

# Computer vision project



## Measurement system

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# Agenda

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# Description

The measurement system receives an image as input, detects the shapes, waits for the user to select an object as reference, and that object as a well-known measure is taken as the base to measure all the others.

# Applications

- You can use an app like this one, to measure things when you do not have a rule, or instead of measuring with the hand, you can use your phone, take a picture, run the app and get the measurement approximately.
- In the industry is also very useful when someone tries to measure something and can not touch physically the object, whether it is too cold or too hot, or just because of the distance between the person and the object.

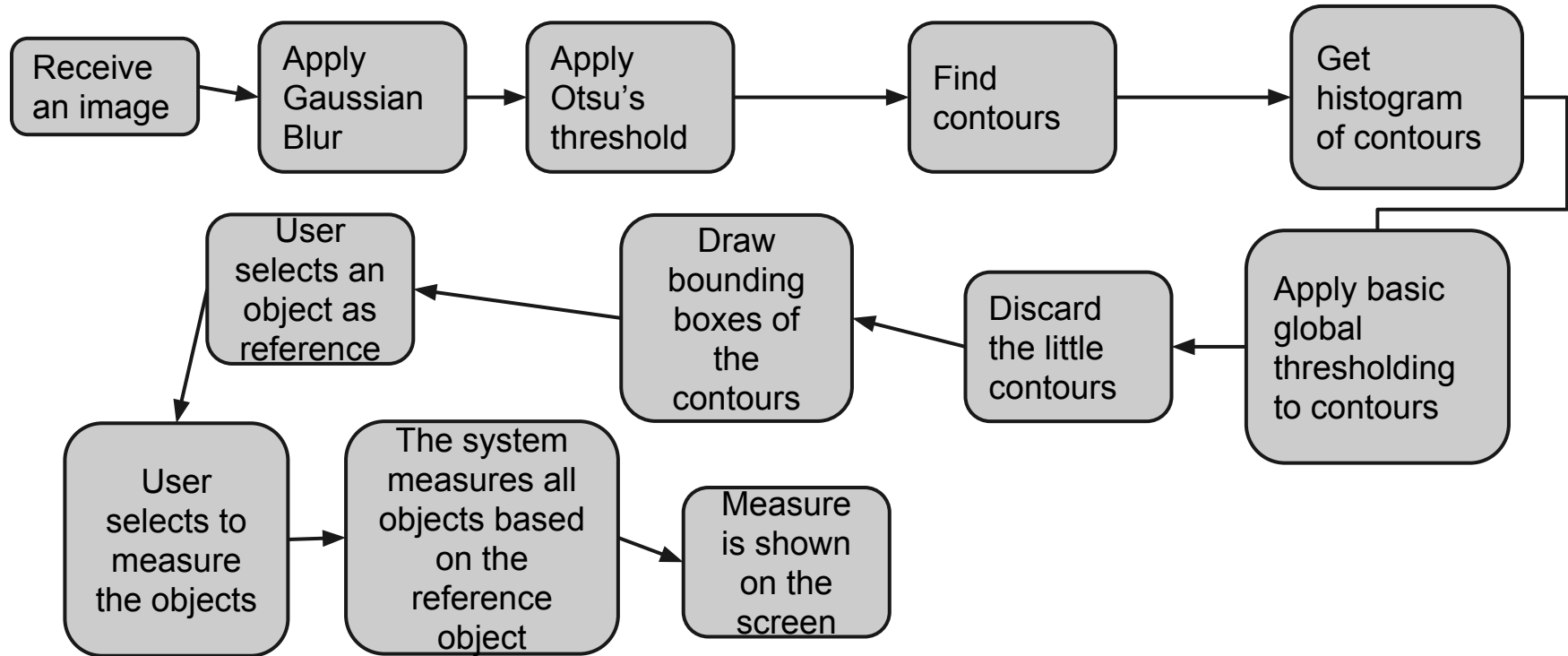
# Objective

My objective with this project is to have an MVP (Minimum Viable Product). I mean, a product as prototype to demonstrate the basic functionality and experiment, in order to gain learning, experience and profits.

