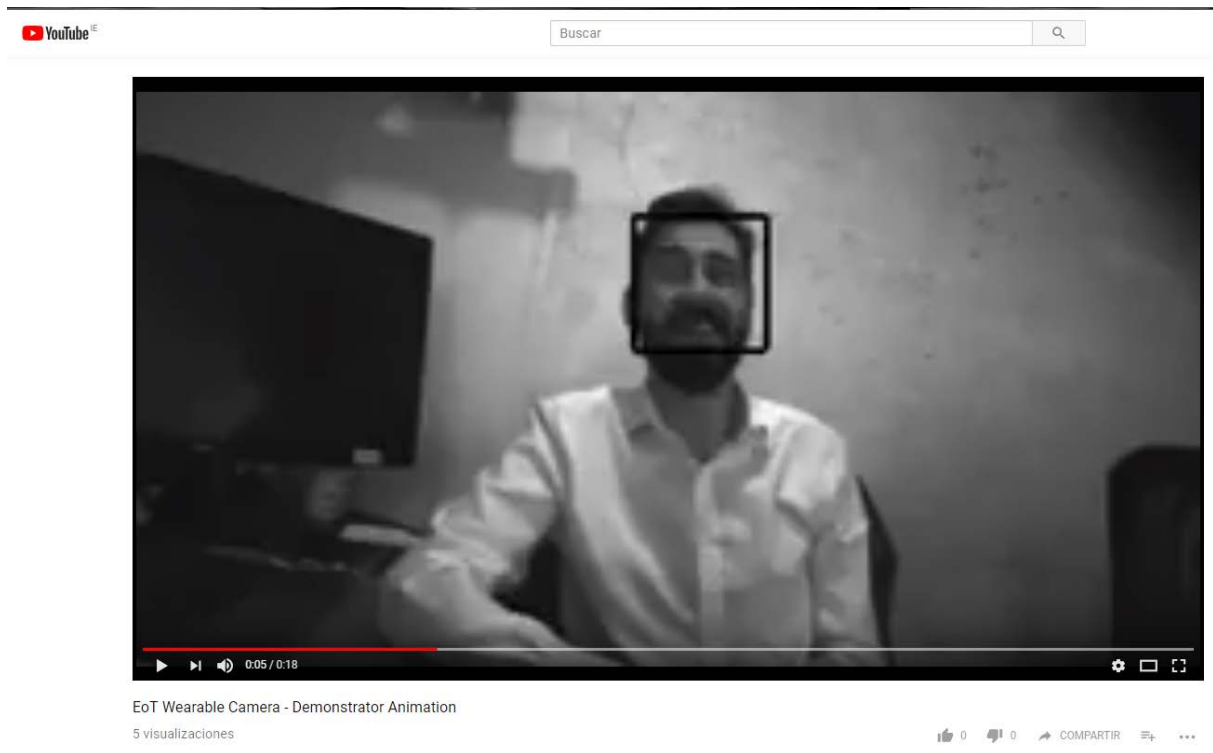
Display the menu on the top right and select "Animations"



As we can see in the video bellow, we are created a video of the activity of our day. The device has detected every movement during the day, taking a picture when it happens and sharing the image with the EoT webapp. Here the link to the video on YouTube:

<https://www.youtube.com/watch?v=4Mi2oKUrfTk>

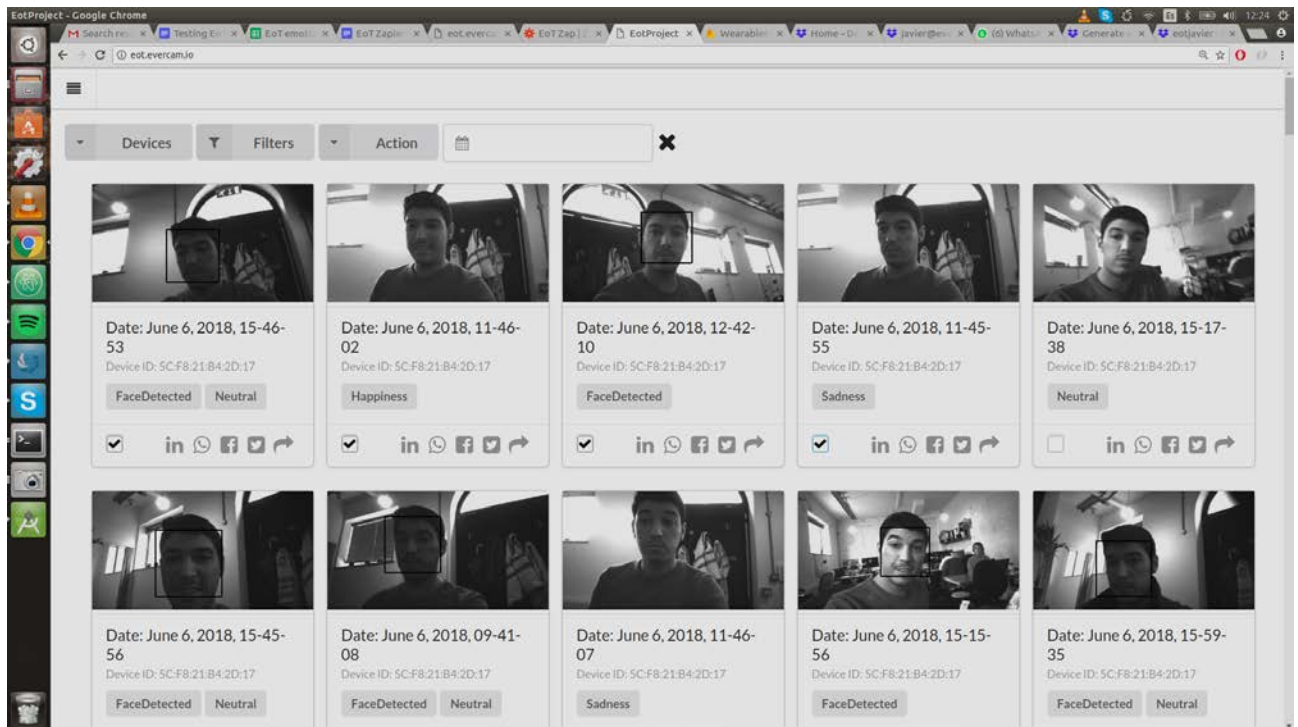




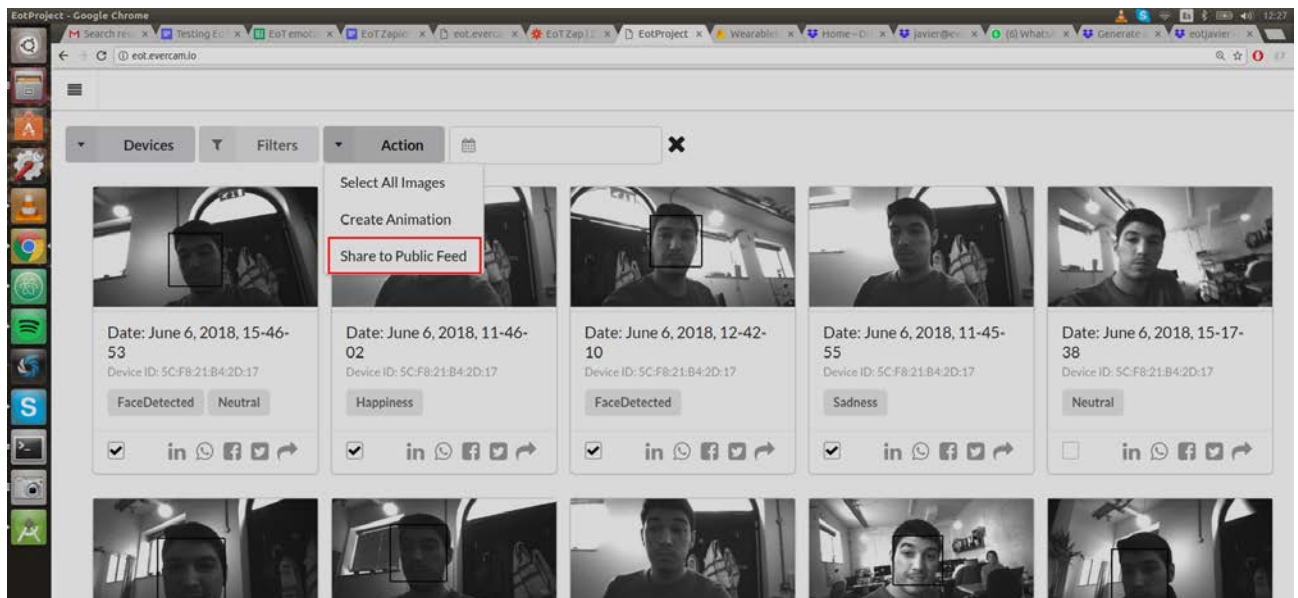
8. Sharing my public feed

The EoT website is a private website where you need a google account to access your archives, therefore, we have the public feed that will be public and everyone can access him.

