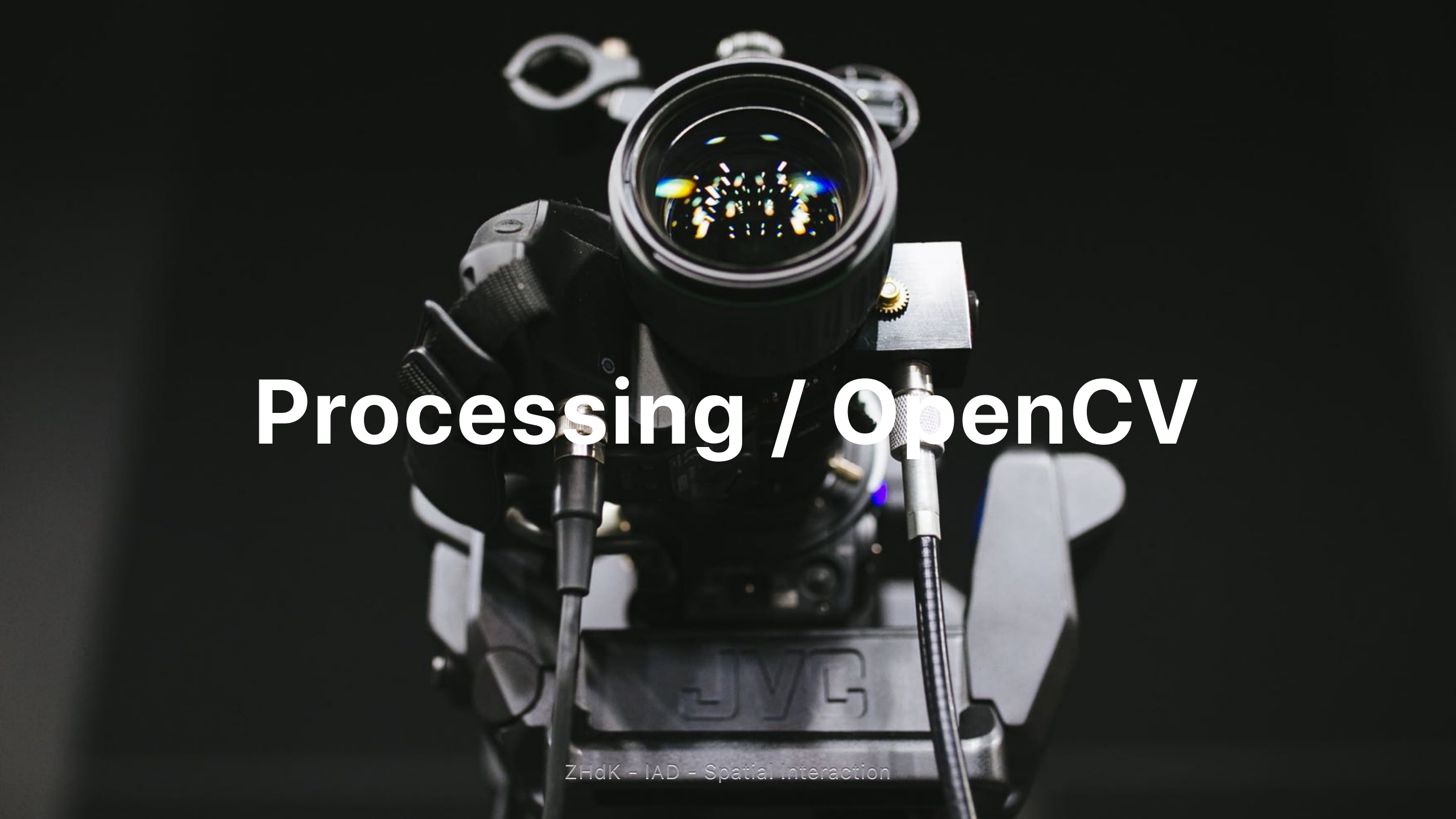


Processing / OpenCV

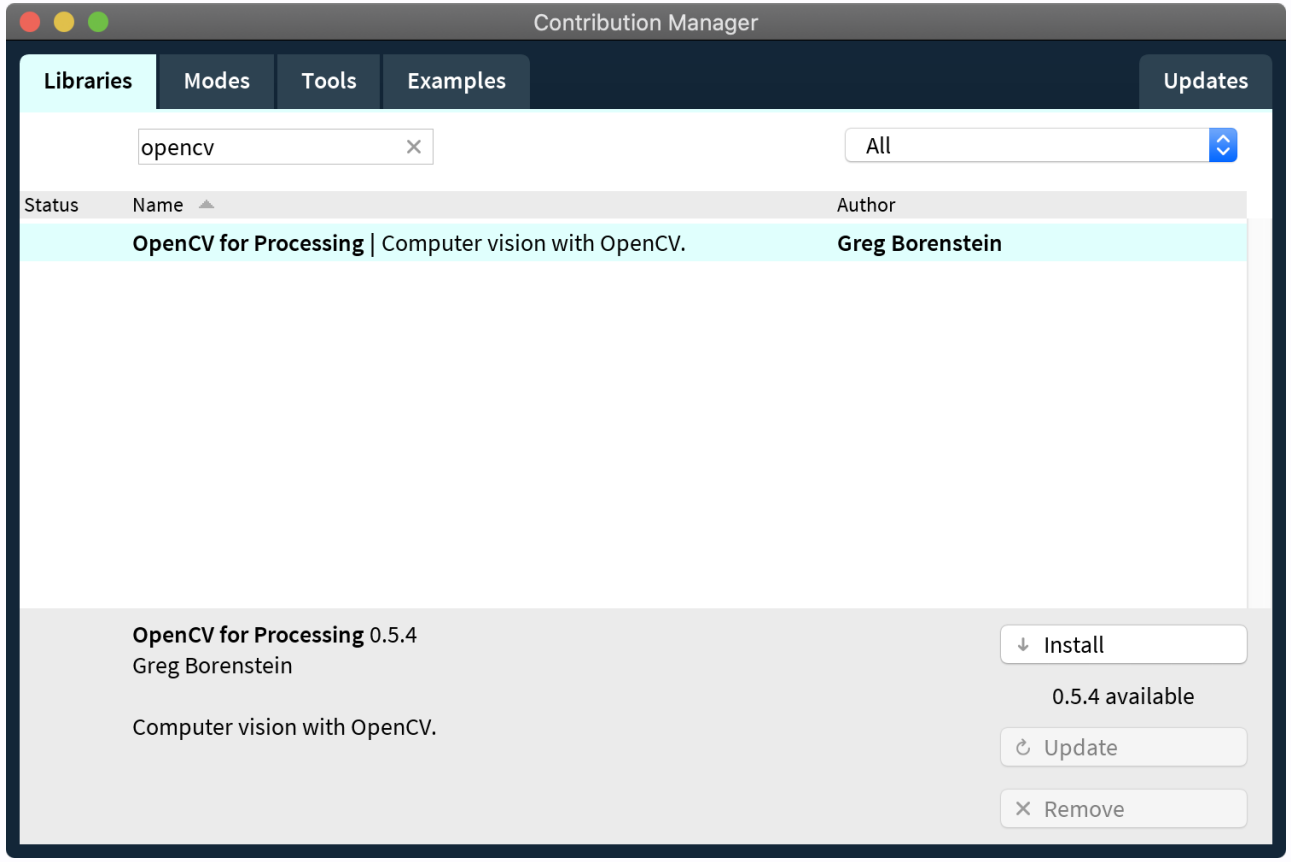
Open Computer Vision Framework

- Intel (2000)
- A lot of algorithms
- Traditional & ML
- Very fast but complex

OpenCV for Processing

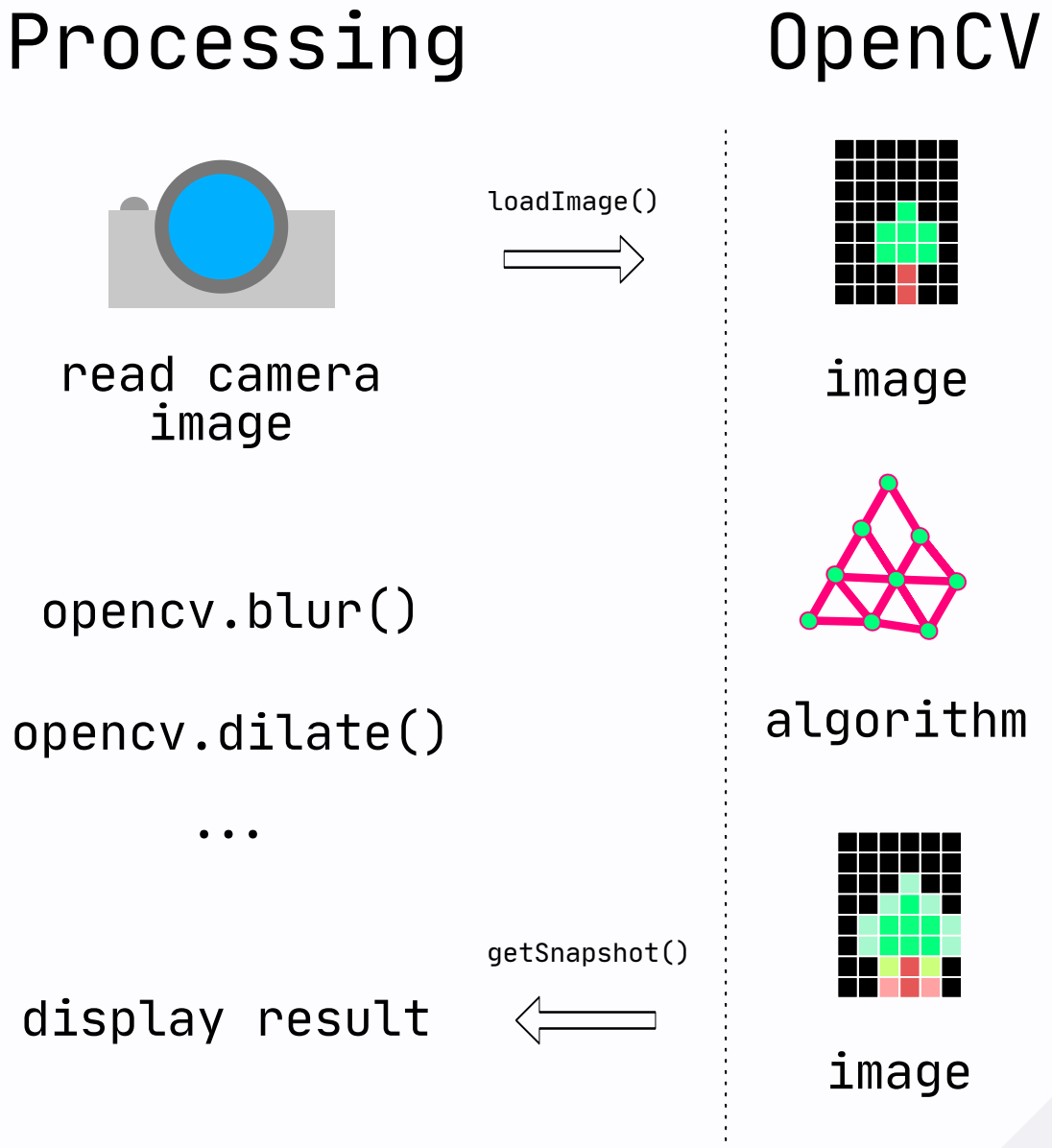
- Greg Borenstein
- MIT Media Lab
- Simplified

Installation



How to use?

- Load image to opencv
- Call algorithms
- Get result back



How to use?

```
import gab.opencv.*;

OpenCV opencv;

void setup() {
  opencv = new OpenCV(this, 640, 480);
}

void draw() {
  opencv.loadImage(cam);

  // do somethings

  image(opencv.getSnapshot(), 0, 0);
}
```

Task 4 - Brightness Detector (15min)

Use opencv to track the brightest spot.

- `opencv.blur(10);`
- `PVector location = opencv.max();`

Task 4 - Solution

```
opencv.loadImage(cam);

// process
opencv.blur(10);
PVector location = opencv.max();

image(opencv.getSnapshot(), 0, 0);

noFill();
stroke(100, 255, 80);
circle(location.x, location.y, 10);
```

Detecting Objects

(Traditional)

