MyRIO Labview Report WSC Mobile Robotics

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2016-02-12 Motor Control Troubleshooting

Used the program “05 Main by Rick with RPM and PID streamlined”. This was fine controlling the previous small motor included in the “Mechatronics Kit”. That motor’s encoder is 228pulses per revolution(PPR). The PID is set at P=0.0001, I=0.001, D=0.00

In the actual machine, we are using a bigger Faulhaber motor. It’s encoder is 3046PPR (measured by turning the wheel and observing the encoder vi output. Its roughly, not exact but ok for our purpose) “Duty Cycle Final” going into the PWM express VI is from 1 to 0. (1 = stop, 0=max speed)

<u>Narrow speed range & weak at low rpm</u>

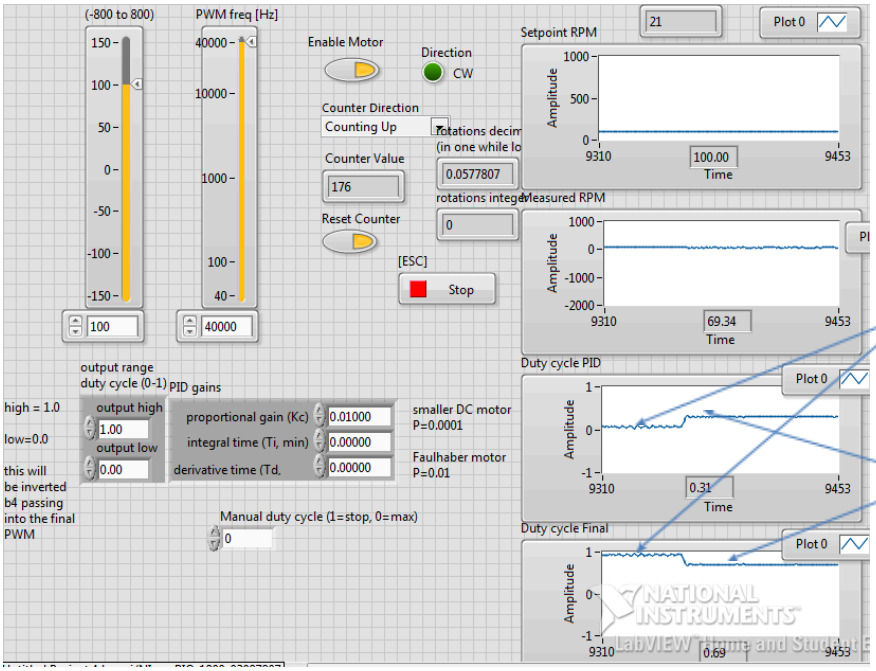
After changing 228 to 3046, program runs ok. Below 50rpm, it does not move.50rpm to 100rpm is very weak. Max is 130rpm. (motor is rated at 120rpm, so it tallies).

<u>PID’s P surprisingly very related to torque!</u>

Originally using the small mechatronics kit motor, I set it at P=0.0001, I=0,001
Now P=0.001 works, but weaker torque
P=0.01 is best, strongest torque
P=0.02 introduces constant oscillation
I or D introduces constant oscillation.

<u>PWM frequency strengthens at high 40000Hz possibly due to program timing issues?</u>

Usually, the torque is stronger at lower frequency. However, in this case, the torque drops off and suddenly picks up when it nears 40kHz!. How is this possible? Unless the timing issues cause it to not really be generating the pulses at 40kHz. I need to find other ways of obtaining the RPM instead of through timed 50ms while loop. This may be causing the weird behavior. I need labview to give me the RPM without going into specific sequences just to obtain the RPM.



At Setpoint 100rpm. PWM 100Hz…Speed is 92rpm, but low torque. (9.0V)

40000Hz…slower 70rpm, but surprisingly **stronger** torque as visible from the increased in PWM duty cycle. But how come an increase in PWM will result in slower speed???? (6.7V)

2016-02-15

Good Reads

RADE CERN website http://rade-drupal.web.cern.ch/ni-myrio

Configuring myRIO with Virtual Machine

Configuring WiFi on the NI myRIO

General notes on the myRIO

Install software on the myRIO

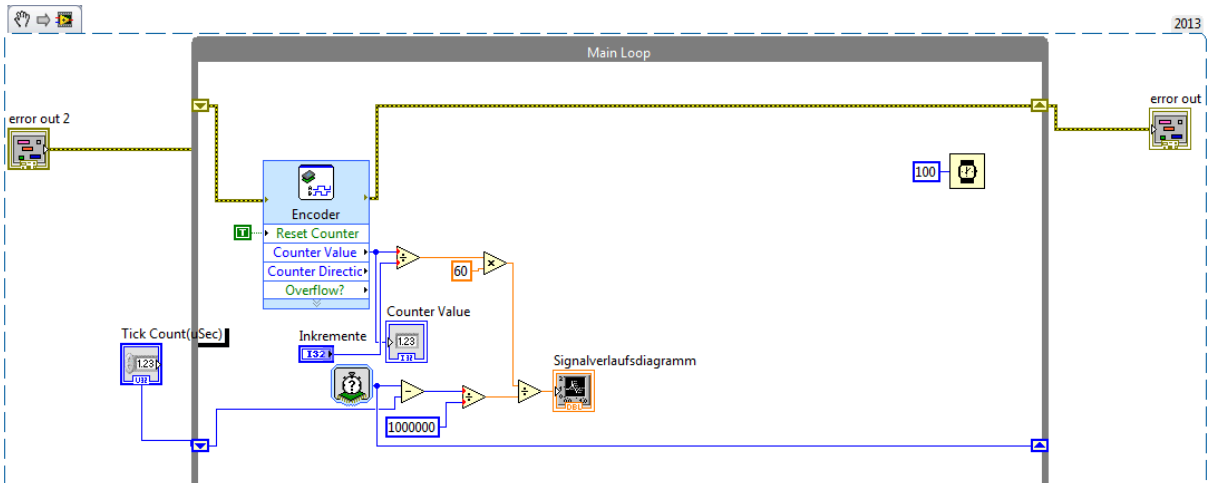
myRIO Template

Simple Quick Start Guide
http://home.hit.no/~hansha/documents/lab/Lab%20Equipment/myRIO/myRIO%20Overview.pdf

Online Solution A for getting RPM from encoder

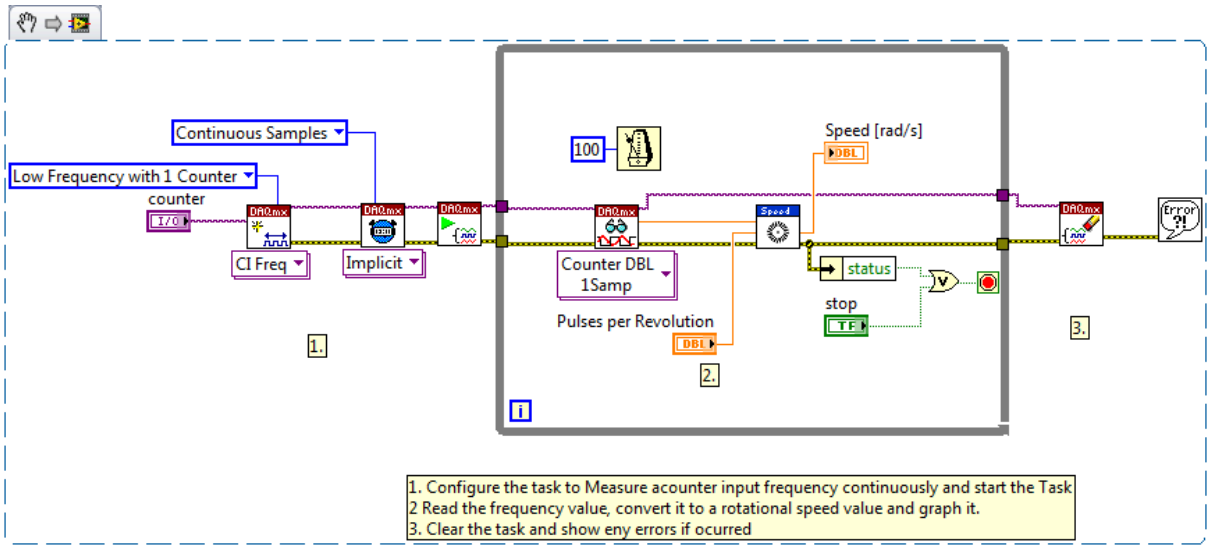
The below solution is taken from
http://forums.ni.com/t5/Academic-Hardware-Products-ELVIS/myRIO-get-velocity-RPM-and-acceleration-from-quadrature-encoder/td-p/2843914

I can't read it fully, but I think it uses the same method as me, using a timed while loop of 100ms and then reading the pulses that occurs in 100ms to guess the speed. It will eventually have the same problem as me. I need one that does not do this in time loop.

