Computer Vision Workshop

Turkish Robotics Off-Season

Kickoff

06/10/2017

Merhaba

- Barış Balcı, OzU EE ‘18, TEVİTÖL / 4191 ‘14

- Kodlama yapanlar?
- Raspberry Pi kullananlar?
- Python kullananlar?

- Beklentileriniz?

Ajanda

- Computer Graphics / Image Processing?
- Bilgisayarla Görme + Kullanım Alanları
- Nasıl?
- Demo 1 – Hedef Analizi
  - Sayma/Koordinat/Uzaklık
- Demo 2 – Obje Takibi
- FRC Entegrasyonu

Computer Graphics/Image Processing

Computer Graphics

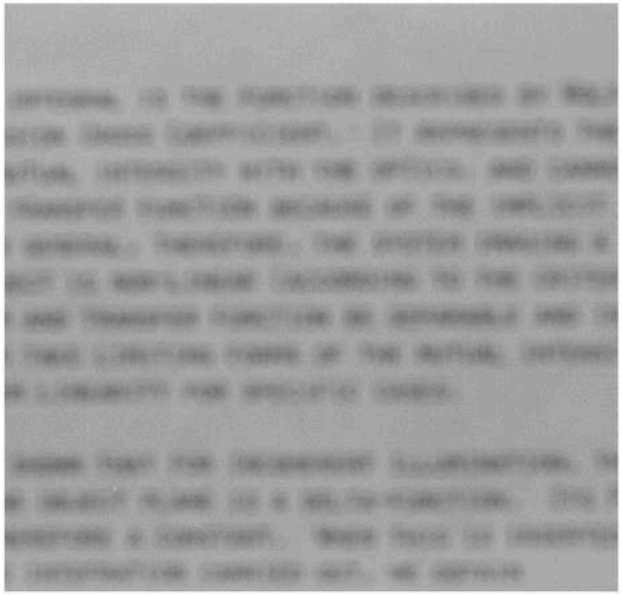
- Lights and materials
- Shading
- Texture mapping
- Environment effects
- Animation
- 3D scene modeling
- 3D character modeling
- *(OpenGL)*

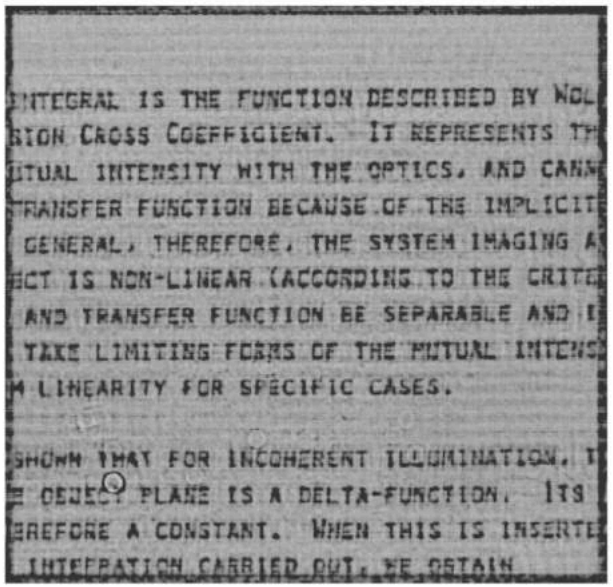
Image Processing Topics

- Resampling
- Enhancement
- Noise filtering
- Restoration
- Reconstruction
- Segmentation
- Image compression
- *(MATLAB and OpenCV)*