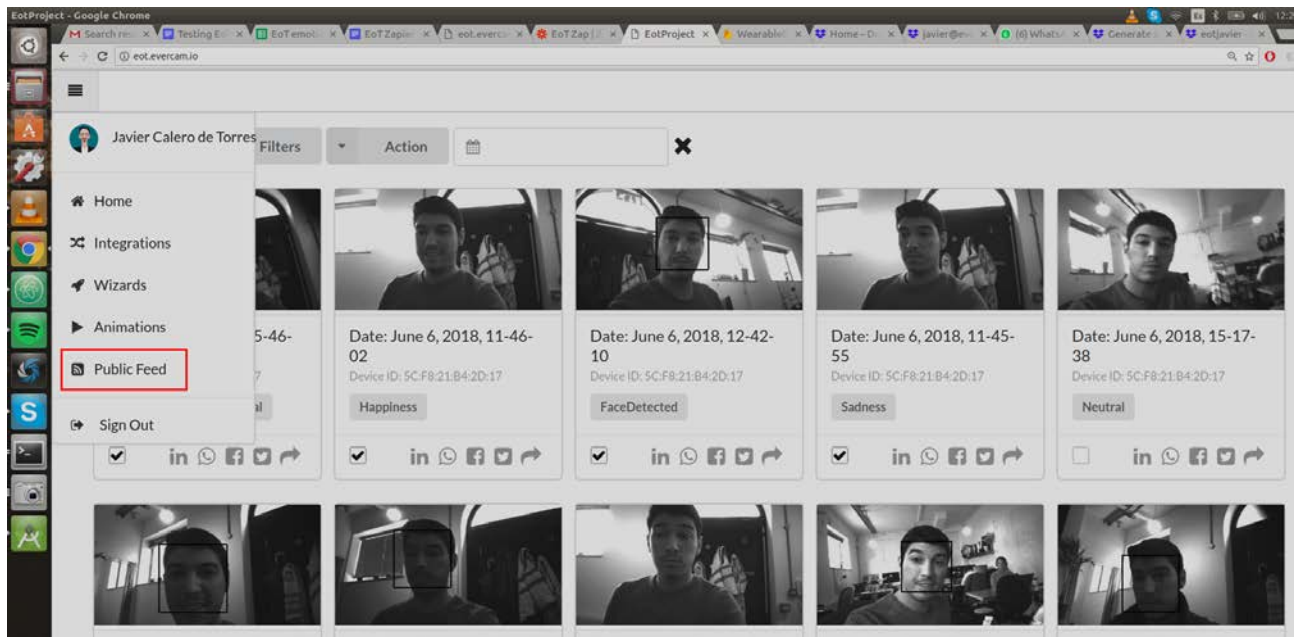
To add images to our public feed we have to select the images that we want to share



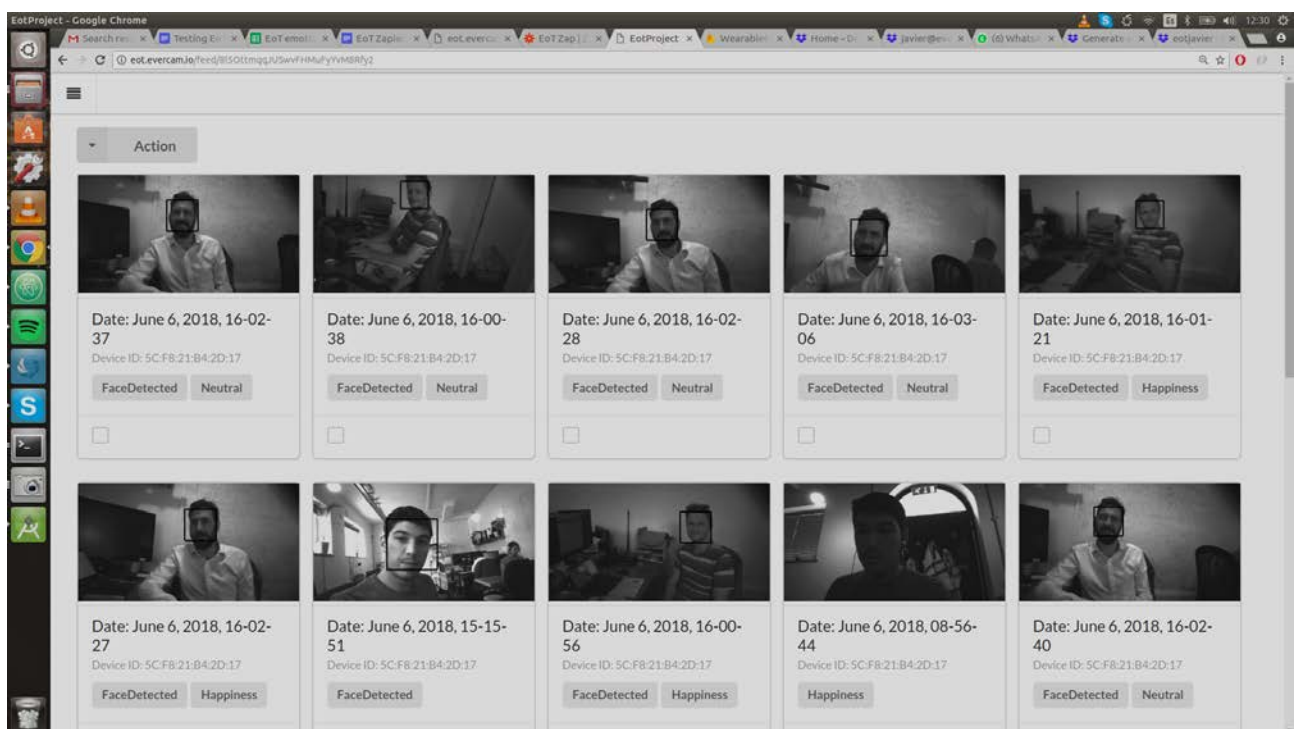
Select "Action" >> "Share to public feed"



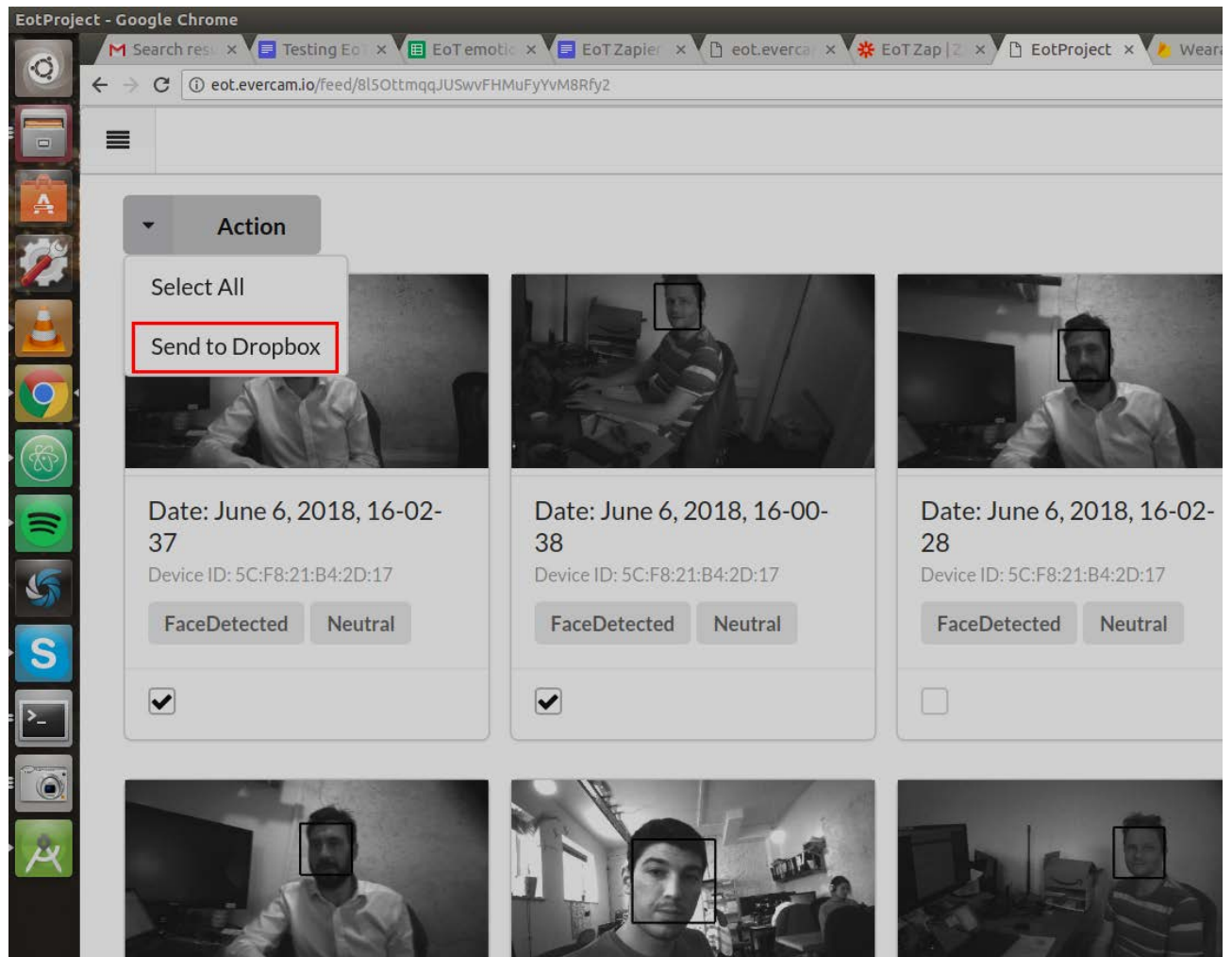
To check that it is correctly added to our public feed we have to move in the main menu to "Public Feed"