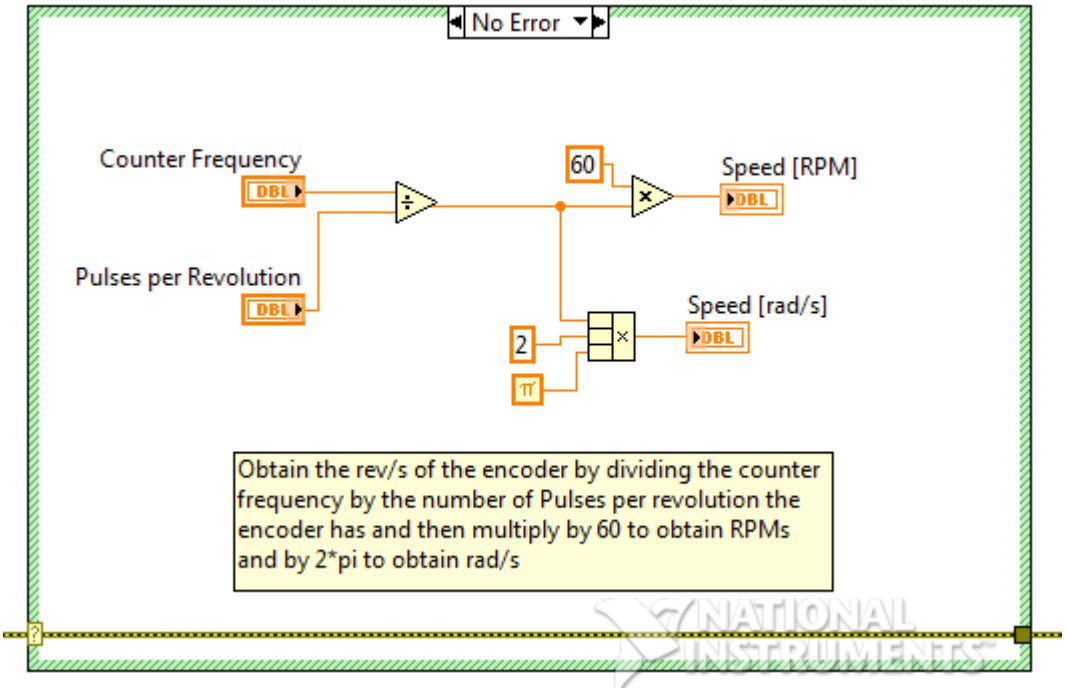


http://forums.ni.com/t5/Academic-Hardware-Products-ELVIS/Using-more-than-4-quadrature-encoder-input-for-MyRIO/td-p/2773082
Fair bit of discussion on quadrature encoders on myrio

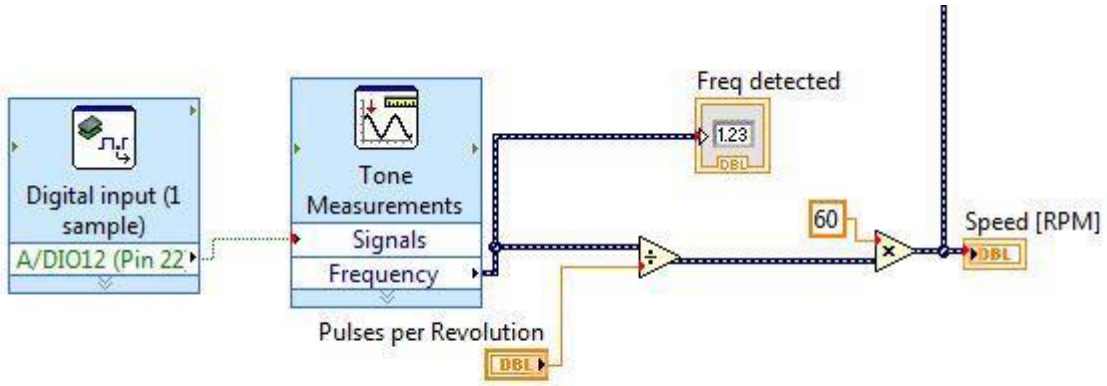
http://forums.ni.com/t5/LabVIEW/encoder-and-speed-sensor/td-p/2539952
User directed an alternate link to use "Counter Frequency" to obtain an Encoder Rotational Speed
https://decibel.ni.com/content/docs/DOC-13039



The below shows the same way which I obtain speed. But how do I obtain counter frequency without resorting to counting tick without a time while loop ?? I was unable to find the function blocks such as CI Freq as in the previous picture.



I tried the following but I did not get any frequency reading from the “Tone measurement”



Motor and Encoder connection

	Wheel L1	Wheel L2	Wheel R1	Wheel R2
ENC A	A/pin18	A/pin19 (link to C/pin15)	B/pin18	B/pin19 (link to C/pin11)
ENC B	A/pin22	A/pin21 (link to C/pin17)	B/pin22	B/pin21 (link to C/pin13)
PWM	A/Pin27 (PWM0)	A/Pin29 (PWM1)	B/Pin27 (PWM0)	B/Pin29 (PWM0)
DIR (1=CW, 0=CCW)	A/pin23	A/pin31	B/pin23	B/pin31

Mecanum Wheel Configuration

		Forward		Reverse		Left		Right	
L1	R1	-CCW	+CW	+CW	-CCW	+CW	+CW	-CCW	-CCW
L2	R2	-CCW	+CW	+CW	-CCW	-CCW	-CCW	+CW	+CW
		0	1	1	0	1	1	0	0
		0	1	1	0	0	0	1	1

Short Cut Keys

SHORTCUT Keys		
Ctrl + Left click	Enlarge the canvas! awesome	
Ctrl + H	Context Help – always display	
Ctrl + E	Toggle display front/block diagram	
Ctrl-B	Deletes all broken wires in a VI. If you select a structure or area of the block diagram with broken wires, this shortcut deletes the broken wires in only the selected area.	

http://zone.ni.com/reference/en-XX/help/371361J-01/lvhowto/keyboard_shortcuts/

Connection to WiFI on 2016-02-16

Step 1: connect usb cable PC to myrio

Step 2: Open http://172.22.11.2/ in browser. Use Microsoft

Step 3 : Navigate to Wireless Lan connection

Step 4: Connect to a common network that both PC and MyRIO can run on. In this case in 6203C is ITElab1.

Step 5: Press the save button and IPv4 address should be shown. In my case is 172.19.122.206
Step 6: Start a new project , MyRIO project
Step 7: In the Target field, choose the fourth option “Specific IP address or Hostname”

Method2 Using

Step 1: connect usb cable PC to myrio
Step 2: Open http://172.22.11.2/ in browser. Use Microsoft
Step 3 : Navigate to Wireless Lan connection
Step 4: Choose wireless mode as “Create Wireless Network” as compared to “connect to wireless network. Put the SSID as something u like. In my case “SuperMyRIO”
Step 5: Press the save button and IPv4 address should be shown. In my case is 172.16.0.1
Step 6: Go to your own PC or Laptop wireless connection and try to detect

Error Codes

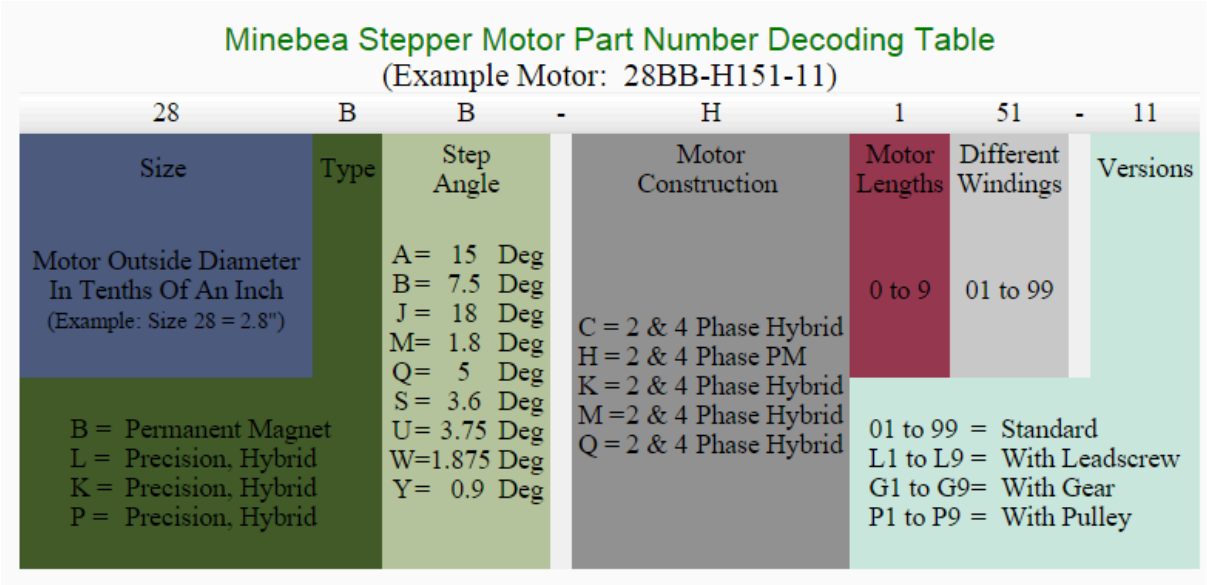
Tried to move the vehicle. Everything was ok, until we put it on the ground. Running on VI “12 Main by Rick” Error code 363005. Look up on the internet and found this

http://zone.ni.com/reference/en-XX/help/373925A-01/myrioreference/myrio_error_codes/

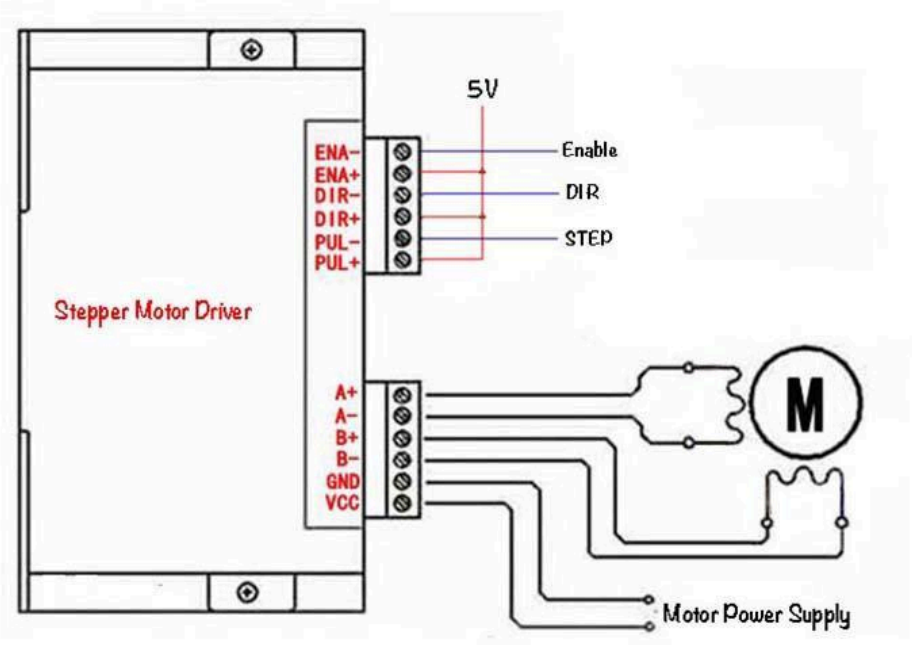
-363005	An invalid transition occurred in the quadrature encoder. Ensure that you have connected the hardware correctly and the encoder is not turning too fast.

