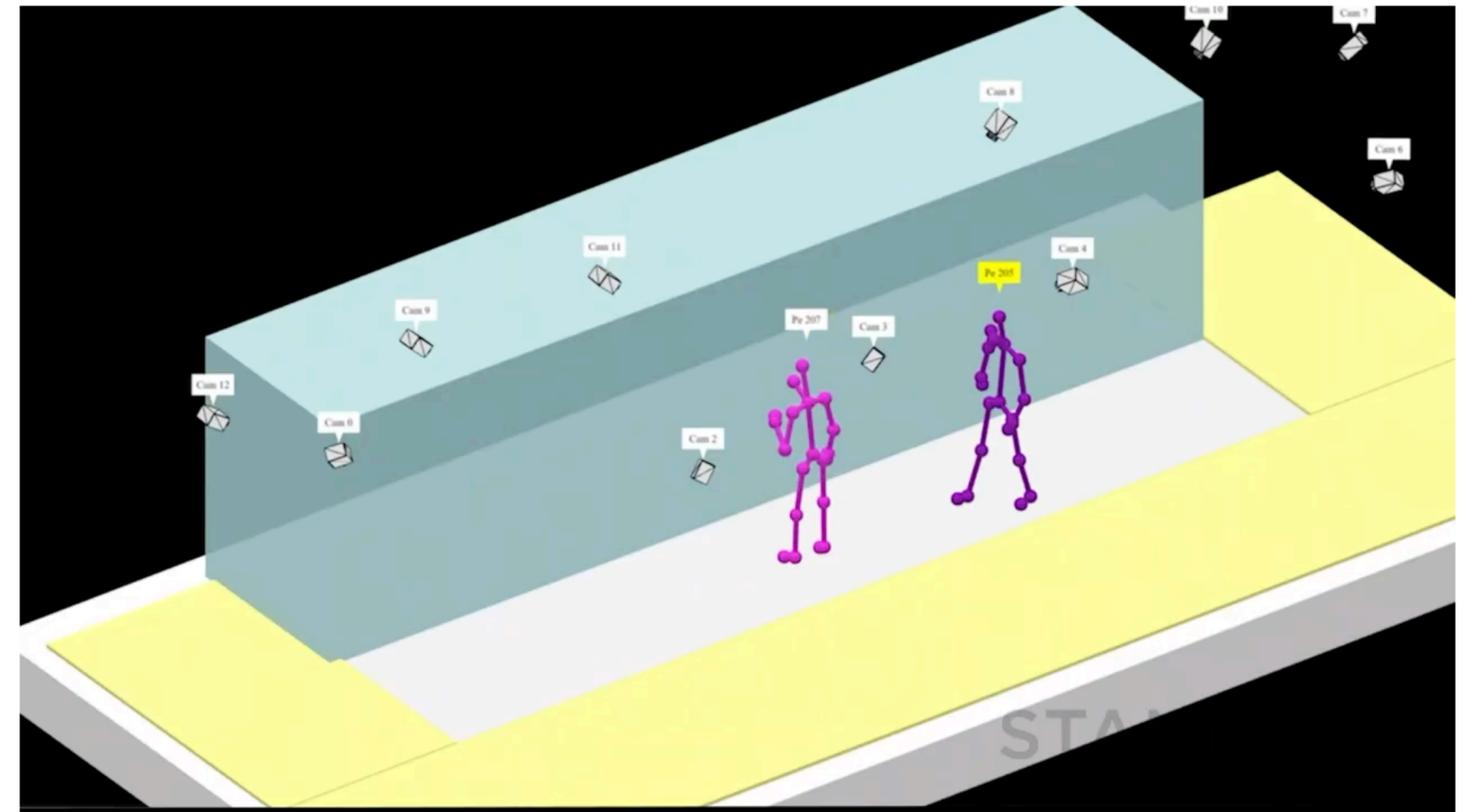
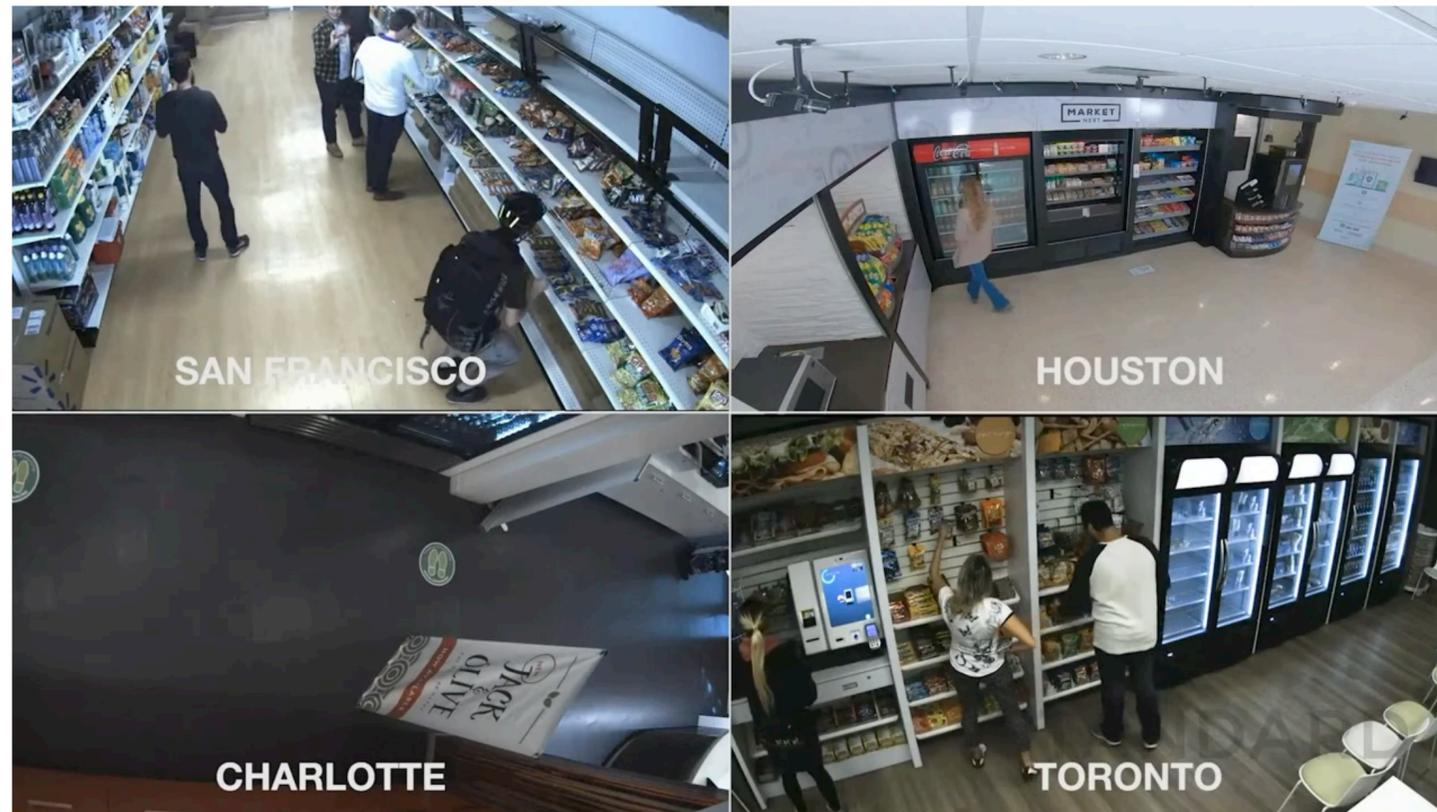


# Обработка и проверка данных для компьютерного зрения в офисах продаж МТС по всей России

Кирилл Овчинников, 2021

# Машинное зрение в продажах



# Аналитика в салонах



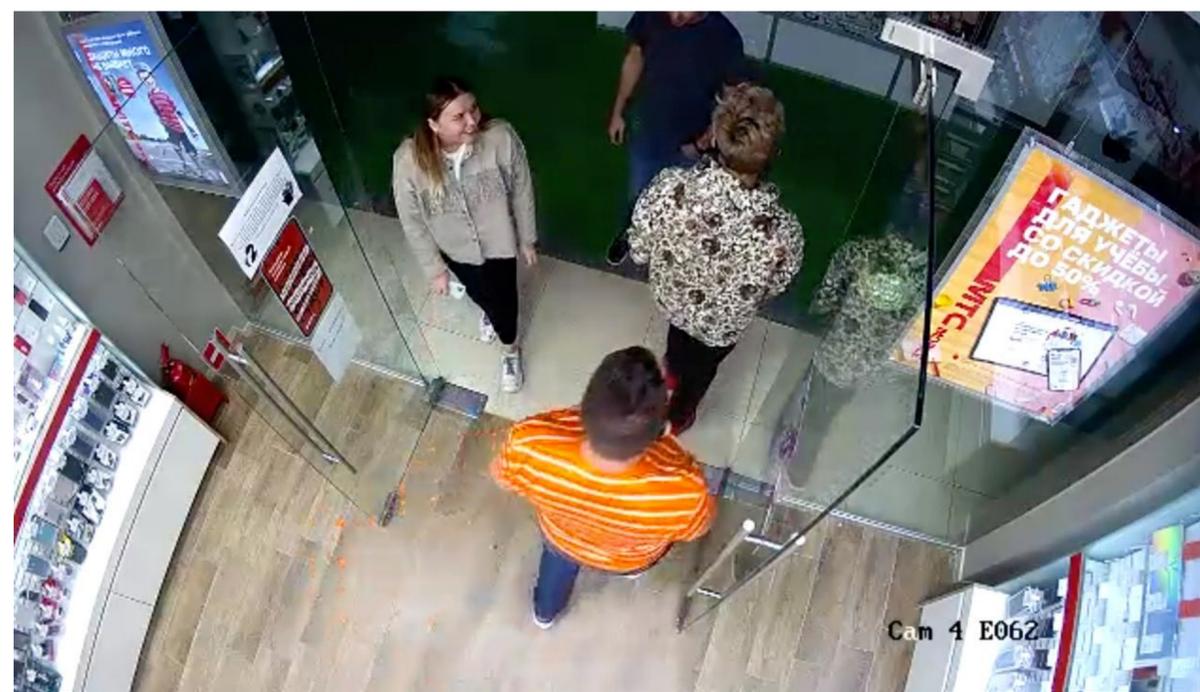
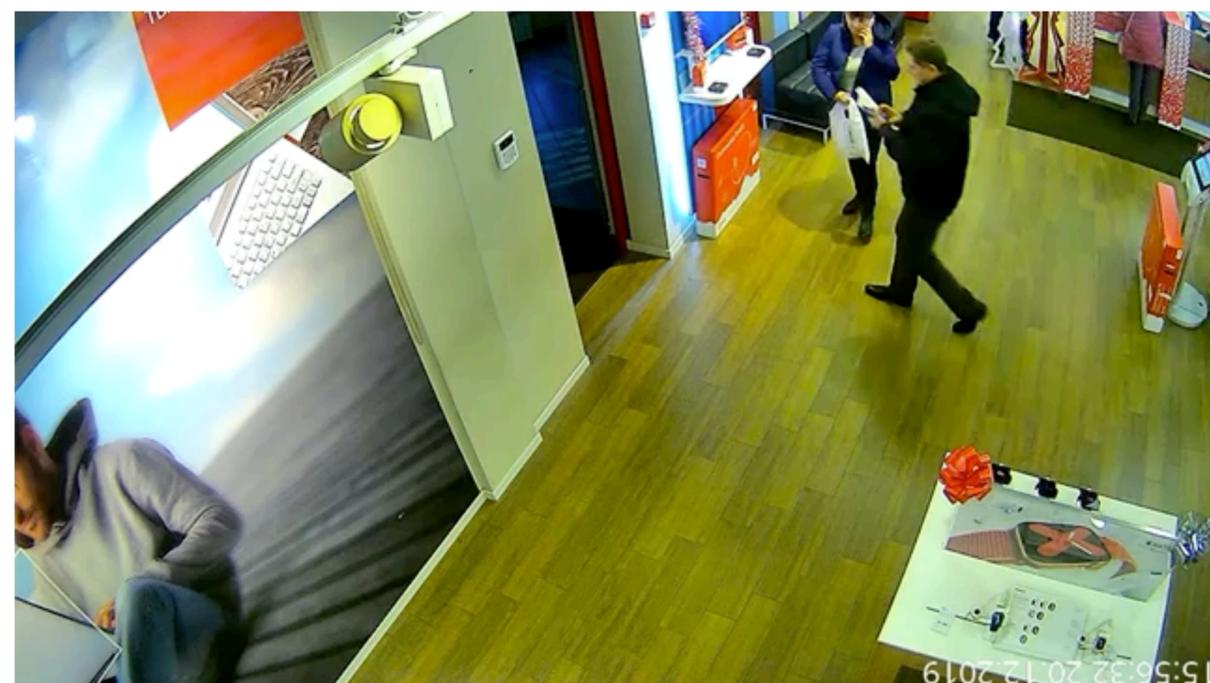
У ? У