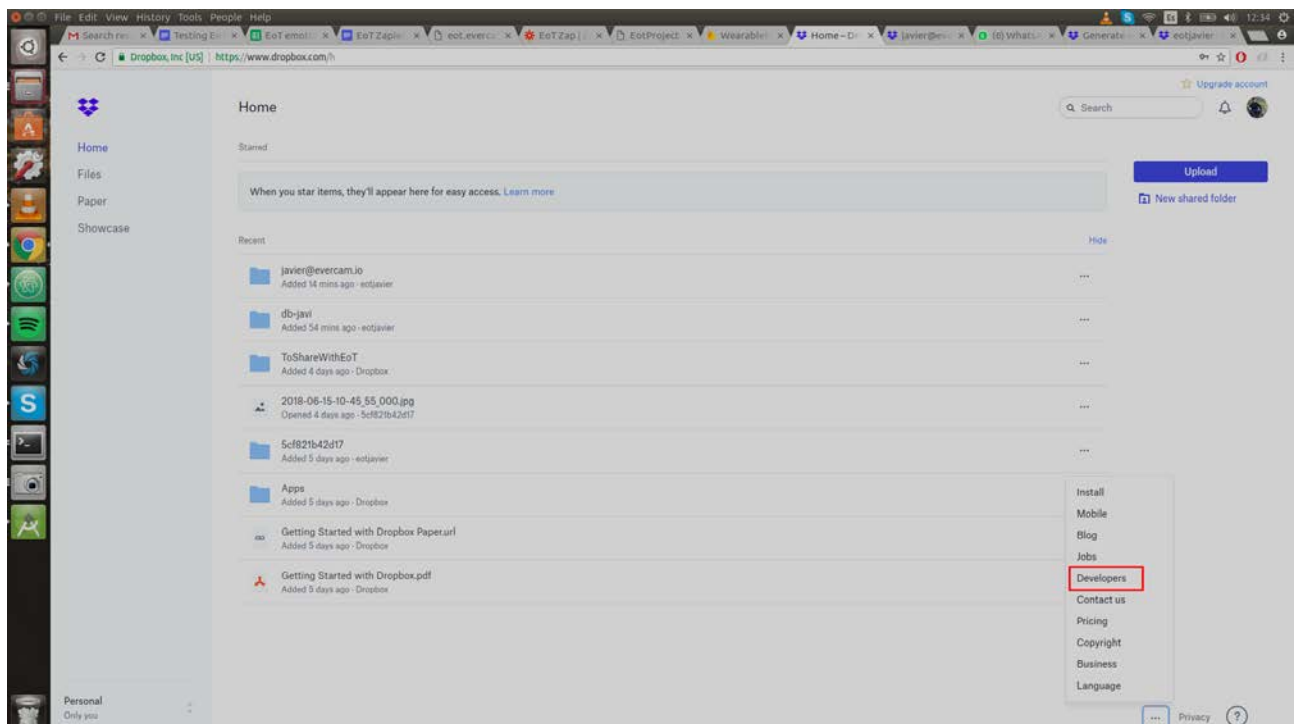
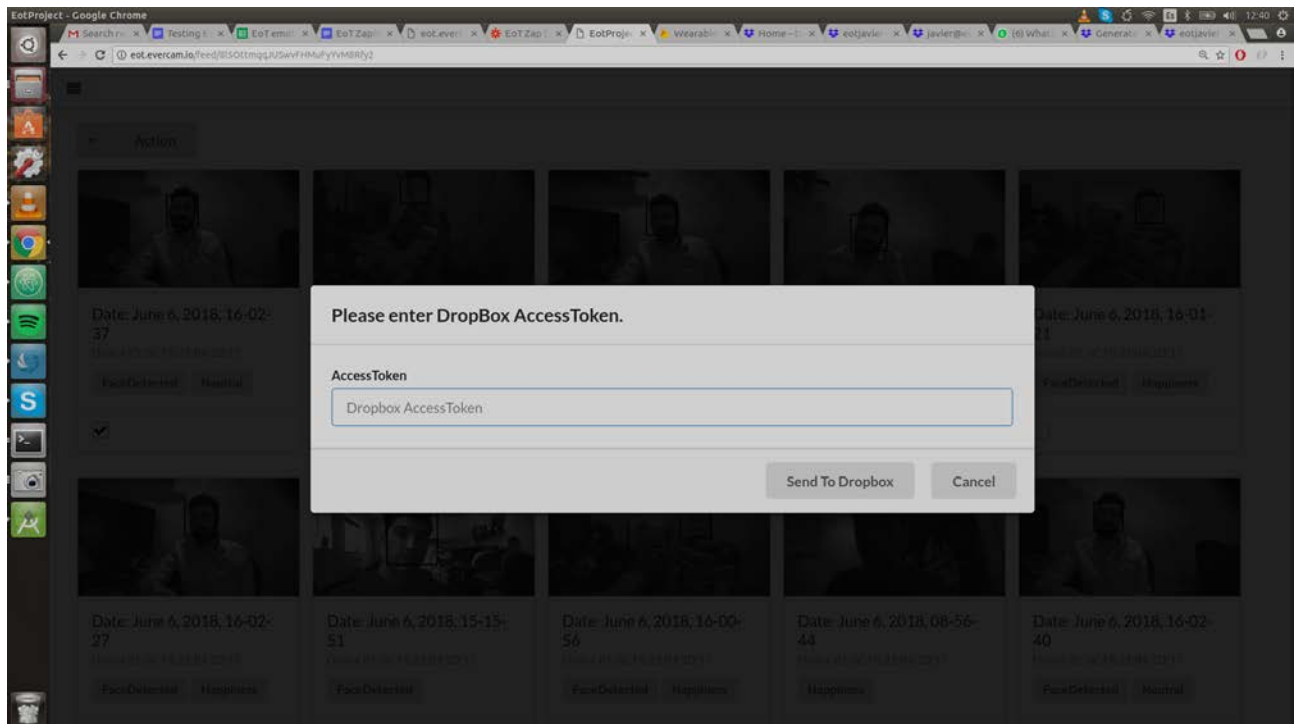
Here we can show our public images