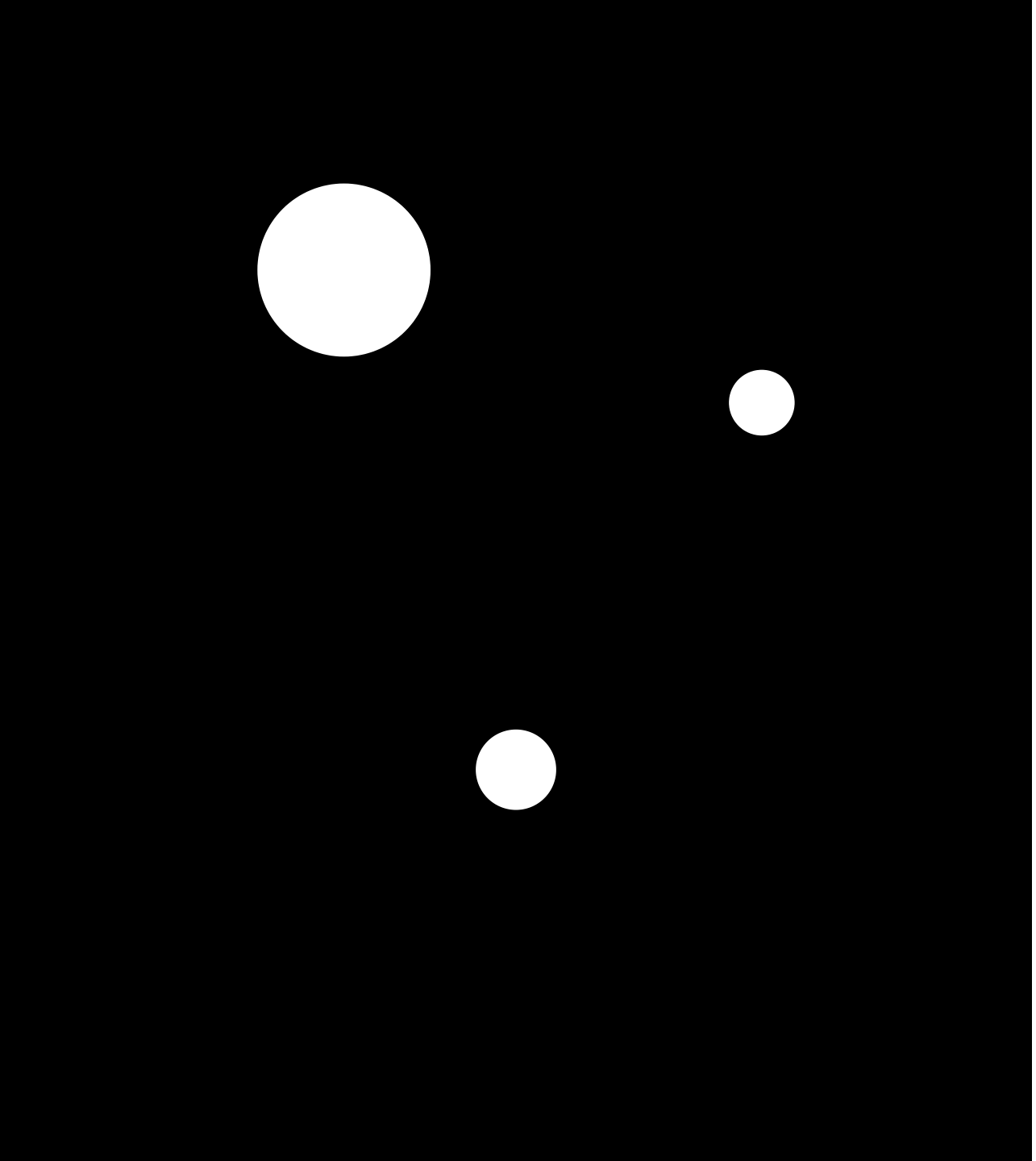
- Characterize
  - Color
  - Shape
  - Size
- Extract
- Compare

Source: Holly Mindrup)

Task 5 - Detecting Apples (30min)

Use the provided image and mark the green apples in the image. Check out the example code to extract Hue colors.

