

UNITED STATES NAVAL ACADEMY

WEAPONS, ROBOTICS, AND CONTROL ENGINEERING



EW309corona Final Demonstration Overview

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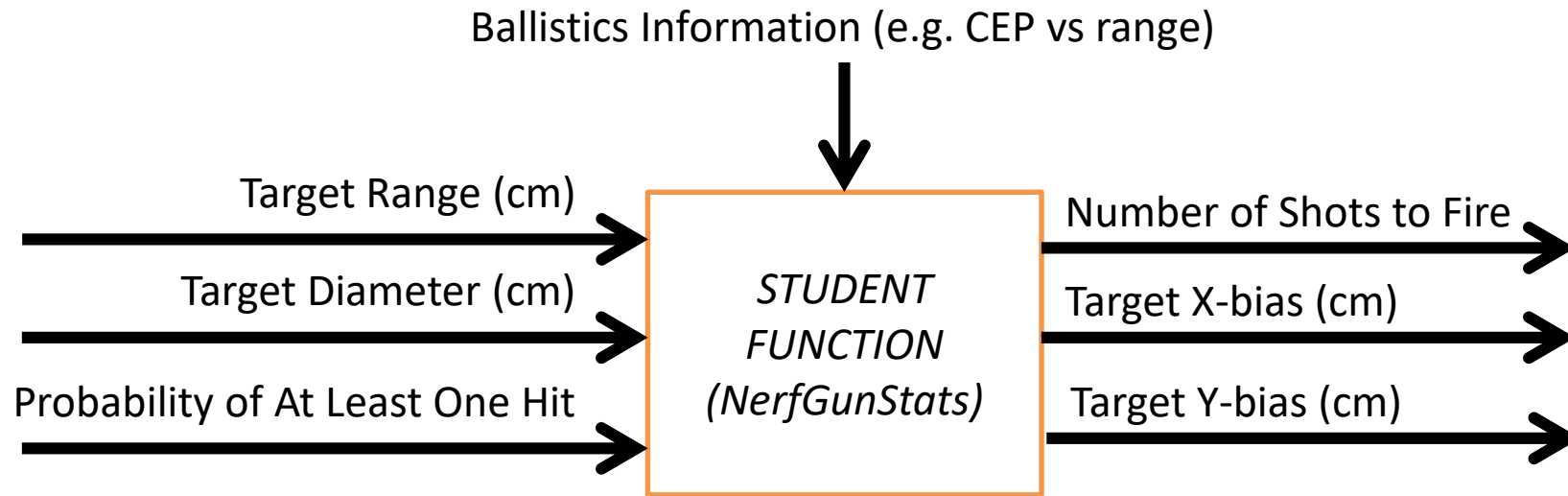