Computer Graphics/Image Processing

Image Processing



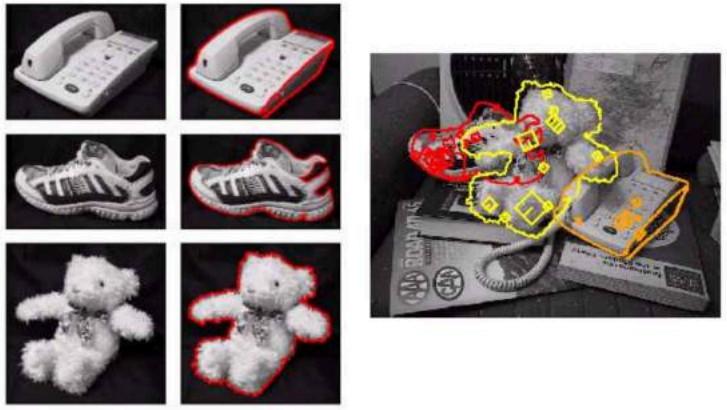


Bilgisayarla Görme

Image Stitching

Image Matching

Object Detection and Recognition

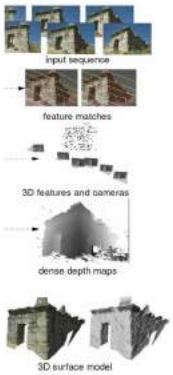


Human Tracking

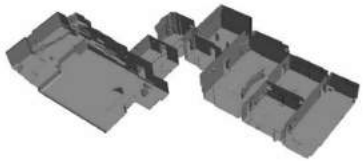
Bilgisayarla Görme

Object Detection and Recognition

3D Reconstruction

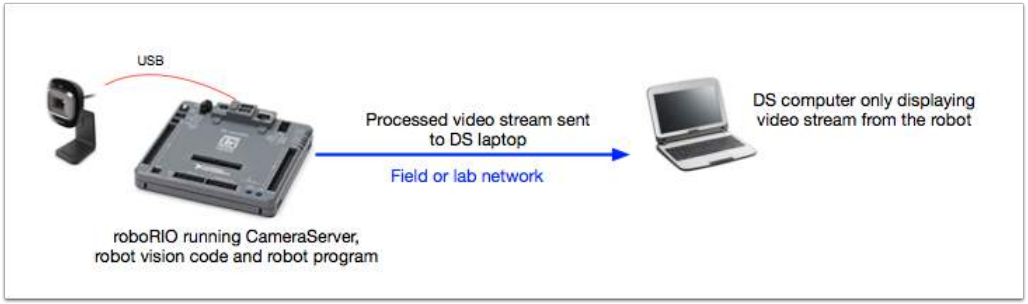


Interior Modeling

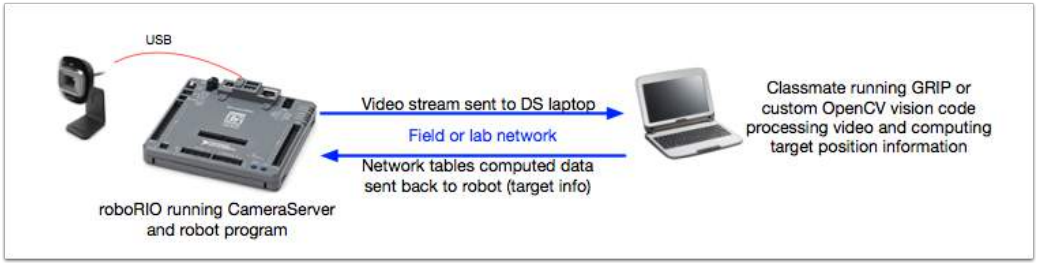


Nasıl?