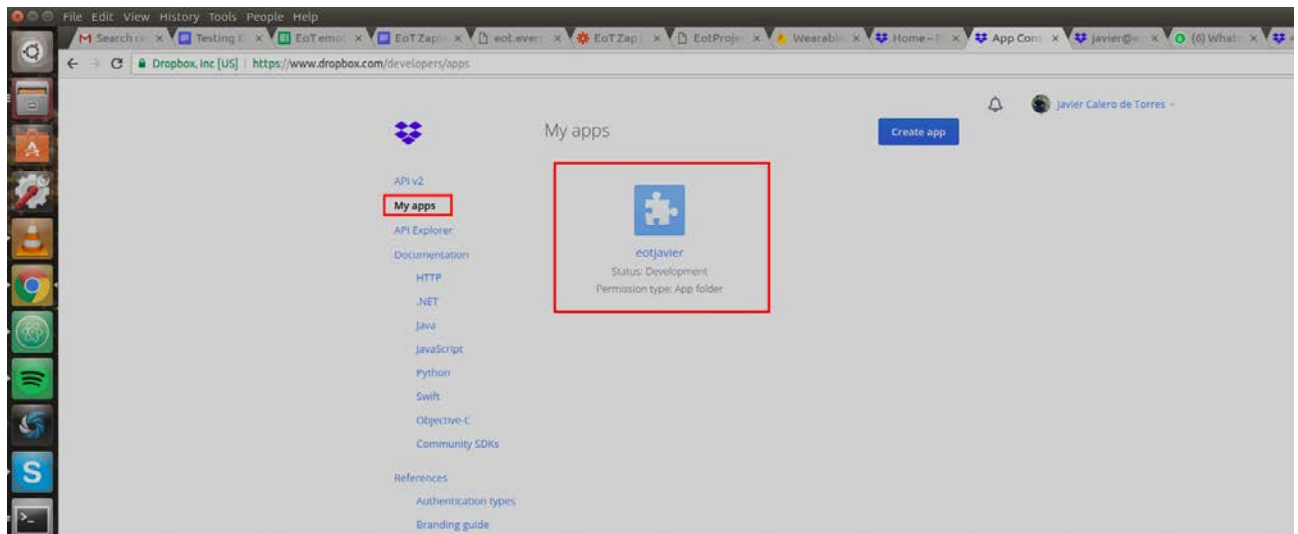
Now we are going to share that images. We have to select the images that we want to share and click on "Send to dropbox"



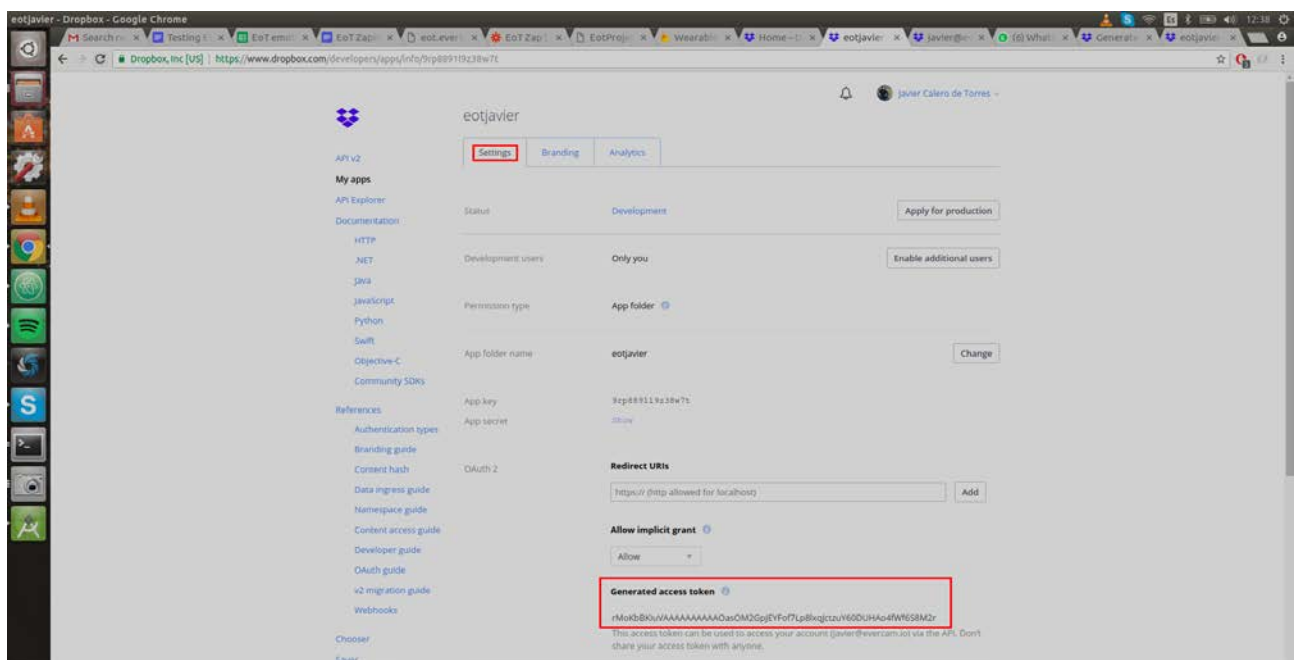
We are going to need the access token of our dropbox account. Login on dropbox and at bottom of the main screen, you have a menu where you have to select "Developers"