17/2/2015 started on Stepper motor

Using a recycled motor 17PS-C504-01 somehow unable to get the datasheet online. But found some naming convention



Stepper Motor Controller from sgbotic



ENA-	ENA+	Stepper	With Resistor 2.2K	
Not connected	5V	Energized		
5V	5V	Energized		
3.9V channel C DIO1 upon power on and no prog running	5V	Engergized	3.4V	De-Engergize
PROGRAM RUNNING				
MyRIO Reset ( )	5V		3.4	De-Engergize
Program Running ( ) Stepper set to OFF	5V		0.7	De-Energize
Program Running ( ) Stepper set to ON	5V		3.4	De-Energize

For the DIP switch, switch up is OFF, down is ON.

Reads

https://decibel.ni.com/content/docs/DOC-13039
Use Counter Frequency to obtain an Encoder Rotational Speed

http://forums.ni.com/t5/LabVIEW/encoder-and-speed-sensor/td-p/2539952/page/2
NI Discussion Forums : Most Active Software Boards : LabVIEW : encoder and speed sensor

http://www.ni.com/pdf/labview/us/compactrio_motor_control_basics.pdf

MyRIO and NI-DAQmx compatibility

http://forums.ni.com/t5/Academic-Hardware-Products-ELVIS/myrio-amp-DAQmx/td-p/2766370

DAQmx VIs will not work for myRIO because it runs off the NI-RIO Driver. There is a myRIO Module that comes with myRIO. Here are pages to the module and the VIs that you will be able to utilize:

http://zone.ni.com/reference/en-XX/help/373925A-01/myriohelp/myriohelp/

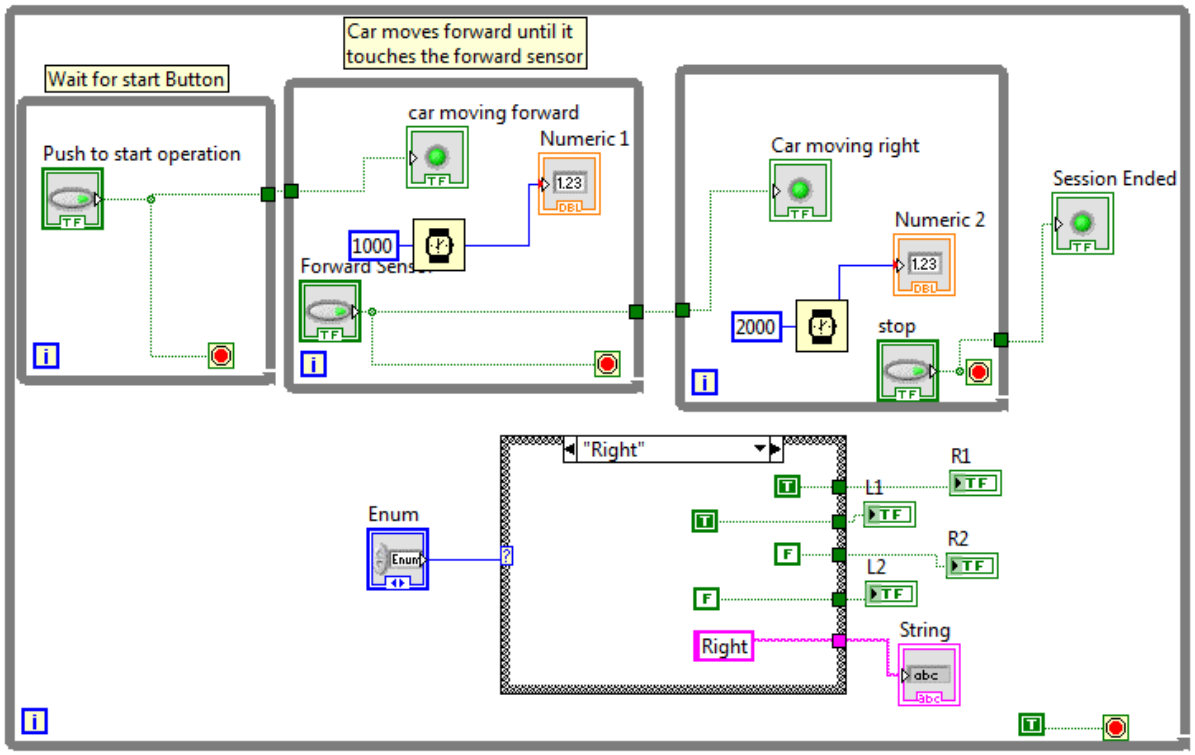
http://zone.ni.com/reference/en-XX/help/373925A-01/myrioreference/myrioreference/

2016-02-21 Testing of how multiple while loops work within a while loop

Below is a program I type out to test out how the while loop works.
My initial assumptions
1) The first small loop will continue until the “start button” is pressed, then car will move forward and continue to move forward until “forward sensor” is activated, then it will exit the 2nd while loop and the 3rd while loop will move the car right. Until the stop button is pressed to exit the 3rd while loop and turn on the “session ended” indicator. (True, indeed **while a while loop executes, nothing else will run**.
2) case structure will always work. (not true. It work once when the VI is run and remains inactive while the 3 small while loops are running. It will work for one more time, which is the moment the 3rd while loop exits, thereafter it remains dormant, even as the while loop is active.

Conclusions: indeed when the 3 mini while loops are running, nothing else is active. Even code which is in the bigger while loop and is supposed to run after execution of the 3 mini while loops, are not

Will only run once before 1st while loop and once after 3rd while loop.



Using Control References to Pass Access of Front Panel Controls to SubVIs

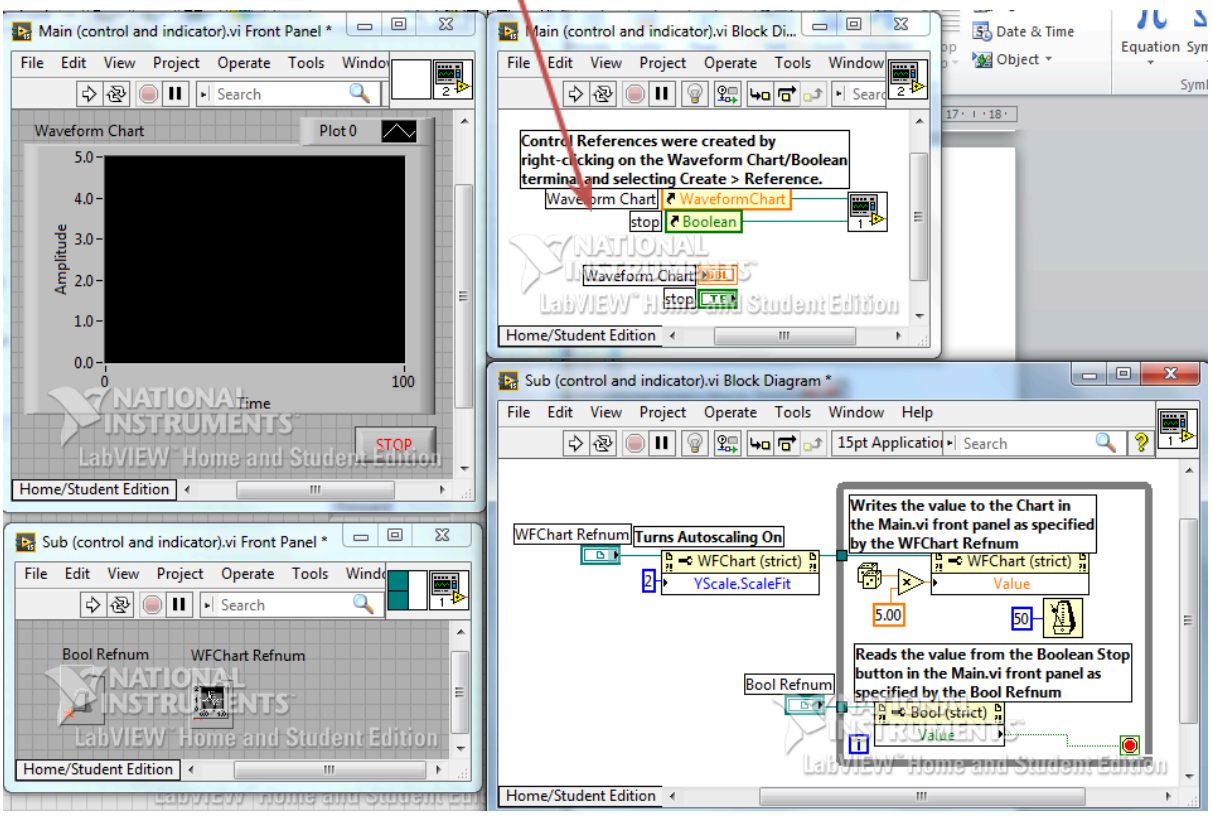
Reads

http://www.ni.com/example/28769/en/

Downloaded the following VI from the link which is quite helpful in explaining.