(1.1) Define Test Parameters



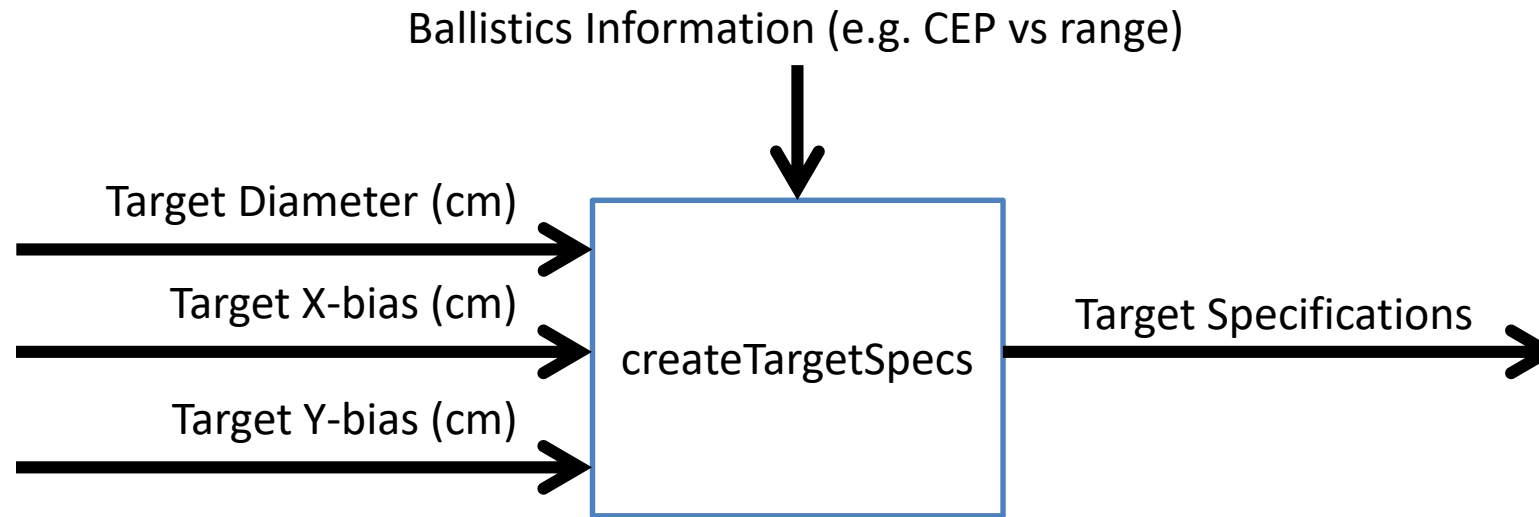
Target Range (cm)	→	<i>targetRange</i>
Target Diameter (cm)	→	<i>targetDiameter</i>
Probability of At Least One Hit	→	<i>pOne</i>
Proportional Gain (K_p)	→	K_p
Integral Gain (K_i)	→	K_i
Derivative Gain (K_d)	→	K_d
Turret Controller Stop Time	→	<i>tf</i>

(1.2) Calculate Target Statistics



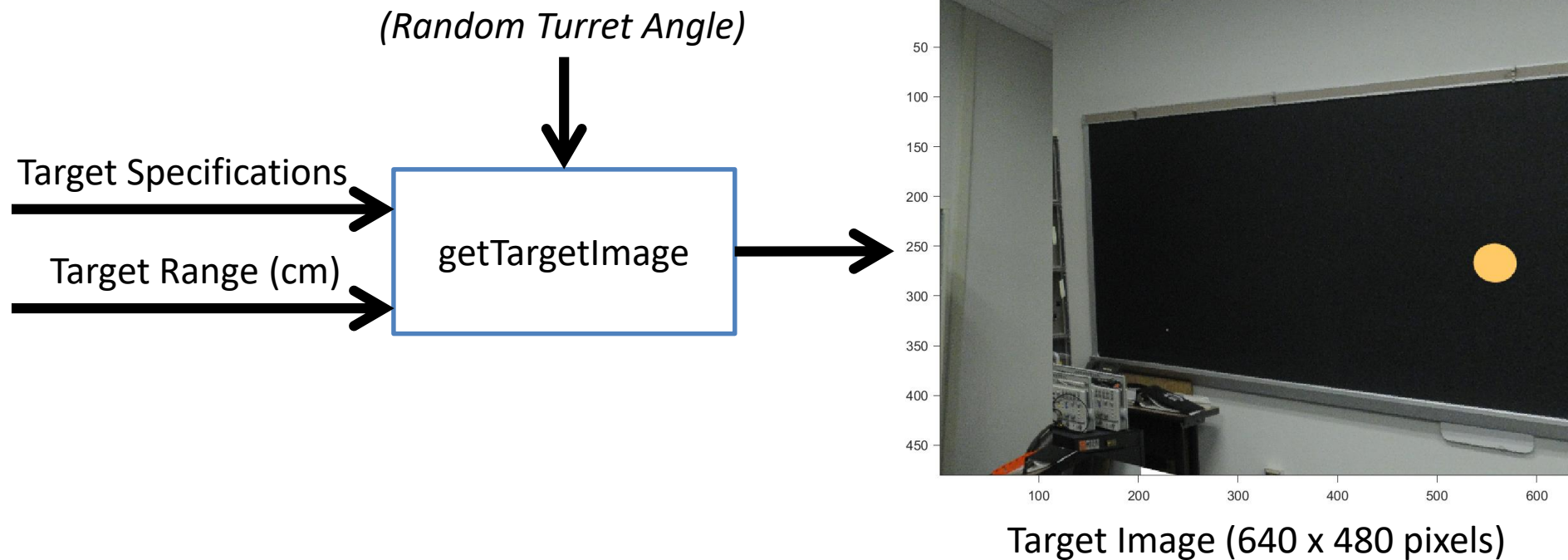
```
[xBias,yBias,nShots] = NerfGunStats(targetRange,targetDiameter/2,pOne);
```