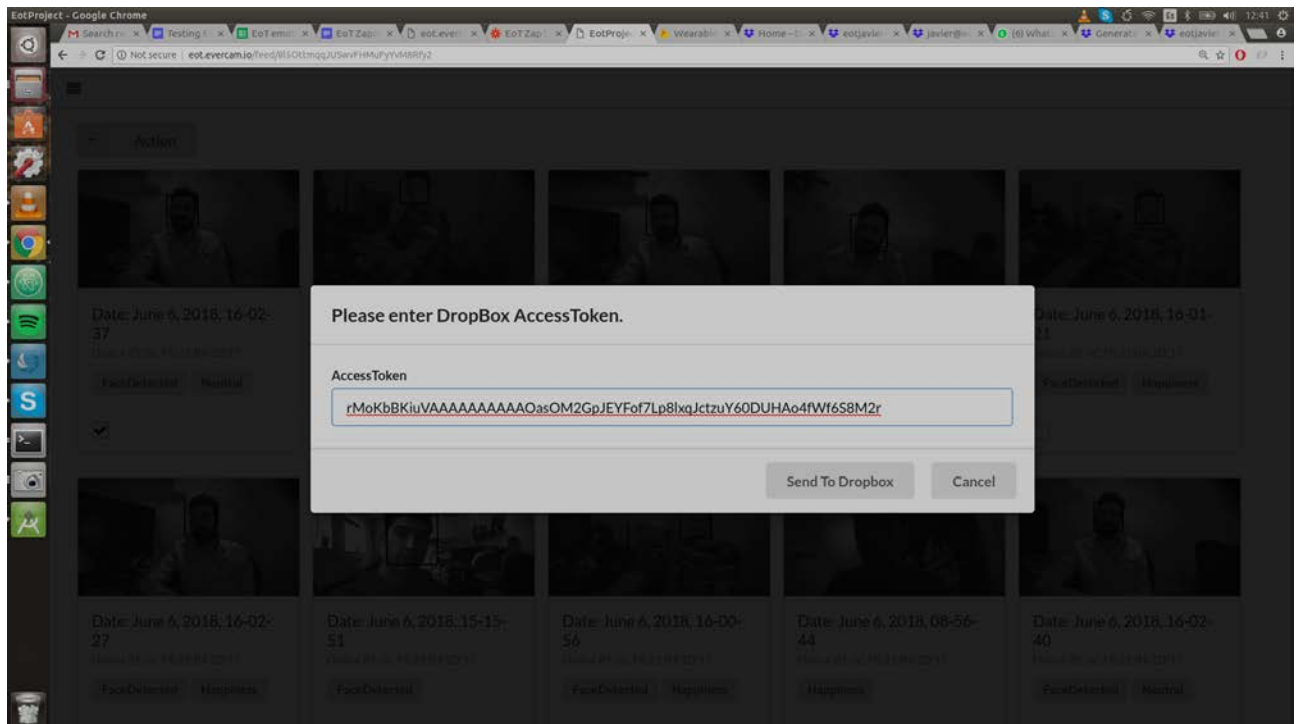


Select your app

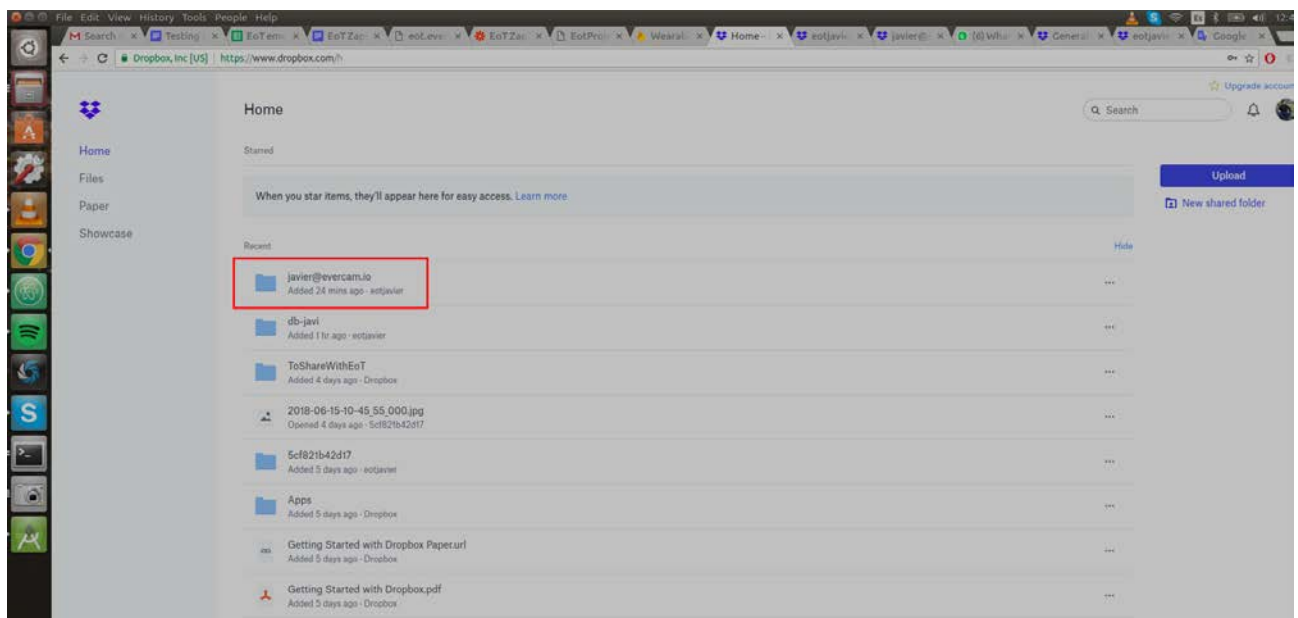


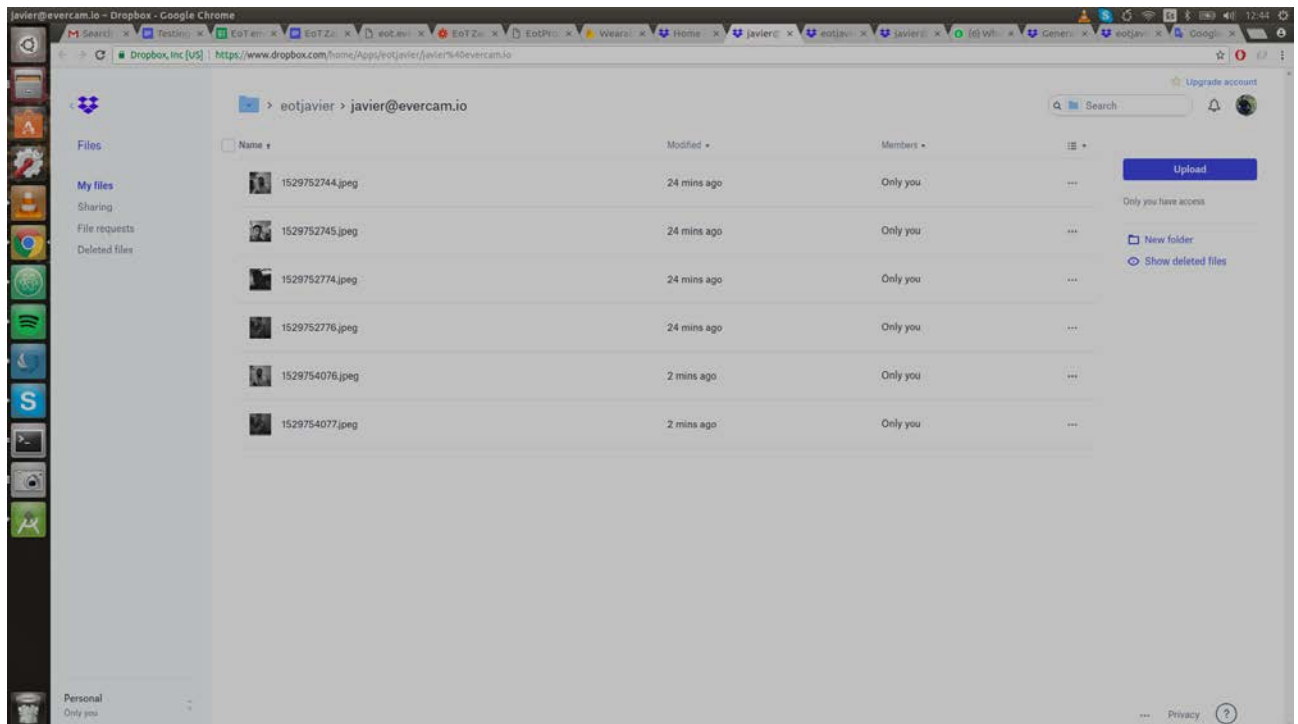
In the tag "Settings" you have your "Generated access token", copy it and paste in the EoT website.