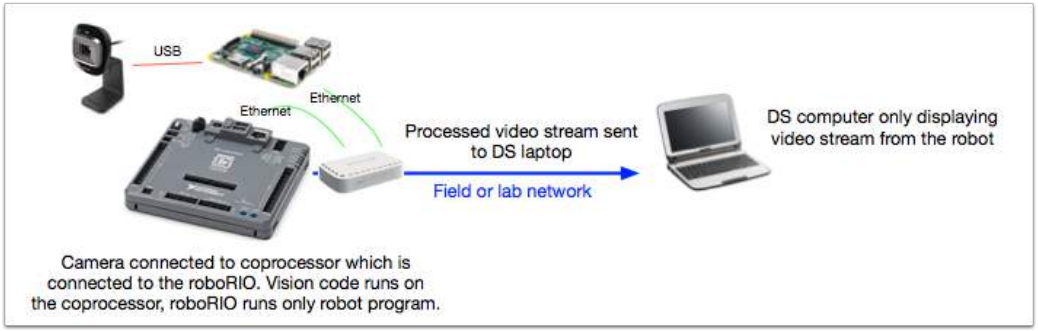
Analiz roboRIO üzerinde



Analiz DS bilgisayarında



Analiz yardımcı işlemcide



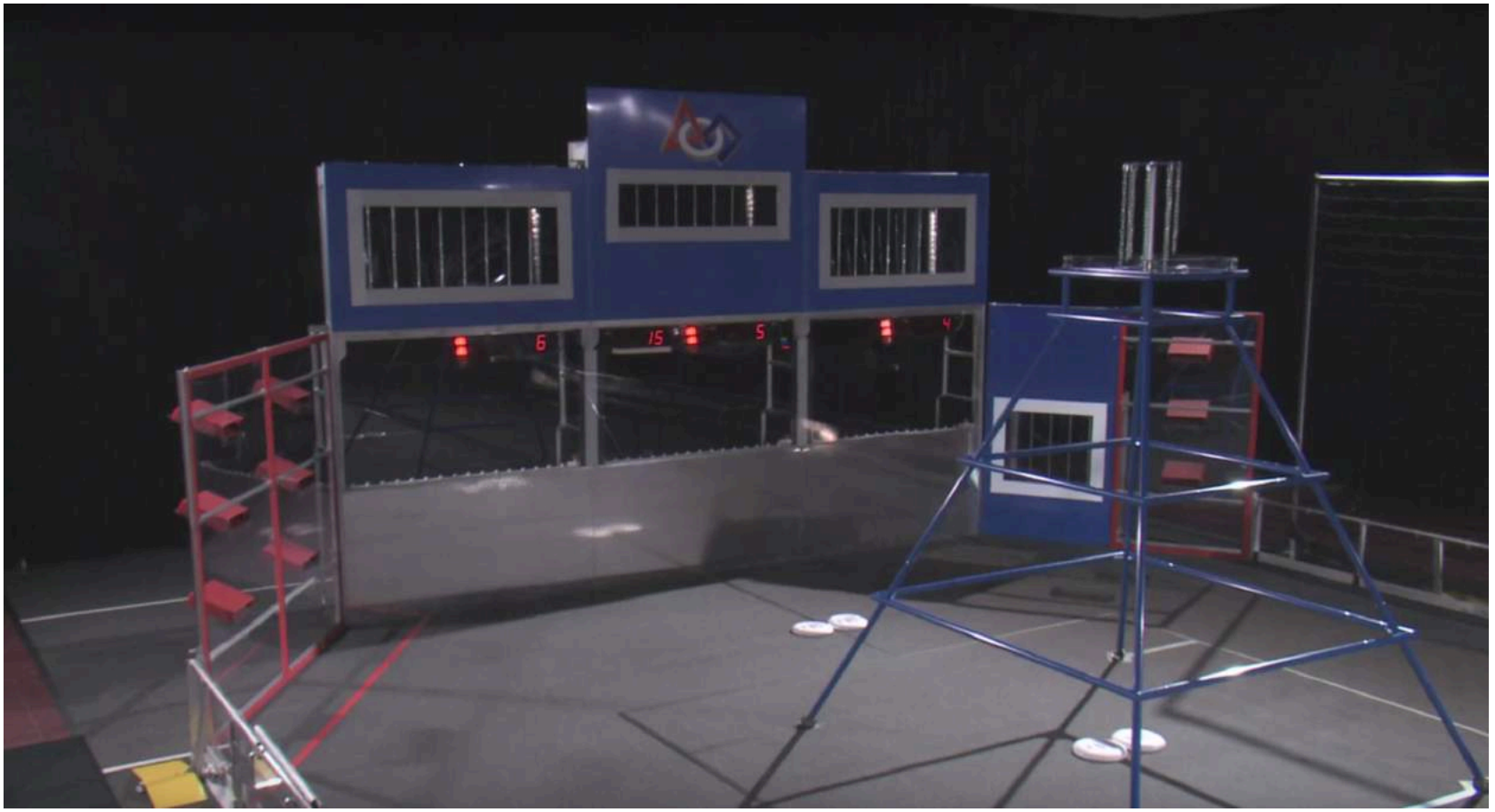
Nasıl?

pynetworktables

Nasıl?

