Covid19 Facial Detection Tools

Team

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Goal

Detect people who are not obeying by covid guidelines (i.e. mask on or off) as well as measure their temperature.

Interactive UI Mode with Qt

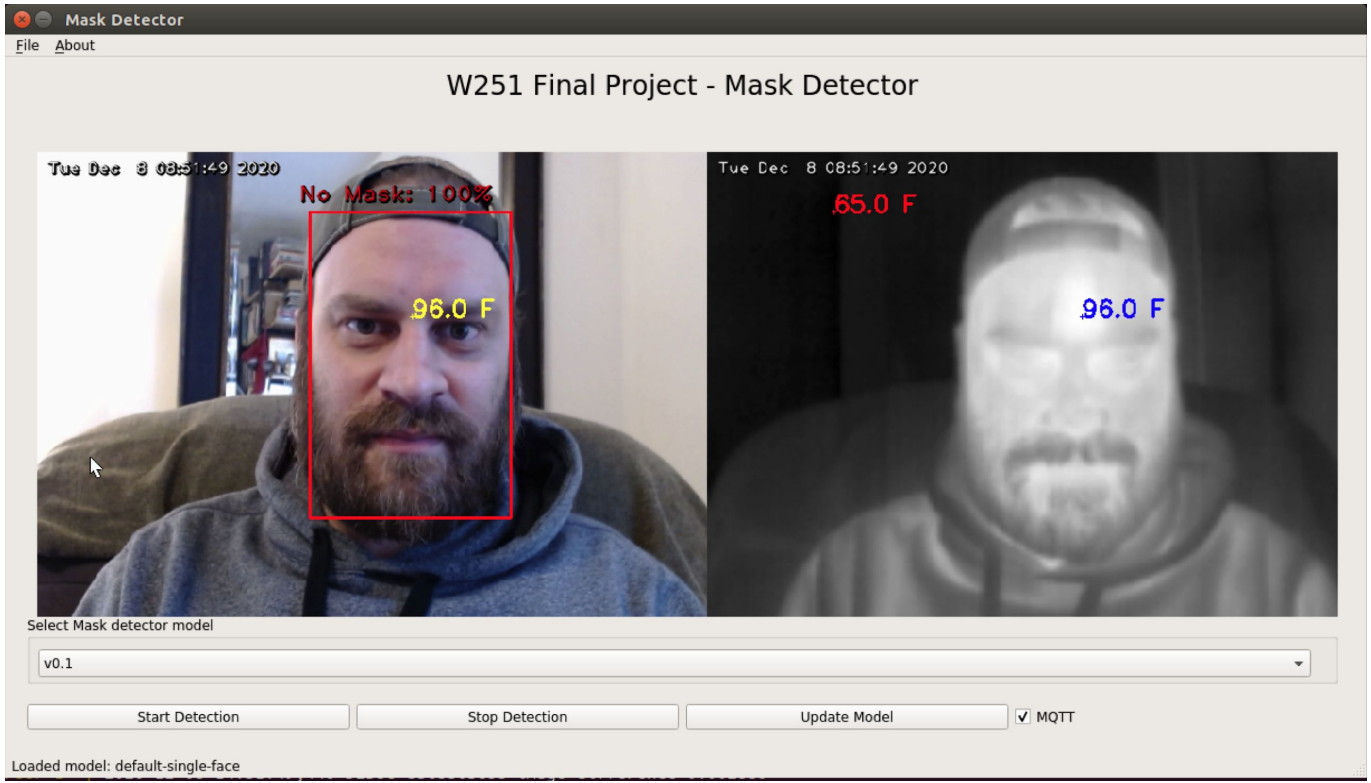
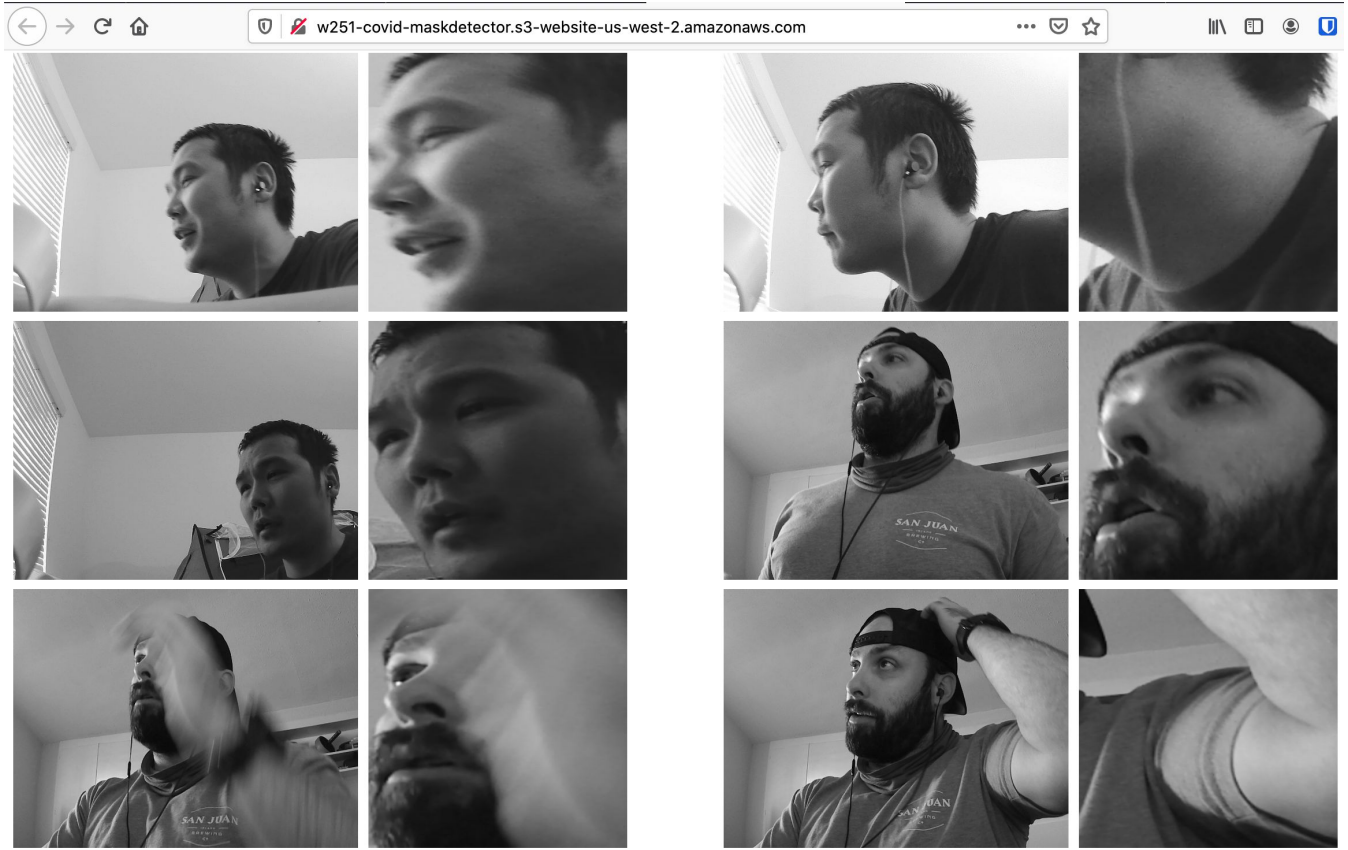
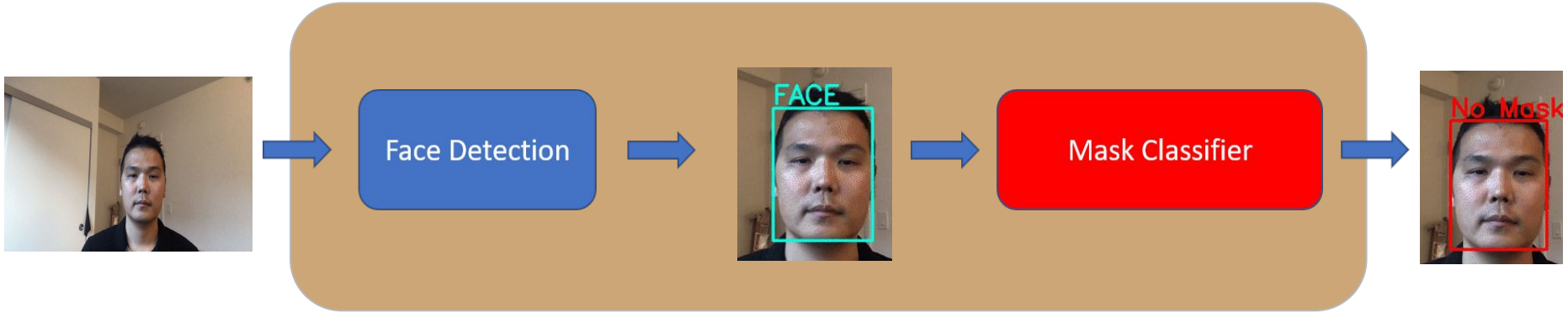