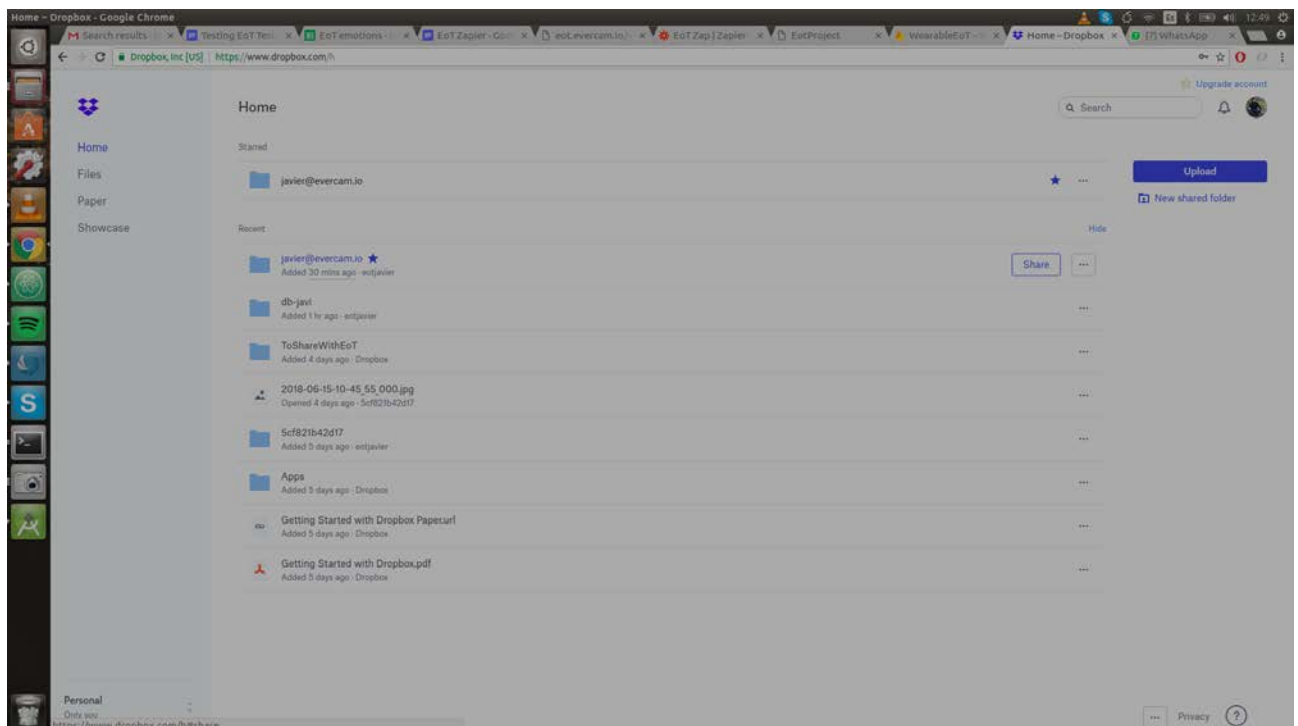


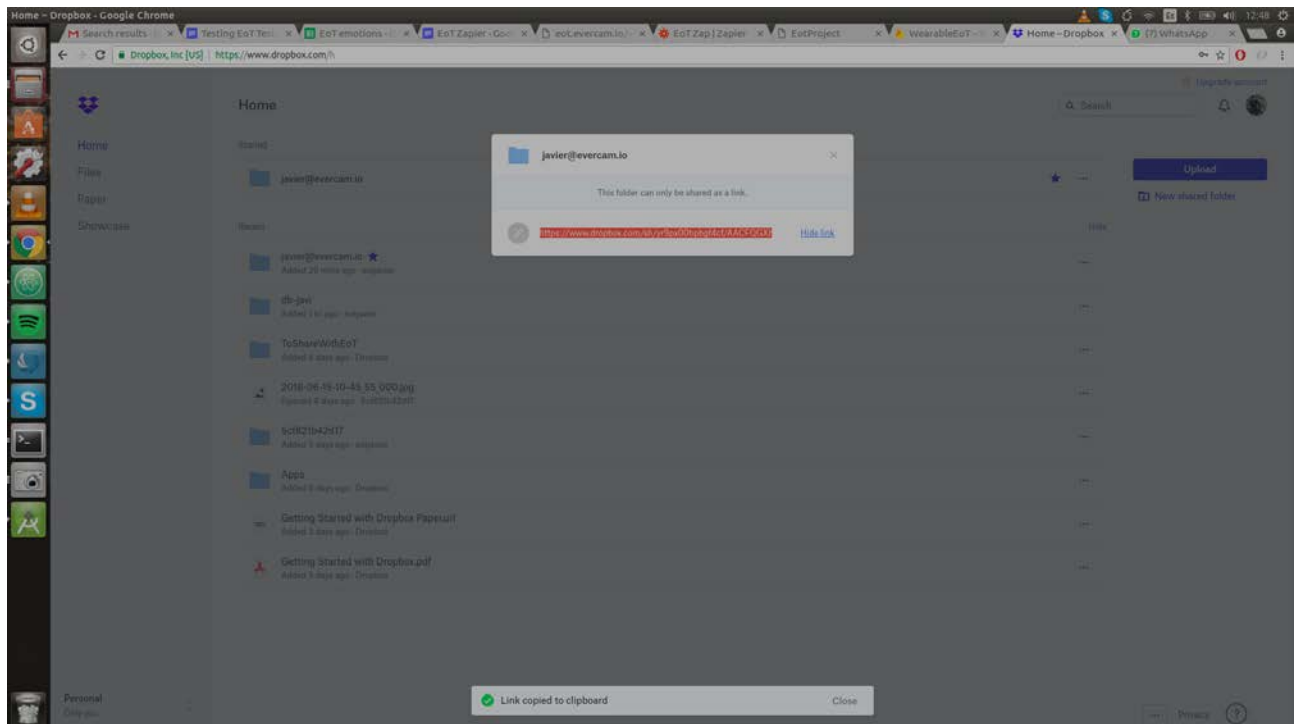
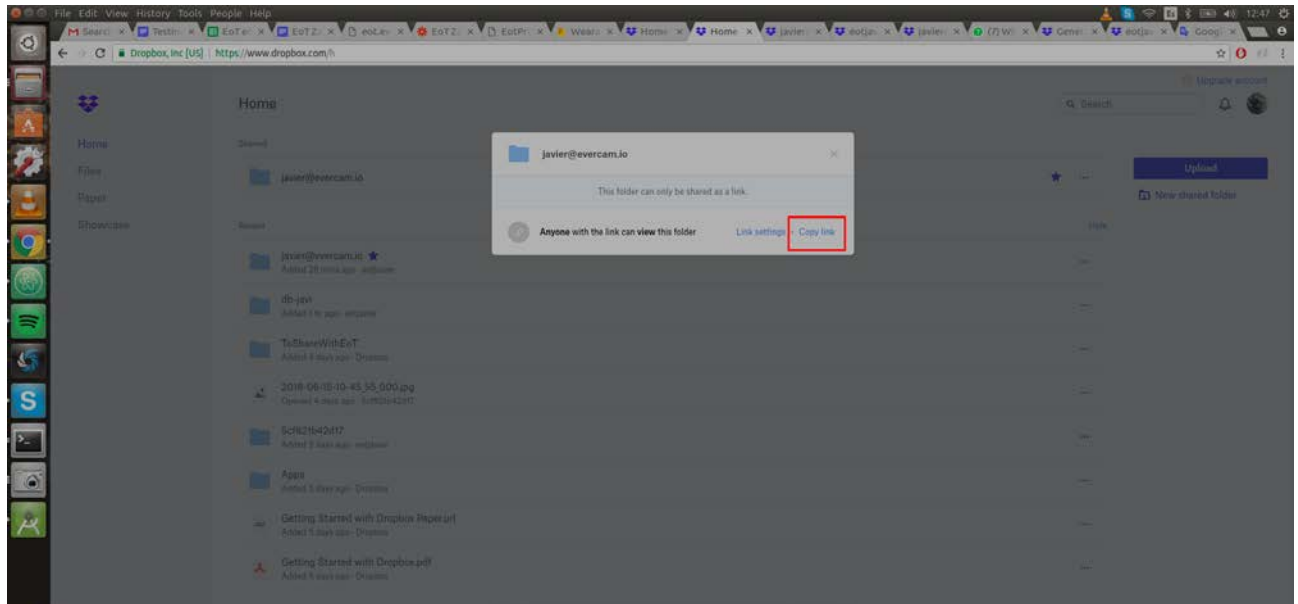
Automatically it is created a new folder in our dropbox account where we have our images.





Finally, we can share this folder with a friend if we click on the share button to the right of the folder and send the link generated with our friend





<https://www.dropbox.com/sh/yr9px00hpbgf4cf/AACFOGXhcu-KwMsioLyA7KjNa?dl=0>

7. PILOTS

1. Wearable: Lifelogger Cam

This Pilot is a complete run through of using the EoT device in the format of a Lifelogging Camera.

In our case we chose to do all of the tests in our office environment in order to satisfy the concerns of the Ethics Committee. In our office environment it was possible to receive informed consent from everyone who was photographed.



The Camera was worn as shown in the picture for the duration of one battery charge, between 5 and 7 hours of battery capturing images with the 2050 mAh battery. Of course, a more powerful battery would be better, like a 4000mAh battery (37x68x19mm) which would double battery time to 10-14h.

A selection of the images captured are shown below:





And we used the API Integrations to create an animation of the day's images. The animation can be seen uploaded here:

<https://www.youtube.com/watch?v=t-ViqGQNH0c>



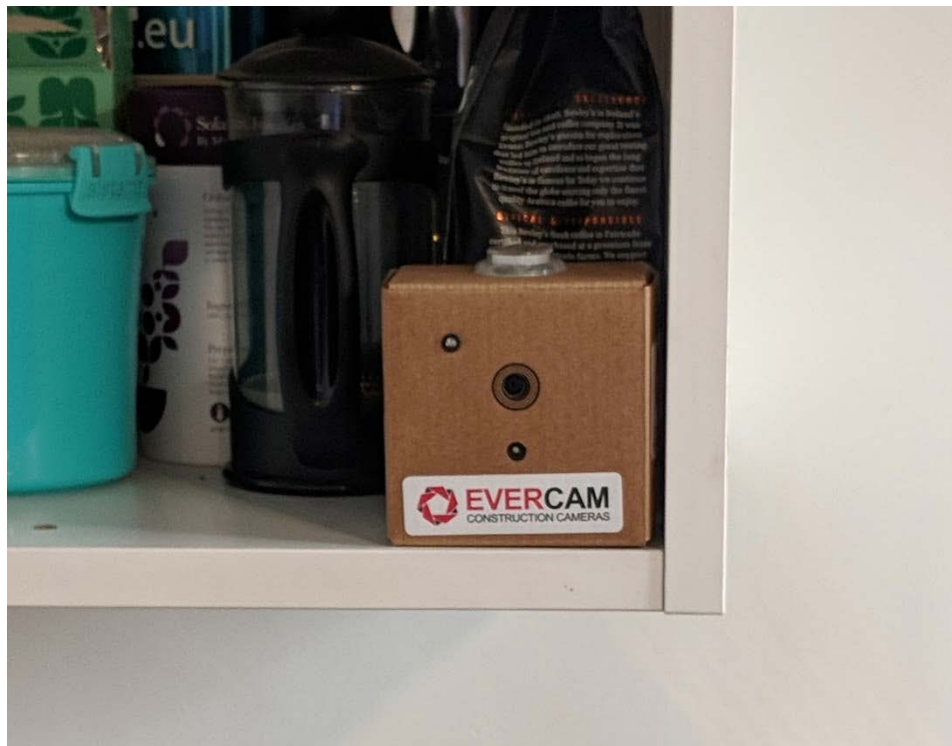
2. Portable: Office Activity Camera

For this Pilot we chose a different form factor for the box. In this case, it was an indoor environment, so we chose the light & easy form factor of a cardboard box.

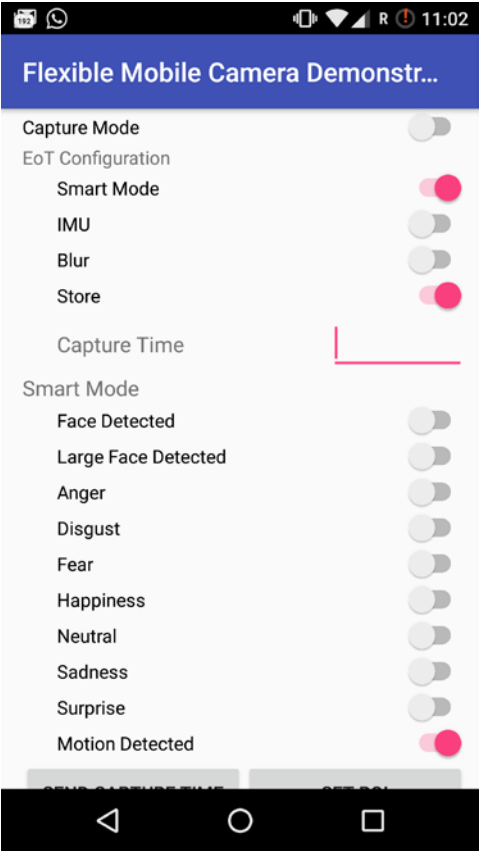
This box had room for our battery and also the addition of an illuminated button which could be used as an on off switch or as a notification.



