MINOR PROJECT :

FACE MASK DETECTION SYSTEM

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BACKGROUND

- Novel human coronavirus disease COVID-19 has become the fifth documented pandemic since the 1918 flu pandemic.
- Throughout 2020, the virus has spread to **219** Countries and Territories with a total of **134M confirmed cases** of the coronavirus COVID-19 and a death toll of **2.9M deaths.**
- COVID-19 spreads mainly from person to person through respiratory droplets.
- According to the WHO, one of the most effective methods of preventing the spread of the virus.

MOTIVATION AND SCOPE

- “To prevent the hardship of this last year from happening again, pandemic preparedness must be taken as seriously as we take the threat of war.” - Bill Gates.
- Several countries, including India, have made wearing masks in public compulsory.
- Maintaining hygiene and using protective equipment has become even more important ahead of the reopening of religious places, malls, and restaurants in India.
- This motivated us to create a the COVID-19 Mask Detector to help ensure your safety and the safety of others

PROBLEM STATEMENT

“The COVID 19 pandemic has spread globally at a rapid rate. Wearing masks have proved to be an effective and crucial method of prevention in battling the spread of this virus and various other viruses. In this project, we aim to create a face mask detection system in Python, using machine learning, neural networks and computer vision. We further implement this output onto an Arduino Uno to give an audio alert(via a buzzer) and a visual output (via a LED). By doing so we hope to create a face mask detection and alert system that can help curb the spread if the virus and promote COVID appropriate behavior in the future.”

LITERATURE SURVEY

01

Prototype for Integration of Face Mask Detection and Person Identification Model – COVID-19

