Simple Theta IPS

Techniques used:

- fast object detection
- Theta 360 image transformation
- deep neural network model, (pre-trained)
- Calculate direction + distance to CAM

Approach

FAST SCAN: Fast human (or possibly to be human) object detection ---------- may get multiple possible datapoints

View Retrieving: get view via Theta 360 image transformation

Verification: AI object recognition with a resnet50 ML model.

Calculation:

Precise offset (minor adjustment)

Get direction + distance to CAM

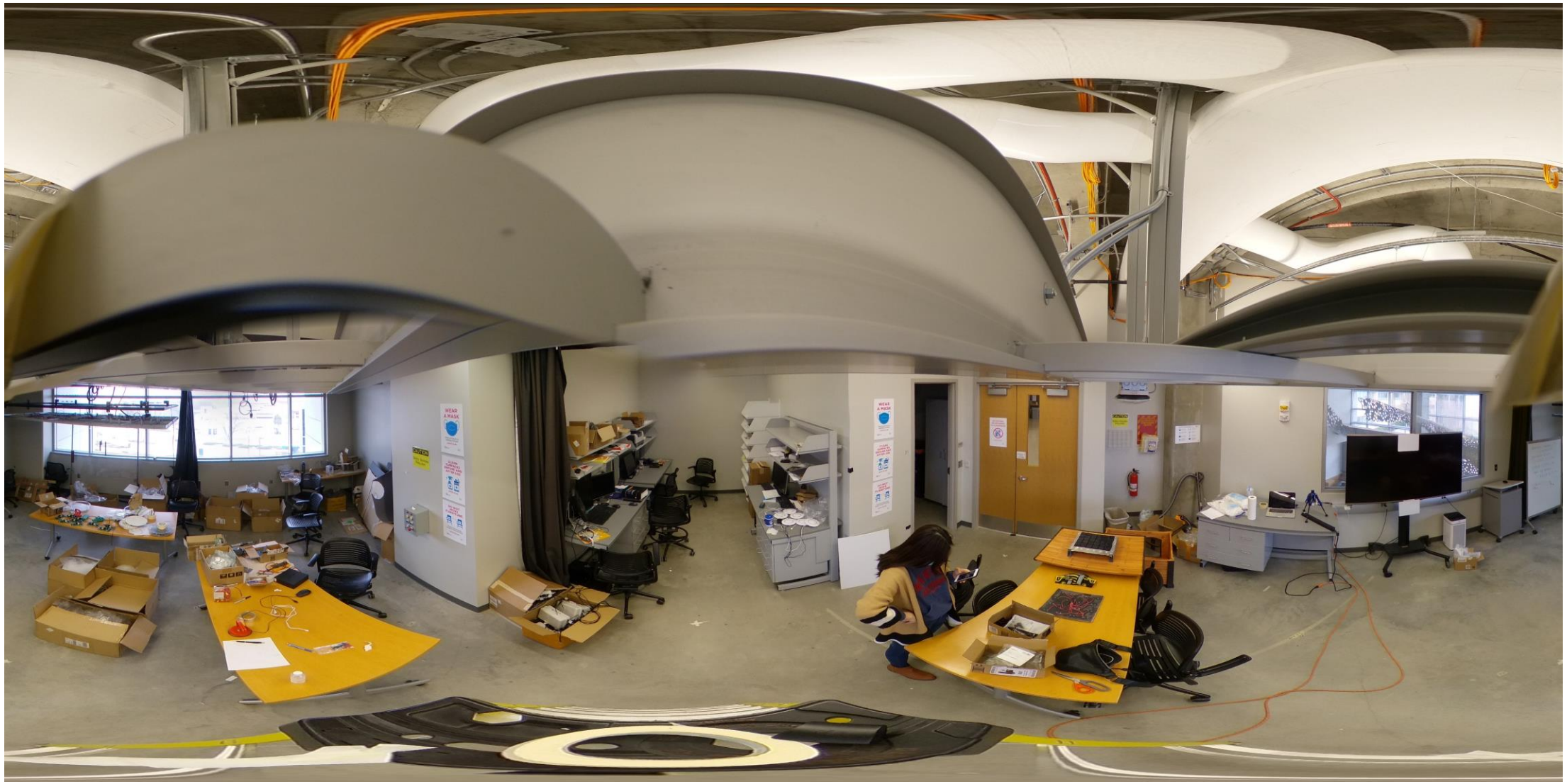
location obtained

DEMO

FIG 1

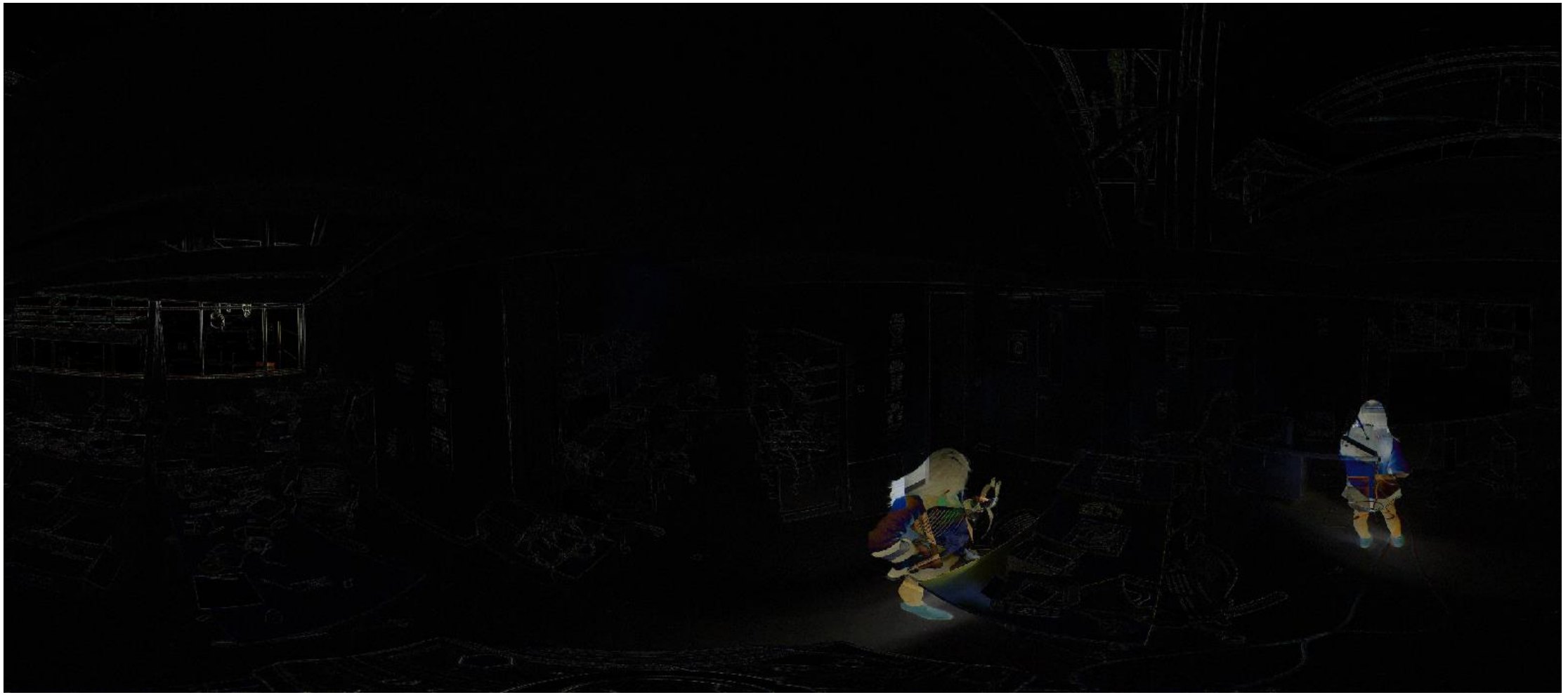