# Аналитика в салонах



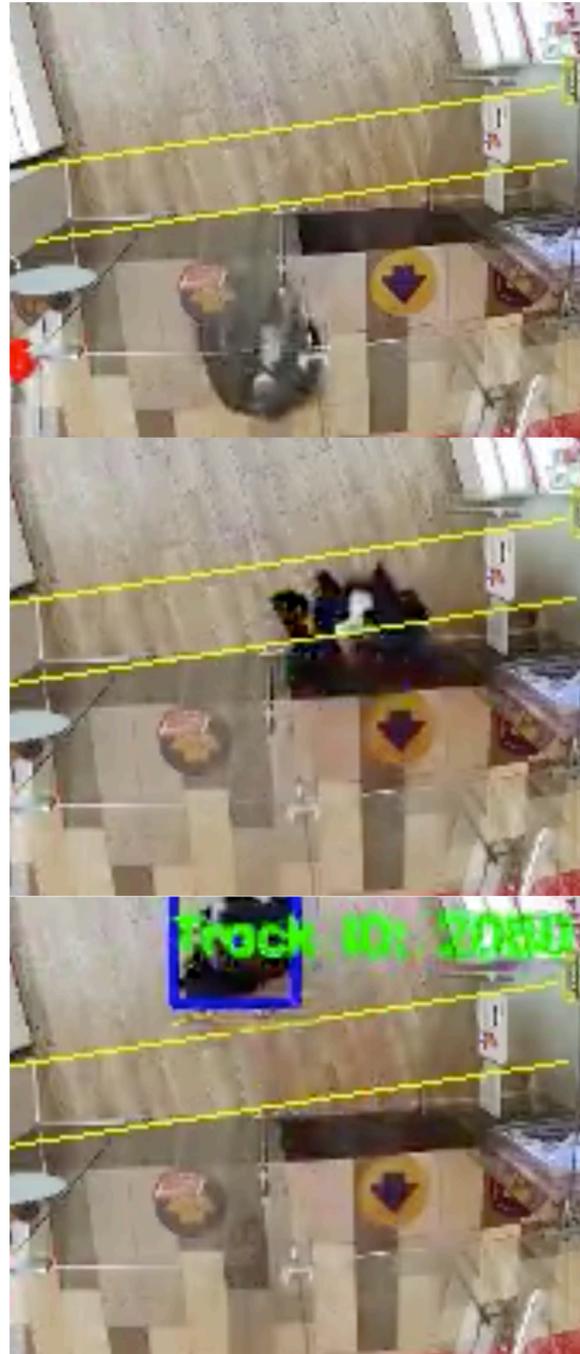
# Аналитика в салонах



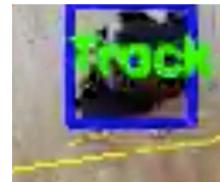
**Этап**

**RND**

# Задача

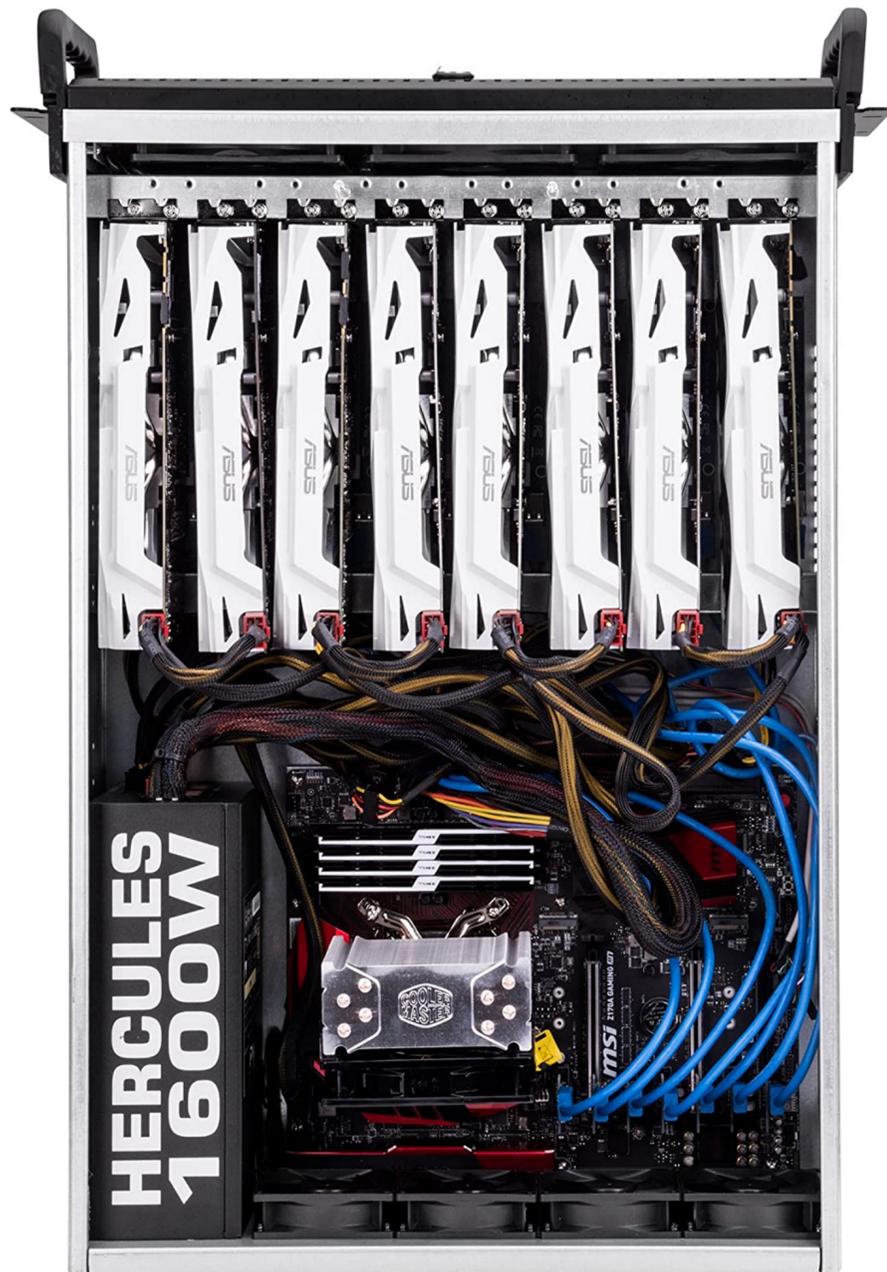


Кадры

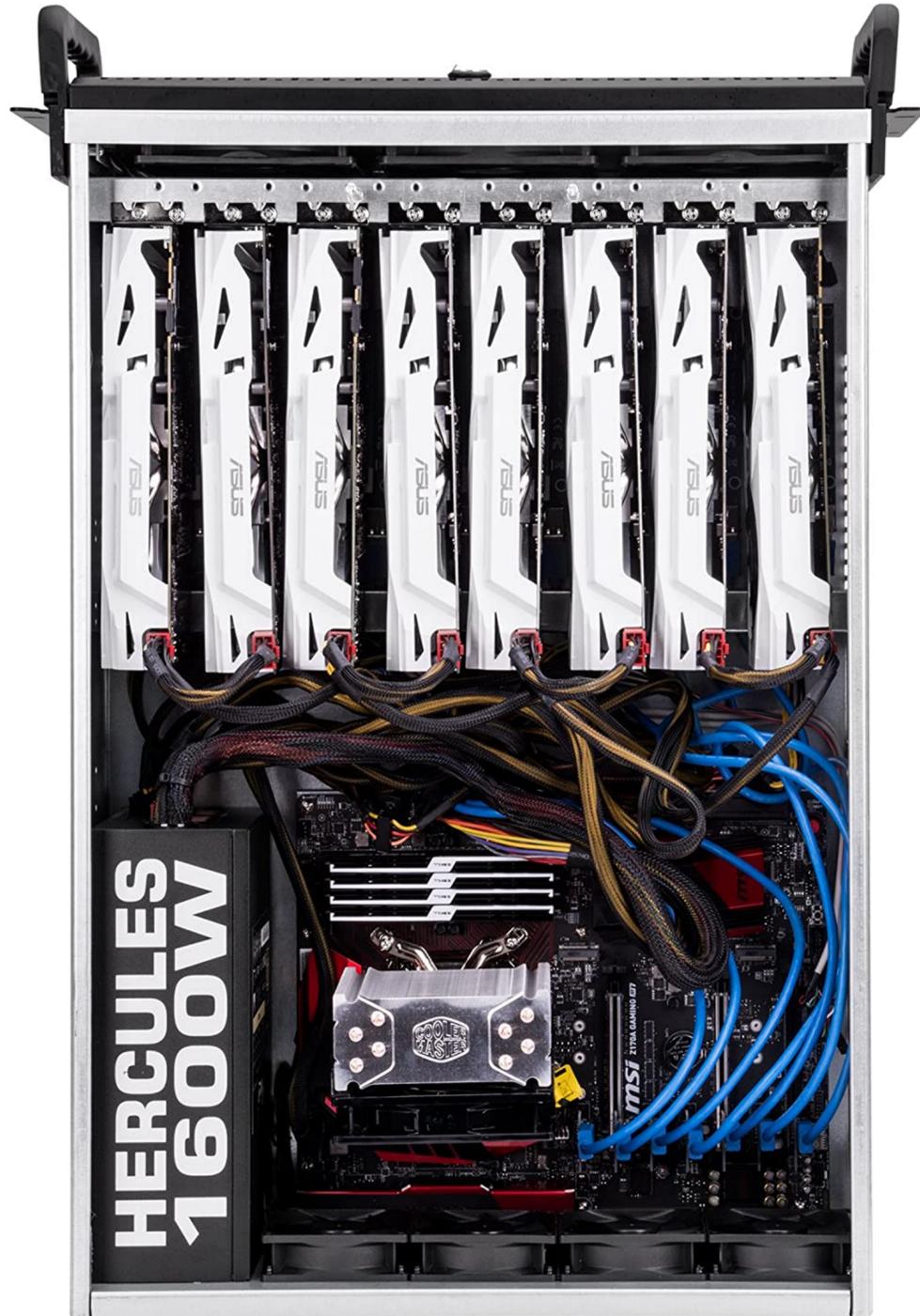


Посетитель зашел

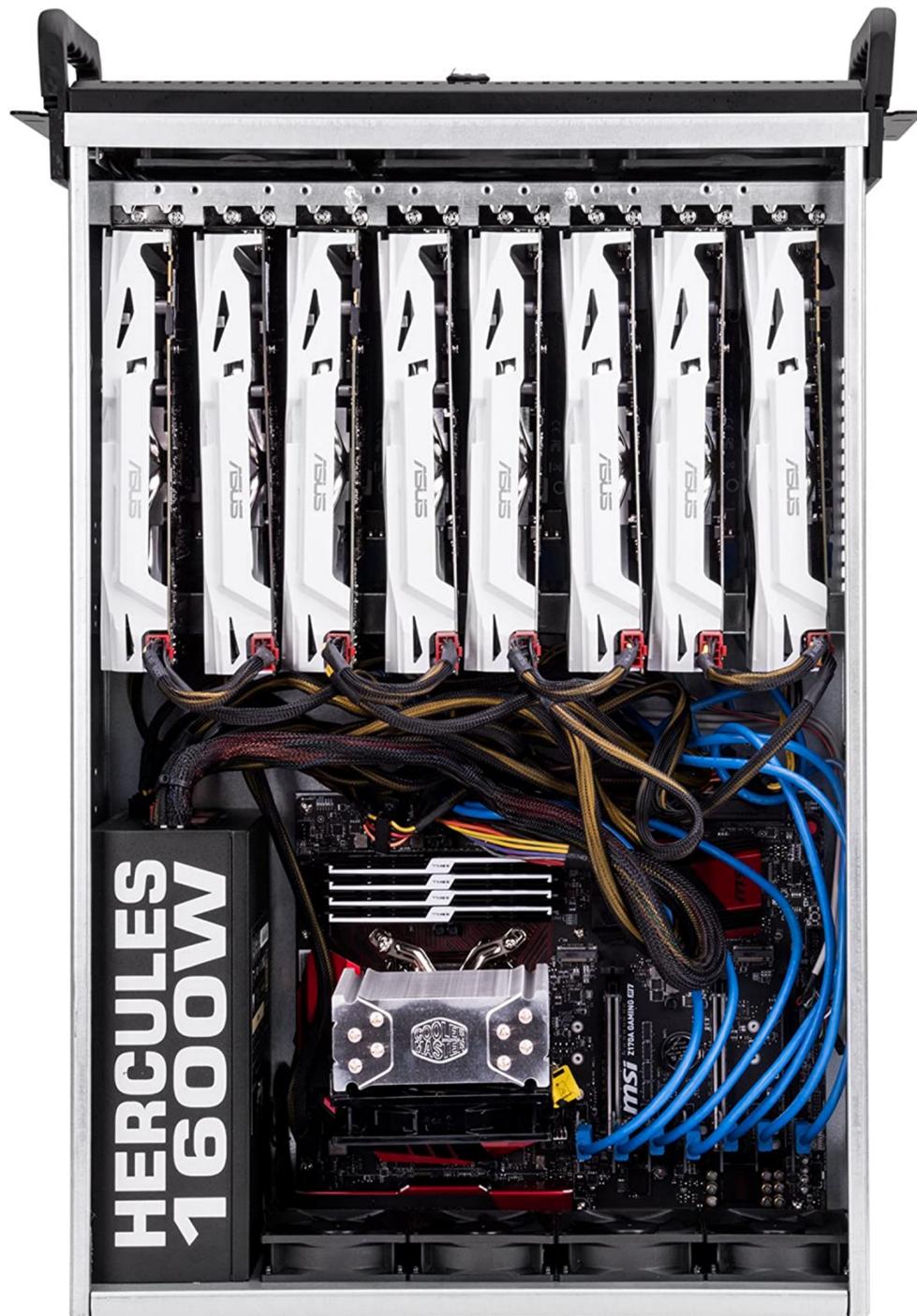
# Варианты решения



# Серверное решение



# Серверное решение

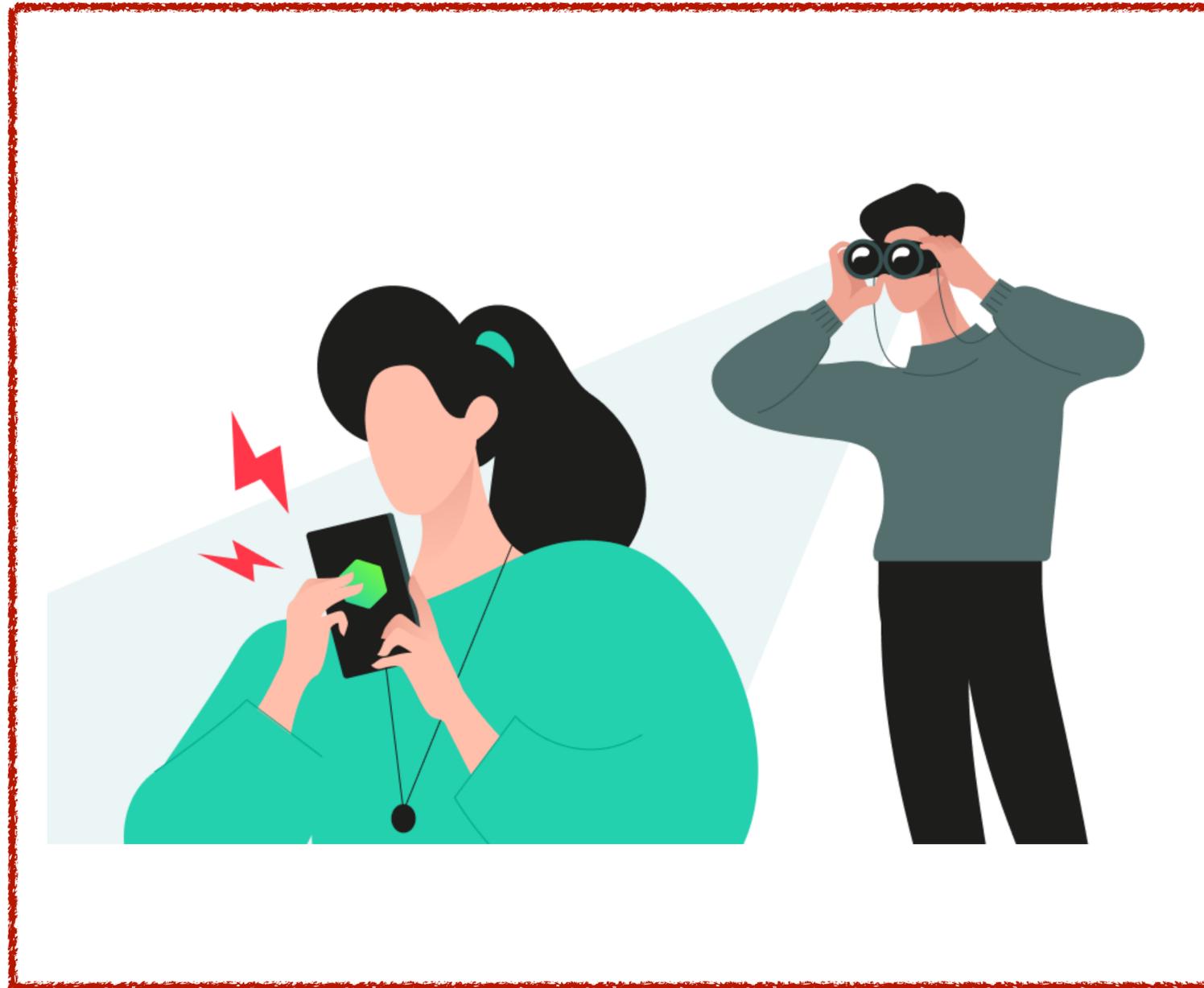


# Серверное решение

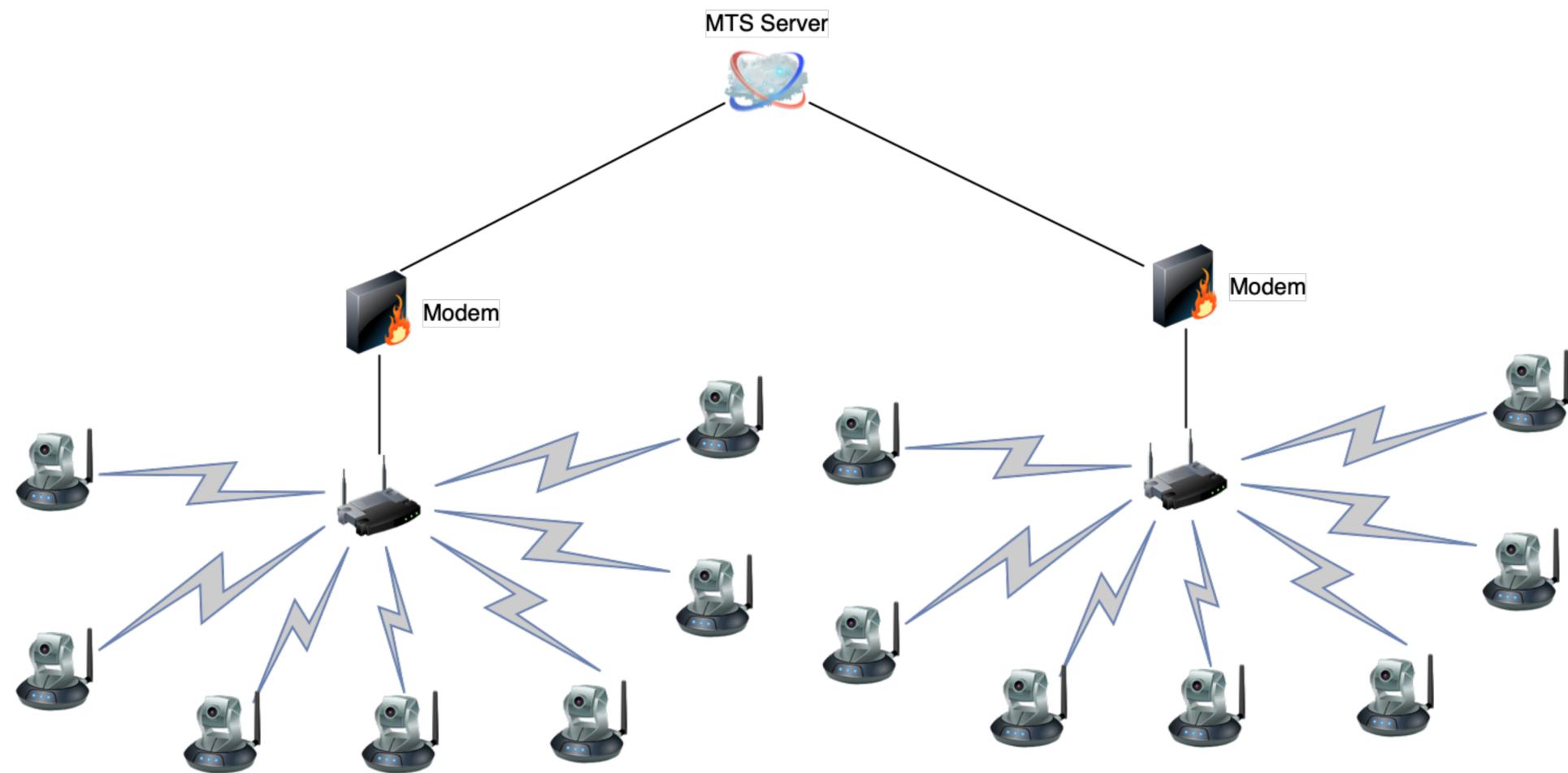
Запуск 1 детектора в 500 точках =