02

Face Mask Detection Using MobileNetV2 in The Era of COVID-19 Pandemic

03

Implementation Of Tensorflow And Caffe Frameworks: In View Of Application

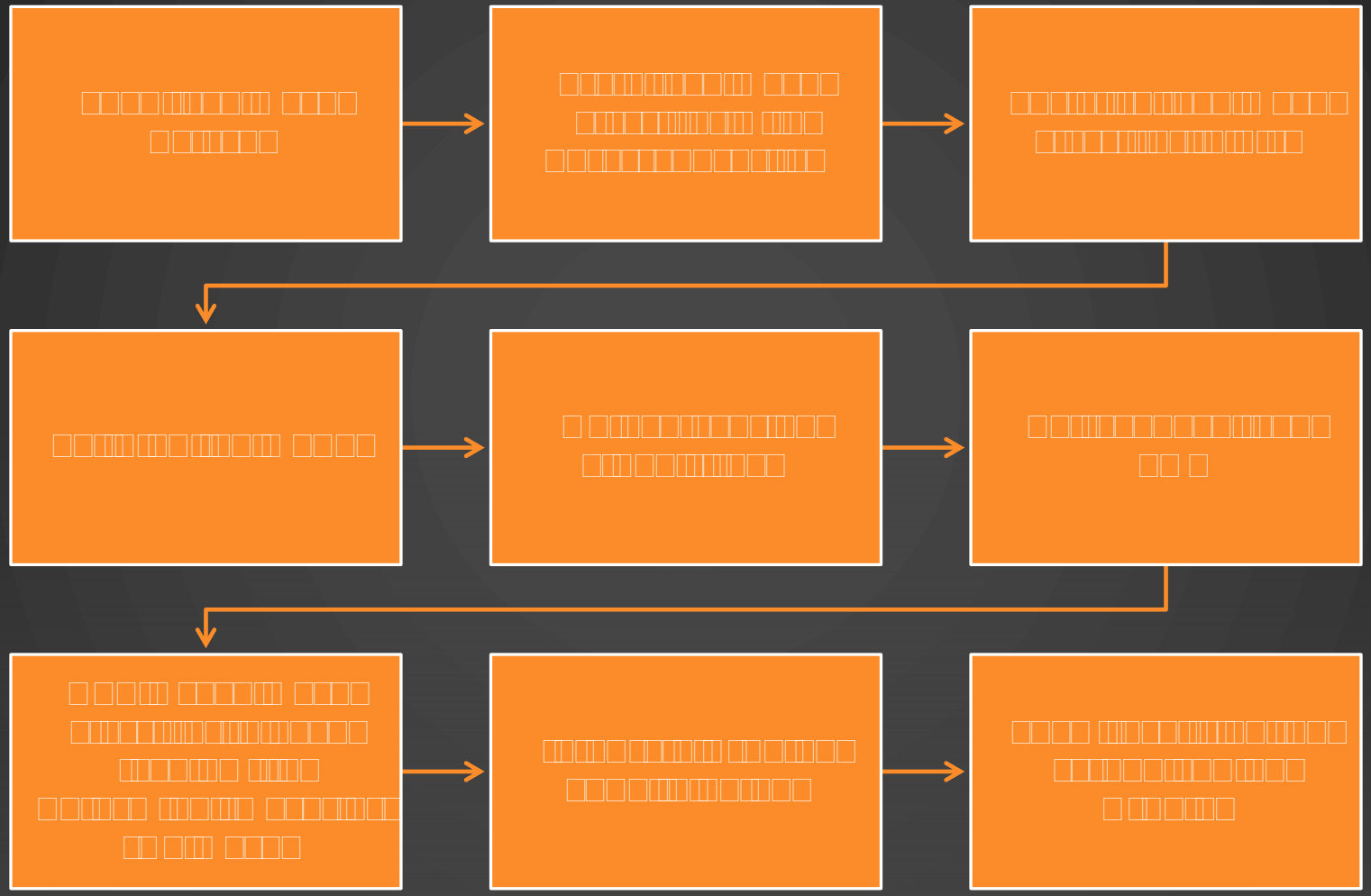
04

Face Mask Detection Using MobileNetV2 in The Era of COVID-19 Pandemic

There are two distinct phases :

- Training: Here we focus on loading our face mask detection dataset from disk, training a model (using Keras/TensorFlow) on this dataset, and then serializing the face mask detector to disk.
- Deployment: Once the face mask detector is trained, we can then move on to loading the mask detector, performing face detection, and then classifying each face as with_mask or without_mask using the webcam.

FLOWCHART



Load face mask dataset

Train face mask classifier with Keras/Tensorflow

Serialize face mask classifier to disk

Building the model

Detect faces on video stream

Extract each face ROI

Apply Face mask classifier to each face ROI to determine "Mask" or "No Mask"

Integrate Arduino code in python

Show results on the screen and on Arduino

[illegible]