Image browser website



Face/Mask detection models

Face/mask detection inference pipeline



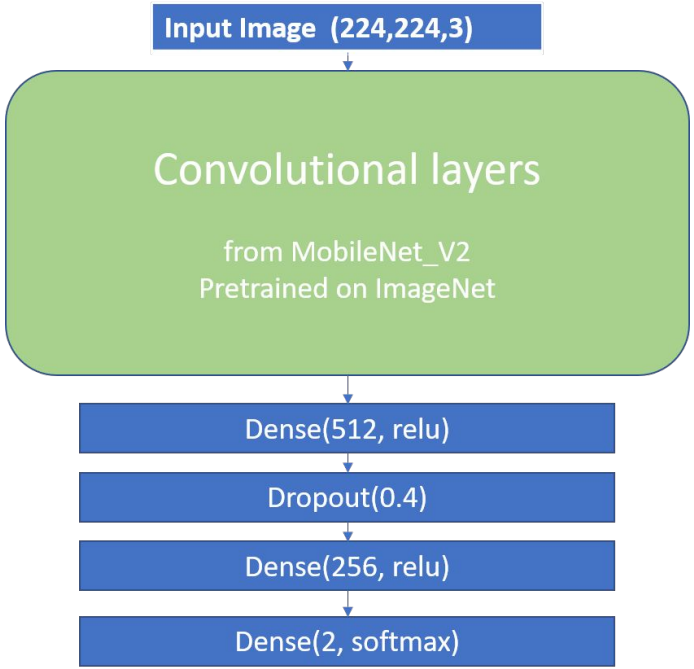
Models

1) **Haar Cascades**
2) **Res10_SSD**
3) **YoloFace**

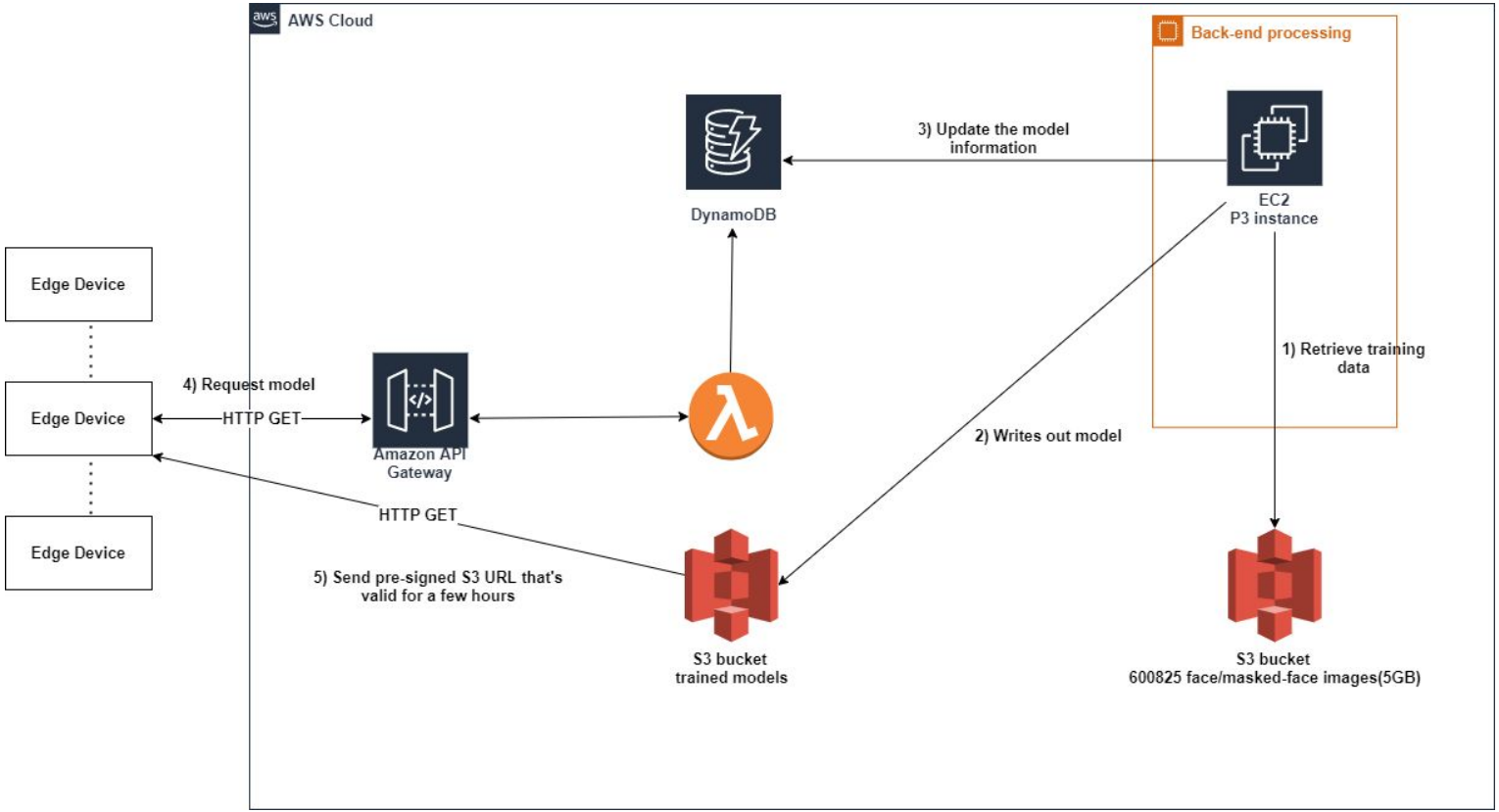
MobileNetV2

Mask detection models

- Deep Learning Framework:
  - Tensorflow/Keras
- Data source:
  - 600k face/masked face images (5GB)
- Model architecture:
  - MobileNet v2 -based
- Transfer learning
- Data augmentation
  - Crop, zoop, rotate, and etc..