**4 000 000 ₺/год**

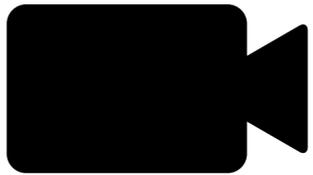
# Приватность



# Локальное решение

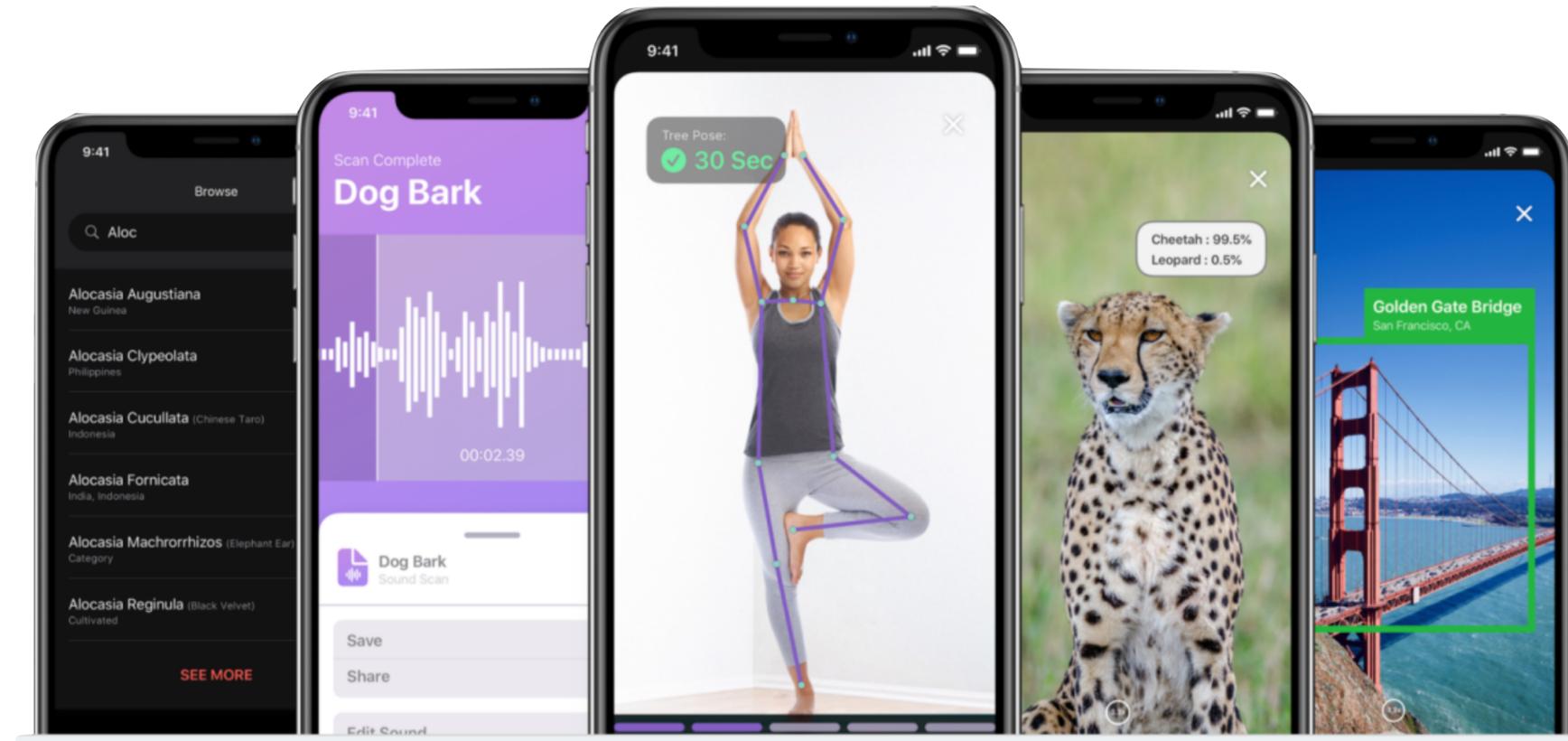


# Локальное решение

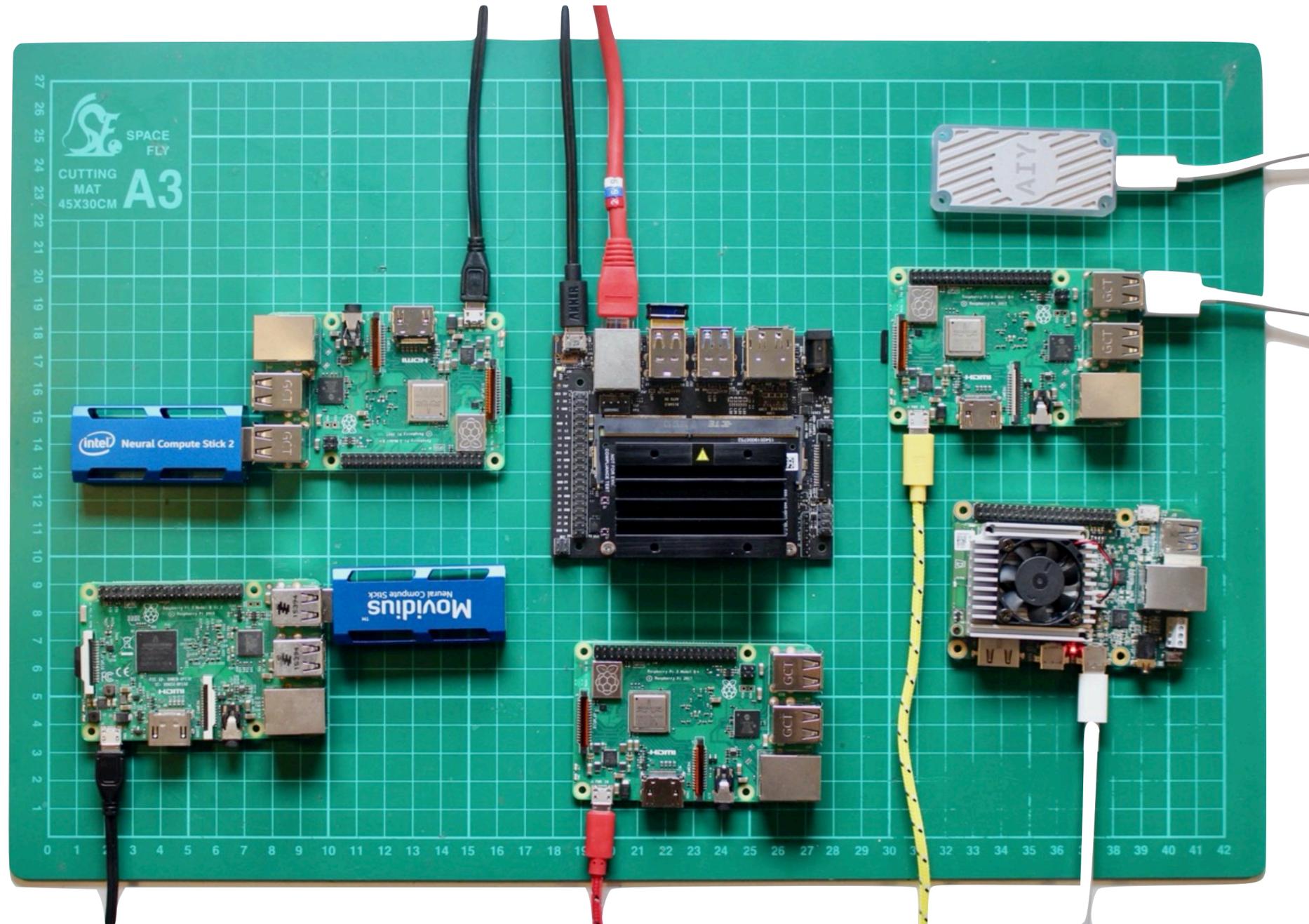
1  =

160 Гб/месяц

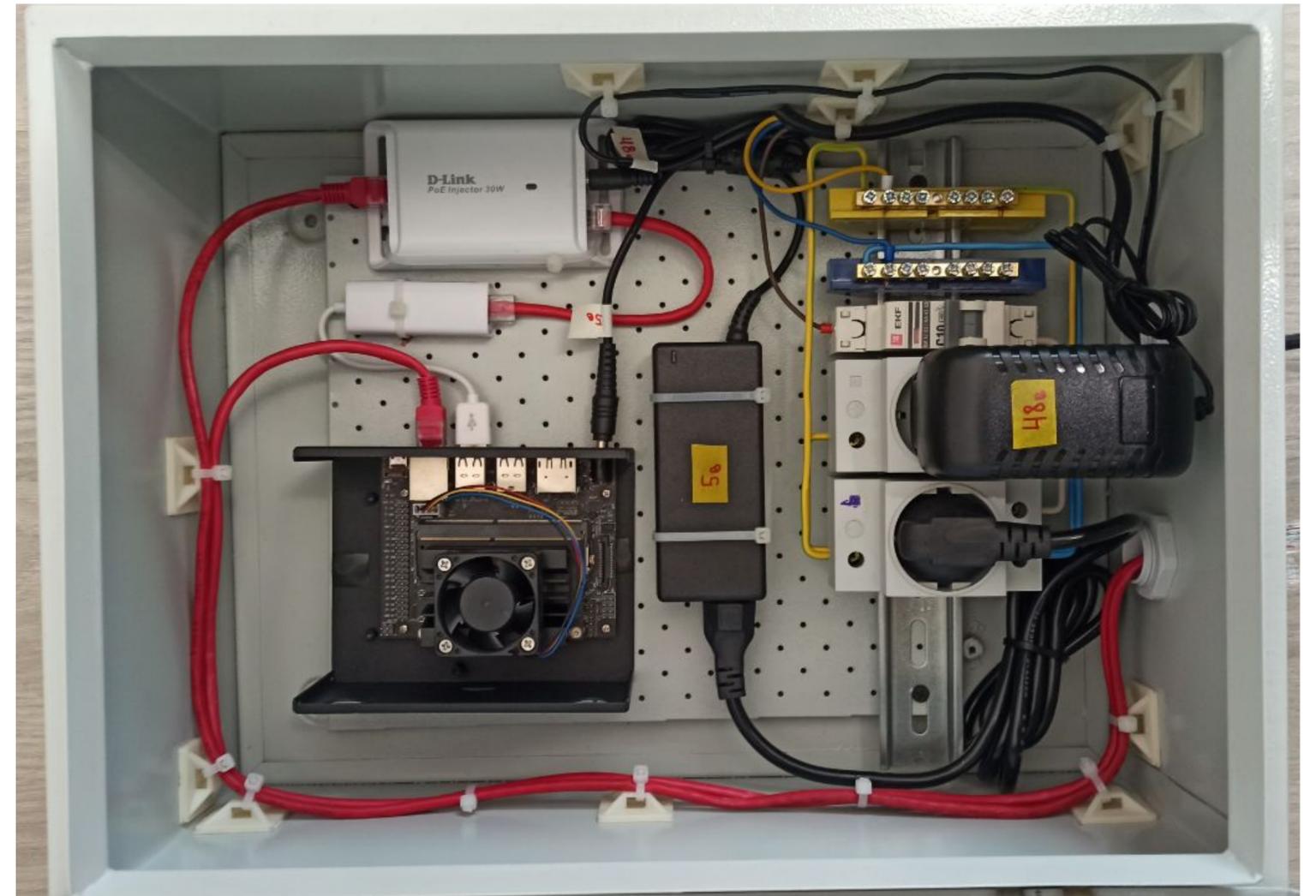
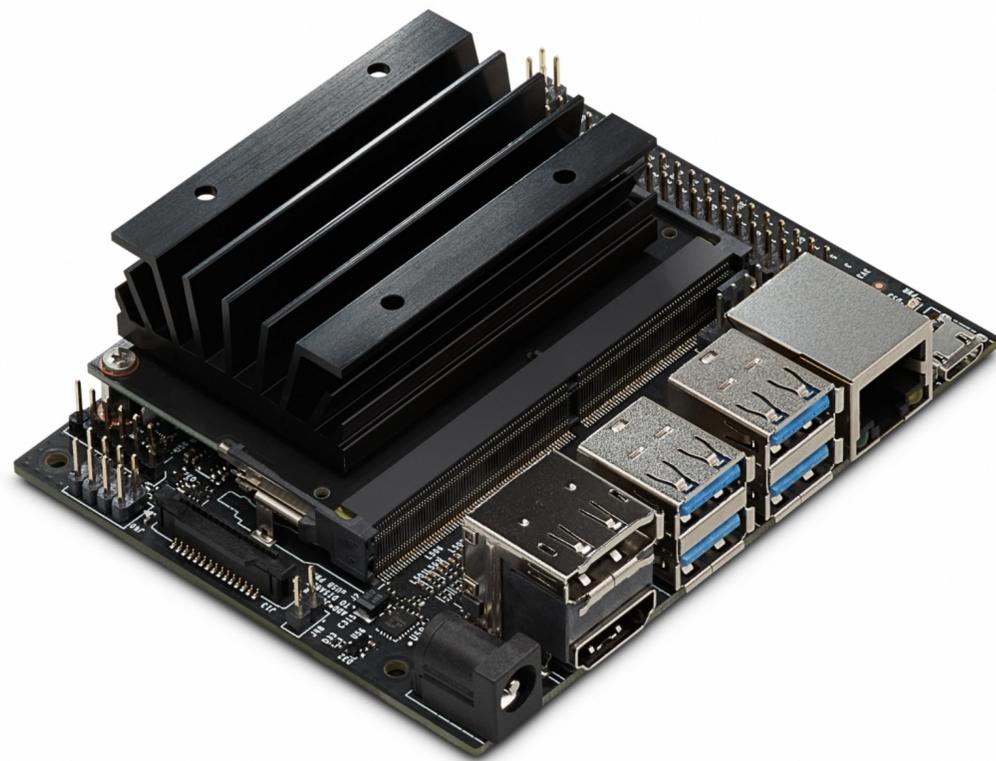
# SBC решение



# SBC решение



# SBC решение



# Различные варианты SBC



NVIDIA Jetson Nano

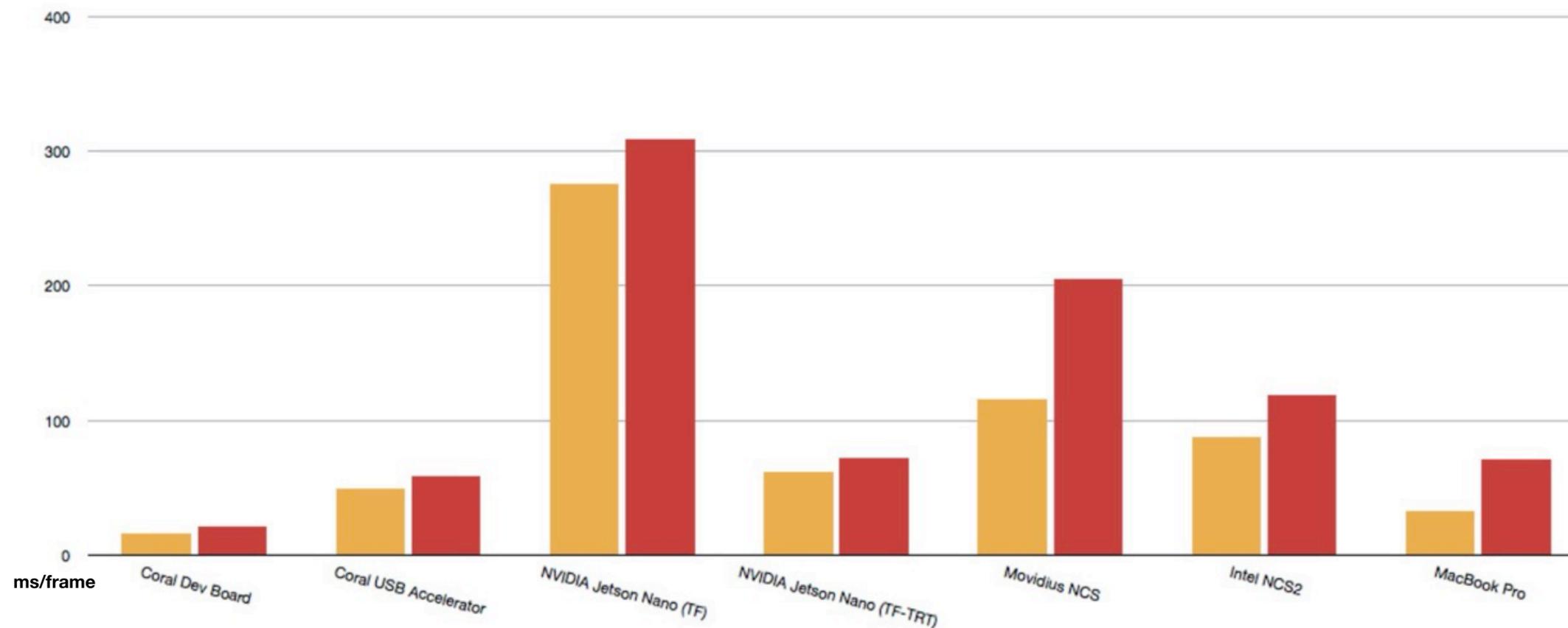


Google Coral Edge TPU



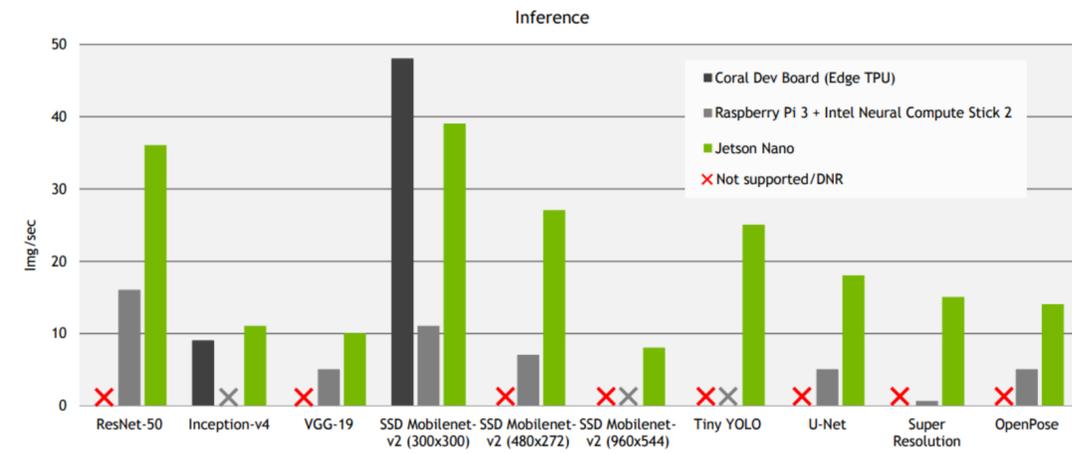
Raspberry Pi  
Intel Neural Compute Stick 2