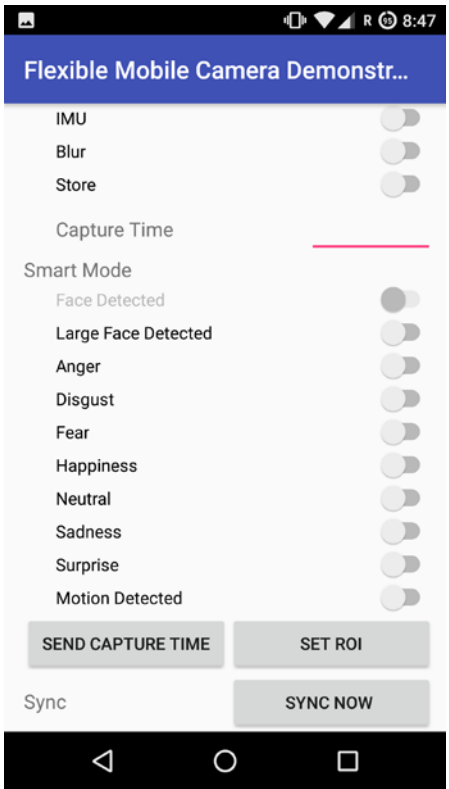
Indoor Portable Style EoT



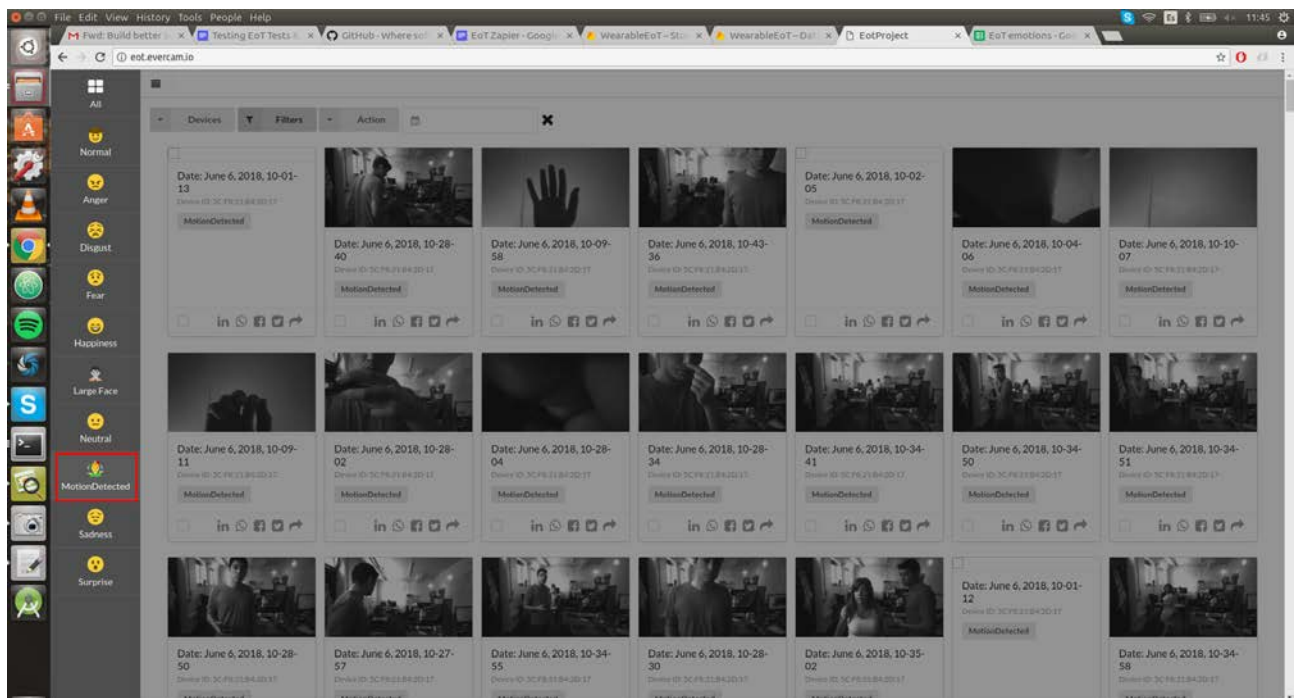
In the Android app, we are going to configure the device to capture images on motion detected



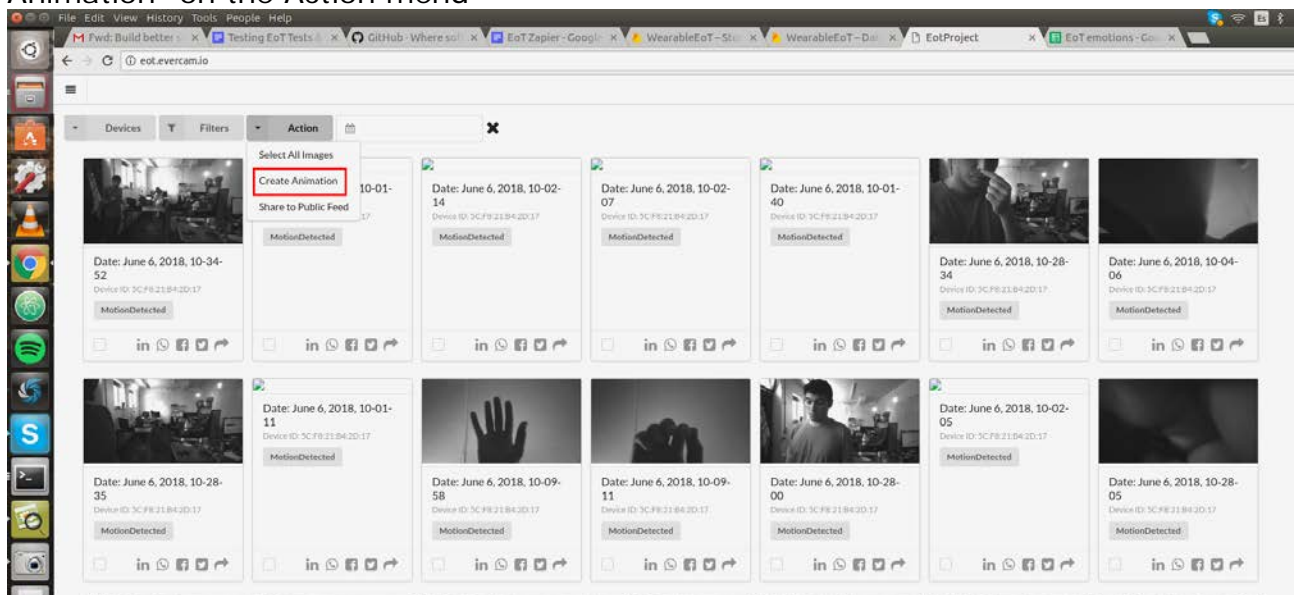
At the end of the day, we are going to sync up our device, to do this, we have to go to operating mode and select "Sync now"