Keras

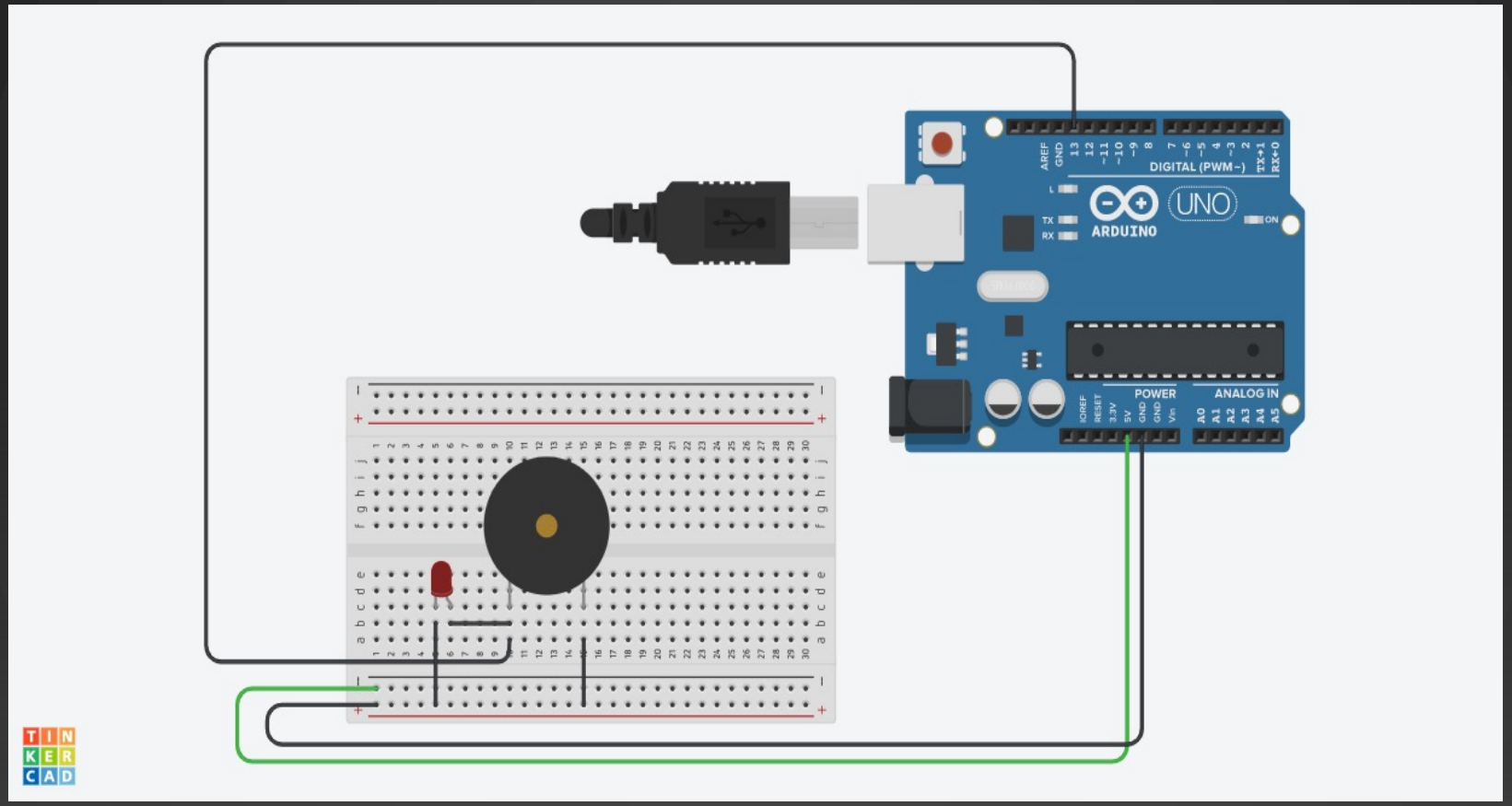

jupyter


OpenCV
(Open Source Computer Vision)