(1.3) Create Simulated Target



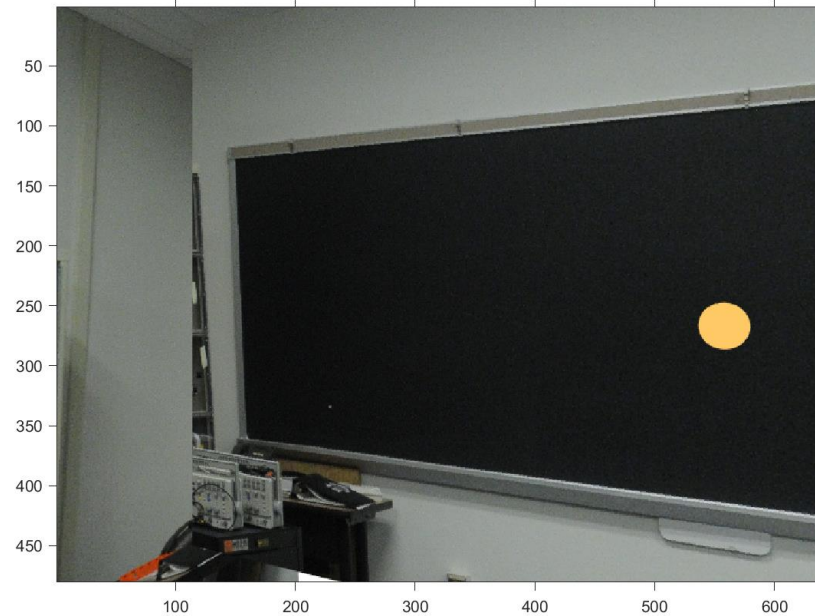
```
targetSpecs = createTargetSpecs(targetDiameter,xBias,yBias);
```

(2) Get Initial Target Image



```
im = getTargetImage(targetRange,[],targetSpecs);
```

(3.1) Locate Target in Pixels



Target Image (640 x 480 pixels)



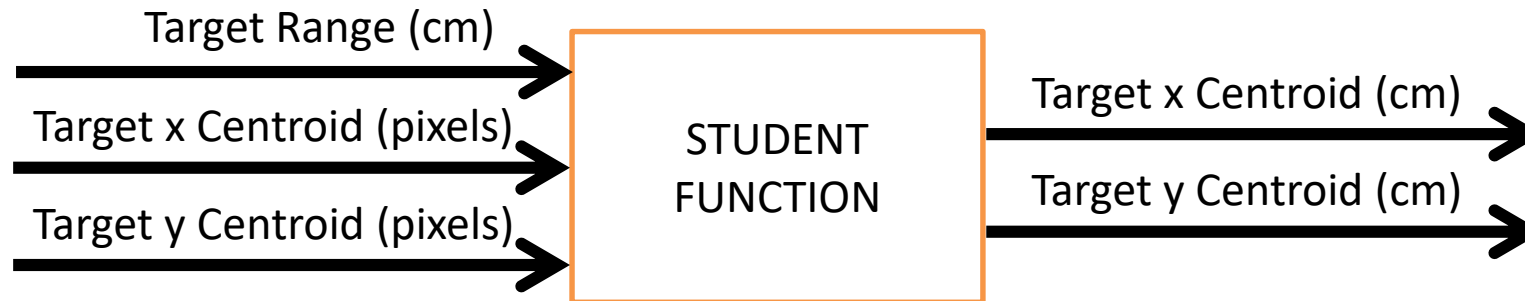
STUDENT
FUNCTION

Target x Centroid (pixels)