# Различные варианты SBC



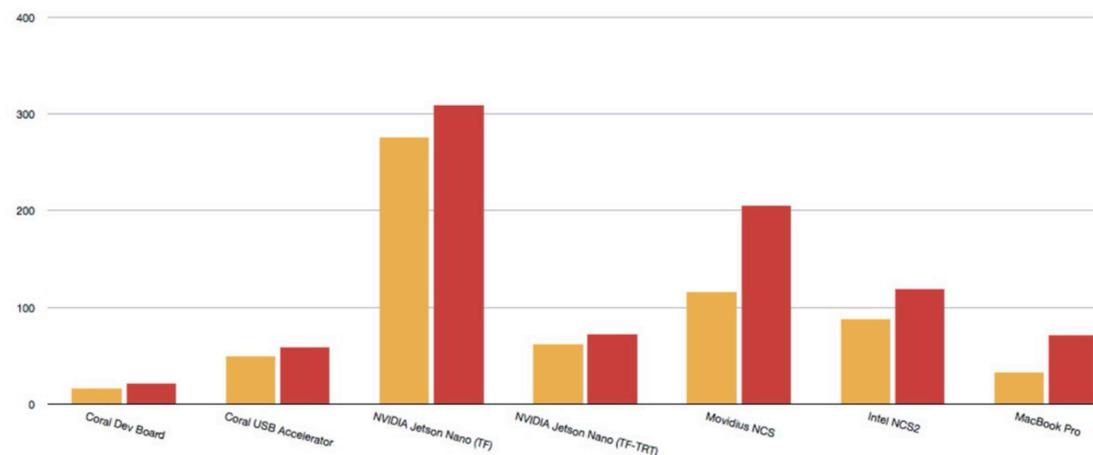
Benchmarking results with the outlying results from the unaccelerated Raspberry Pi removed showing the relative speeds for MobileNet SSD V1 with 0.75 depth (orange) and MobileNet SSD V2 (red) across platforms.

# Различные варианты SBC

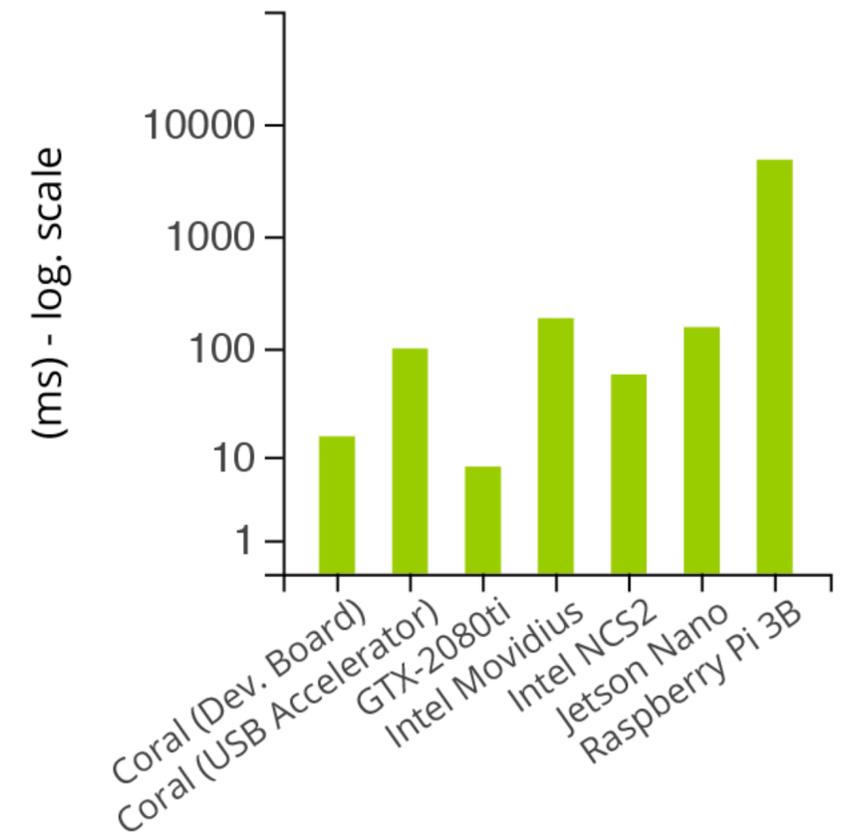
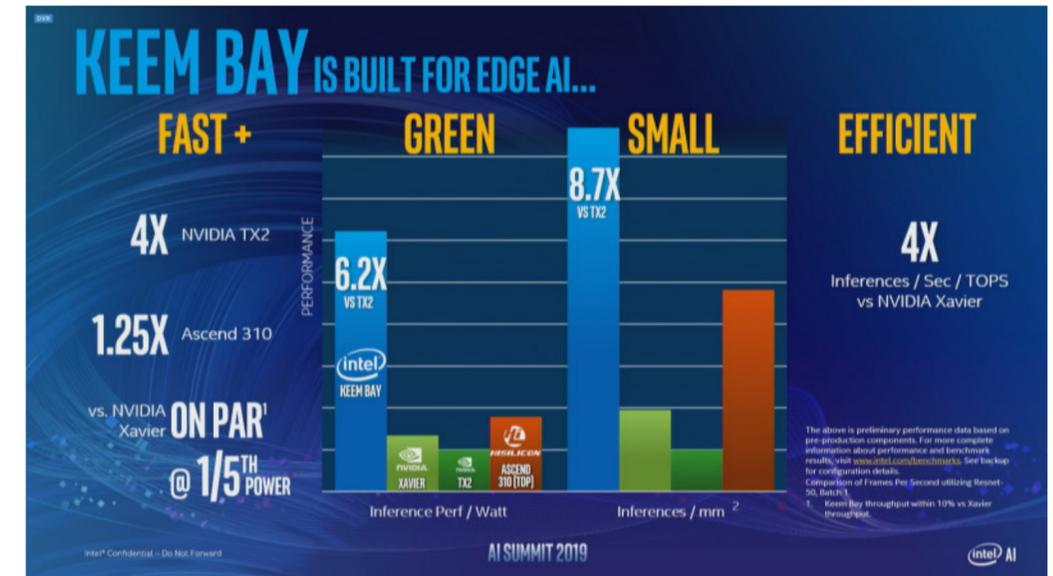
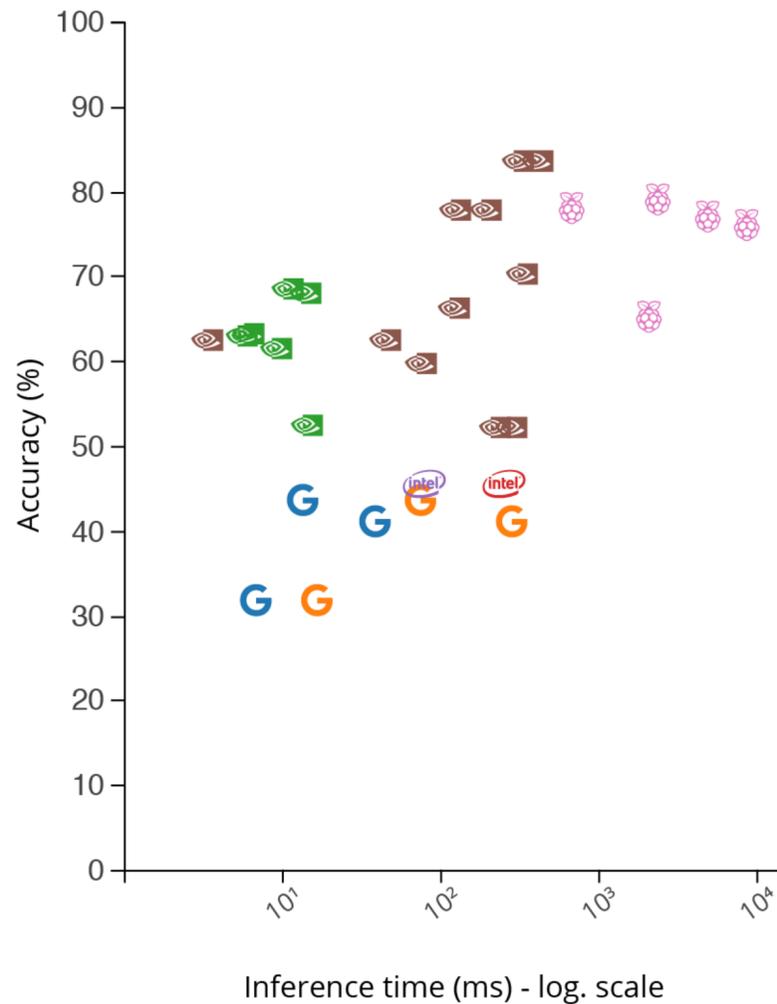


[developer.nvidia.com/embedded/jetson-nano-dl-inference-benchmarks](https://developer.nvidia.com/embedded/jetson-nano-dl-inference-benchmarks)

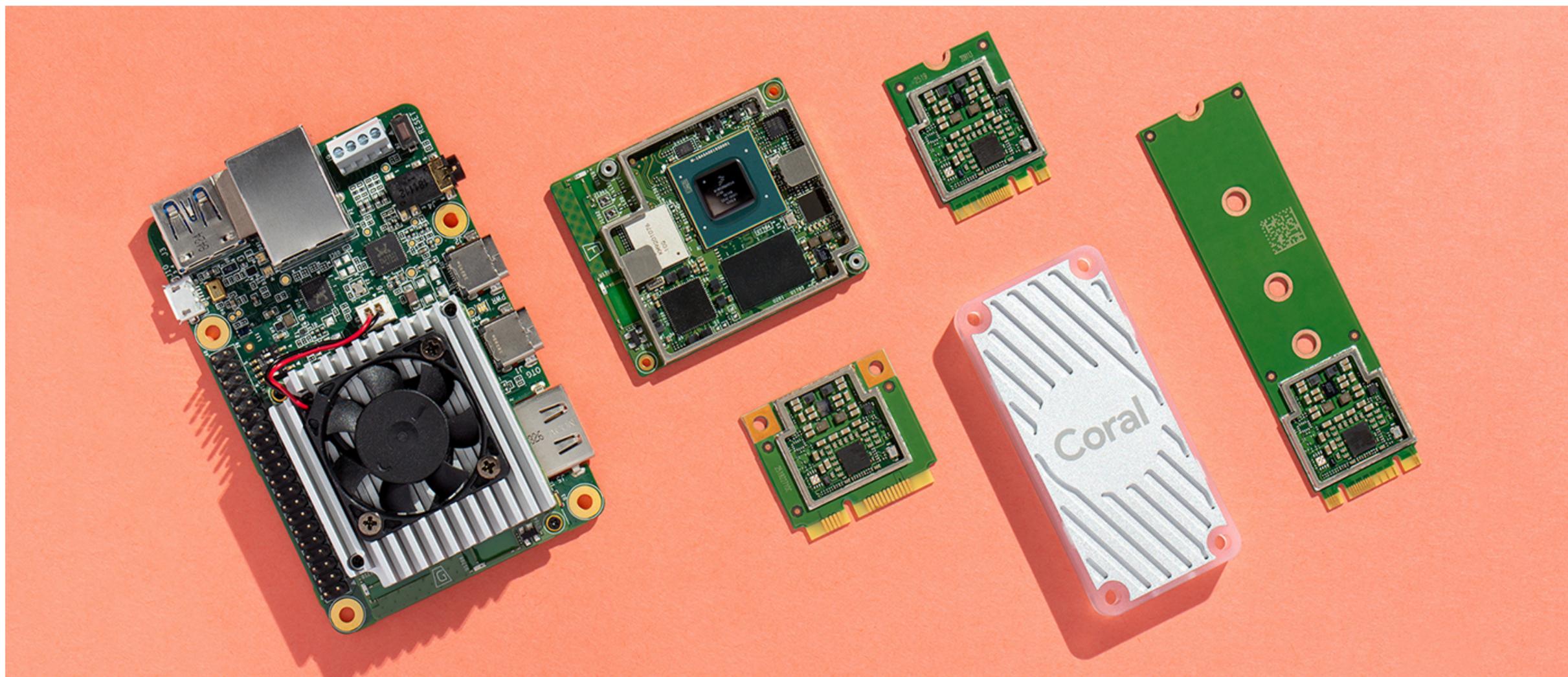
- Coral (Dev. Board)
- Coral (USB Accelerator)
- GTX-2080ti
- Intel Movidius
- Intel NCS2
- Jetson Nano
- Raspberry Pi 3B



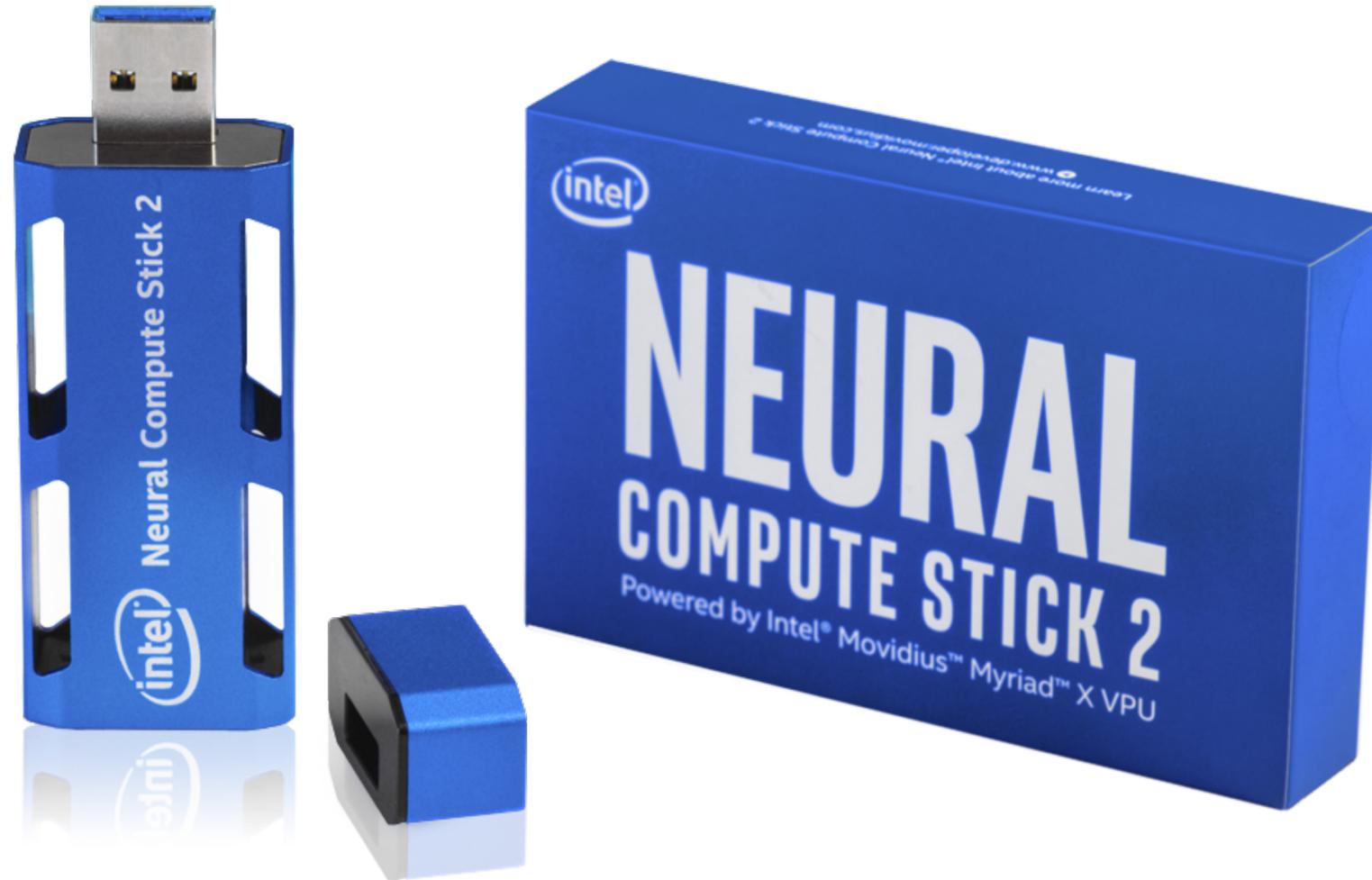
Benchmarking results with the outlying results from the unaccelerated Raspberry Pi removed showing the relative speeds for MobileNet SSD V1 with 0.75 depth (orange) and MobileNet SSD V2 (red) across platforms.