# Development

- 1) GUI (Graphical User Interface)
  - a) Created with Pygame
  - b) File picker with tkinterFileDialog
- 2) Image processing
  - a. OpenCV

# Development



# Development

```
def Measure(objectIndex, contourBoxes, unit):
```

```
    dist = []
```

```
    box = contourBoxes[objectIndex]
```

```
    dist.append(math.hypot(box[1][0] - box[0][0], box[1][1] - box[0][1]))
```

```
    dist.append(math.hypot(box[3][0] - box[0][0], box[3][1] - box[0][1]))
```

```
    baseMeasure = 4.0 #cm
```

```
    resultImg = cv2.imread("RESULT.png")
```

```
    for i in range(len(contourBoxes)):
```

```
        if i != objectIndex or 1 == 1:
```

```
            boxDist = []
```

```
            boxToMeasure = contourBoxes[i]
```

```
            boxDist.append(math.hypot(boxToMeasure[1][0] - boxToMeasure[0][0], boxToMeasure[1][1] - boxToMeasure[0][1]))
```

```
            boxDist.append(math.hypot(boxToMeasure[3][0] - boxToMeasure[0][0], boxToMeasure[3][1] - boxToMeasure[0][1]))
```

```
            width = boxDist[0]*baseMeasure/dist[0]
```

```
            height = boxDist[1]*baseMeasure/dist[1]
```

```
            label1 = str(float("{0:.1f}".format(height)))
```

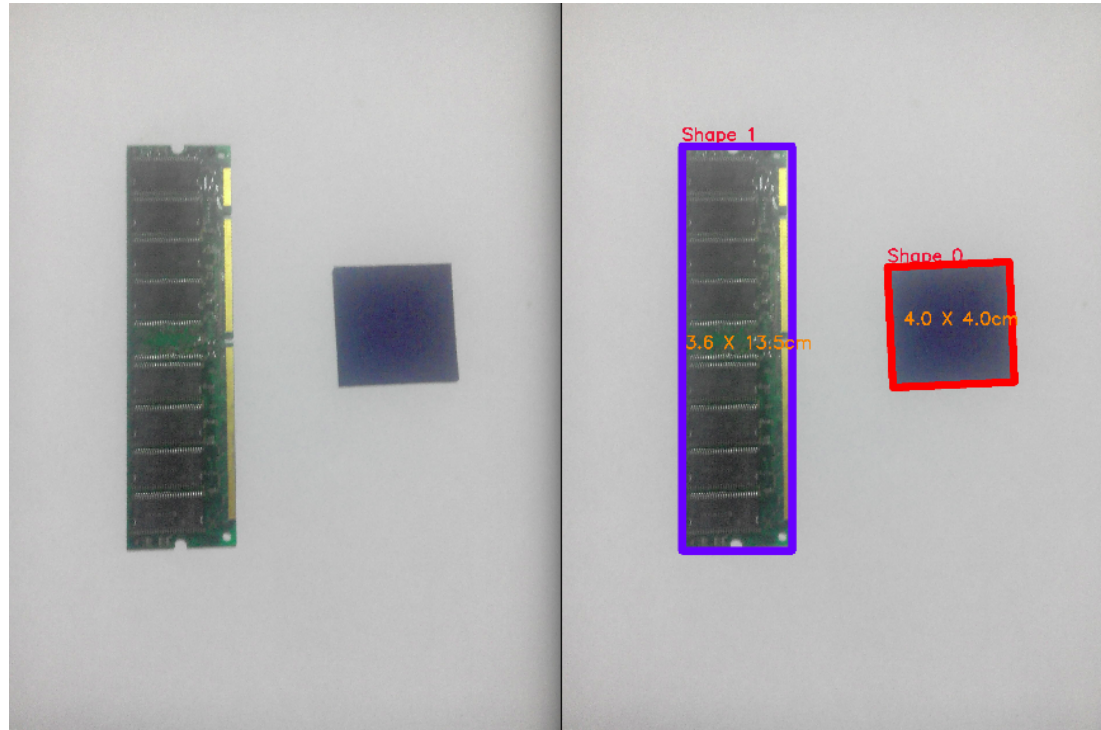
```
            label2 = str(float("{0:.1f}".format(width)))
```

```
        if unit == "cm":
```