Target y Centroid (pixels)

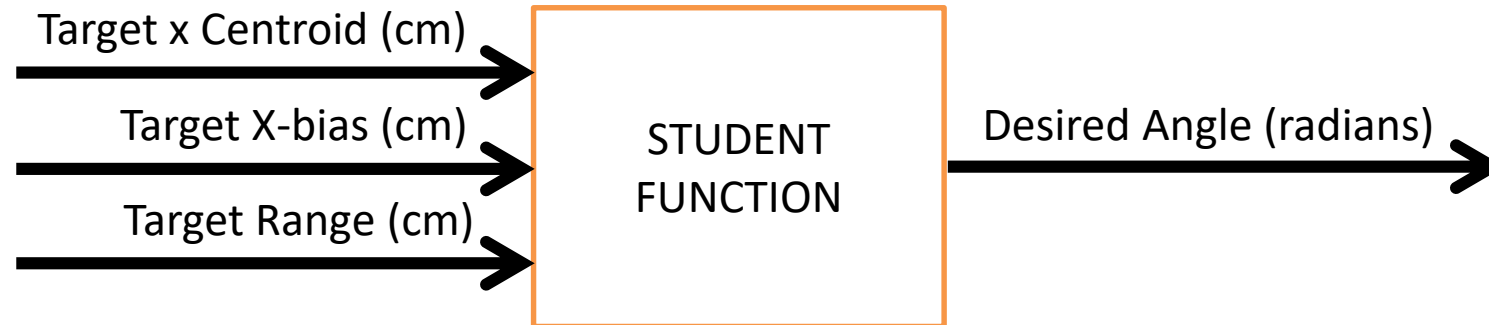
```
[xPixels,yPixels] = STUDENTFUNCTION(im);
```

(3.2) Locate Target in Centimeters



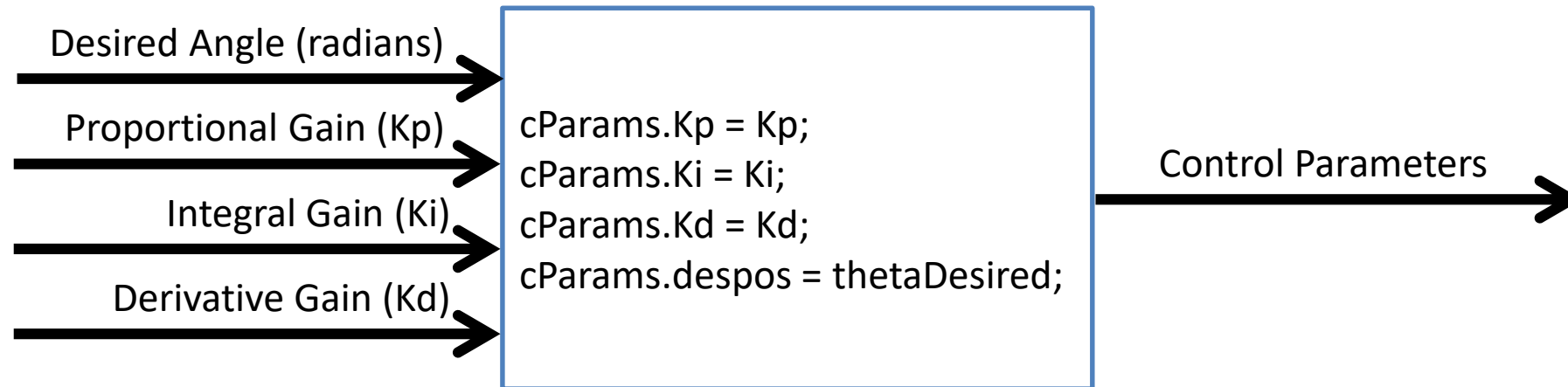
```
[x_cm,y_cm] = STUDENTFUNCTION(targetRange,xPixels,yPixels);
```