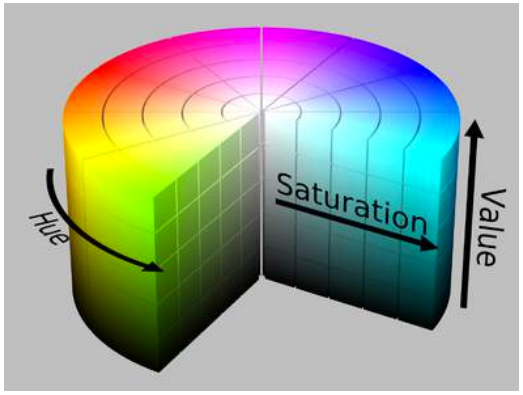
- Ubuntu Mate
  - https://ubuntu-mate.org/blog/ubuntu-mate-for-raspberry-pi-3/
- Raspbian
  - https://www.raspberrypi.org/downloads/raspbian/
- SD Card Oluşturma
  - https://www.raspberrypi.org/documentation/installation/installing-images/
- OpenCV Kurulumu
  - http://docs.opencv.org/2.4/doc/tutorials/introduction/linux_install/linux_install.html
- pynetworktables
  - https://github.com/robotpy/pynetworktables
- pyimagesearch
  - https://www.pyimagesearch.com/

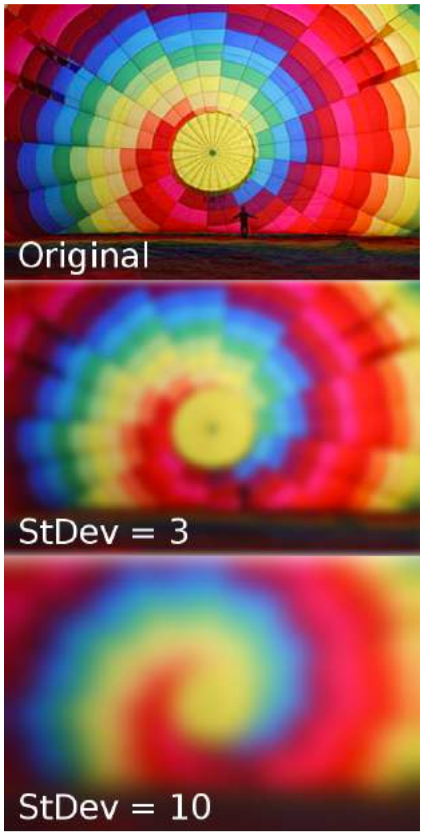
Nasıl?



Nasıl?

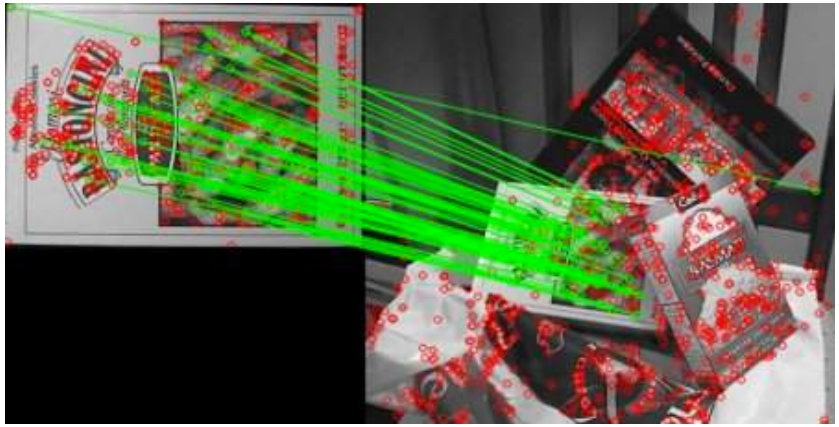
- Bulanıklaştırma (Blur): Basitleştirme
- Özellik Bulma: Renkleri görme
- Şekil Bulma
- Şekilleri Anlamlandırma