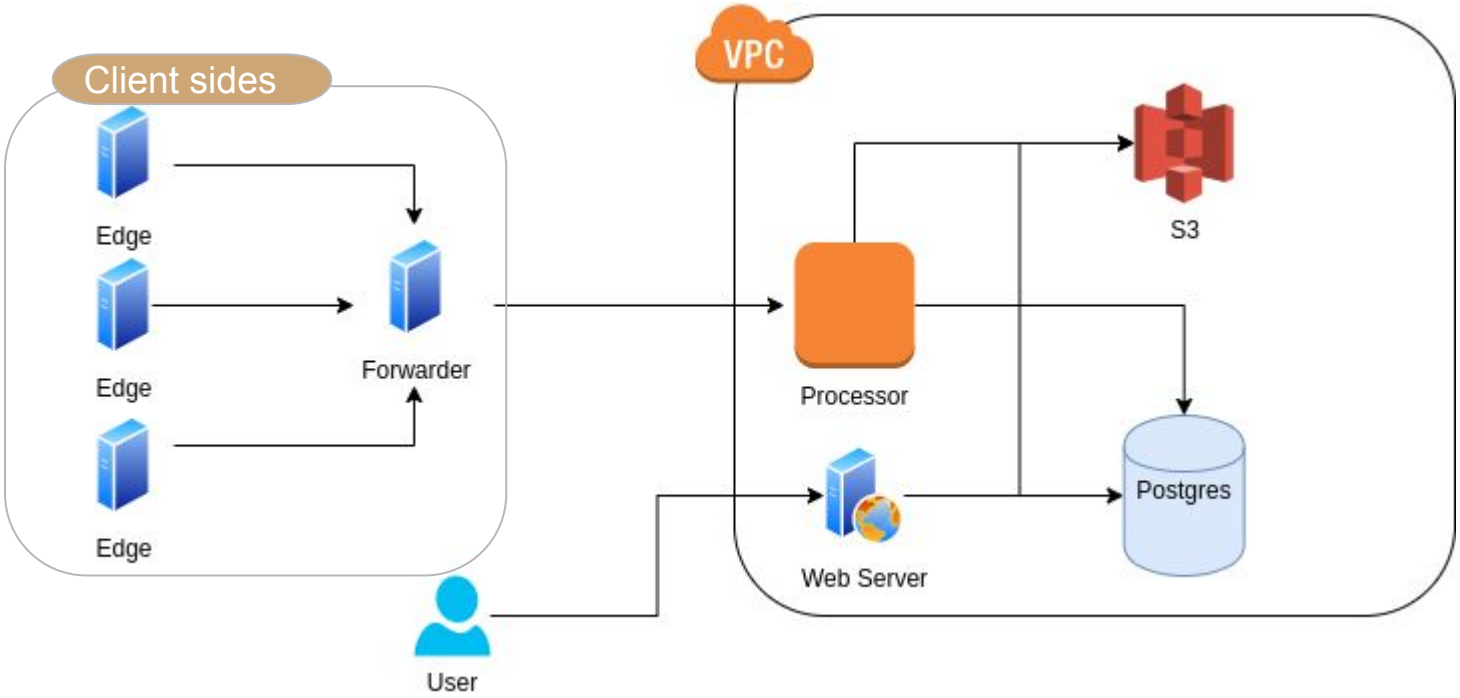


Training and deploying models



IoT System Architecture and Deployment

Architecture



Infrastructure Deployment

- **.env**: stores user-defined environment variables for device and server configurations.
- **Makefile**: defines scripted targets for common actions such as docker builds, AWS deployment, edge device deployment
- **Terraform**: create, configure and destroy AWS services such as vpc, security roles, s3 buckets.
- **Ansible**: scripting of service deployment on target machines. Transfer docker-compose.yml; pull, run, stop container services at cloud and edge.

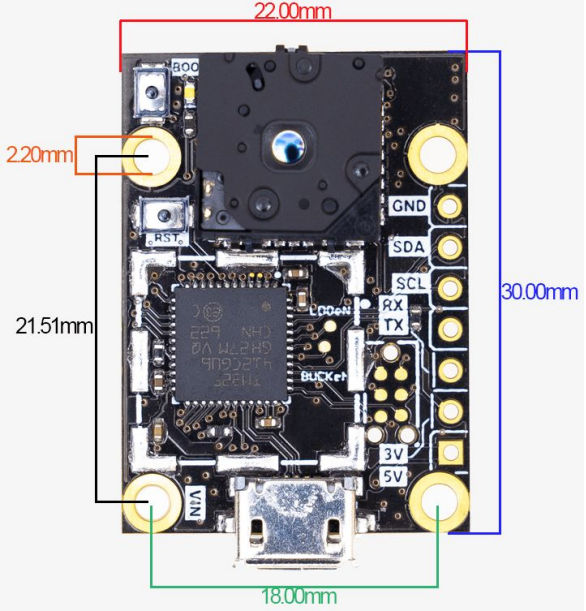
Ansible playbook for targeted deployment

```
TASK [s3 : remove temp file] ***************************************************************
Tuesday 08 December 2020  09:07:11 -0600 (0:00:01.607)       0:00:07.297 ******
changed: [localhost]

PLAY [all] *********************************************************************************
skipping: no hosts matched

PLAY RECAP *********************************************************************************
localhost                  : ok=7    changed=6    unreachable=0    failed=0    skipped=0    rescued=0

Tuesday 08 December 2020  09:07:12 -0600 (0:00:00.555)       0:00:07.852 ******
===============================================================================
s3 : Upload website index.html ------------------------------------------------------- 2.48s
s3 : Upload website javascript ------------------------------------------------------- 1.61s
s3 : Upload error.html --------------------------------------------------------------- 1.52s
s3 : Write javascript template to file ----------------------------------------------- 1.05s
s3 : remove temp file ---------------------------------------------------------------- 0.56s
s3 : create temporary file ----------------------------------------------------------- 0.54s
include_vars ------------------------------------------------------------------------- 0.05s
Playbook run took 0 days, 0 hours, 0 minutes, 7 seconds


Captured images can be viewed at the following URL:
http://w251-covid-maskdetector.s3-website-us-west-2.amazonaws.com


Mask detection stats can be viewed at the following URL:
http://34.210.77.165:8080
```