# Google Coral



# Intel Movidius



# Nvidia Jetson



**NANO**



**TX2**

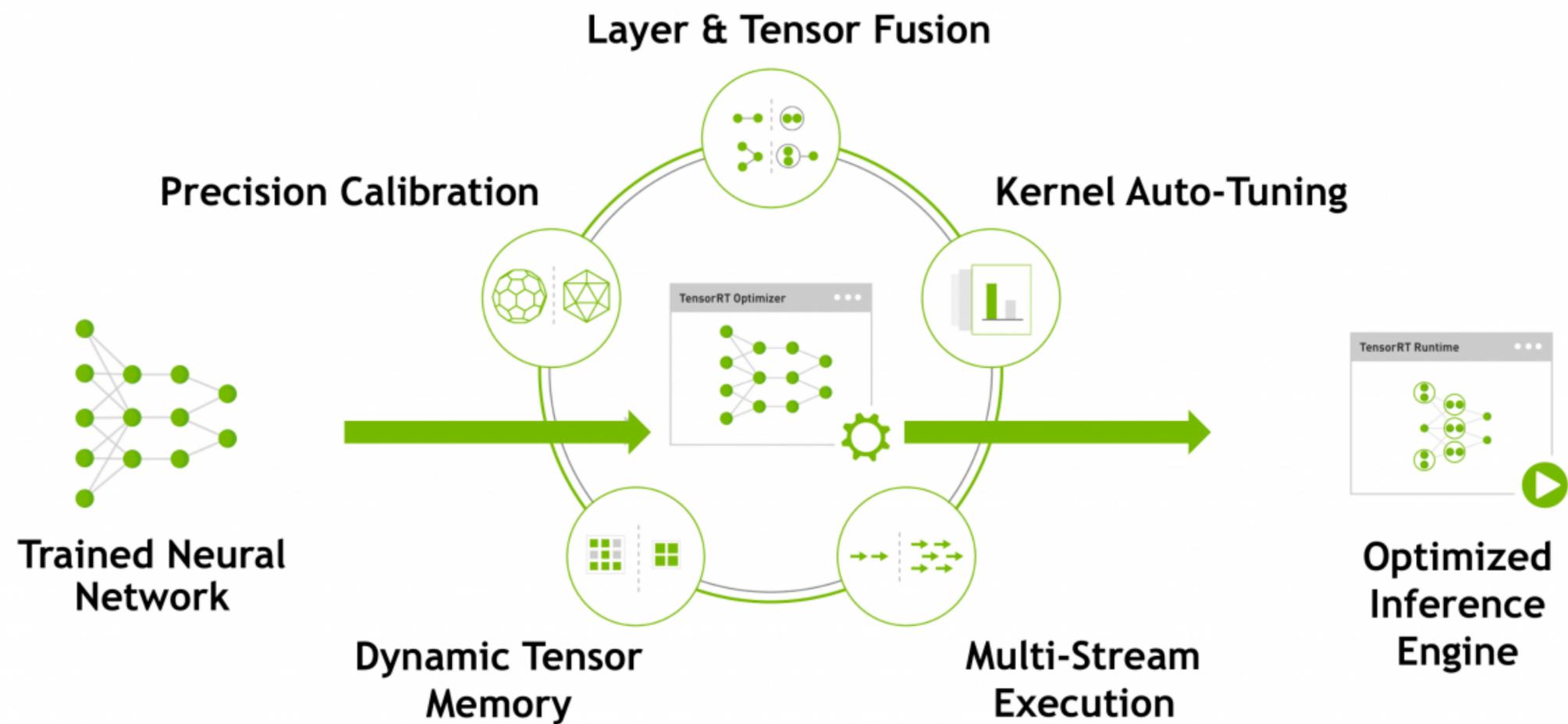


**XAVIER NX**



**AGX Xavier**

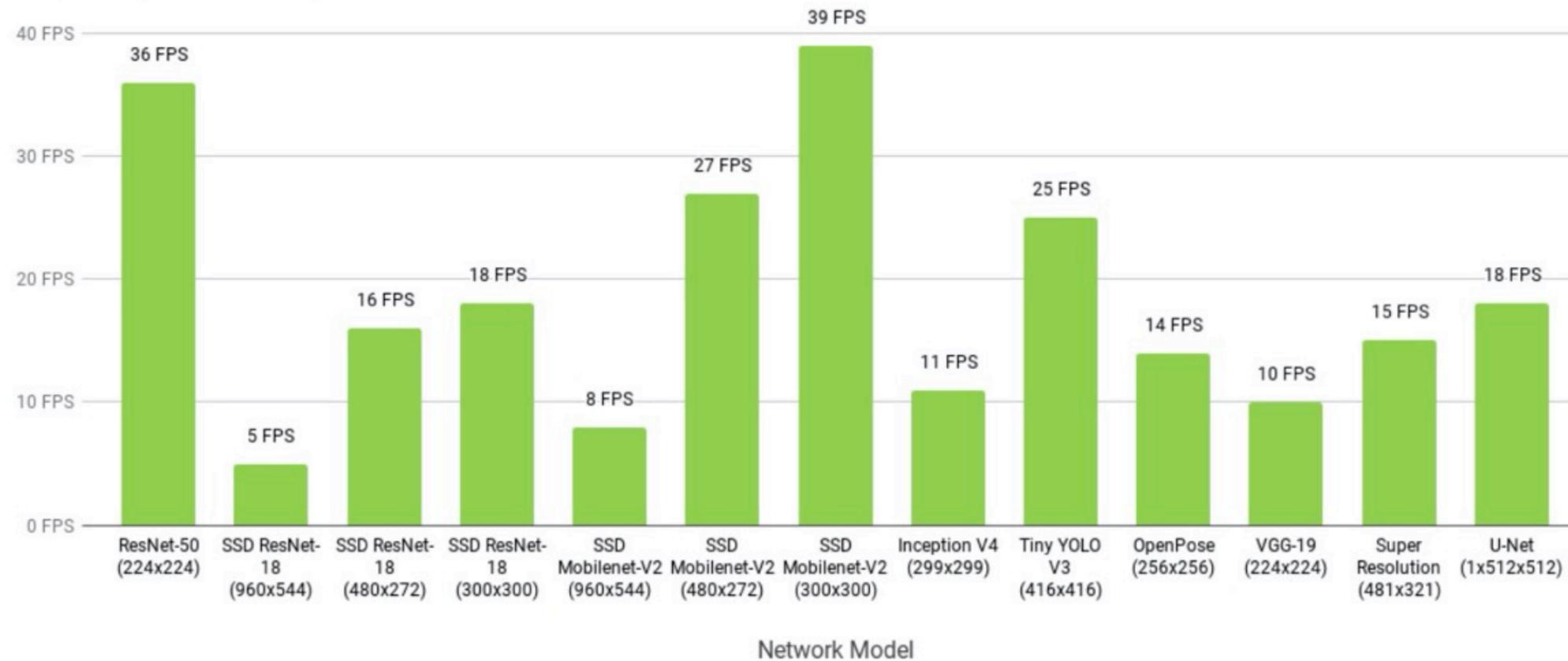
# Nvidia Jetson



# Nvidia Jetson

## Deep Learning Inference Performance

Jetson Nano (FP16, batch size 1)

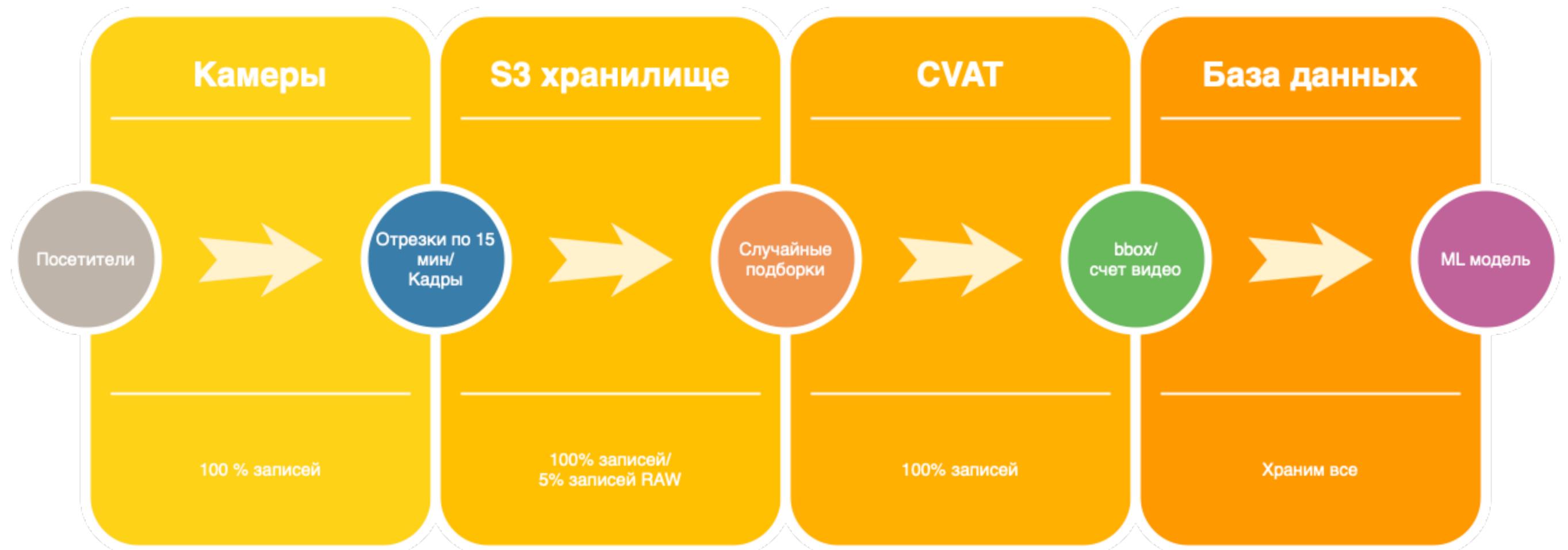


Results from NVIDIA's own benchmarking. (🇮🇹: NVIDIA)