DEMO

FIG 2



DEMO

1. scan

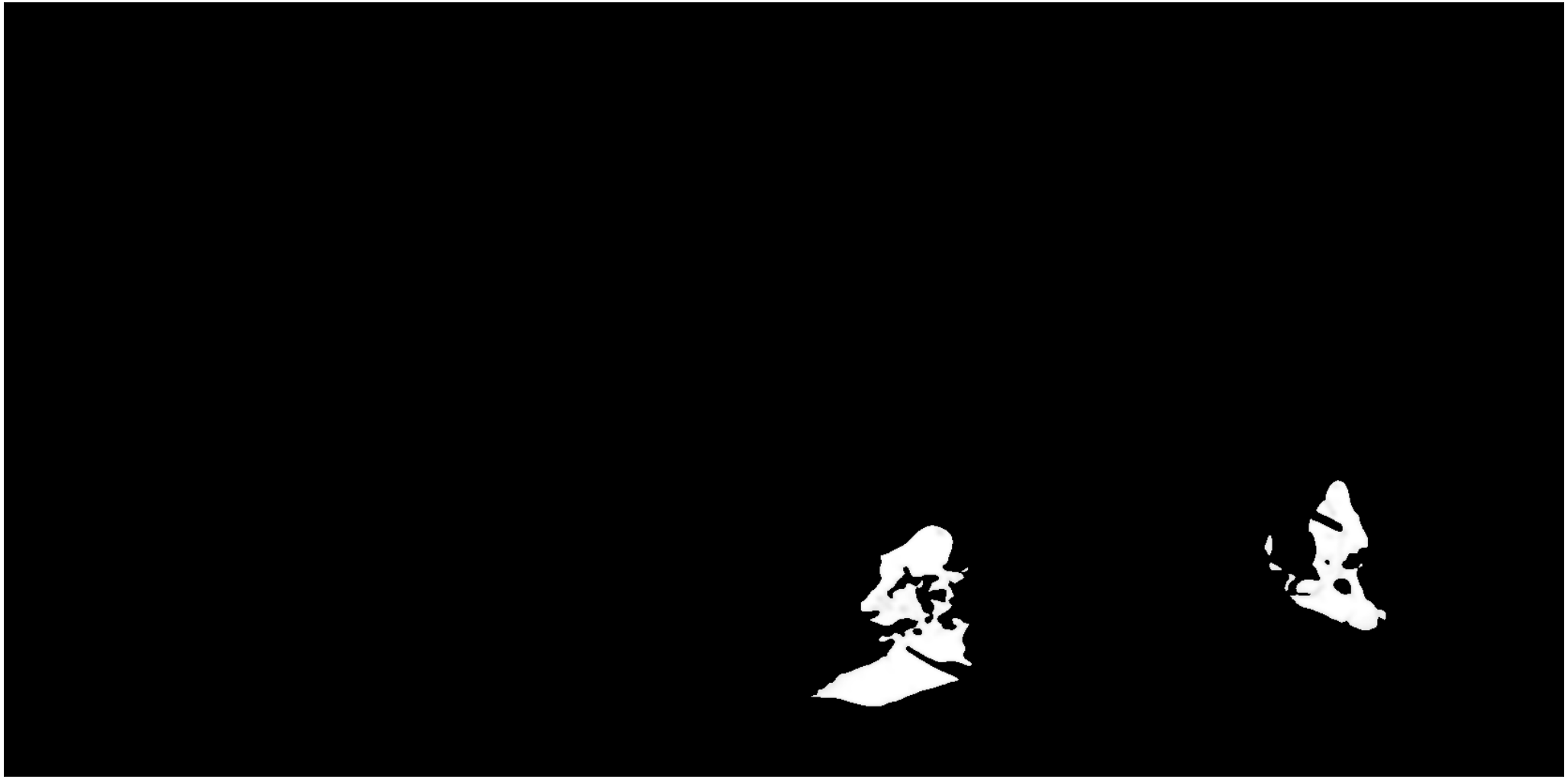


DEMO

2. Enhance

DEMO

3. Salient extraction



DEMO

```
View of object detected
Notes: positive number, X: clock-wise, Y: looking down
DP_1, [X]: -28 (deg), [Y]: 54 (deg)
DP_2, [X]: -127 (deg), [Y]: 40 (deg)
>>
```