I tend to be confuse with the

1) Reference (becomes a source input?)
2) Local Variable (becomes a sink output?)



2nd MyRIO started using on 2016-02-22 (Configuration)

Name: NI-myRIO-1900-030b89c8

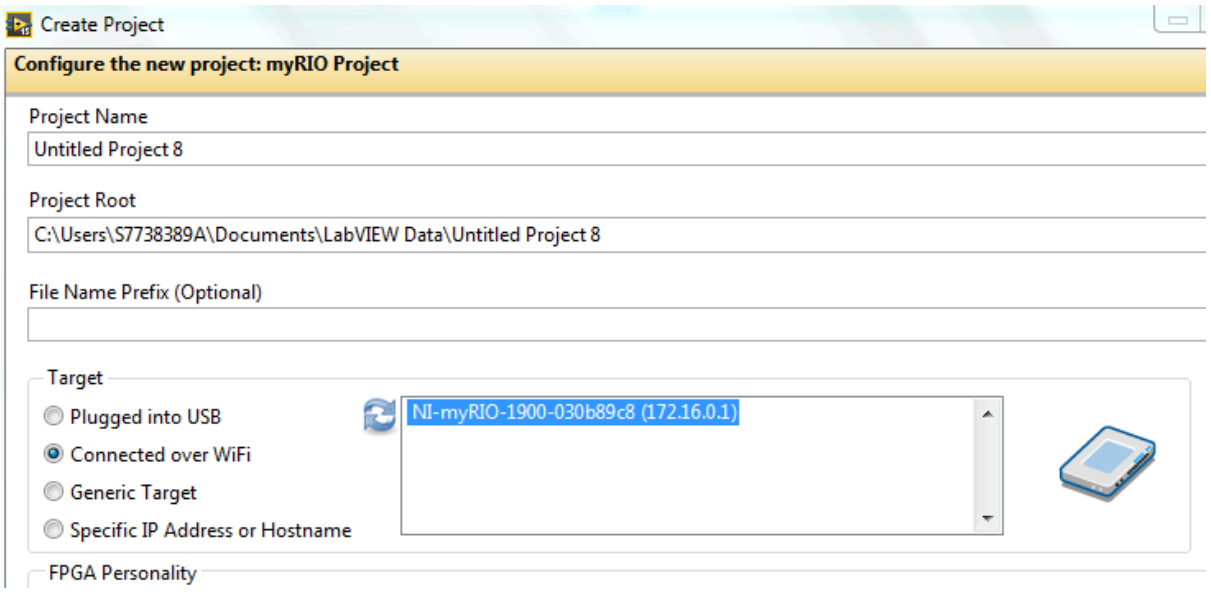
Serial 030B89C8

IP 172.22.11.2

MAC 00:80:2F:23:6B:85

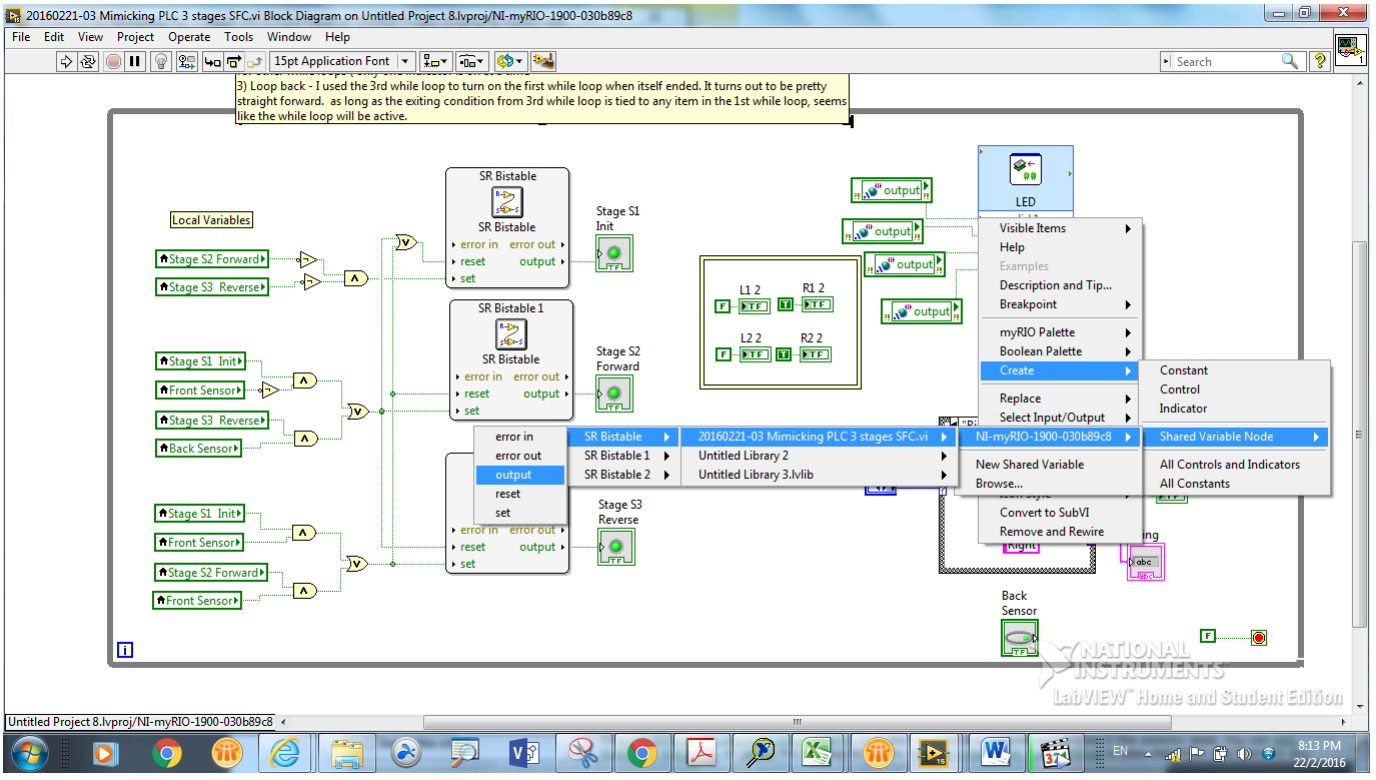
SSID SuperMyRIO2

IPv4 172.16.0.1



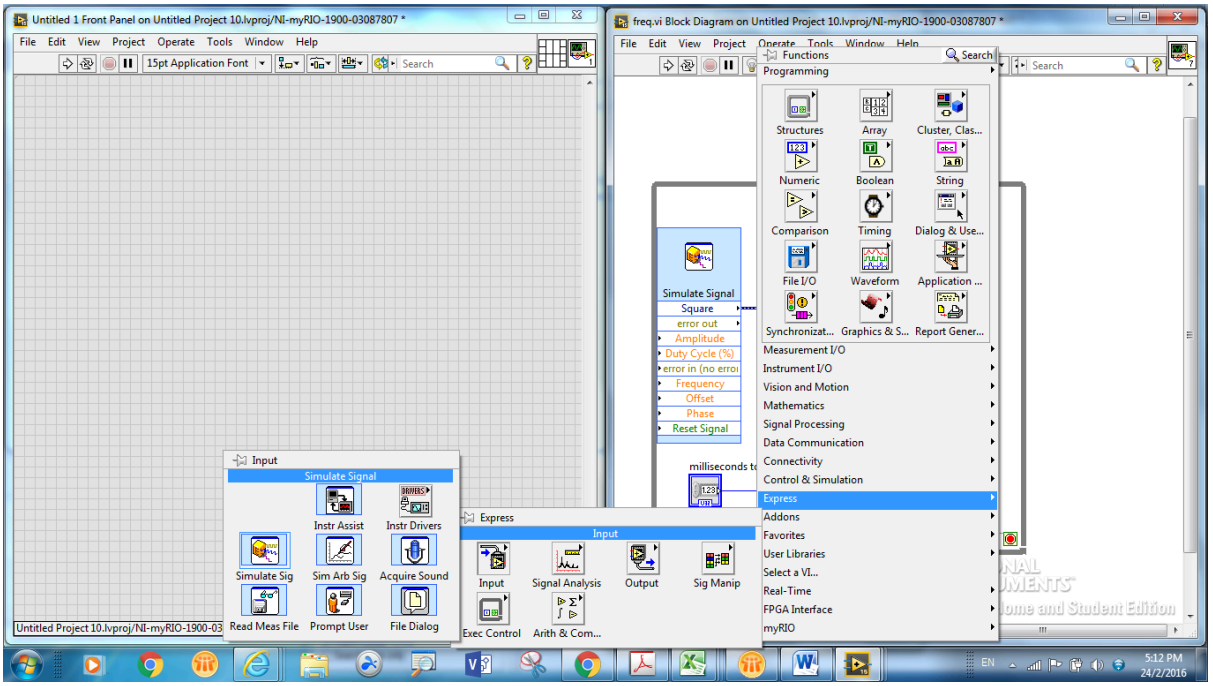
Shared Variable Node

Observe the use of shared variable node



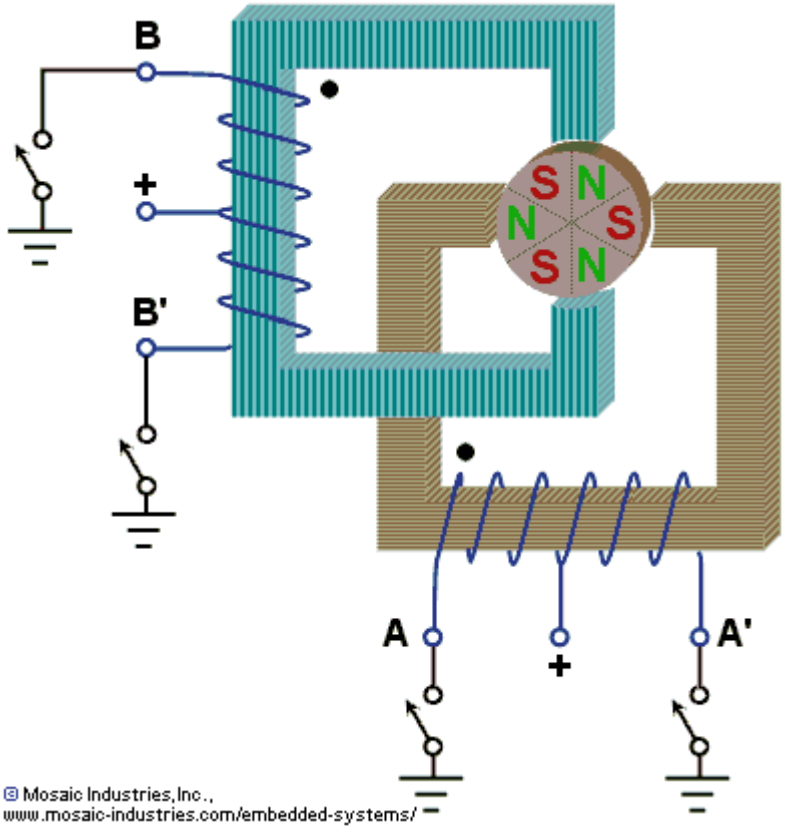
]

Stepper Square wave generation



Express> Input > Simulate Signal

Stepper motor explanation (unipolar type)



Testing of DIO

Using Discrete LED on 2nd MyRIO.

Channel B DIO0/Pin11	Voltage	
Turn bit on (H)	3.2V	
Turn bit off (L)	0.3V	

Channel C DIO1/Pin12	Voltage	Power on without running program. Bit is default tied to zero and outputs 0V
Turn bit on (H)	3.0V	
Turn bit off (L)	0.3V	

Introduction to the NI LabVIEW Real-Time Module