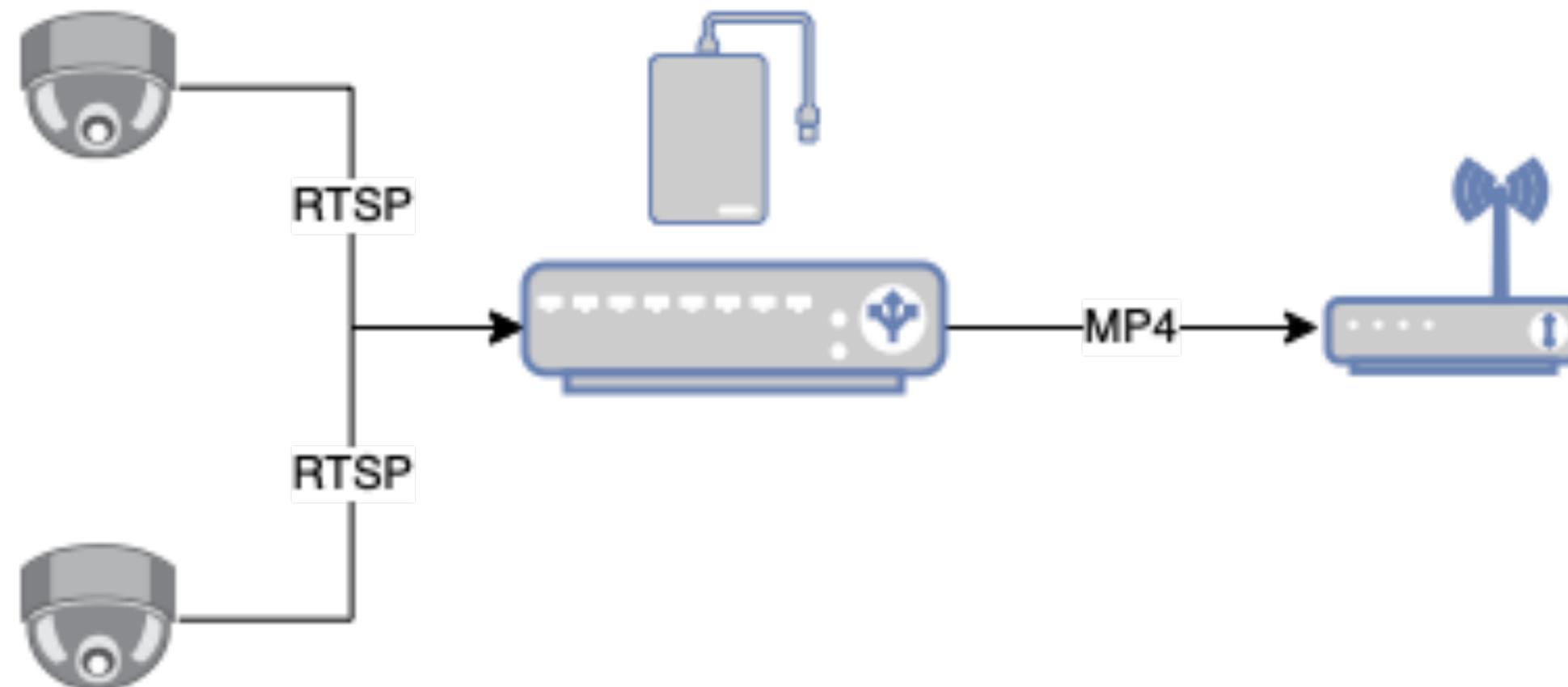
# Устройств

10

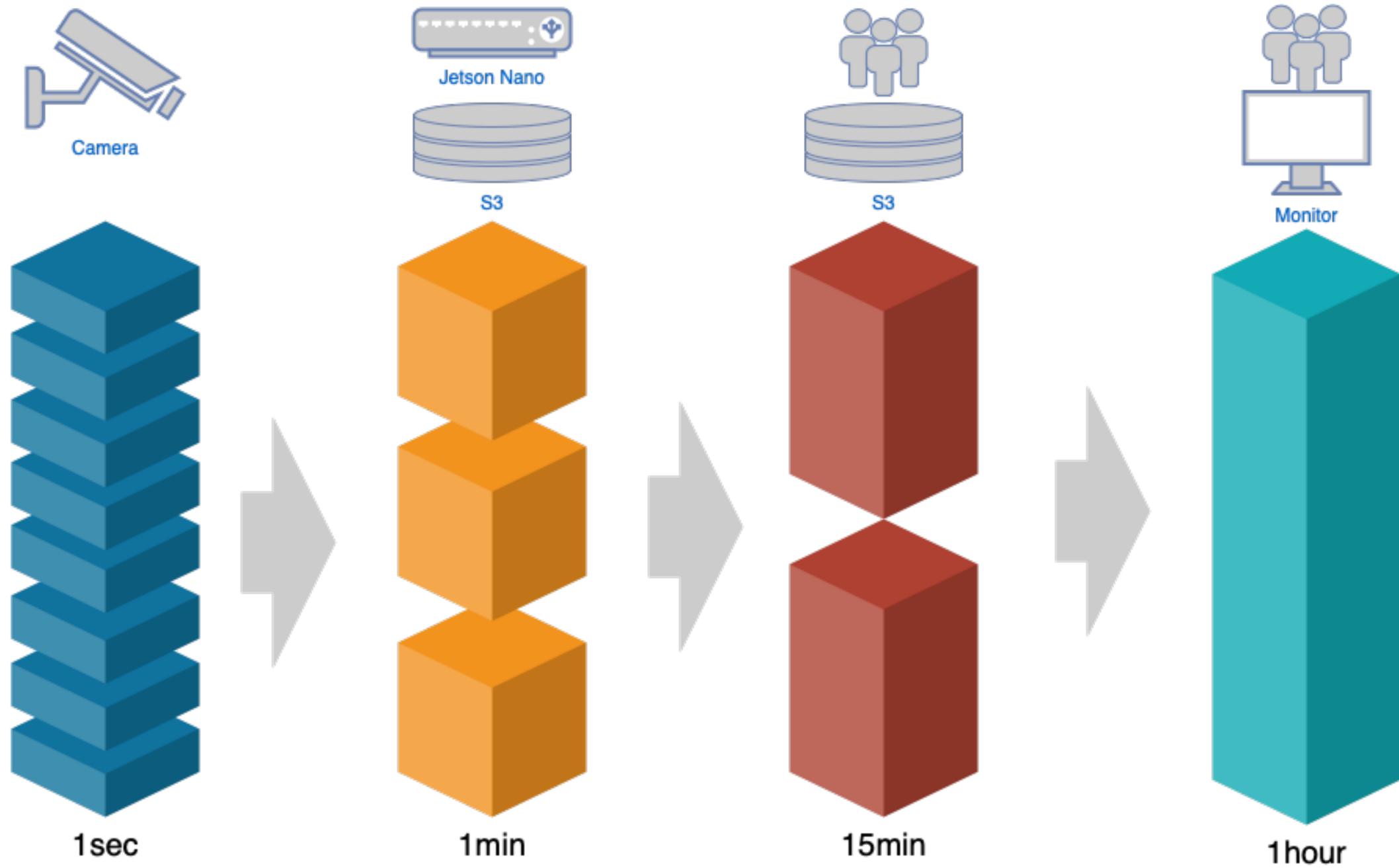
# Данные для обучения



# Данные для обучения



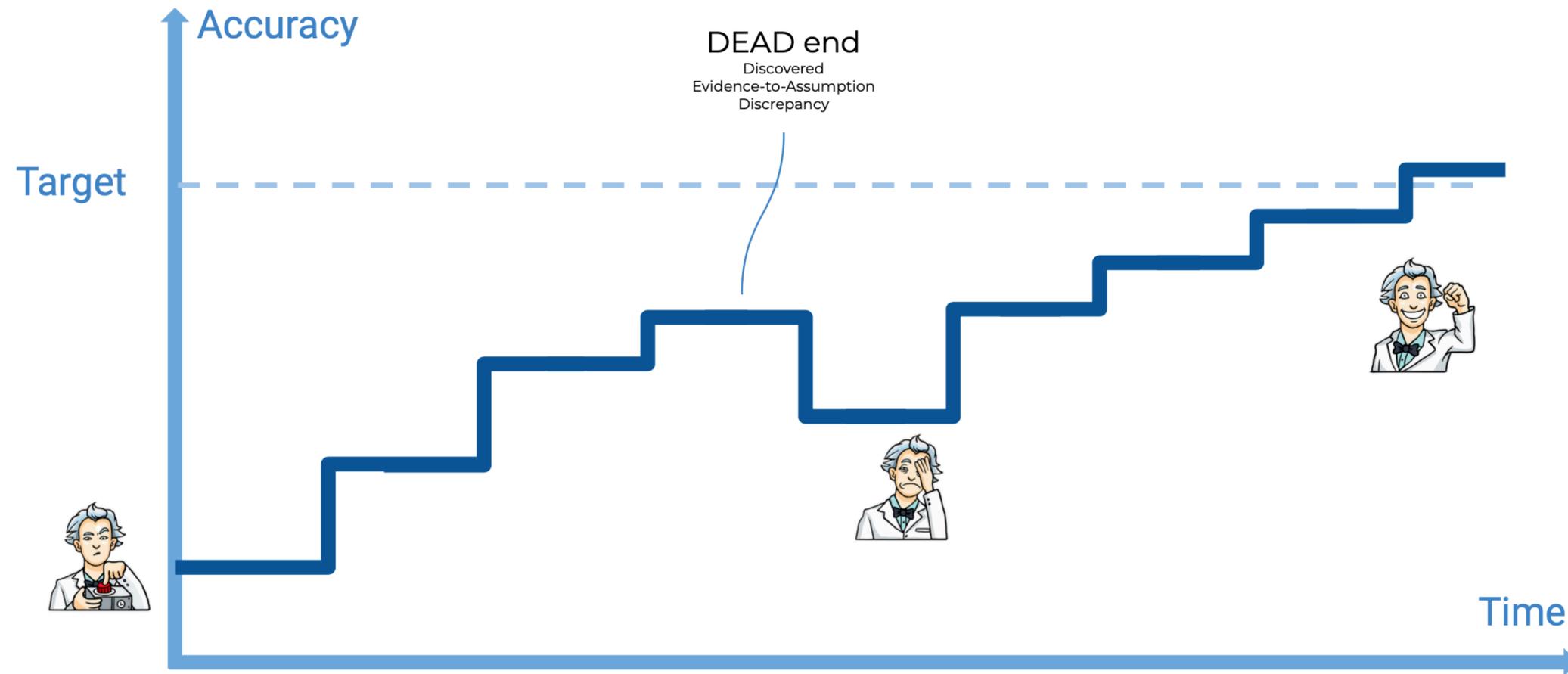
# Данные для обучения



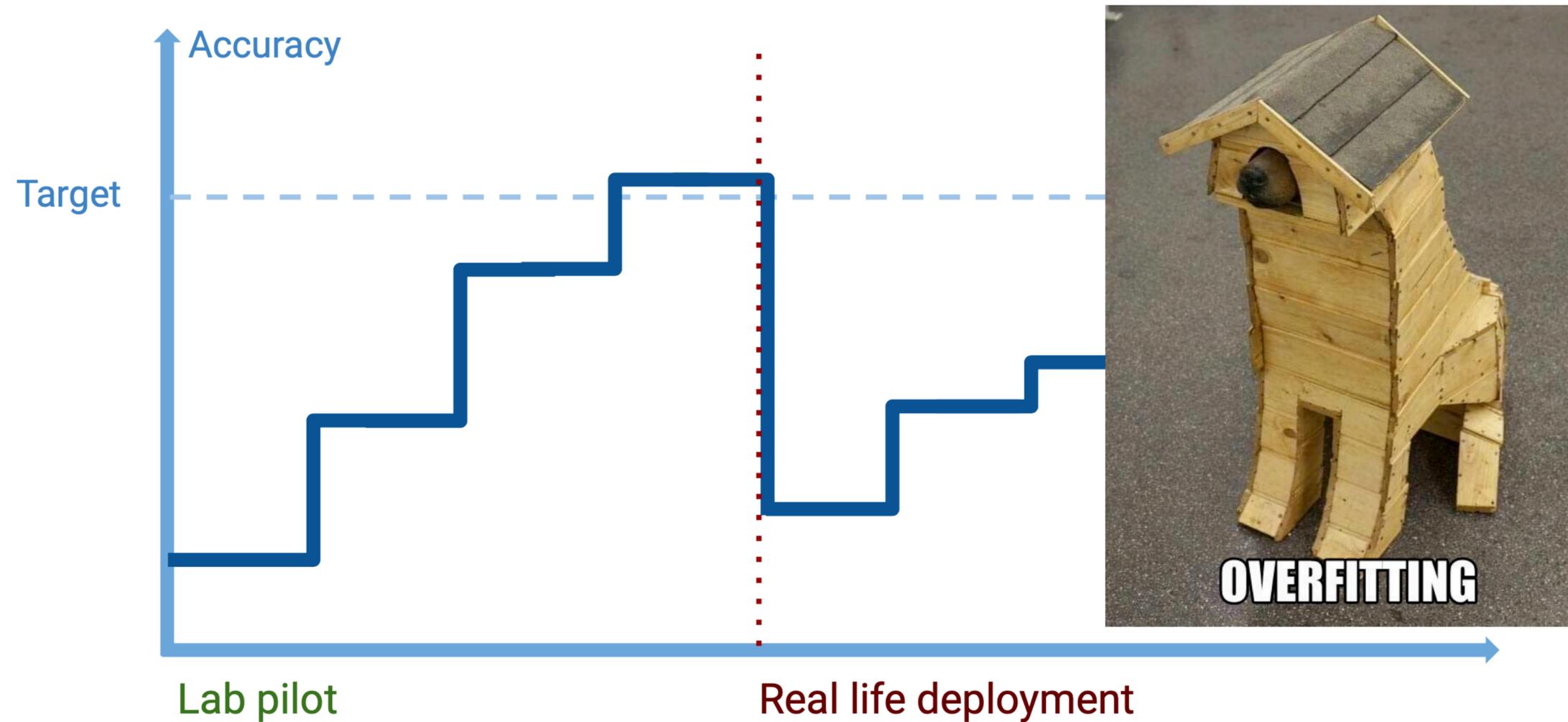
# Данные для обучения

The image displays a video annotation software interface. The central video frame shows a person in a red shirt walking in a hallway, with a bounding box around them. The timestamp in the top left of the video is "05-02-1979 Sat 10:47:54". The text "Камера 01" is visible in the bottom right of the video frame. The interface includes a timeline at the bottom with navigation buttons and a filter set to "car\_attr/model=/mazda". The right sidebar contains an "Objects" panel with "human 1 [box, annotation]" and a "Labels" panel with a dropdown menu set to "human". The bottom control bar includes sliders for "Fill Opacity" and "Selected Fill Opacity", a "Black Stroke" checkbox, and "Color by" options (Instance, Group, Label). The "Frame 0" indicator is also present.

# Постановка задачи в Hardware



# Постановка задачи в Hardware



# Безопасность Hardware



# Безопасность Hardware



# Безопасность Hardware

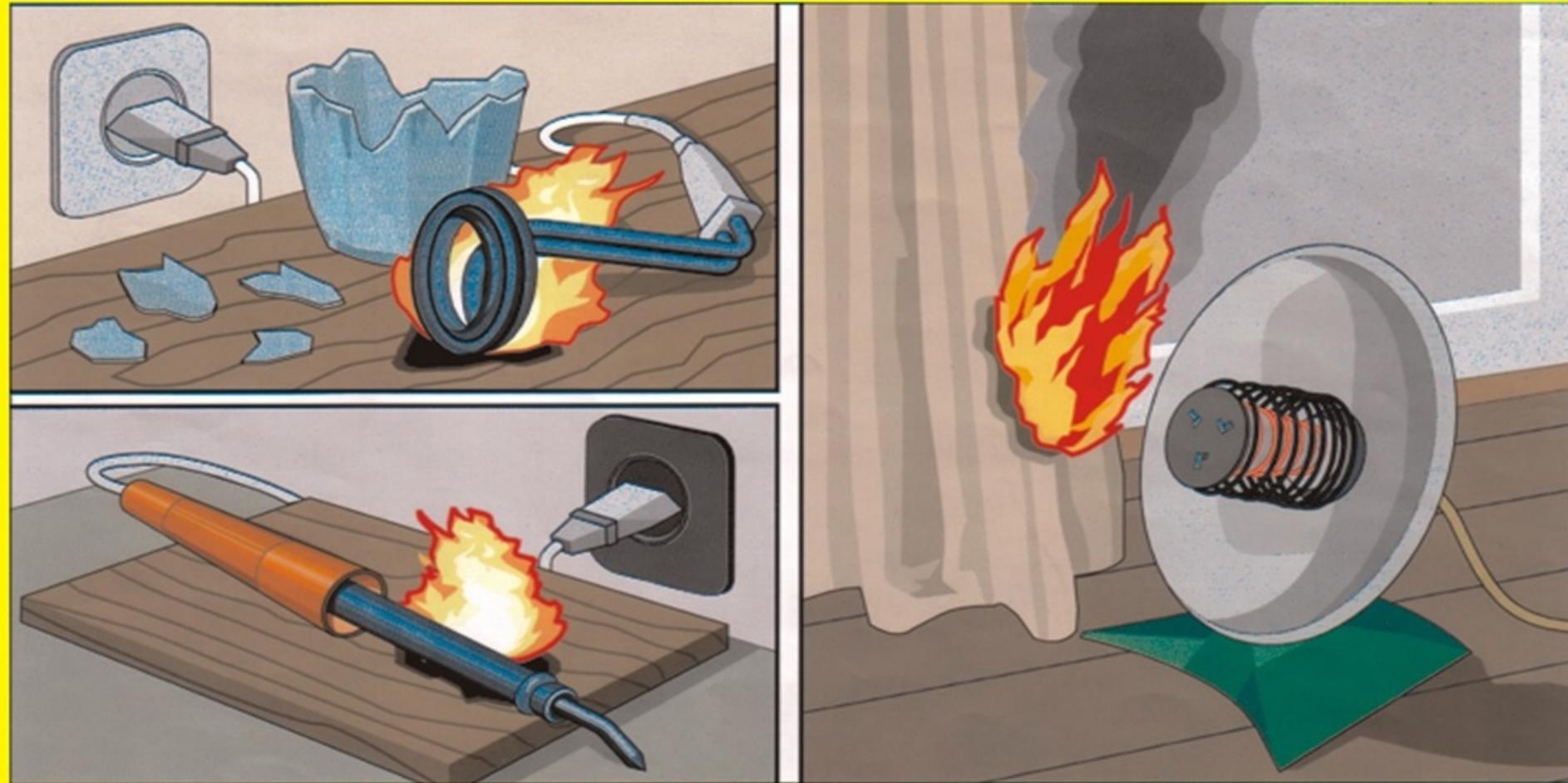


# Безопасность Hardware

0013	0020	0021	0023	0027	4621606850439-0007	4621606850439-0014	4621606850439-0019	4621606850439-0055 (LAB)
2	1	1	4	2	1	1	2	44
4621606850439-0056 (LAB)	63	78 LAB	79 LAB	80 LAB	81 LAB	82 LAB	83 LAB	84 LAB
7	1	158	158	157	157	158	158	158
85 LAB	86 LAB	87 LAB	88 LAB	90 LAB	91 LAB	falling-forest		
157	158	158	158	158	157	158		