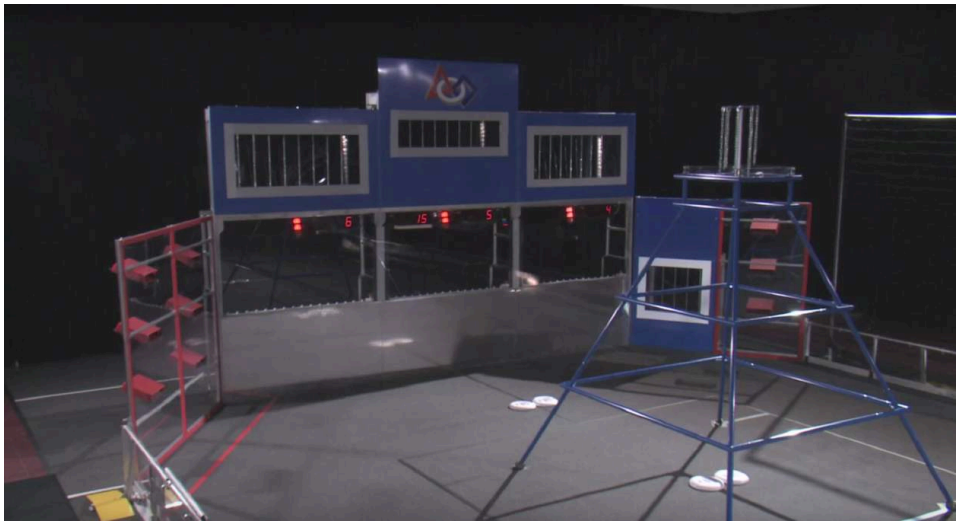


Nasıl?

- OpenCV halleder.