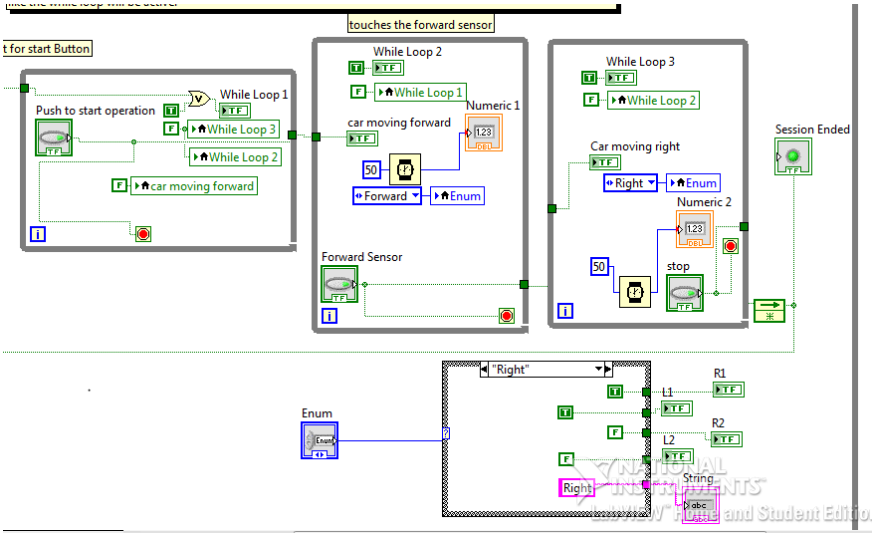
http://www.ni.com/labview/realtime/

Watch the video at http://www.ni.com/webcast/1246/en/

Multiple Loop Testing

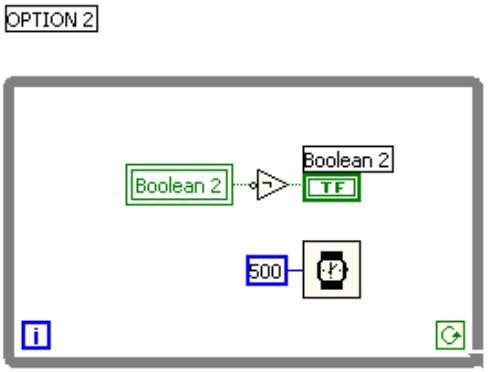
Tested consequtive while loop and 1 case structure for wheels.

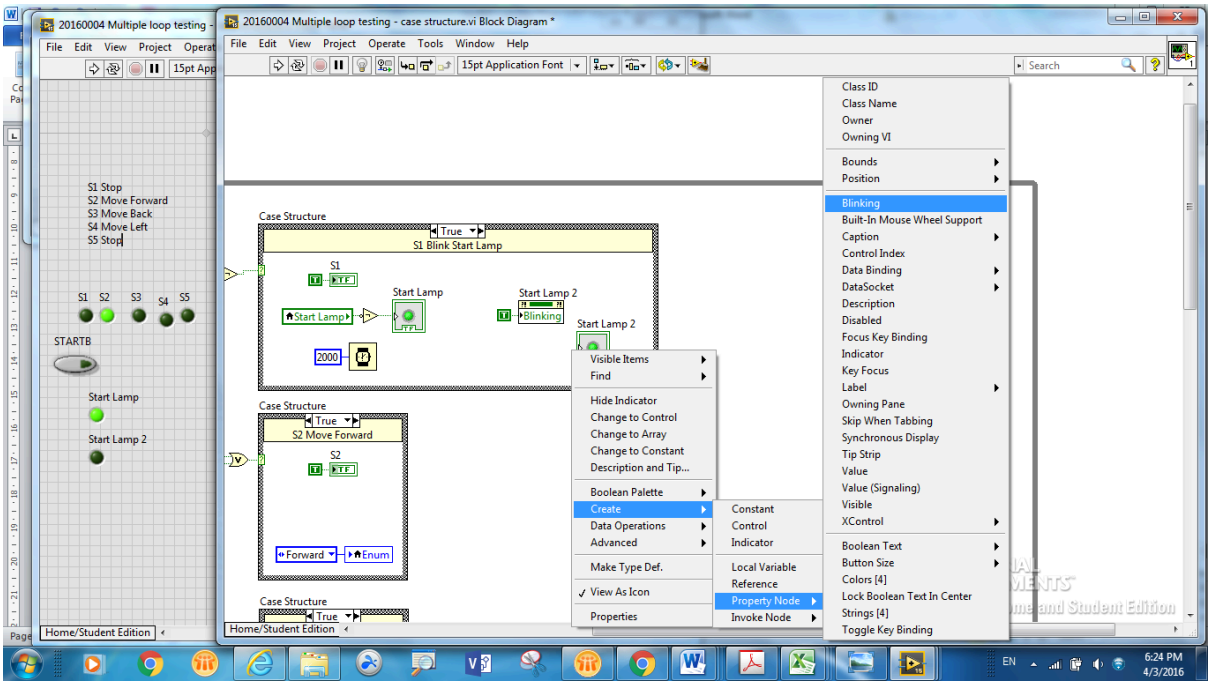
The case exec only once at the start of program and once it goes into the first while loop, case becomes unresponsive. Enum is updated during loop, but case is not executed.



Blinking LED

https://lavag.org/topic/1649-blinking-led/

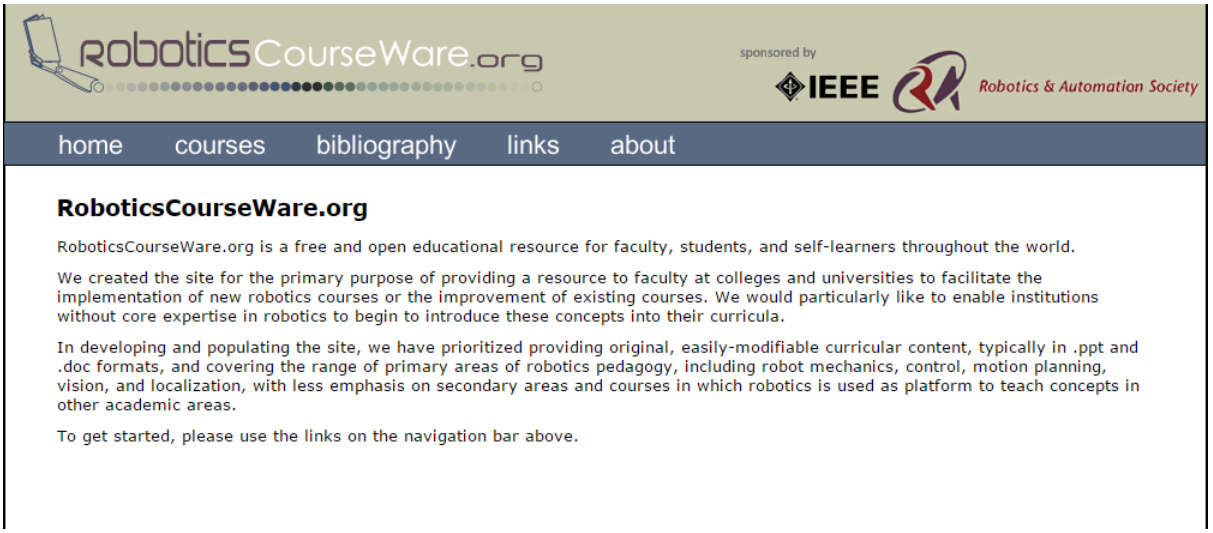




20160306 Top three challenges in Robotics
http://www.ni.com/webcast/1827/en/

20160306 Ni Robotics Page
http://www.ni.com/robotics/

Good to explore www.roboticscourseware.org



20160306 Downloaded the Robotics Module 2015 version. Evaluation
2013 may not be evaluation, but I already installed.. so…..
Anyway, there is the PING))) under robotics palette>sensor>sonar> but dunno how to use.

