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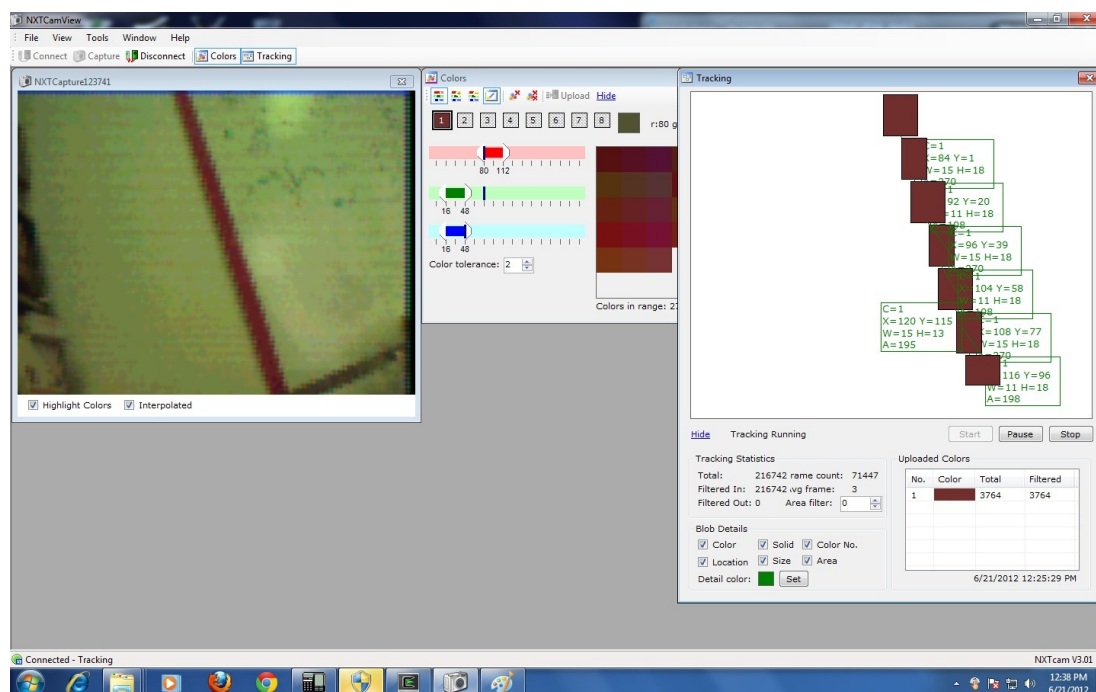
Line Tracking using NXTCam

NXTCam recognizes and reports upto 8 objects to the host NXT.

It reports information as color number of the object recognized and coordinates of it's bounding box.

In Line Tracking mode, an object recognized as a line is divided in upto 8 segments, and bounding boxes (along with color number) of those segments is reported to NXT.

Capture below (left) shows a Red line in view of NXTCam. Tracking information of this line is displayed in the adjacent Tracking window.



Using program camtest-v3.nxc, the tracking information of the same object appears as follows:

In Object Tracking Mode:

```
n:26
B:112
t:143
l:36
b:143
r:43
clr:0
NXTCAM V3.50
```

In Line Tracking Mode:

```
n:65
B:517
t:96
l:128
b:133
r:143
clr:0
NXTCAM V3.50
```

Line Follower Robot using NXTCam

To follow a line, NXTCam should be able to see the line directly in front.

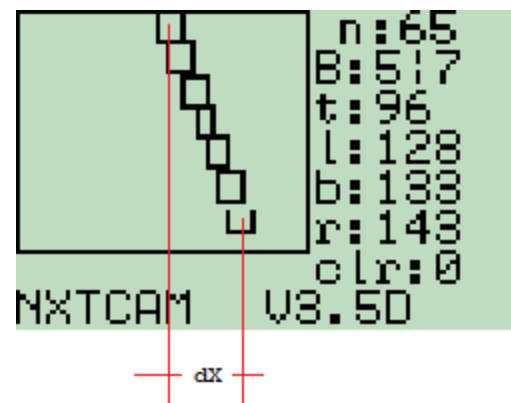
To facilitate that, mount NXTCam over a Robot looking down to the line, such that line is roughly in front view (see adjacent picture).



The line may be seen somewhat like this (as shown in adjacent picture).

Your goal is to keep the line vertical in the view.

Use the coordinates of top and bottom bounding-box to compute which motor should turn more.



For a simple algorithm,

Find the center position of top and bottom boxes along X axis, and move the motors such that dx is reduced to zero.