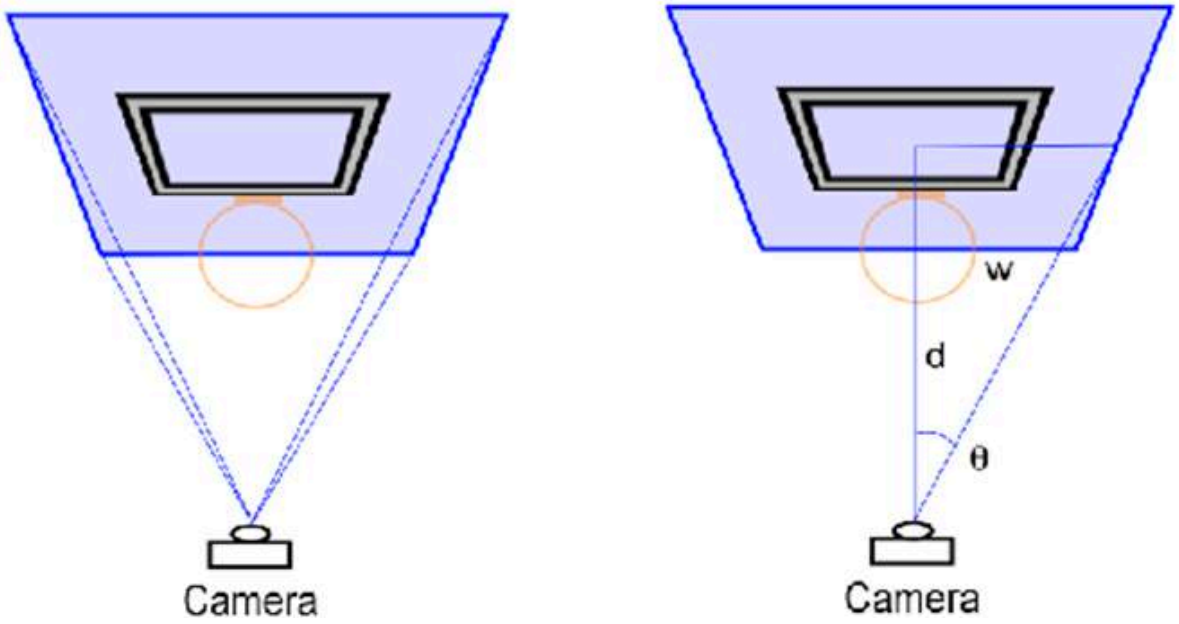


Demo 1 – Hedef Analizi



- Hedef sayısı
- Hedef koordinatları
- Hedef uzaklığı

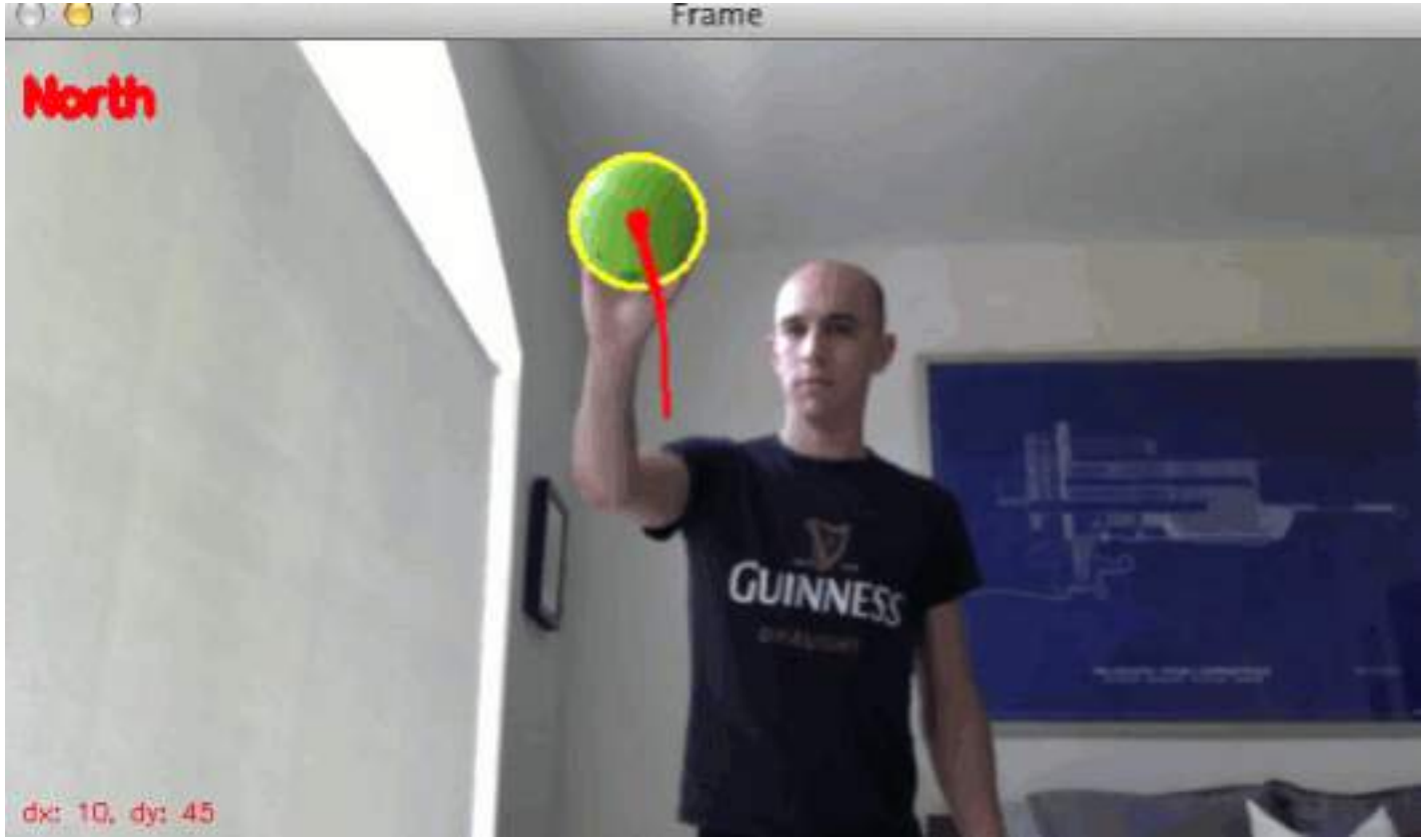
Demo 1 – Hedef Analizi



$$Tft/Tpixel = FOVft/FOVpixel \quad \text{and} \quad FOVft = 2*w = 2*d*\tan\Theta$$