http://www.ni.com/download/labview-robotics-module-2015/5440/en/
http://www.ni.com/download/labview-robotics-module-2013/4067/en/
http://www.ni.com/labview/robotics/

Free 3rd party sensor drivers http://www.ni.com/downloads/instrument-drivers/

Self paced Training http://sine.ni.com/myni/self-paced-training/app/main.xhtml

Instructor-Led Ni Training http://ni.com/training

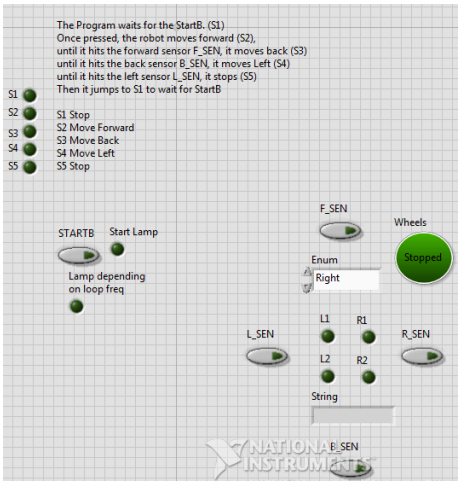
Calculating the Pulse Per Second of the endcoder

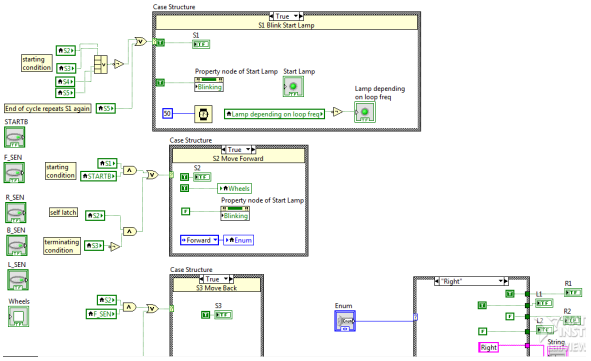
	rpm	rps	cps	c/50ms	c/10ms
3046	48	0.8	2436.8	121.84	24.368

2016-03-04 Successful use of PLC ladder rung method

To do a linear sequence. Each rung is executed by a true false case. Similar to PLC, there is trigger conditions, self-latch, and exit conditions on a rung. This is done via logic gates.

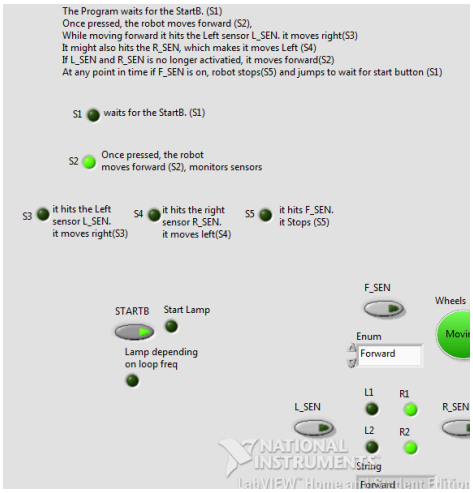
Program 20160004 Multiple loop testing - case structure 5 State and Blinking LED (success)





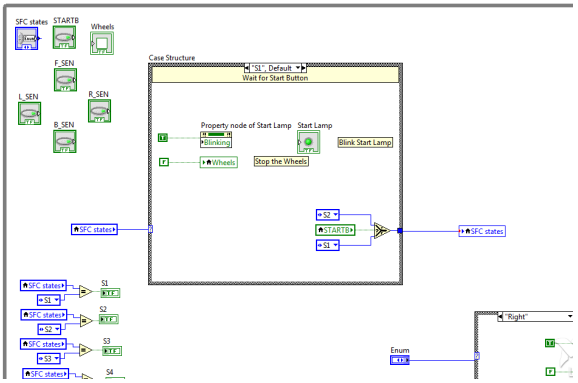
2016-03-06 Success on conditional multiple branching

Program 20160306 Multiple loop testing - case structure - branching to different case depending on condition (Success)



2016-03-07 Success on Neat Multiple case structure

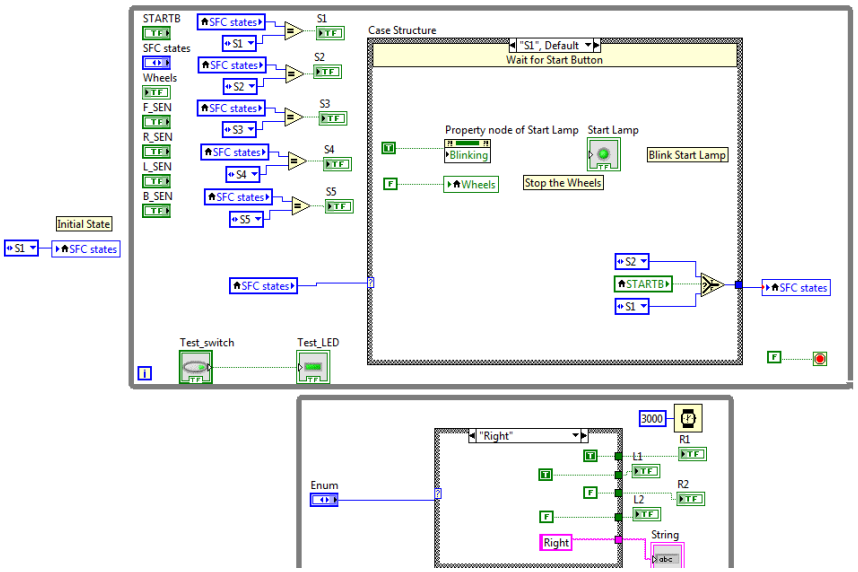
20160307 Multiple loop testing - Multiple case structure trigger from within each case



2016-03-08 Success on Dual parallel while loop

20160308 Multiple loop testing - Dual parallel while loop - one for sequence - one for motor control (success)

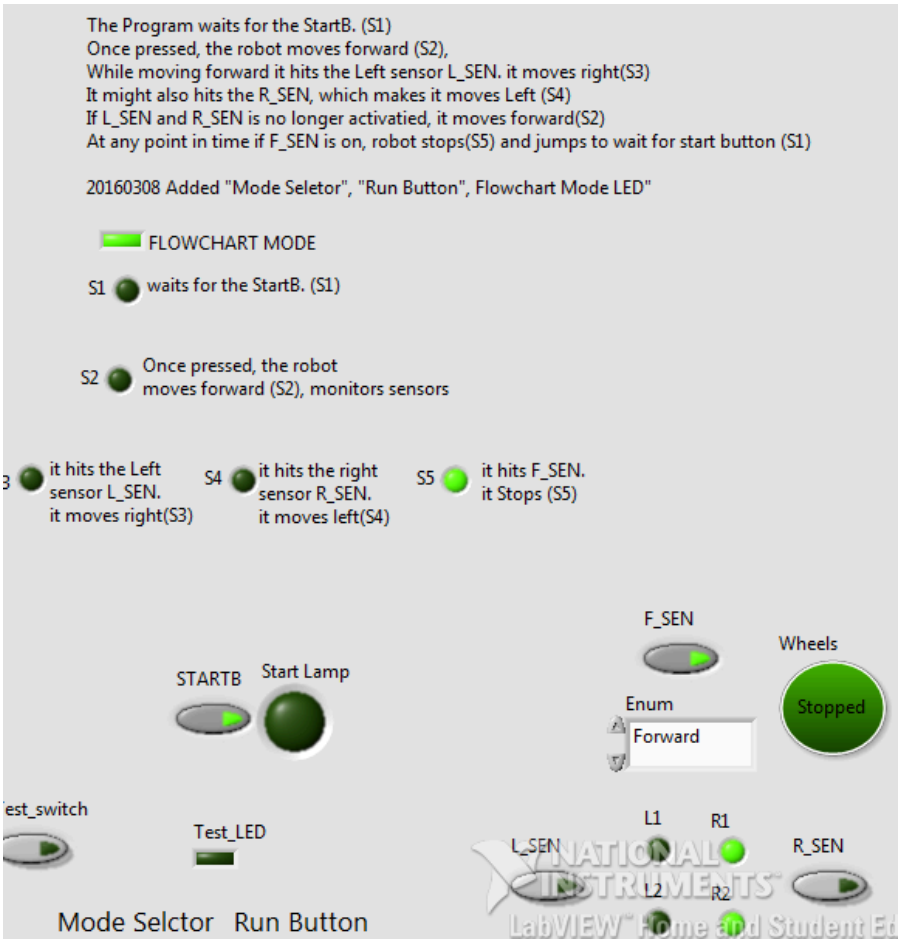
Taking out the motor controls does not affect. This may be useful for separating the real motor controls and encoder reading. In fact, I should take out the encode reading and put it in a while loop by itself to generate the RPM.

