



# **GROUP D3**

# **MAJOR PROJECT PRESENTATION**

# **MONITORING SOCIAL DISTANCING USING IMAGE PROCESSING AND DETERMINING EFFICIENCY**

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# LITERATURE REVIEW

[1] Suganthi A et al. OpenCV was used for face detection and recognition. The program was developed to recognise human face using data models.

[2] Martin H. Trauth. The main tools for importing, manipulating and exporting image data were presented. This knowledge was then used to process satellite images.

# OBJECTIVE

Our main aim is to detect people in a video, and mark the number of social distancing violations according to the distance between them.

This helps in reducing the spread of the virus, building a habit of social distancing among people.

# METHODOLOGY

- The code is used to :-
  - Detect people in a frame.
  - Calculate social distancing violation, stay at home index and social distancing index in real time.
- Its efficiency will be derived using actual parameters:-
  - Laser distance meter is used to calculate actual distance and to find accuracy of tracker.
  - Theodolite is used to find a cut-off angle after which the tracker shows error for elevated surfaces.

# IF DISTANCE < 6 FT



# IF DISTANCE $\geq$ 6FT



# TECH USED

- Programming language used : Python
- Image Processing
- Deep Learning
- Theodolite
- Laser distance meter



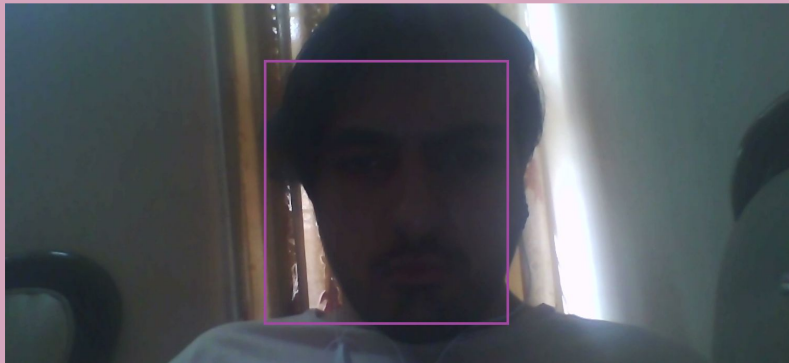
# STEPS TO ACHIEVE OBJECT DETECTION

We have used OpenCV library for image processing.

First, we used it to detect a person in an image.

We also performed detection on videos downloaded from the internet, via copyright free sources.

# DETECTION USING IMAGE PROCESSING



Front View



Side View

# STEPS TO DETERMINE EFFICIENCY

TO DETERMINE EFFICIENCY OF OUR TRACKER, WE HAD TO COMPARE IT WITH ORIGINAL PARAMETERS.

TO GET ORIGINAL PARAMETERS, WE USED MECHANICAL INSTRUMENTS LIKE THEODOLITE AND LASER DISTANCE METER.

# OBSERVATION TABLE 1

## Laser Distance Meter measurements

Actual Distance (ft)	Violation shown	Actual Violation	Deviation from 6ft, if error observed
5.8	Yes	Yes, as $d < 6\text{ft}$	NA
5.85	No	Yes, as $d < 6\text{ft}$	0.15
5.9	No	Yes, as $d < 6\text{ft}$	0.1
5.95	No	Yes, as $d < 6\text{ft}$	0.05
6.0	Yes	No, as $d \geq 6\text{ft}$	0
6.05	Yes	No, as $d \geq 6\text{ft}$	-0.05
6.10	No	No, as $d \geq 6\text{ft}$	NA

# OBSERVATION 2

## Theodolite measurements

Inclination angle (degrees)	Error in observation for 0.5 ft deviation(6.5 ft)	Error in observation for 1 ft deviation(7 ft)
15.2	No	No
21.2	No	No
27.5	No	No
32.4	No	No
35.7	Yes	No
38.6	Yes	Yes

# CALCULATIONS

Mean Deviation using laser distance meter

$$\begin{aligned} &= (0.15 + 0.1 + 0.05 + 0 + 0.05) / 5 \\ &= 0.07 \text{ ft} \end{aligned}$$

$$\begin{aligned} \text{Error \%} &= (0.07 / 6) * 100 \\ &= 1.167 \% \end{aligned}$$

$$\text{Hence, Accuracy} = 100 - 1.167 = 98.83 \%$$

Using theodolite, the cut-off point for correct observations is found as roughly 35.7 degrees.

# RESULT

The application was made successfully using python programming, with 98.8% efficiency, with a cutoff point for an elevated surface as 35.7 degrees.

# REFERENCES

1. Li Zhao Zhu et al. The Algorithm of Moving Objects Detection and Movement Templates Based on OpenCV. Aimed at the characteristics of the algorithms for moving objects detection, the paper describes the detection algorithm which integrates movement template detection and the algorithm of two consecutive frames difference.

2. To learn Python programming language :

<https://www.coursera.org/learn/python-crash-course/home/welcome>

3. To learn about OpenCv and Image Processing :

<https://www.udemy.com/course/python-for-computer-vision-with-opencv-and-deep-learning/>