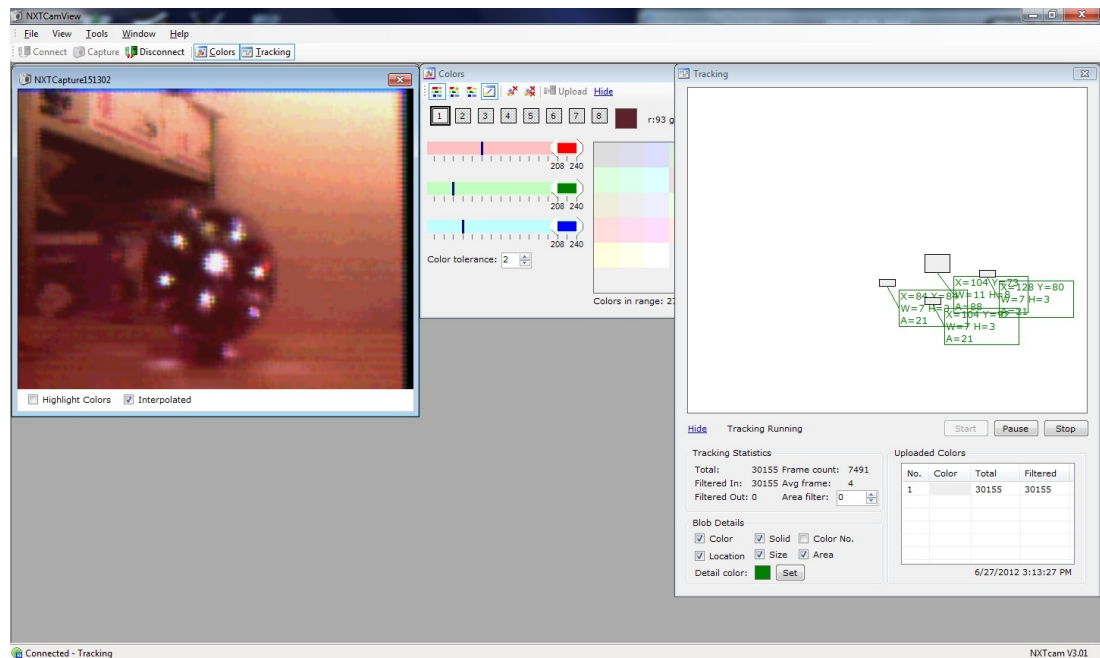
To improve implementation,

Apply rate of change of dx to control motor speed to prevent overshoot, and help increase speed of your robot.

Follow RoboCup Soccer Ball (Infrared Ball) using NXTCam

For best results while detecting IR Ball, use Infrared permitting lens on NXTCam.

A Capture with IR ball in front of NXTCam looks similar to following picture.

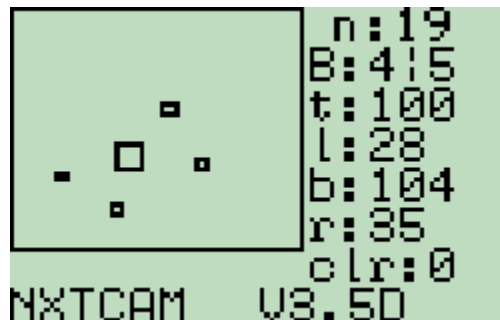


The ball appears as a cluster of 3 to 7 bright spots. In your program, you should use this fact to conclude existence of IR ball (compared to a stray IR source).

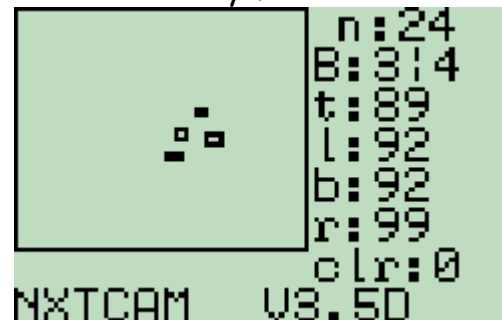
The tracking information of the IR ball is seen in the window on the right.

Using program camtest-v3.nxc, the tracking information of the IR Ball appears as follows:

IR Ball Closer to NXTCam:



IR Ball away from NXTCam:

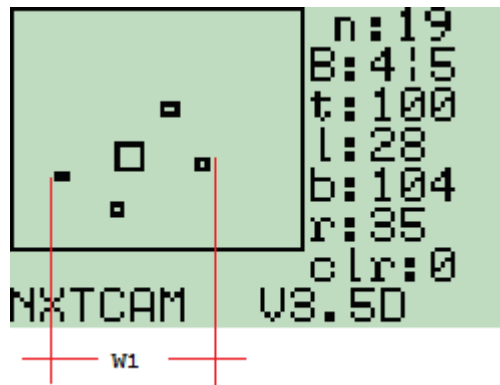


Estimate distance to object using NXTCam

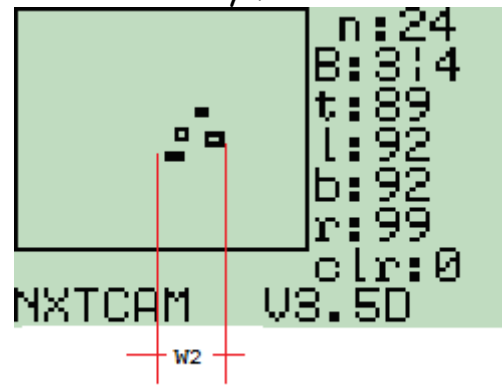
You can estimate distance to object based on the size of its appearance in the NXTCam view (objects that are closer appear to be larger).

For example in picture below an IR Ball is tracked at different distances. (this example uses IR ball, however, any object can be used instead).

IR Ball Closer to NXTCam:



IR Ball away from NXTCam:



Note the width of tracked information in NXTCam view (W1 and W2). In reality, the ball of W1 width was about 20 cm from NXTCam, whereas the ball of W2 width was about 40 cm from NXTCam.

For best results in your program,

Experiment with your object at different distances, and establish a mathematical relation of size to distance that you can use in your program.