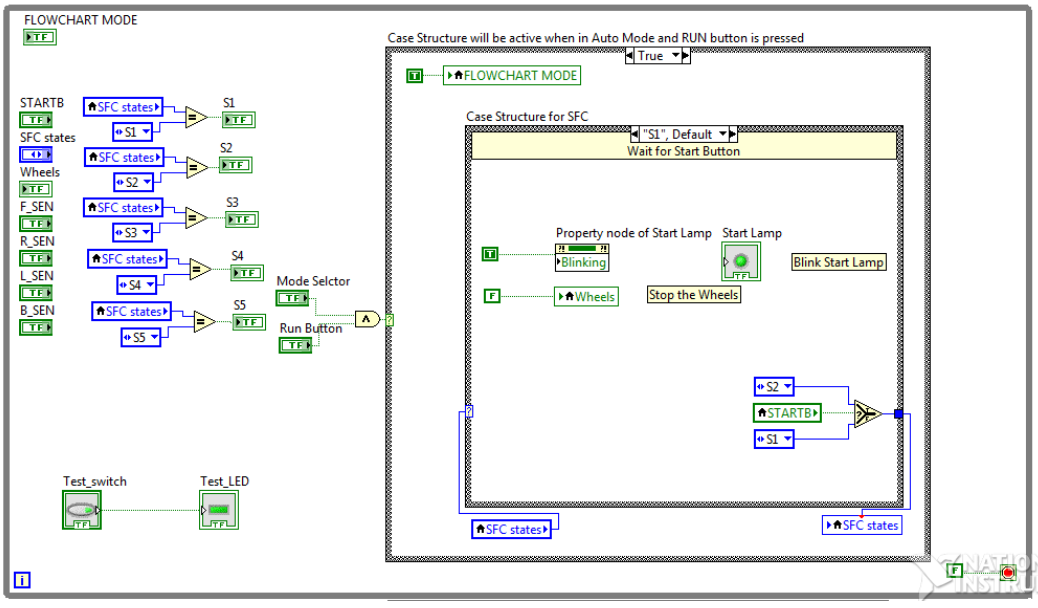


2016-03-08 Success on Dual parallel while loop (Mode selector and Run Button)

20160308 Multiple loop testing - Dual parallel while loop - one for sequence - one for motor control - Auto mode - Run button

The Flowchart Mode only runs when “Mode Selector = 1 = auto” and “Run button = 1”. Whenever the “Mode Selector = 0 =manual” or “Run Button = 0”, the Flowchart will stop and Flowchart Indicator will be off.





Reply from NI engineer support. Refer to email around 7/3/2016

http://digital.ni.com/public.nsf/allkb/267704CDE91156D186256F6D00711AAE

IR range Sensor GP2Y (10-80cm) forward and GP2D (4-30cm)

http://letsmakerobots.com/node/8901

GP2Y http://www.sharpsma.com/webfm_send/1208

http://www.trossenrobotics.com/productdocs/GP2D12.pdf

GP2D http://www.sharpsma.com/webfm_send/1203

https://www.sparkfun.com/products/242

Conclusion for the GP2Y
Follow sharp's advice to add a 10uF capacitor between the 5V and 0V supply
Possibly ground the casing to reduce noise influence. (made of conductive ABS)
The sampling rate is 32ms. Therefore we can take 8 reading in a span of 2 cycles(64ms). Each reading should be 8ms apart. Then do a median in the software. That would throw off the spikes remaining.

Digilent motor adaptor

http://store.digilentinc.com/motor-adapter-for-ni-myrio/

Possible alternative

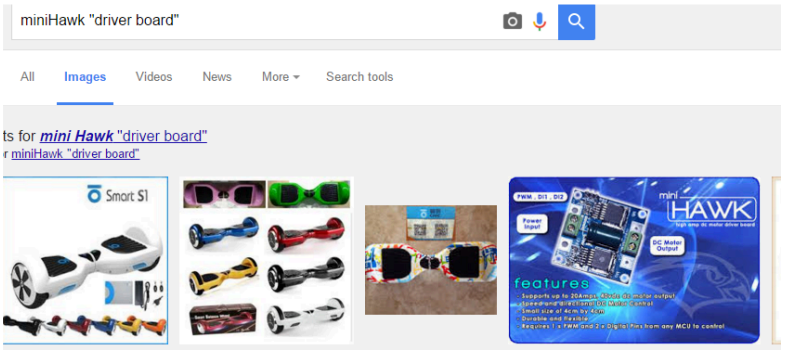
Pololu G2 High-Power Motor Driver 24v13 USD 29.95 https://www.pololu.com/product/2992

Pololu G2 High-Power Motor Driver 18v17 USD 29.95 https://www.pololu.com/product/2991

MC33926 Motor Driver Carrier 28V3A $32.25
http://www.sgbotic.com/index.php?dispatch=products.view&product_id=555

Sabertooth 2x5A 6V-18V Regenerative Motor Driver 18V 2x5A $115
http://www.sgbotic.com/index.php?dispatch=products.view&product_id=1022

VNH5019 Motor Driver Carrier - 12A 24V12A $37
http://www.robot-r-us.com/motor-driver/vnh5019-motor-driver-carrier-12a.html



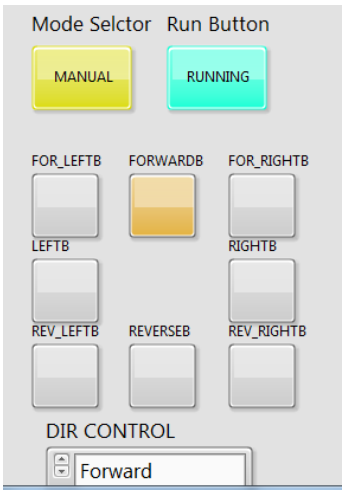
Dual Channel H-Bridge Motor Shield (8A 22V)2x controller no brand $37
http://www.robot-r-us.com/arduino-stuff/dual-channel-h-bridge-motor-shield-8a-22v.html

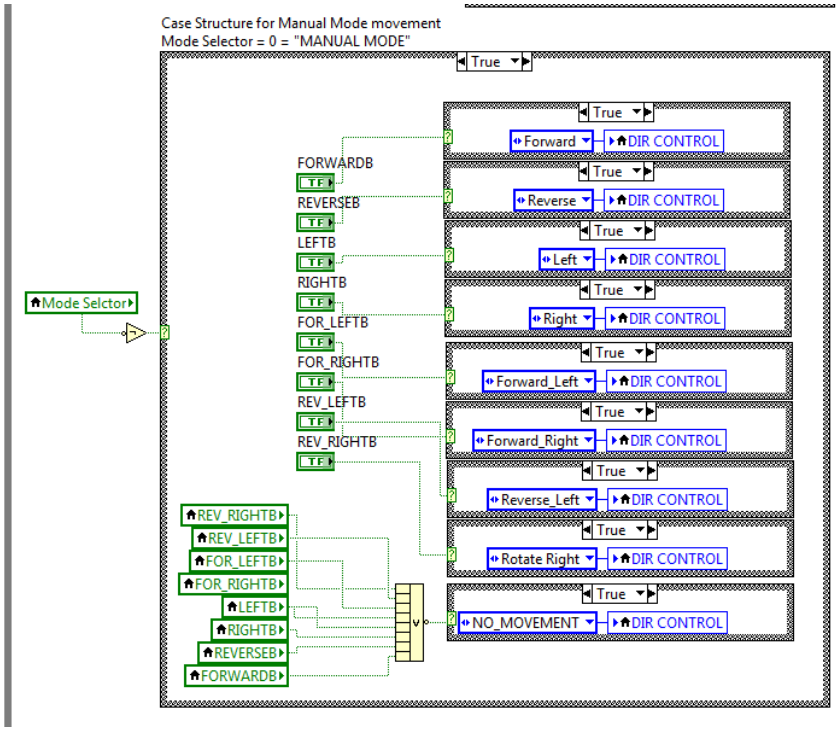
2016-03-08 Creating a Joystick mode using case structure (success)

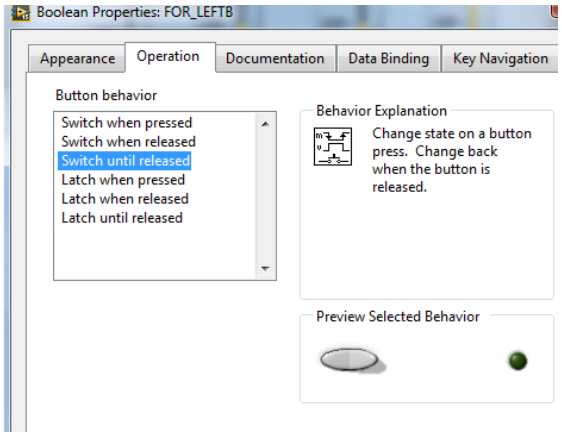
It works perfectly. However, I was **not allowed to use momentary type of push button** “switch until released” when I connect to MyRIO . Under non project, if its just the VI, I can use momentary button. So the work around is that I must press ForwardB to make it move, and press ForwardB again to stop it. Then I can Press RightB to move in another direction. Its its momentary, then I can just Click and hold until the location then release the click.