Task 5 - Using the Camera

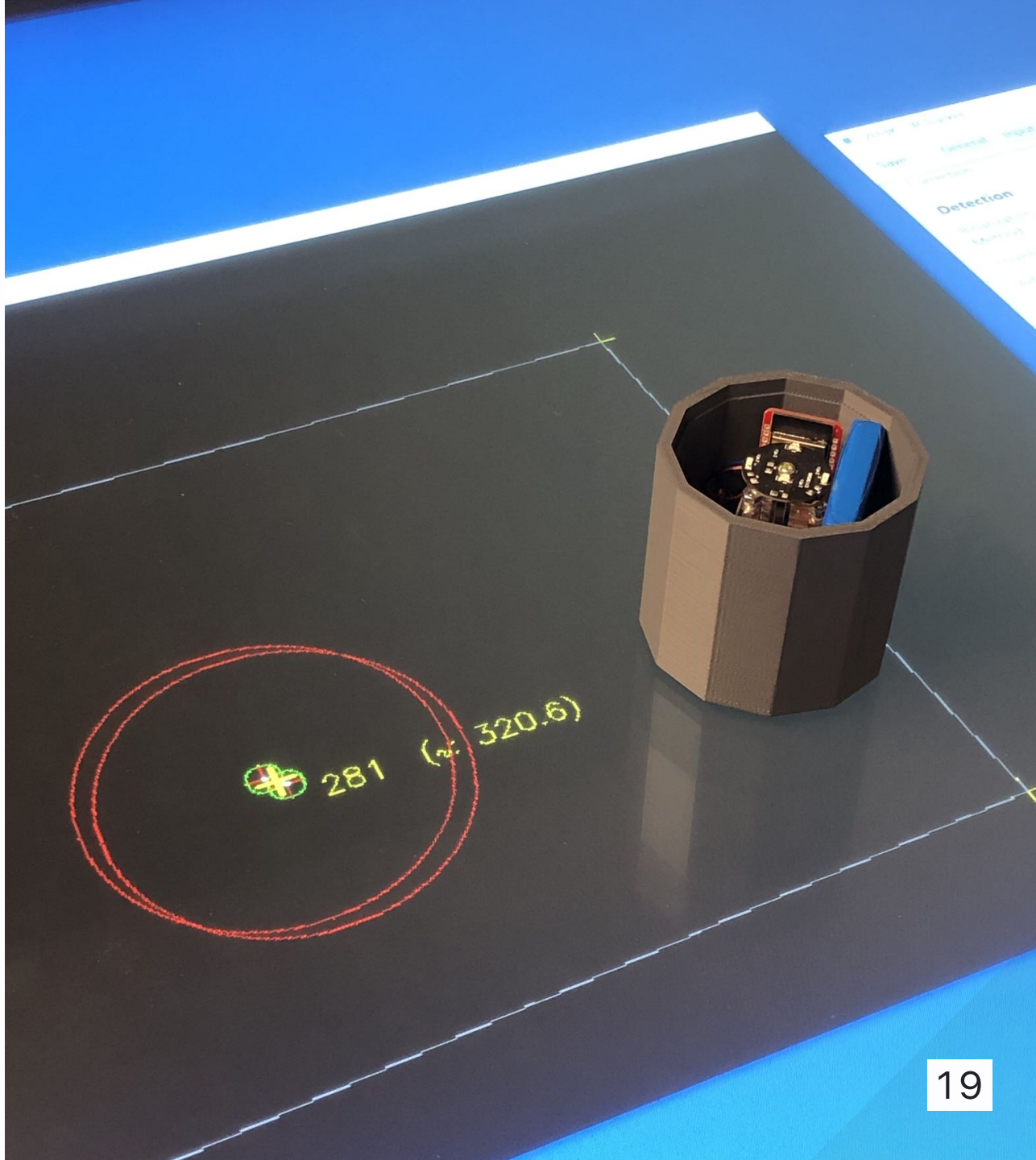


Tactile Table

- Threshold (240)
- Multi user system
- Detect multiple **hot** areas

Contour / Blob Detection

- Detects all white blobs
- Returns position & size
- Used for tracking multiple objects



Find Contours

```
opencv.loadImage(cam);
opencv.threshold(150);

for (Contour contour : opencv.findContours()) {
  contour.draw();
}
```

```
// center
int x = (int)contour.getBoundingBox().getCenterX();
int y = (int)contour.getBoundingBox().getCenterY();

// size
float area = contour.area();
```

Task 6 - Locate Apples (20min)

Locate the position of the apples with the contour detection.

Natural User Interface (NUI)

- Microsoft Kinect
- PlayStation Eye Cam

Source: playstation.com)

Toolset

- Traditional operations on images
- Combine multiple algorithms
- Check out OpenCV Github Page for more examples!