python

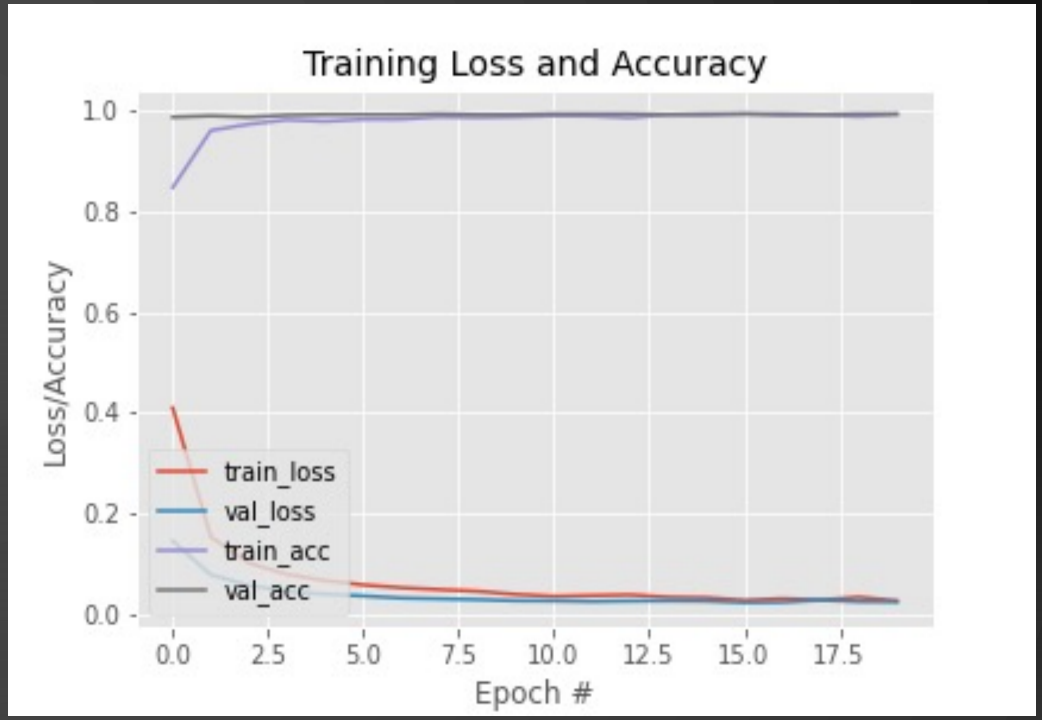

scikit
learn

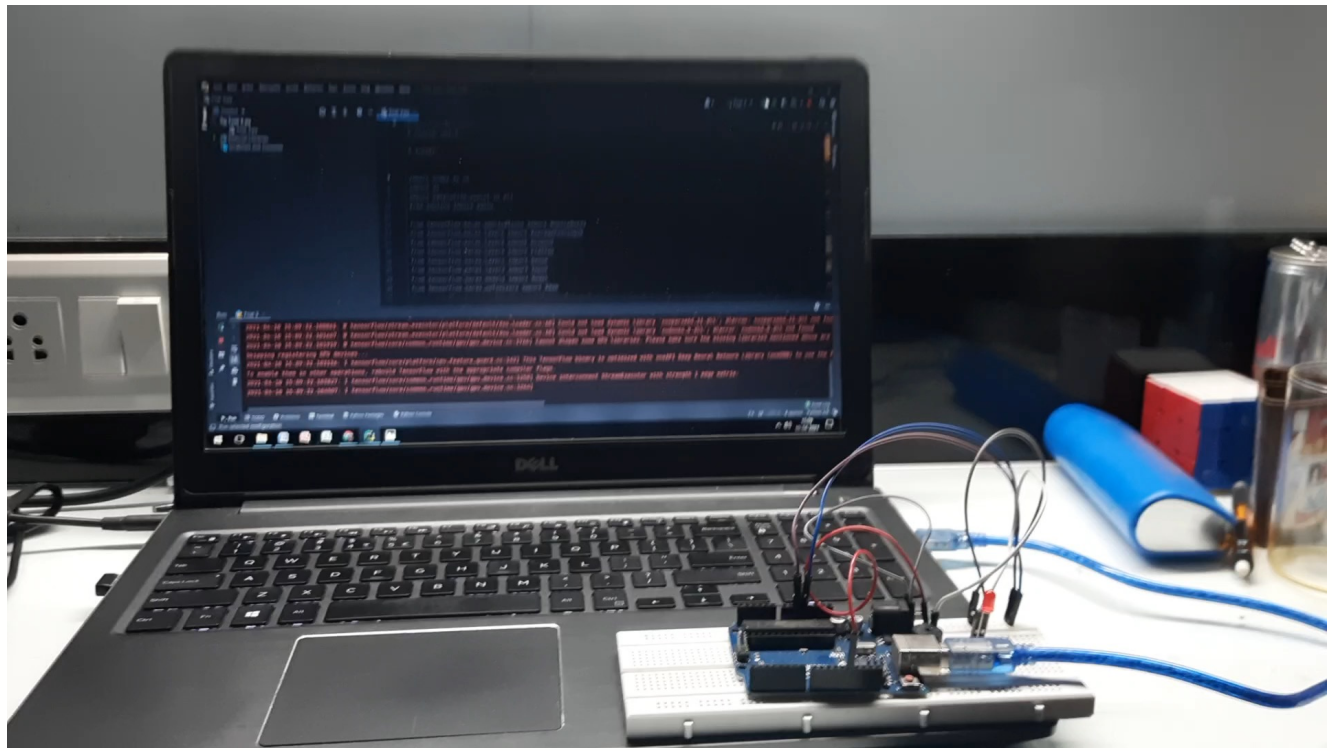

TensorFlow


DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN
TINKERCAD

EVALUATION METRICS

	precision	recall	f1-score	support
with mask	0.98	0.99	0.99	138
without mask	0.99	0.98	0.99	138
accuracy			0.99	276
macro avg	0.99	0.99	0.99	276
weighted avg	0.99	0.99	0.99	276