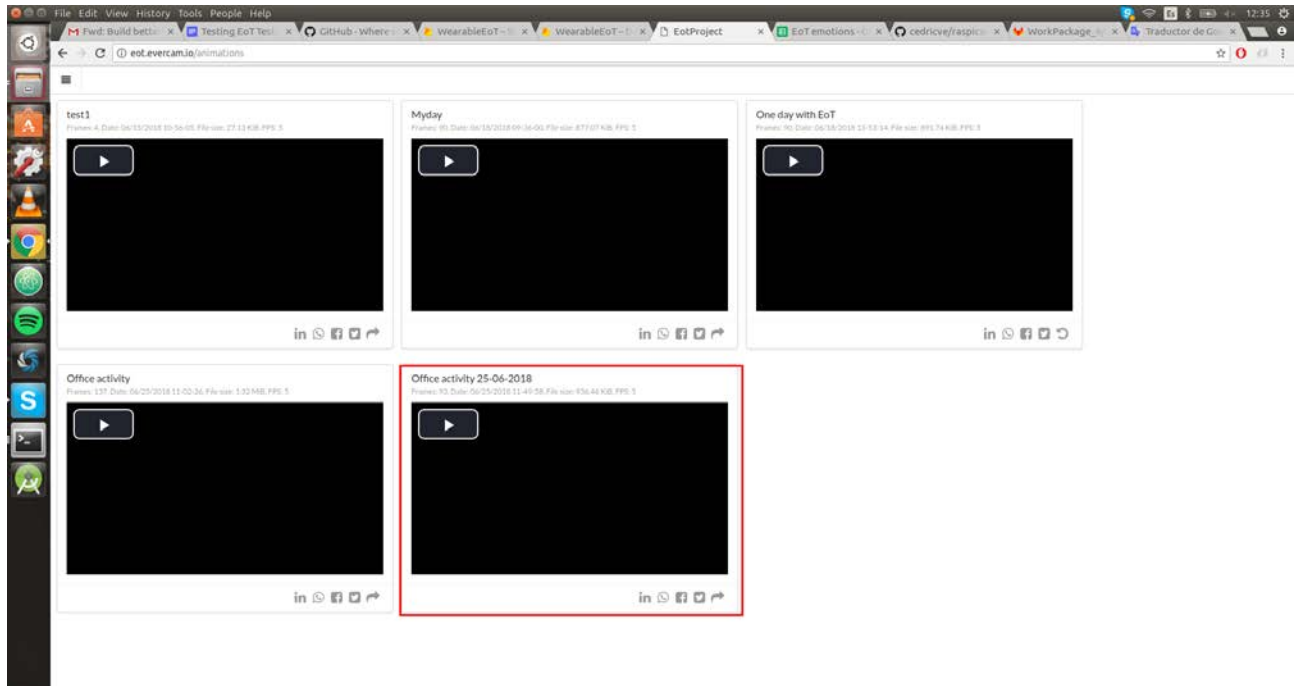
In the web app, we can apply the “Motion Detected” filter to select the images captured during our day



We can select the images captured and create an animation selecting “Create Animation” on the Action menu

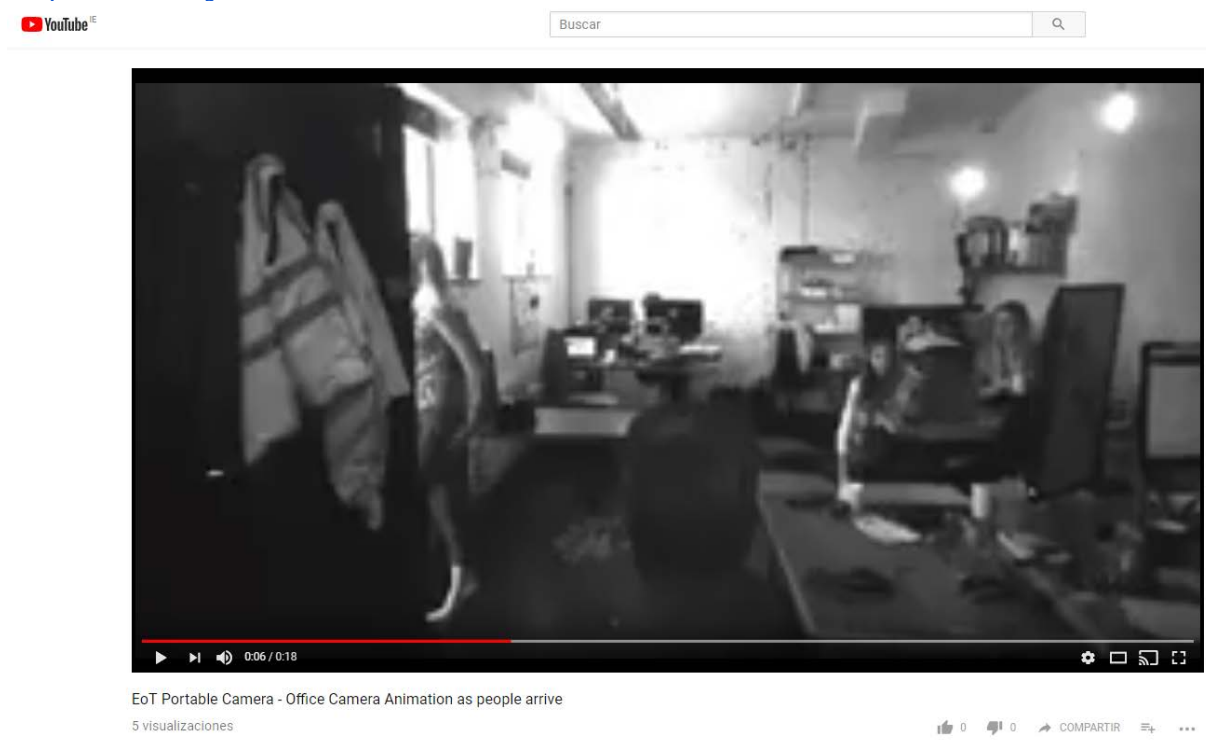


Now we move to the “Animation” section through the top left menu where we can see our new animation of our day in the office



As we can see in the next video, we are created a time-lapse of the activity of our day. The device has detected every movement during the day, taking a picture when it happens and sharing the image with the EoT webapp. Here is the link to the video on YouTube:

<https://www.youtube.com/watch?v=4Mi2oKUrfTk>



The camera was located at one end of the office with a clear view of the room and pre-configured to take snapshots at an interval of 10 seconds.

At the end of the recording period we created the animation and used the Zapier API to create a Count of the different moods in the office into Google Sheets.

3. The Litterbug - Outdoor Camera

During the EoT development period, it became clear to the Evercam team that there was a strong case for a battery powered camera to detect littering. Furthermore, this camera could make use of some of the privacy by design features of the EoT to NOT capture faces / people, but rather to just trigger an alarm if littering was detected in order to deter the person.

We decided to include this as an EoT scenario because it used the same functionality as provided by EoT Portable Camera with some small changes.

In this case, we chose the outdoor form factor which is waterproof and had a clear lens cover and rubber buttons. There is also a waterproof cap for the USB adapter if required. We were able to use the case from a Brinno Timelapse Camera which is a very suitable variant.

We positioned the camera in an area where we expected littering events to take place.

Test 1 was carried out by the UCLM team (see video below)

https://www.youtube.com/watch?v=F_cWe7hjBEk



Test 2 was carried out by the Evercam Team (see video below)

<https://www.youtube.com/watch?v=8nOeJkJSI78>



In both cases, the littering was successfully detected.

Audio alarm was never implemented, but this would be a trivial addition to the hardware.

The Outdoor Assembly:



Positioned outdoors, ready for detections:



8. EXTERNAL URLS

During testing we created some content that could not be included in this document. For further reference, URLs are included below.

Photo Feed: <https://photos.app.goo.gl/7BAd1oa2UNuyitgM6>

This is a more complete set of photos of the testing.

Youtube URLs for various videos made during testing:

Youtube (Litter detection 1): <https://www.youtube.com/watch?v=8nOeJkJSI78>

Youtube (Litter detection 2): https://www.youtube.com/watch?v=F_cWe7hjBEk

Youtube (Office Camera Pilot): <https://www.youtube.com/watch?v=4Mi2oKUrfTk>

Youtube (Wearable Camera Pilot): <https://www.youtube.com/watch?v=t-ViqGQNH0c>

GitLab Code for Litterbug Project:

https://gitlab.com/espiaran/EoT/tree/master/WorkPackage_4/Lifeloggging_Camera/myriad/litterbug_myriad

9. CONCLUSIONS

In conclusion, the EoT device performed as expected and as originally envisioned.

As has been explained in other sections of this report, Evercam was keen to use the EoT hardware beyond the original scope of just a wearable camera as we felt it had much more to offer, in scenarios such as Litter Detection.

We also think this decision was vindicated. While the device worked as expected in the lifelogging scenario and in the office monitoring scenario, we feel that the likelihood of being able to commercialise such a product would be limited.

Image Quality: In the scenarios tested, the image quality was mediocre, equivalent perhaps to a VGA CCTV camera. For the wearable & portable scenarios, most use cases will involve wanting to see the actual images. In this case, one would want a better camera / lens quality.

One of the great advantages of EoT in the Litter Detection scenario is that because our long-term goal is to trigger audio alarms rather than actually recording video evidence, the quality of the images does not need to be high, hence the standard camera provided is a good fit.

Enclosures: In all three scenarios, we were happy with the prototype enclosures used, but naturally in a real scenario they could be improved.

Battery Life: For the Portable Camera and the Litter Detection Camera we would add more battery power to extend life from about 5hrs to several days.

- End of document -