(4) Calculate Desired Turret Angle

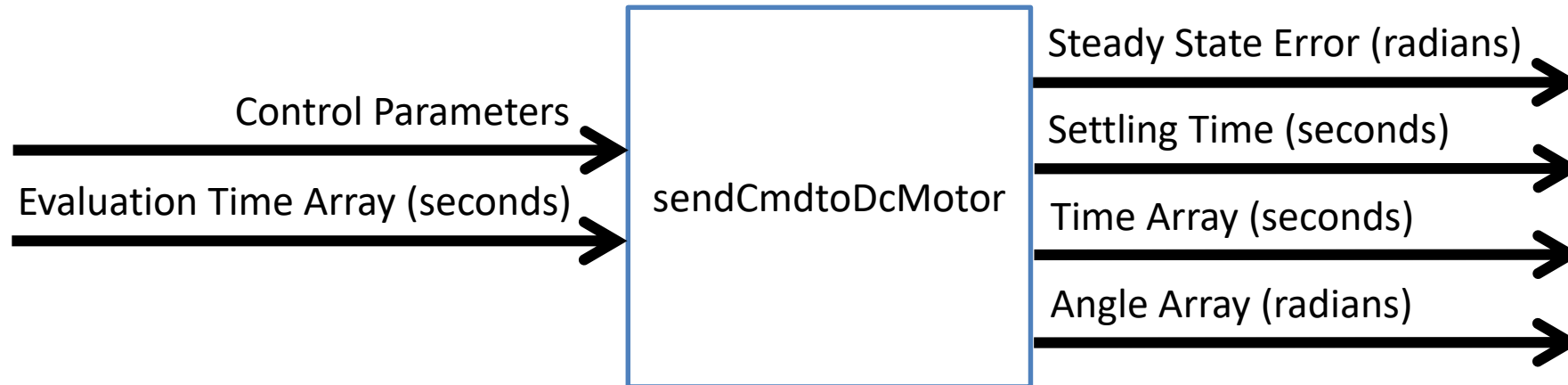


```
[thetaDesired] = STUDENTFUNCTION(xcm,xBias,targetRange);
```


(5.1) Package Control Parameters



(5.2) Rotate the Turret



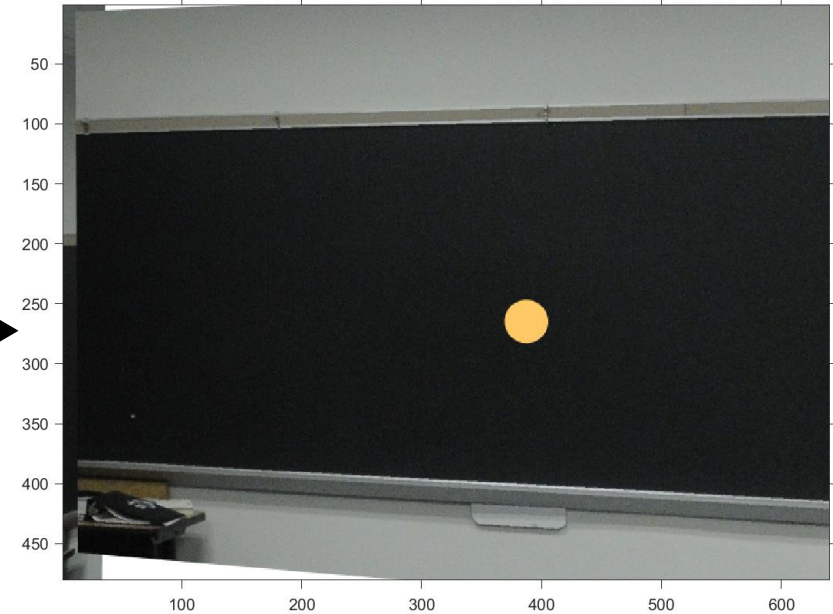
```
tEval = linspace(0,tf,100);  
[SSE,ts,t,theta] = sendCmdtoDcMotor('closed',cParams,tEval);
```