# Безопасность Hardware

**БУДЬТЕ ВНИМАТЕЛЬНЫ С ЭЛЕКТРОПРИБОРАМИ!**



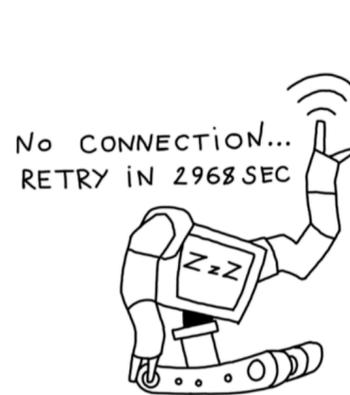
# Устройств

< 100

# Большой объем данных



# Большой объем данных



Low bandwidth

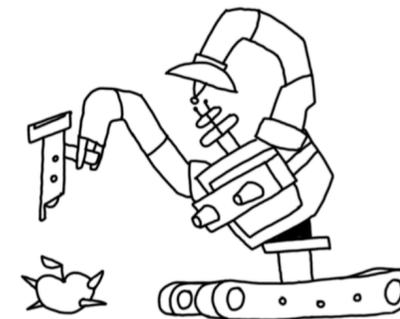


Washdowns,  
moisture, dust

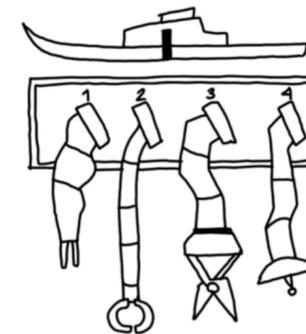


Rare anomalies,  
not enough  
samples for  
statistical  
methods

unstructured  
data

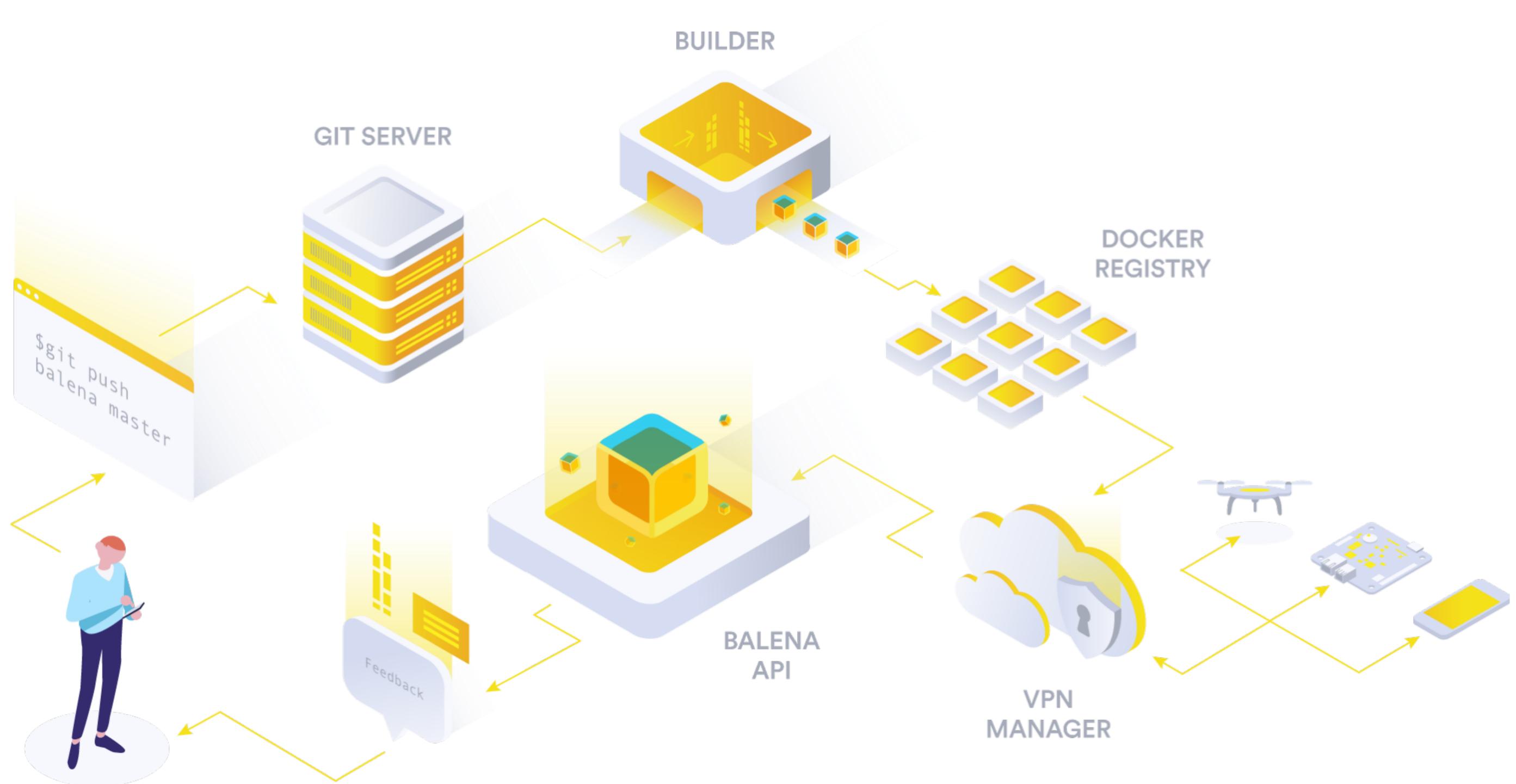


Variable sensor  
information



High level of  
customization

# Удаленное управление роєм



# Удаленное управление роетом

## Applications ?

Create application

Add filter

home\_pi

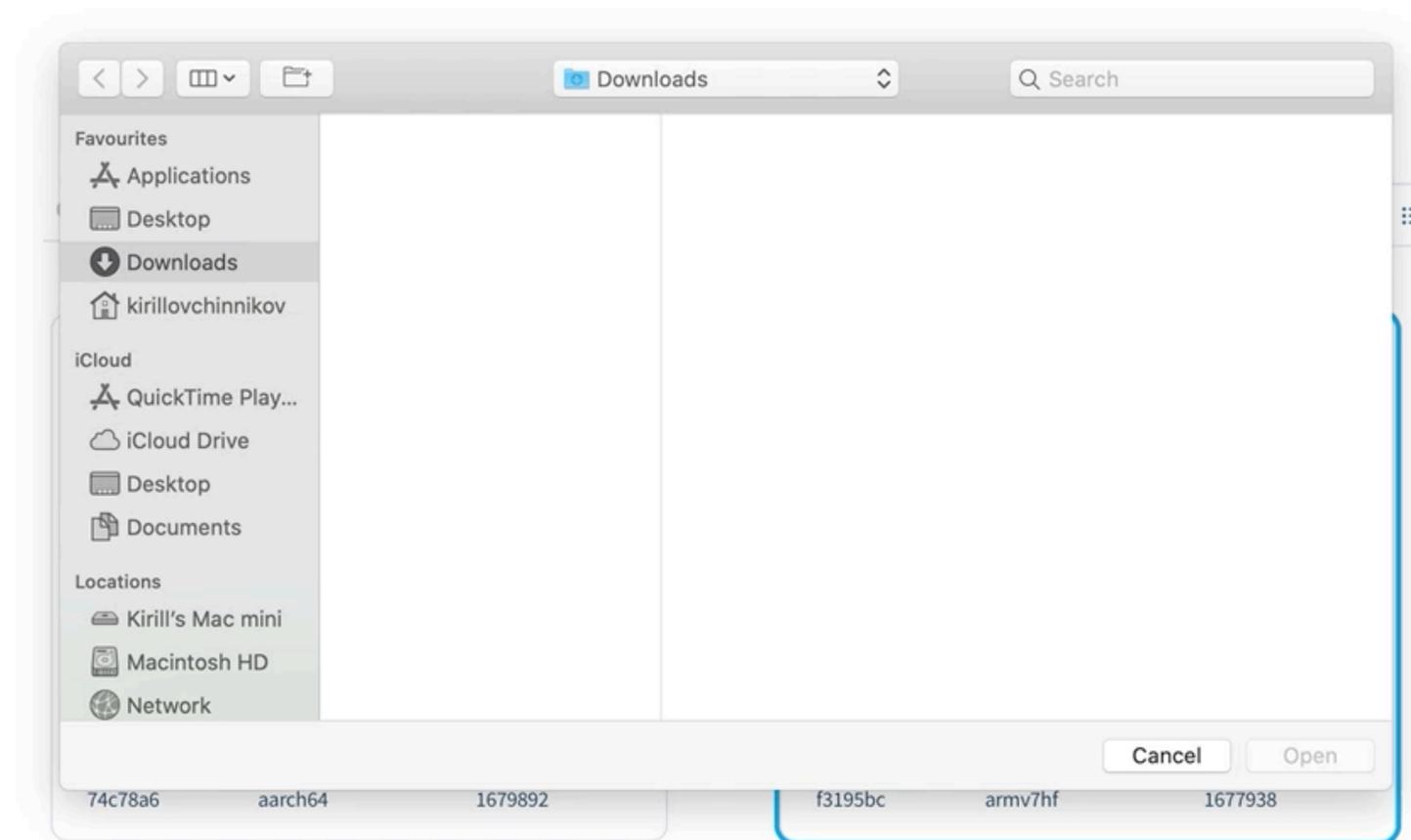
Starter

2

DEVICES

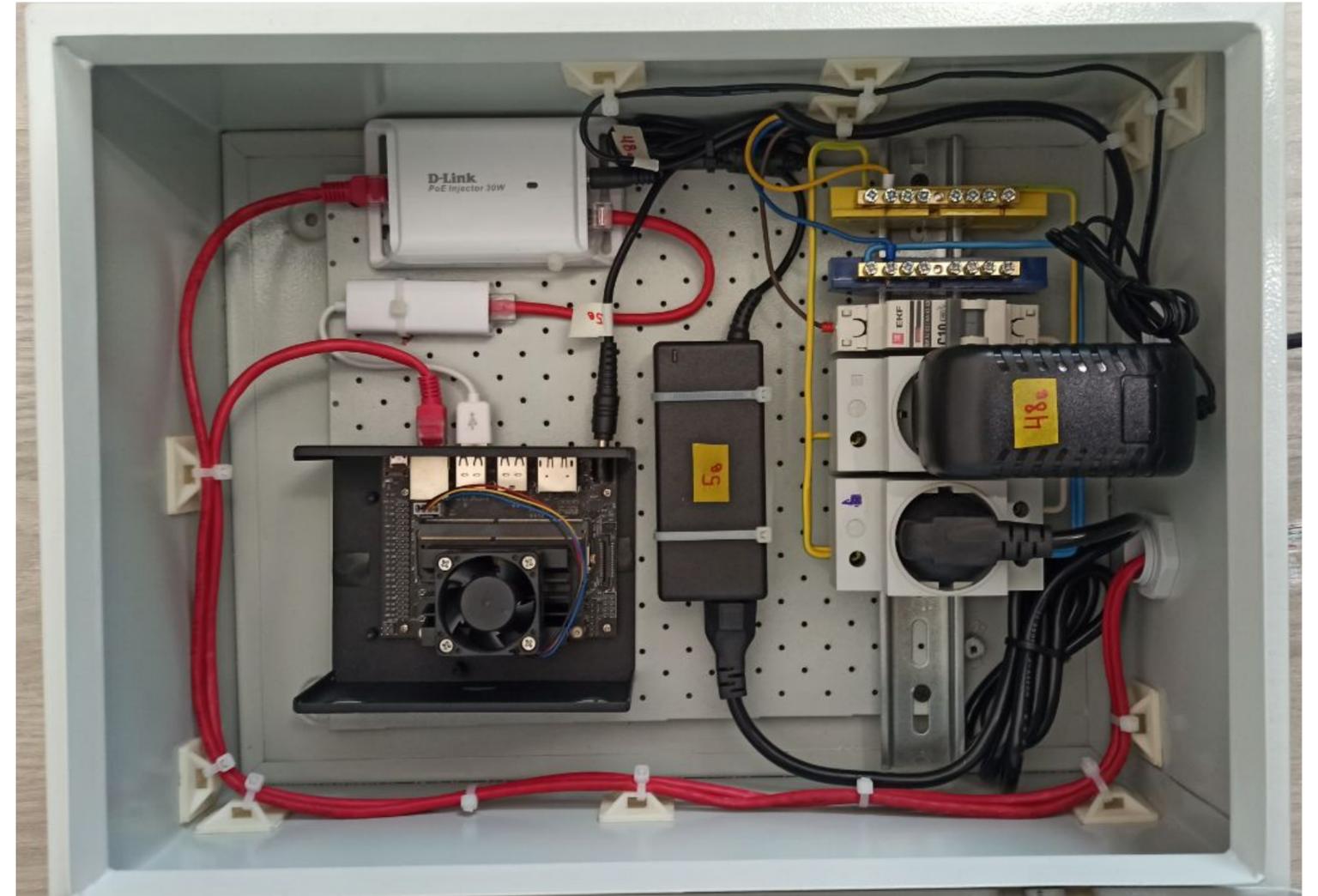
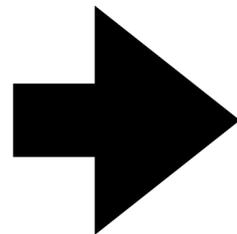
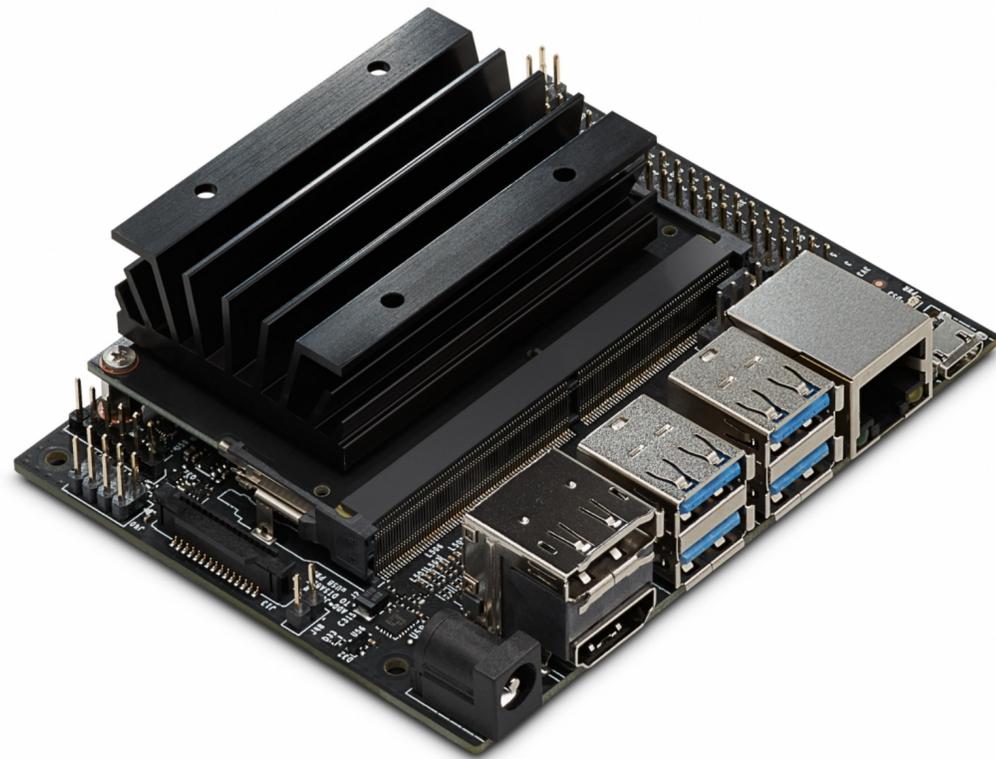
● Online ● Config ● Updating ● Offline ● Post prov ● Inactive

RELEASE	ARCHITECTURE	APP ID
ec009b6	armv7hf	1708862

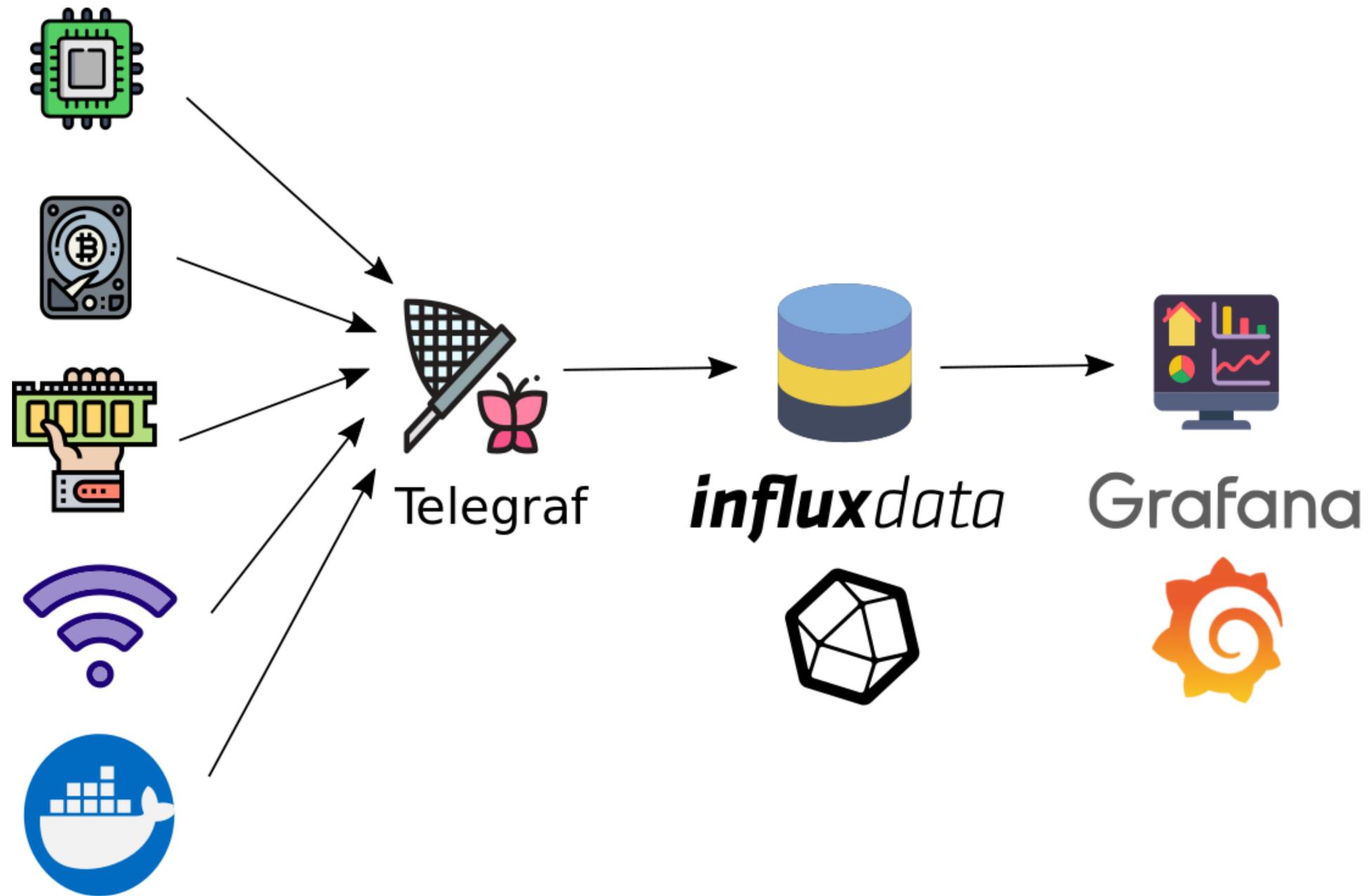


Need help ?