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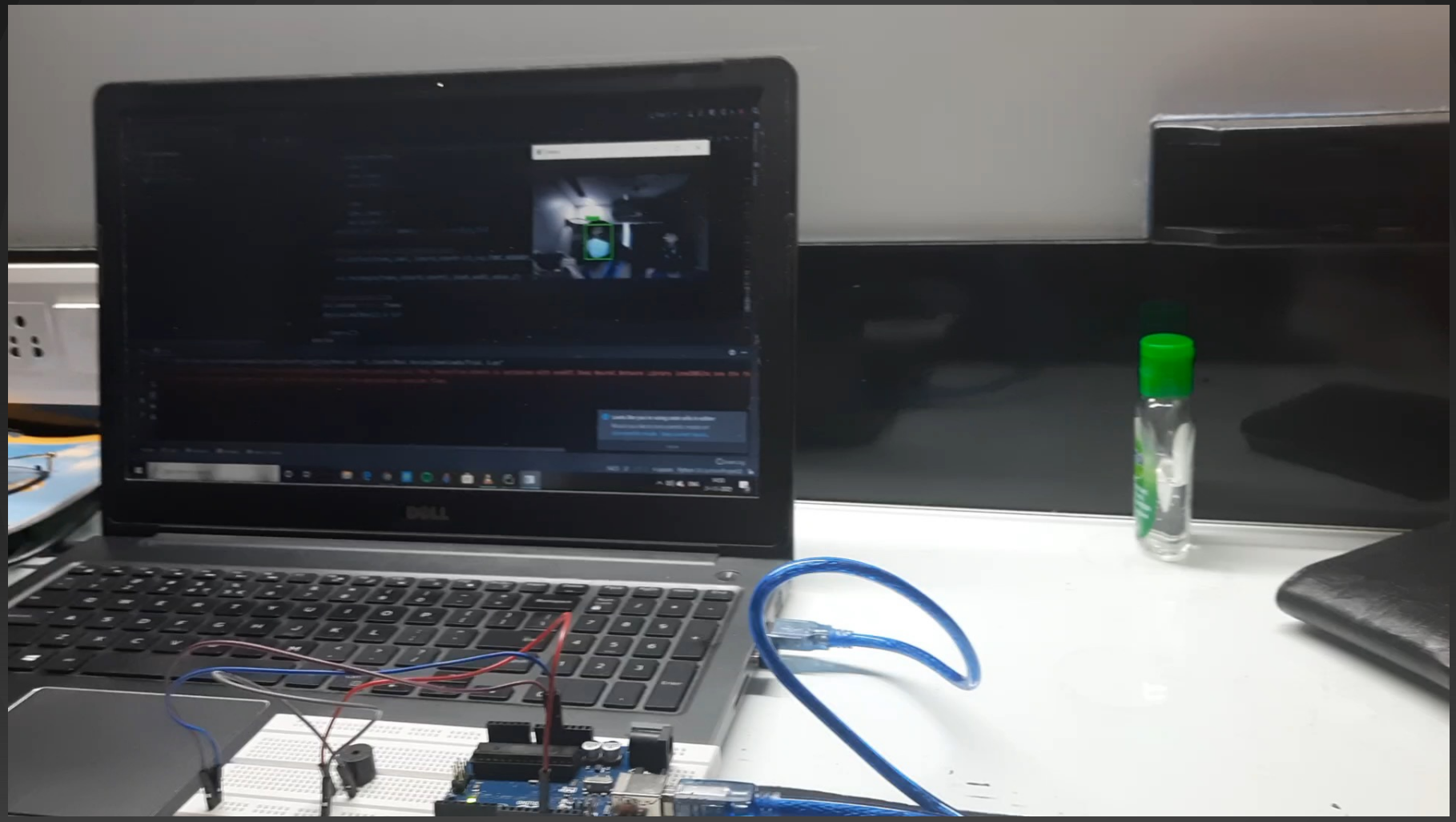

- We fine-tuned MobileNetV2 on our *mask/no mask* dataset and obtained a classifier that is **99% accurate.**
- We then took this face mask classifier and applied it to both *images* and *real-time video streams* by:
    1. Detecting faces in images/video
    2. Extracting each individual face
    3. Applying our face mask classifier

Our face mask detector is accurate, and since we used the MobileNetV2 architecture, it's also *computationally efficient*, making it easier to deploy the model to embedded systems (Raspberry Pi, Google Coral, Nano, etc.).