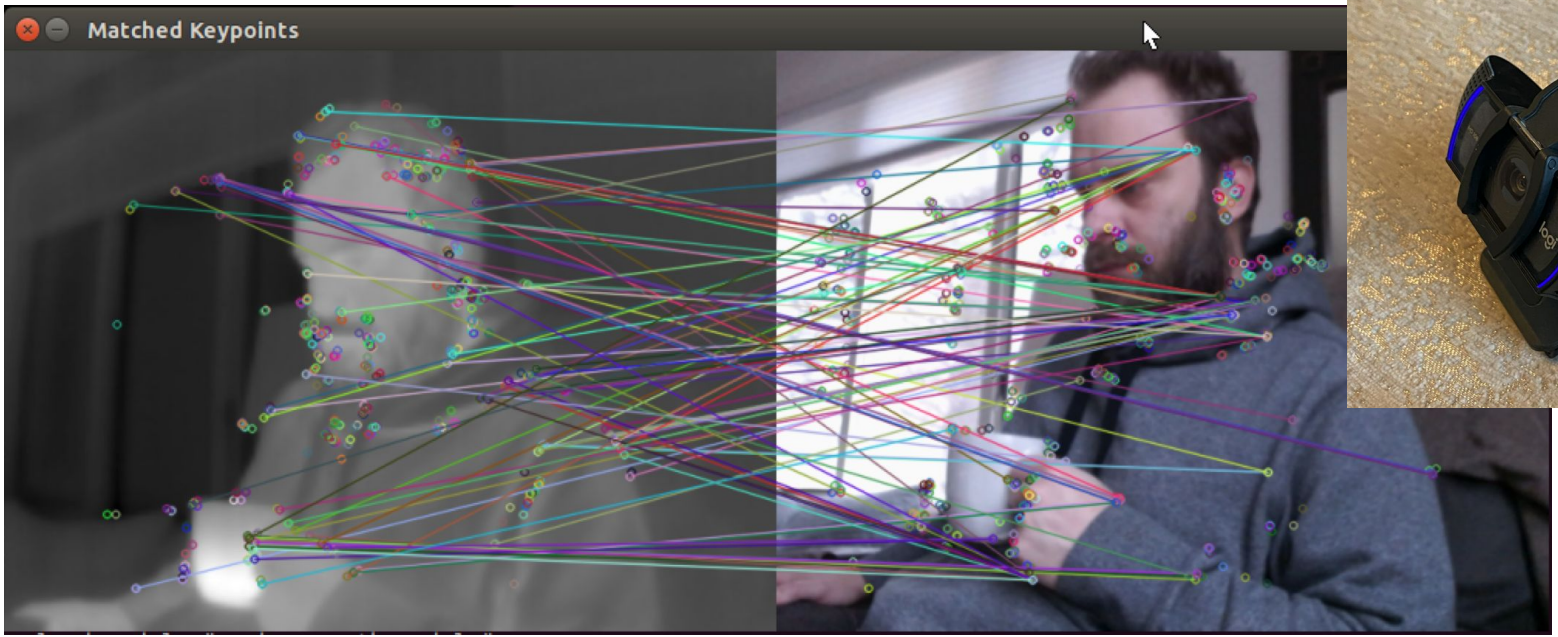
User Interface and Imaging

Thermal Imaging

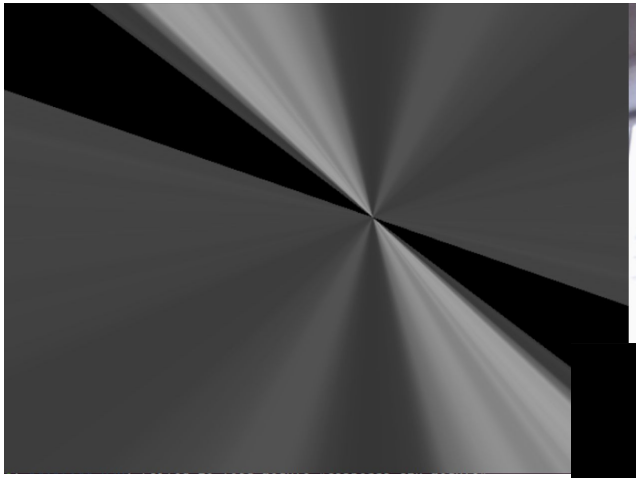
- FLIR Lepton 3.5 LW Infrared Camera
  - https://www.flir.com/products/lepton/
  - $199 - requires IO board
- GroupGets PureThermal2 USB Interface board
  - https://groupgets.com/manufacturers/getlab
  - $119 with case
- GroupGets PureThermal UVC Capture Library