DEMO

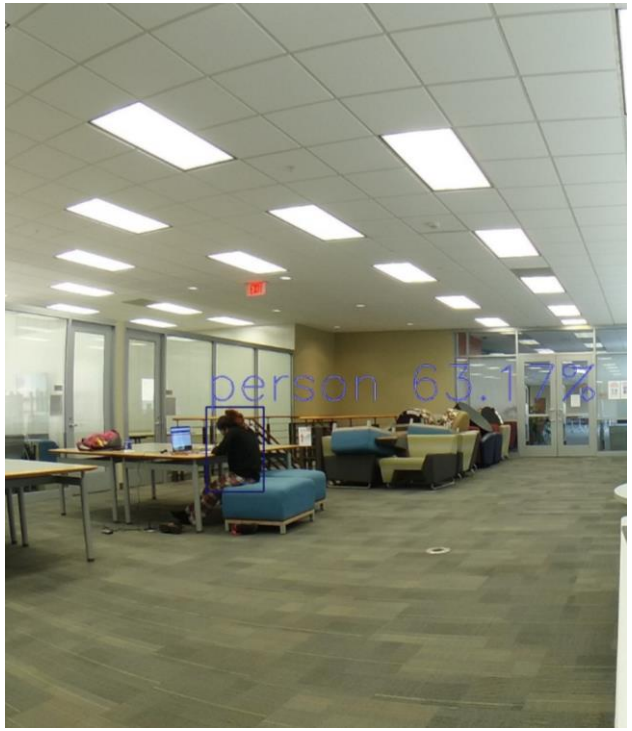
```
View of object detected
Notes: positive number, X: clock-wise, Y: looking down
DP_1, [X]: -28 (deg), [Y]: 54 (deg)
DP_2, [X]: -127 (deg), [Y]: 40 (deg)
>>
```

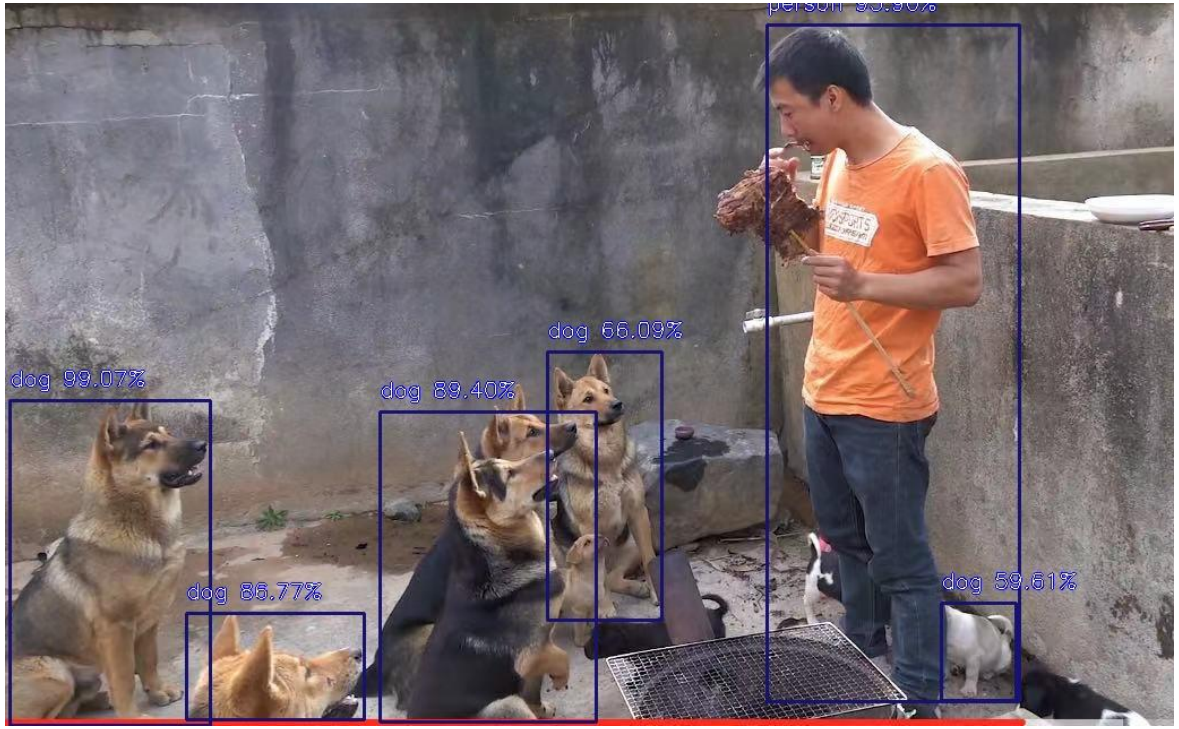
Retrieved view via theta 360 transformation

Then,
Input this view to AI detection.