(6) Get Updated Target Image



Relative Turret Angle (radians)

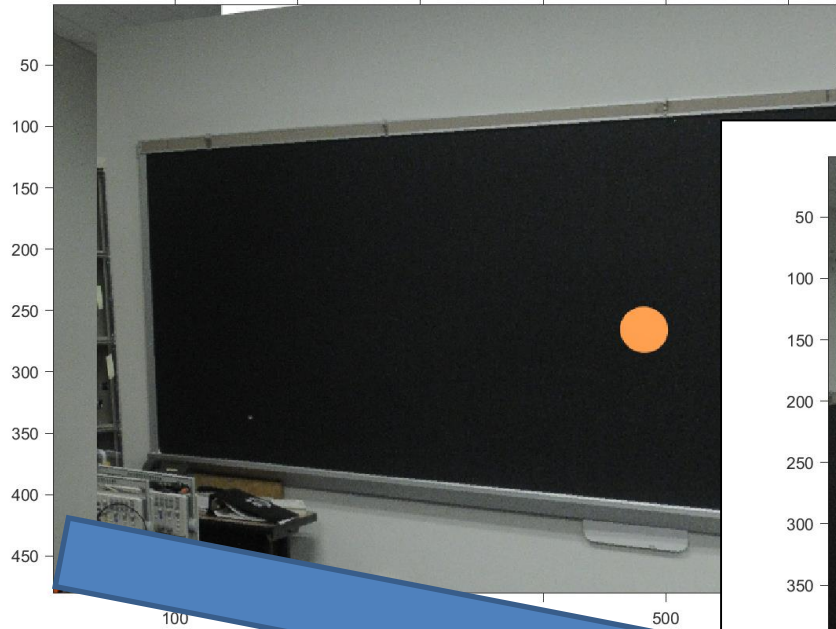
getTargetImageUpdate



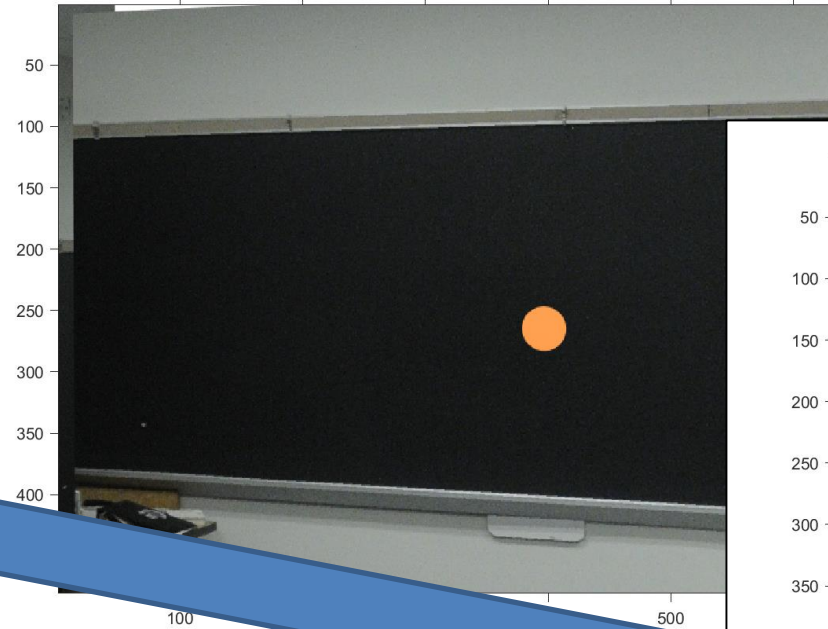
Updated Target Image (640 x 480 pixels)

```
im = getTargetImageUpdate(theta(end));
```