  - https://github.com/groupgets/purethermal1-uvc-capture
- GroupGets fork of lib-uvc
  - https://github.com/groupgets/libuvc

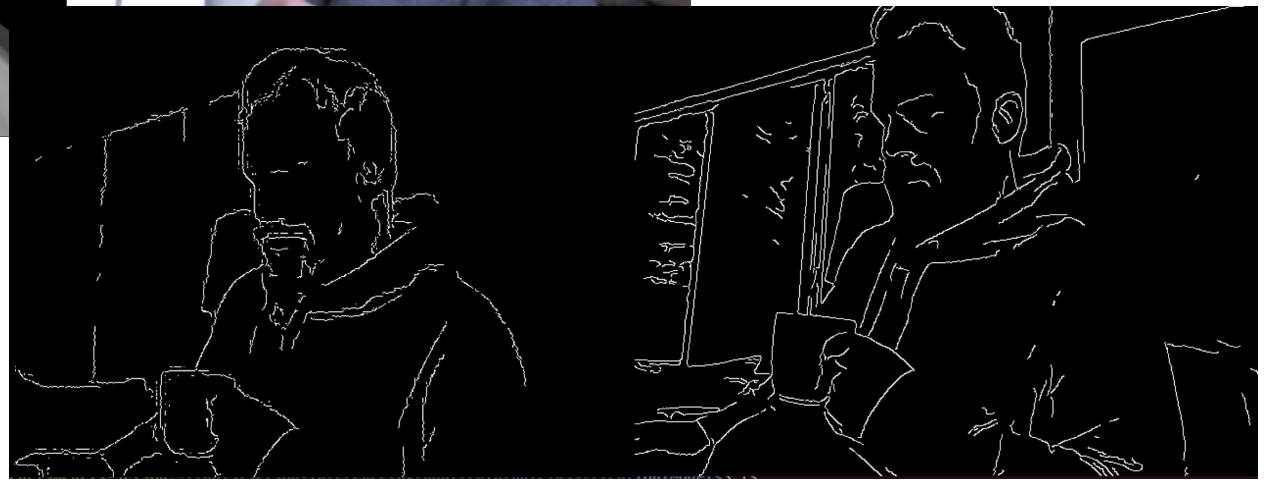


Stereo camera alignment / Image Registration



Stereo camera alignment / Image Registration





Github Repository

https://github.com/cweyandt/mask-and-fever-detector

Questions?