DEMO

ML Model used: RetinaNet (resnet50)

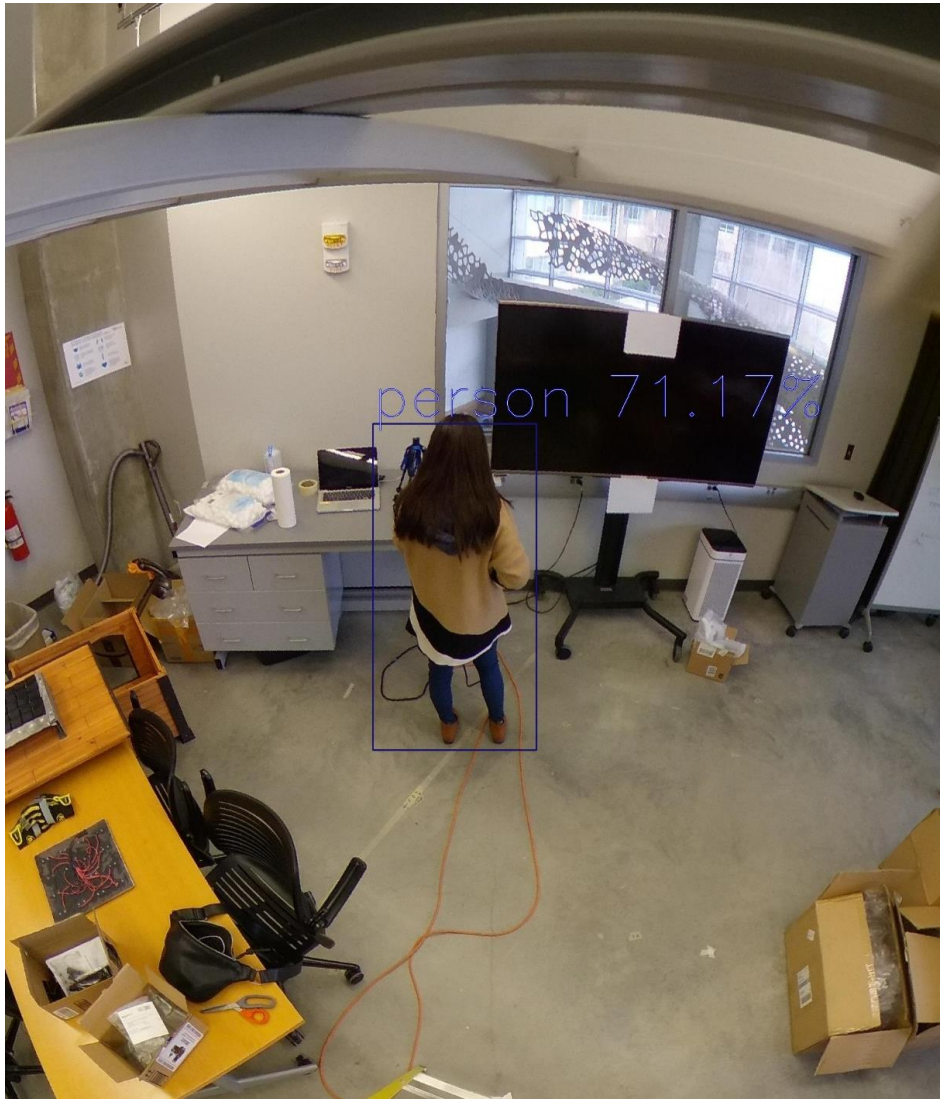




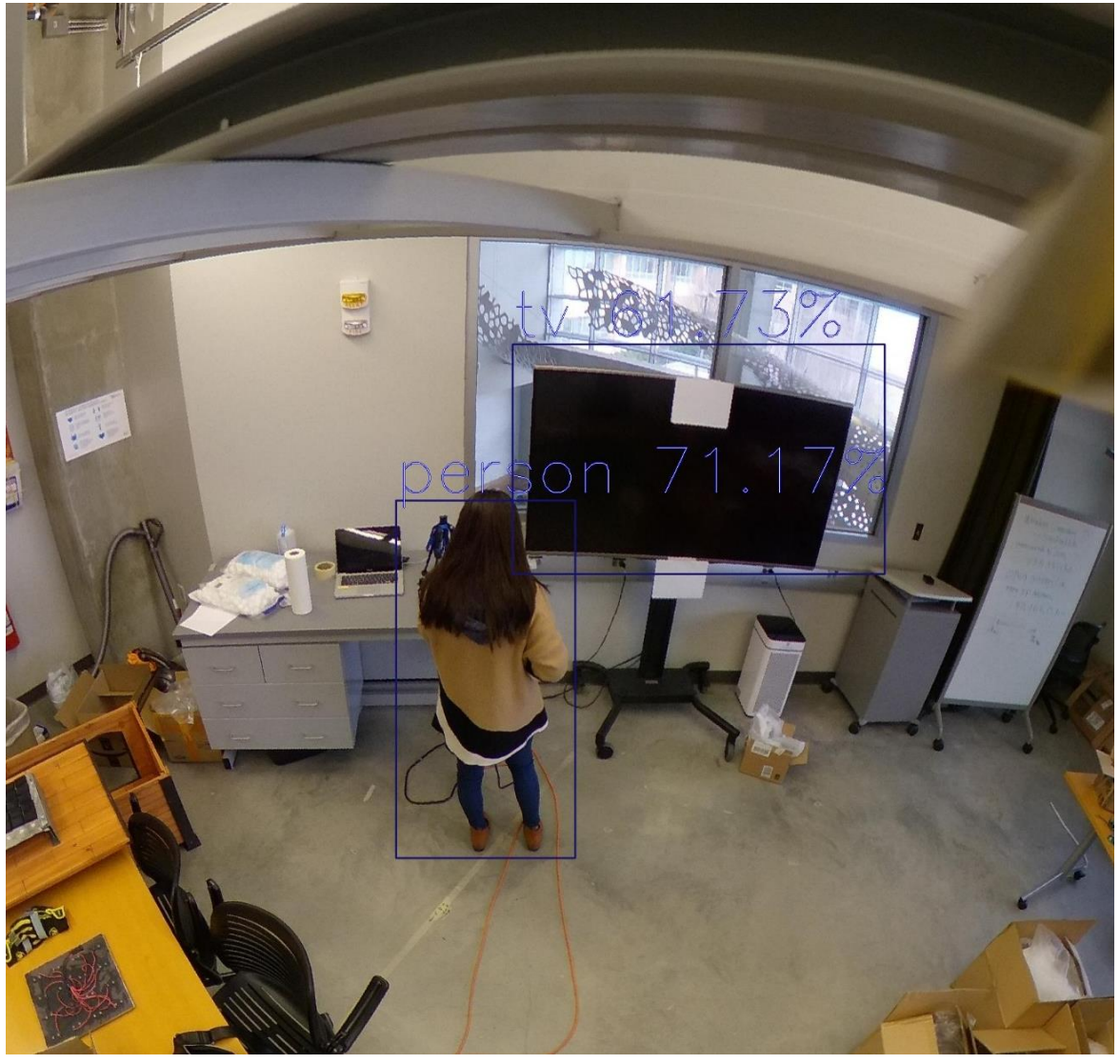

```
person, bicycle, car, motorcycle, airplane, bus, train, truck, boat, traffic light, fire hydrant, stop_sign,
parking meter, bench, bird, cat, dog, horse, sheep, cow, elephant, bear, zebra,
giraffe, backpack, umbrella, handbag, tie, suitcase, frisbee, skis, snowboard,
sports ball, kite, baseball bat, baseball glove, skateboard, surfboard, tennis racket,
bottle, wine glass, cup, fork, knife, spoon, bowl, banana, apple, sandwich, orange,
broccoli, carrot, hot dog, pizza, donot, cake, chair, couch, potted plant, bed,
dining table, toilet, tv, laptop, mouse, remote, keyboard, cell phone, microwave, oven,
toaster, sink, refrigerator, book, clock, vase, scissors, teddy bear, hair dryer, toothbrush.
```