# Дополнительное оборудование



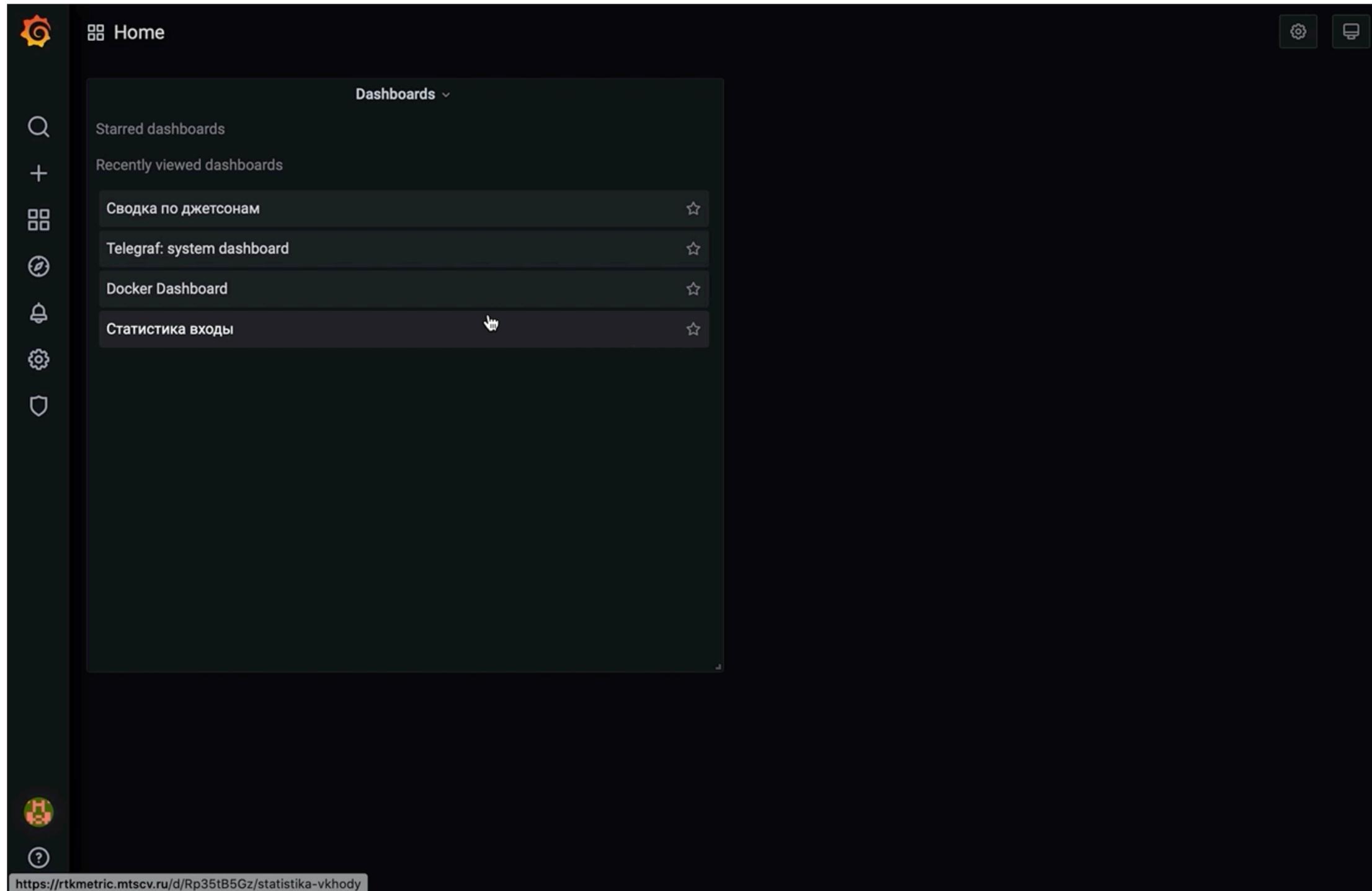
# Мониторинг решения



# Мониторинг решения



# Мониторинг решения

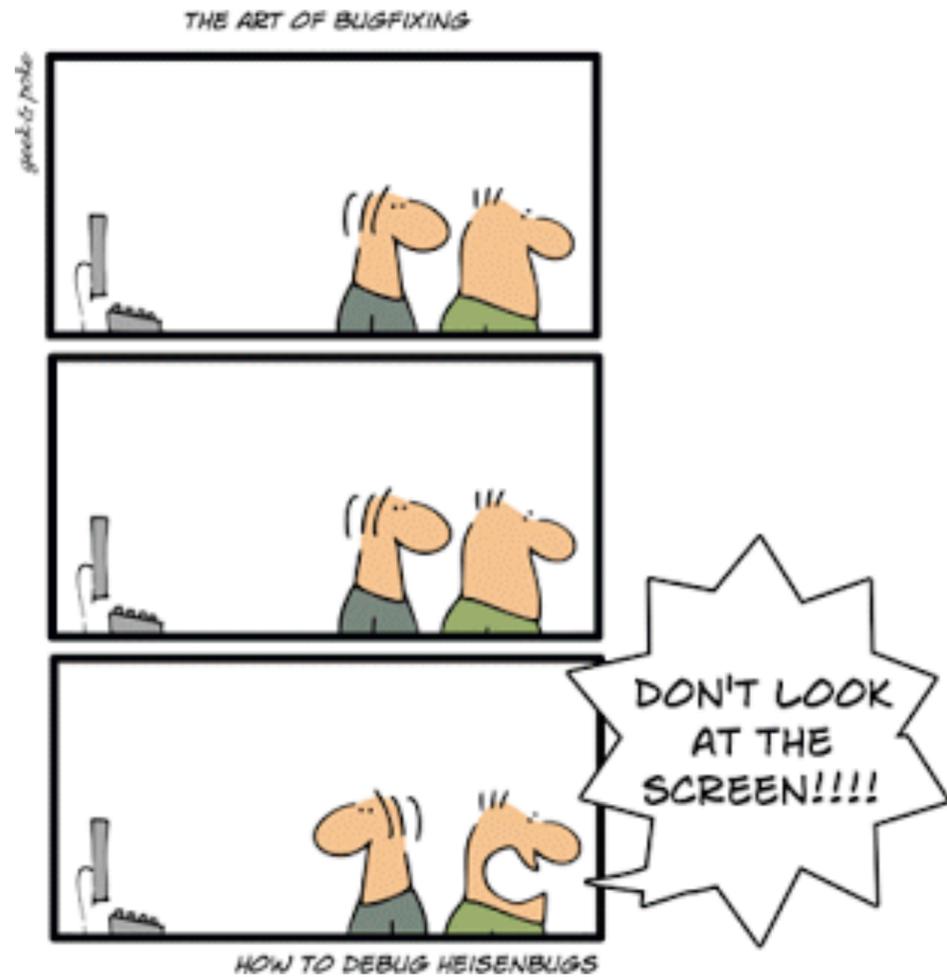


The screenshot shows the Grafana 'Home' page. At the top left is the Grafana logo and the text 'Home'. At the top right are icons for settings and a mobile view. A central panel titled 'Dashboards' contains two sections: 'Starred dashboards' and 'Recently viewed dashboards'. The 'Recently viewed dashboards' section lists four dashboards, each with a star icon on the right:

- Сводка по джетсонам
- Telegraf: system dashboard
- Docker Dashboard
- Статистика входы

A mouse cursor is hovering over the 'Статистика входы' dashboard. At the bottom left, there is a user profile icon and a help icon. At the bottom, the browser address bar shows the URL: <https://rtkmetric.mtscv.ru/d/Rp35tB5Gz/statistika-vkhody>

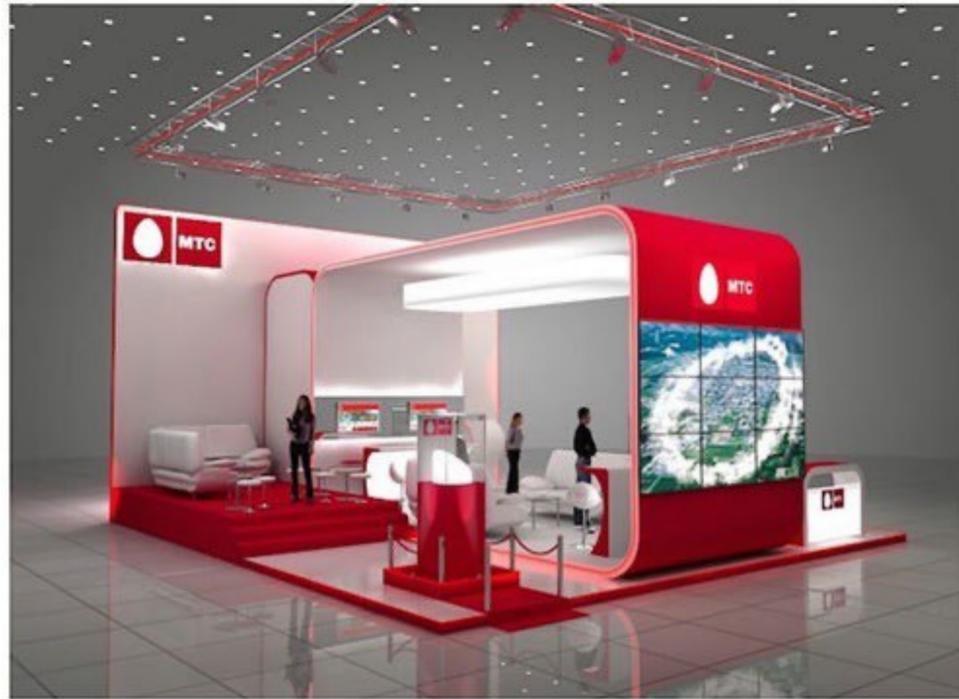
# Проблемы CUDA и прочие



# Устройств

> 100

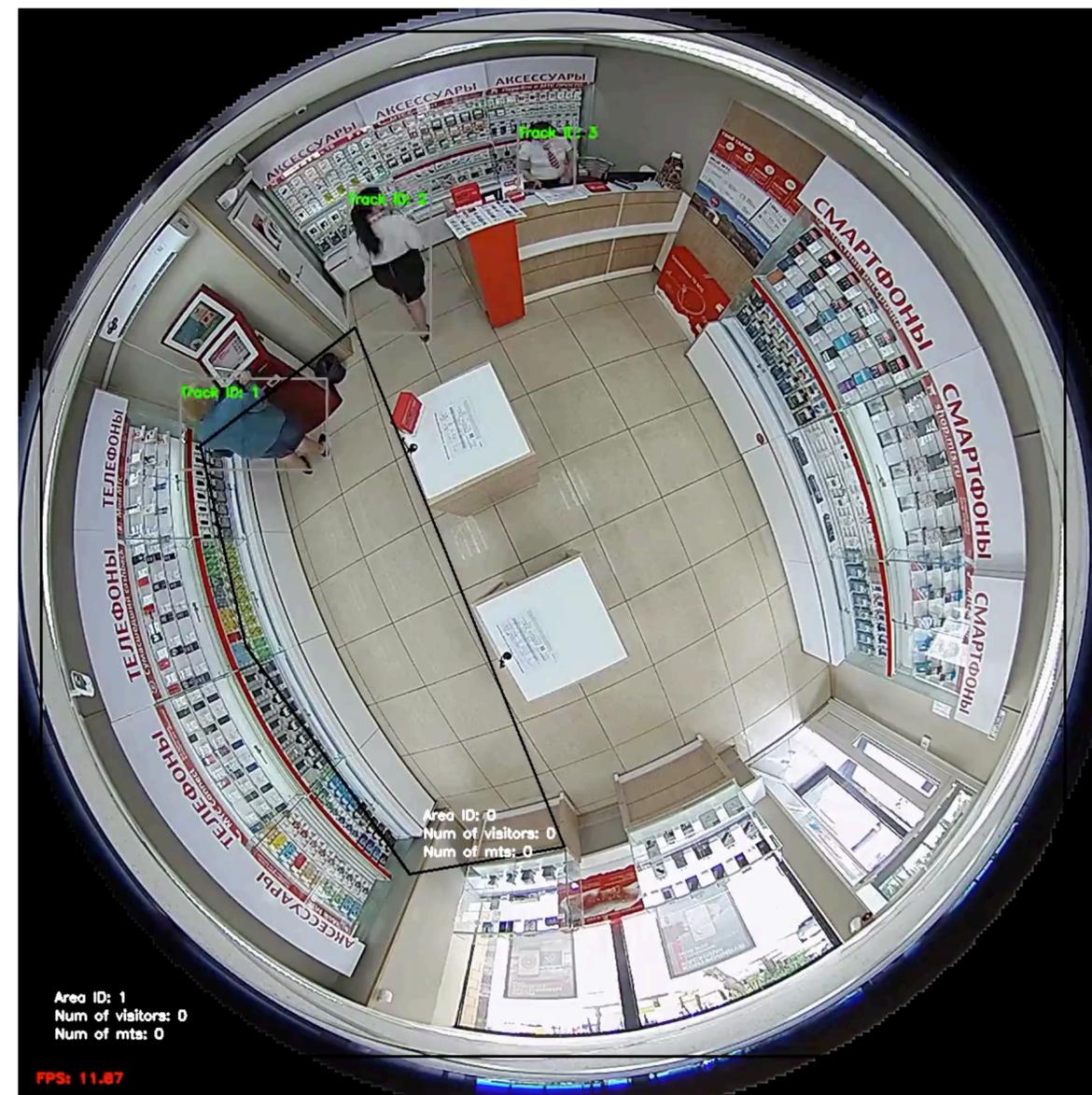
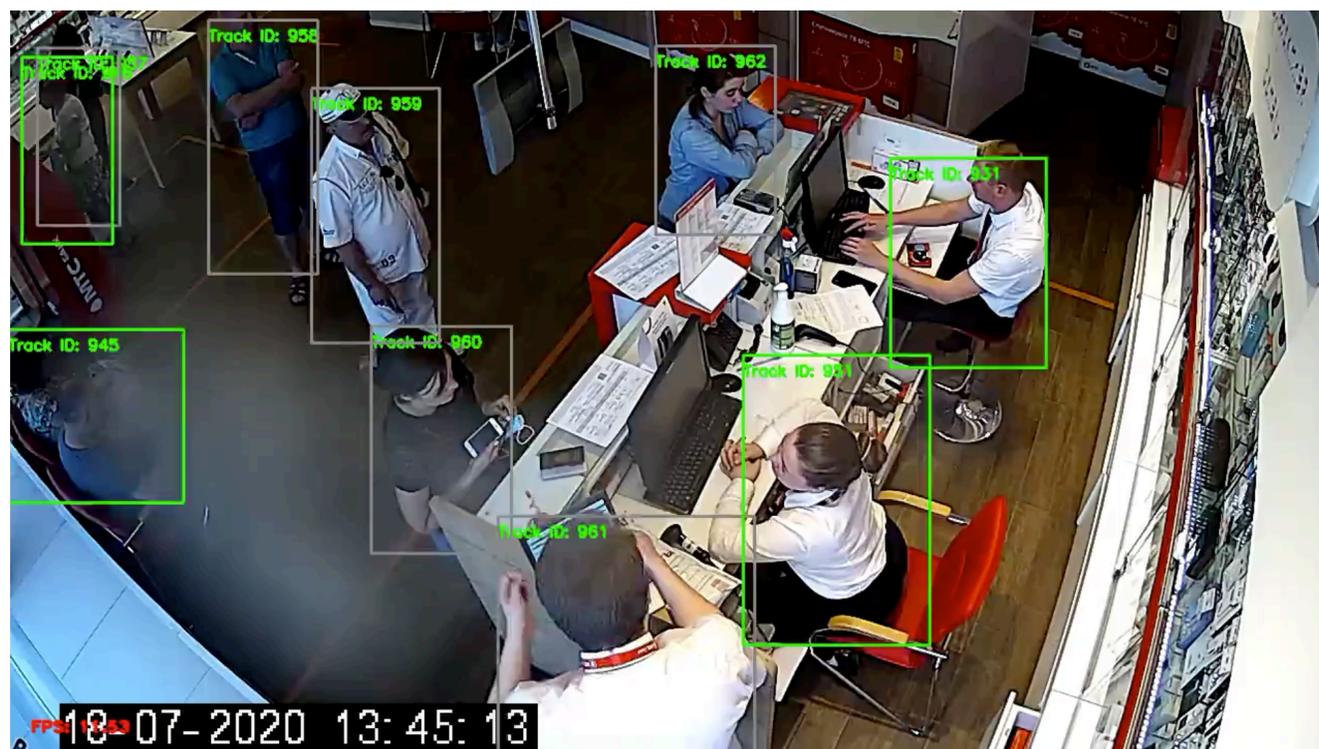
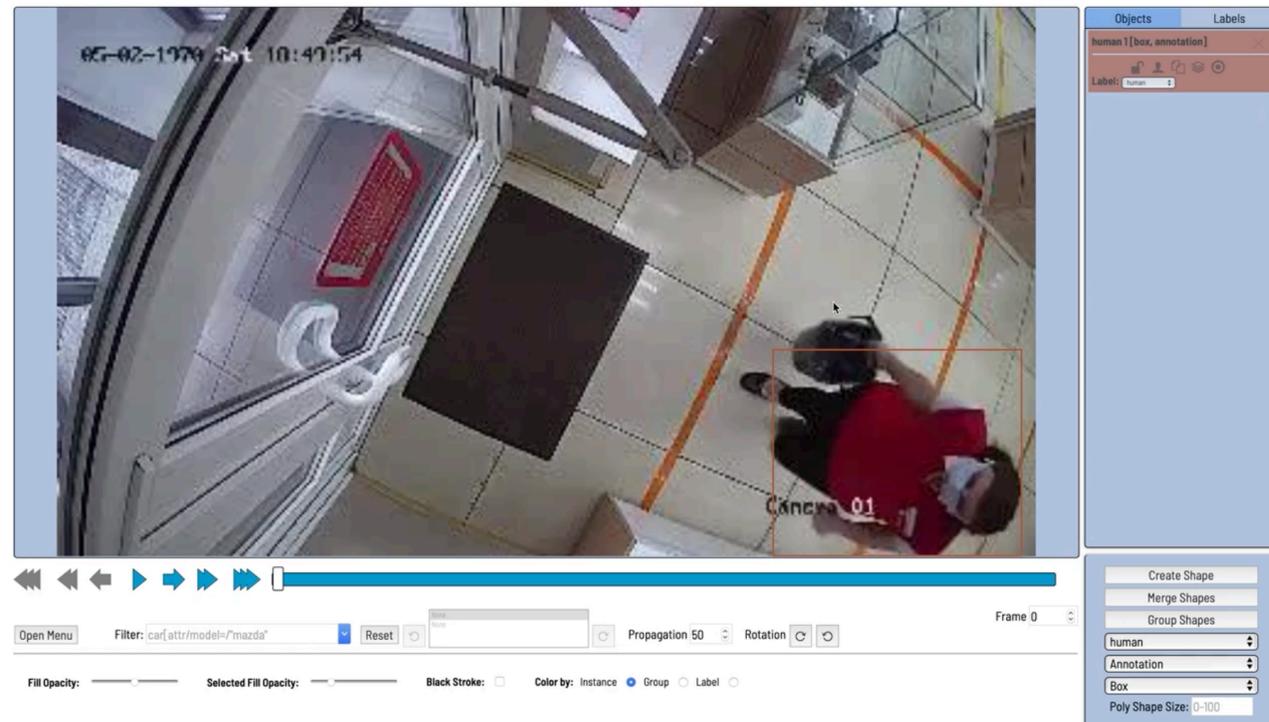
# Различные камеры



# Различные камеры



# Различные камеры



# Людям не всегда нравится AI



# Людям не всегда нравится AI

## Learn About AI

I don't want to be  
the first one to buy it

Looks weird



How is it better than the tools we use now?

Isn't it too expensive?

What the  
hell is this?



Will it take over jobs?

Isn't it dangerous?



Where do I hire  
someone who  
can handle that?

Machines can make humans more productive