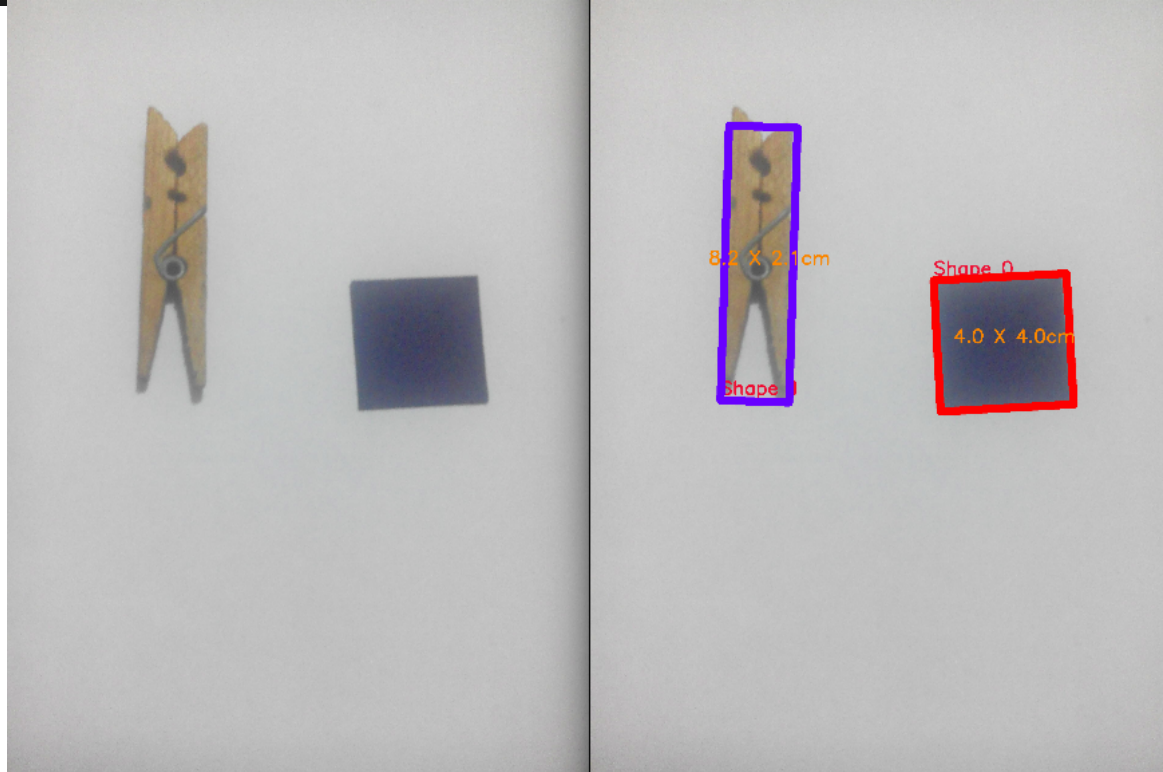
```
            label = label1 + " X " + label2 + " cm"
```



# Tests



# Tests



# Tests



# Tests



# Demo video

[https://www.youtube.com/watch?  
v=GBAVYRhBBdU](https://www.youtube.com/watch?v=GBAVYRhBBdU)

# Future work

- 1) Identify perspective of the image and calculate the distance depending on the angle of the camera.
- 2) Implement convex hull recognition.
- 3) Add a preprocessing method to get rid of the shadows without affecting the border recognition.
- 4) Indicate any object as reference with its size
- 5) Enhance the user experience with a better design
- 6) When it draws, it opens the image, draw and then write and reopen the image every time. I will need to open the image and then put a canvas on it to draw anything without writing and opening the image.

# Future work

- 7) Add button to “save the image as...”
- 8) When I select an object I have to click inside the invisible bounding box formed by  $x_{min}, x_{max} - y_{min}, y_{max}$ . This creates a bug when an object is at 45° for example.
- 9) Export it to app mobile (Android, Windows Phone, IOS)
- 10) Adapt it for Google glasses and Microsoft Hololens

# References

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# Q&A