$$d = Tft*FOVpixel/(2*Tpixel*\tan\Theta)$$

Demo 2 – Obje takibi



FRC Entegrasyonu

NetworkTables is a communications protocol used in FIRST Robotics.

It provides a simple to use mechanism for communicating information between several computers.

There is a single server (typically your robot) and zero or more clients. These clients can be on the driver station, a coprocessor, or anything else on the robot's local control network.

FRC Entegrasyonu

```
pip install pynetworktables
```

```
from networktables import NetworkTables

# As a client to connect to a robot
NetworkTables.initialize(server='roborio-XXX-frc.local')
```

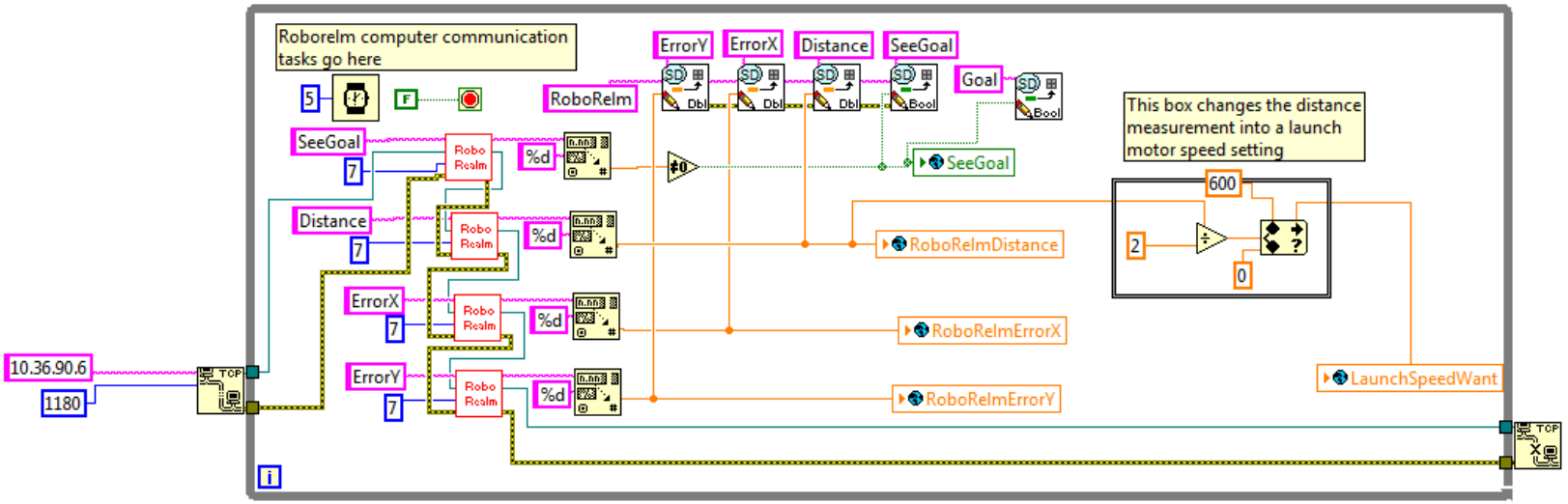
```
from networktables import NetworkTables

NetworkTables.initialize(server='10.xx.xx.2')
```

```
sd = NetworkTables.getTable('SmartDashboard')

sd.putNumber('someNumber', 1234)
otherNumber = sd.getNumber('otherNumber')
...
```

FRC Entegrasyonu



Teşekkürler!

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