DEMO

Customized detection



Full detection



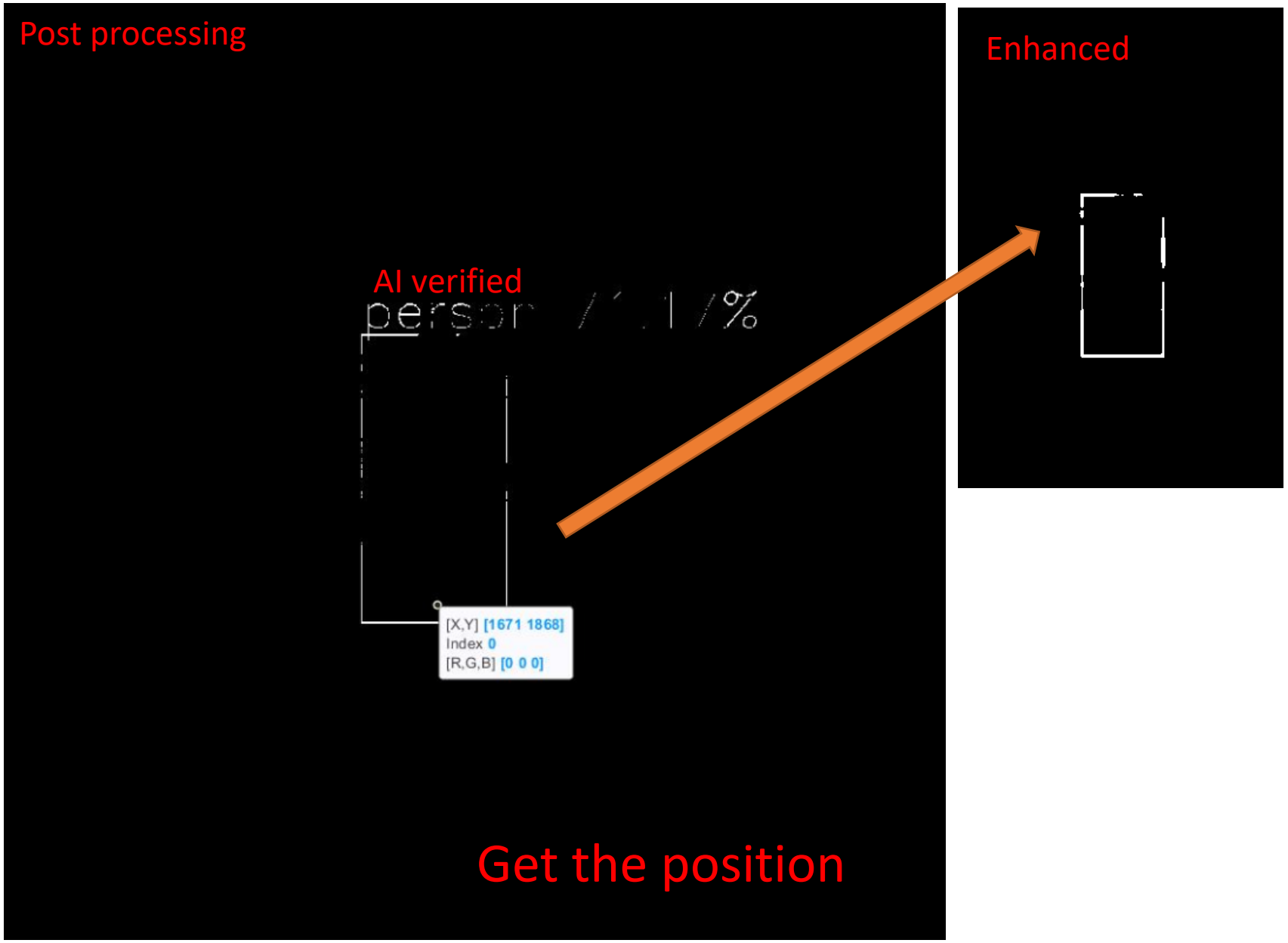
DEMO

From fast object scan

```
Current view:
 Horizontal: -127
 Vertical: 40
Angle offset:
 Angle_offset_H: 0
 Angle_offset_V: 10
New view:
 Horizontal: -127
 Vertical: 50
```

Minor adjust

Now, the aiming point is human position



DEMO

```
New view:
 Horizontal: -127
 Vertical: 50
```

This aiming point should be on the human feet

Results

```
OK!
Human location:
Distance to camera: 6.71 (ft)
Angle: -127 (deg,[+] is anti-clockwise)

...End...
>>
```

Final view

DEMO

CAM principal view

CAM ground view