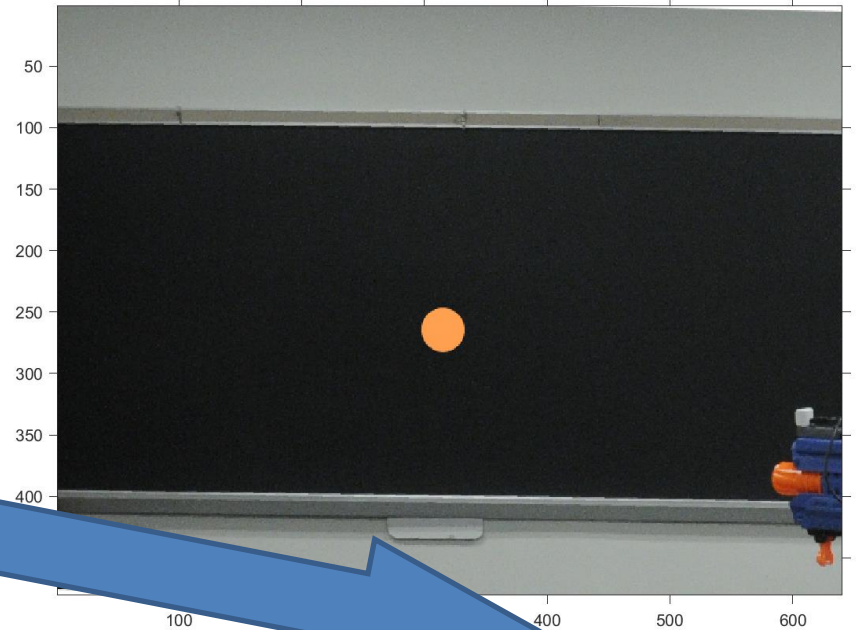
(7) Repeat Steps (3) – (6) OPTIONAL



Iteration 1



Iteration 2



Iteration 3

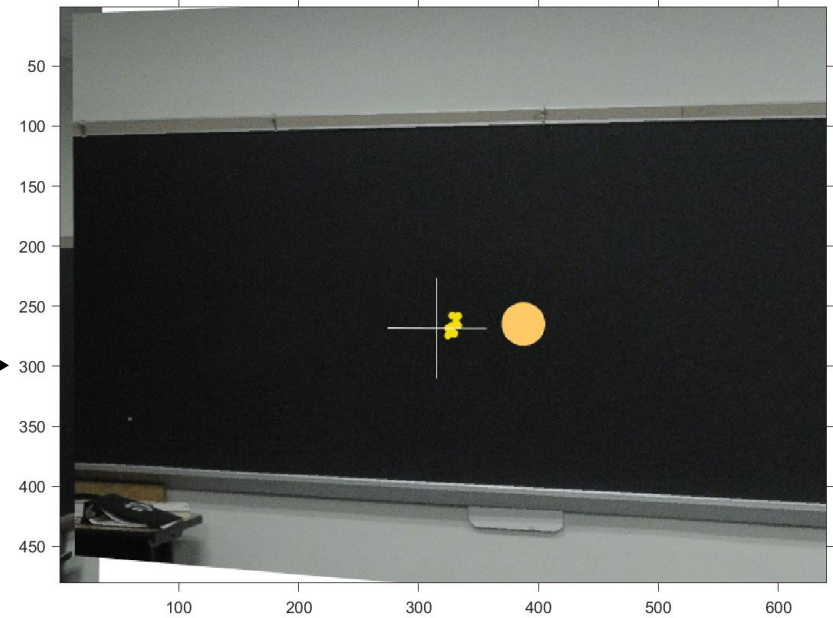
See SCRIPT_EW309corona_Multiple_Move_Demo.m

(8) Fire At Target



Number of Shots to Fire

getShotPatternImage



Updated Target Image with Shot Pattern
(640 x 480 pixels)

```
im = getShotPatternImage(nShots);
```

(9.1) Analyze Results



EW309coronaPerforanceEval