Program

15 Main Change to Multiple Case SFC - Dual while loop motor control (edited from 13)

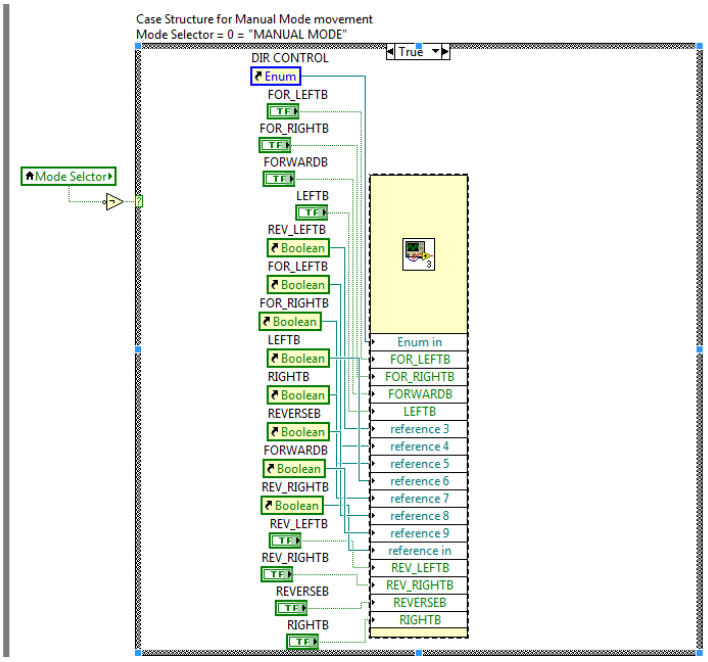





Boolean Properties: FOR_LEFTB
Appearance
Operation
Documentation
Data Binding
Key Navigation
Button behavior
Switch when pressed
Switch when released
Switch until released
Latch when pressed
Latch when released
Latch until released
Behavior Explanation
Change state on a button press. Change back when the button is released.
Preview Selected Behavior

2016-03-08 Creating a sub VI for the Joystick mode (failed)

Tried to pack the Joystick code into a VI so that the 8 Joystick inputs will just connect to a subVI. Failed. Look like what's below. The internal "local variable" changes itself to "ref" and "propery node" automatically.



2016-03-08 Improving the Joystick mode to allow changing of direction without stopping. (failed)

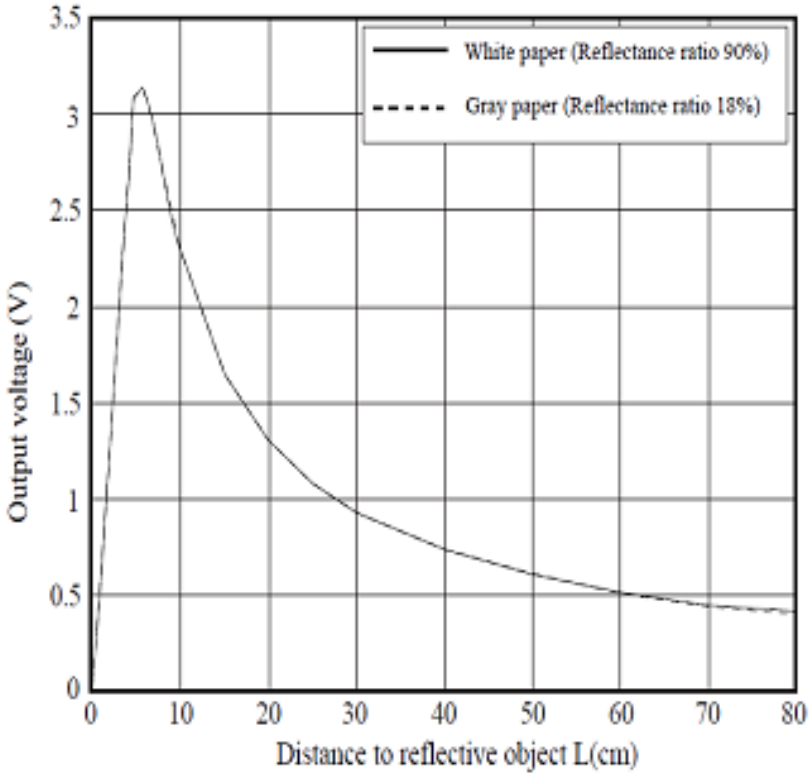
2016-03-10 First integration of Auto sequence with vehicle movement (success)

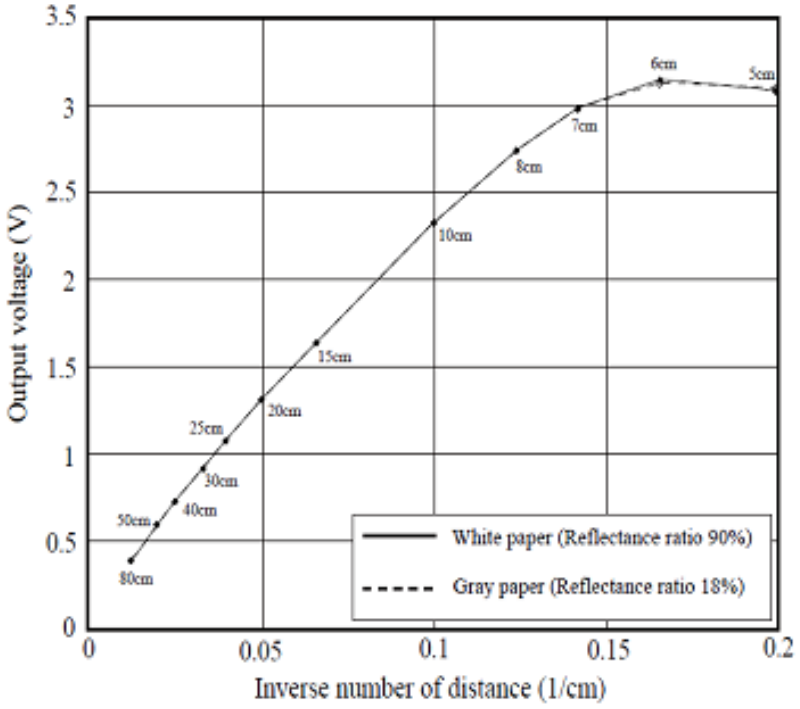
16 First integration of Auto sequence with vehicle movement (edited from 15 and 20160308 Multiple loop testing) (success)

2016-03-10 Auto sequence - draw a square - with vehicle movement (success)

16a Auto sequence - draw a square - with vehicle movement (edited from 15 and 20160308 Multiple loop testing)(success)

2016-03-15 GP2Y Sensor





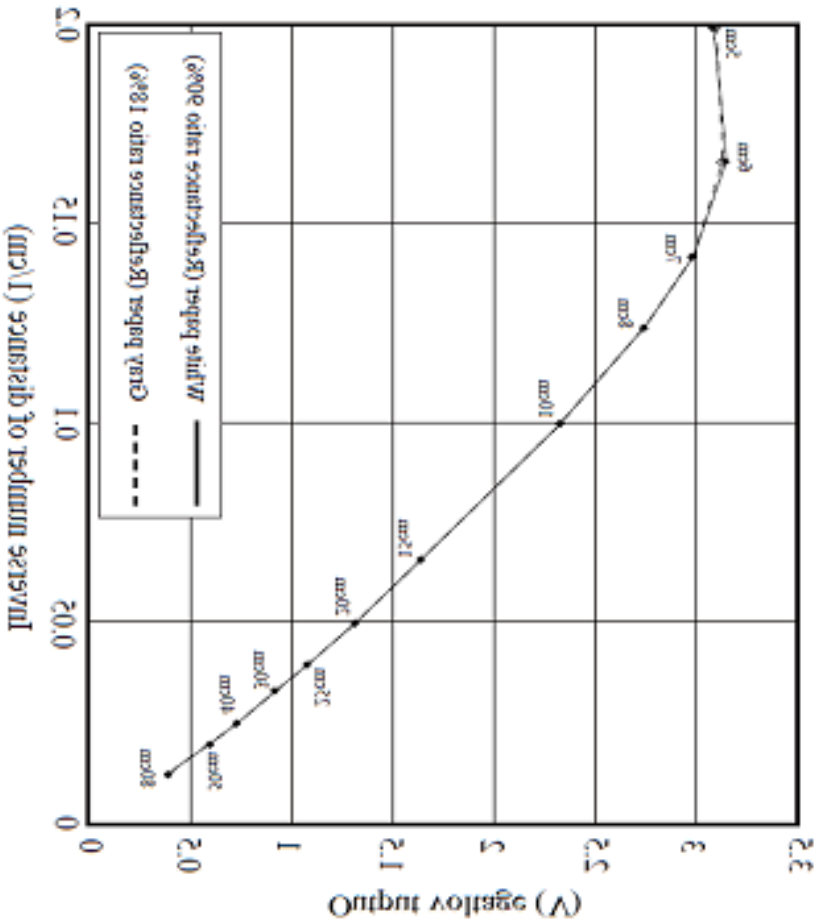
Tested the parameters on the graph is quite accurate.

As seen from graph 2, the relationship is linear. If I flip the graph around and plot y axis as 1/cm and x axis as V, as shown below, I can derive a line equation y=mx+c,

M= gradient = (y2-y1)/(x2-x1)=((1/10cm)-(1/80cm))/(2.3V-0.37V)=(0.1-0.0125)/1.93=0.04533

C seems to be approximately -0.005

Thus y=mx+c, → y=0.04533x-0.005 → (1/cm)=0.04533(V)-0.005 → cm= 1/[0.04533(V)-0.005]



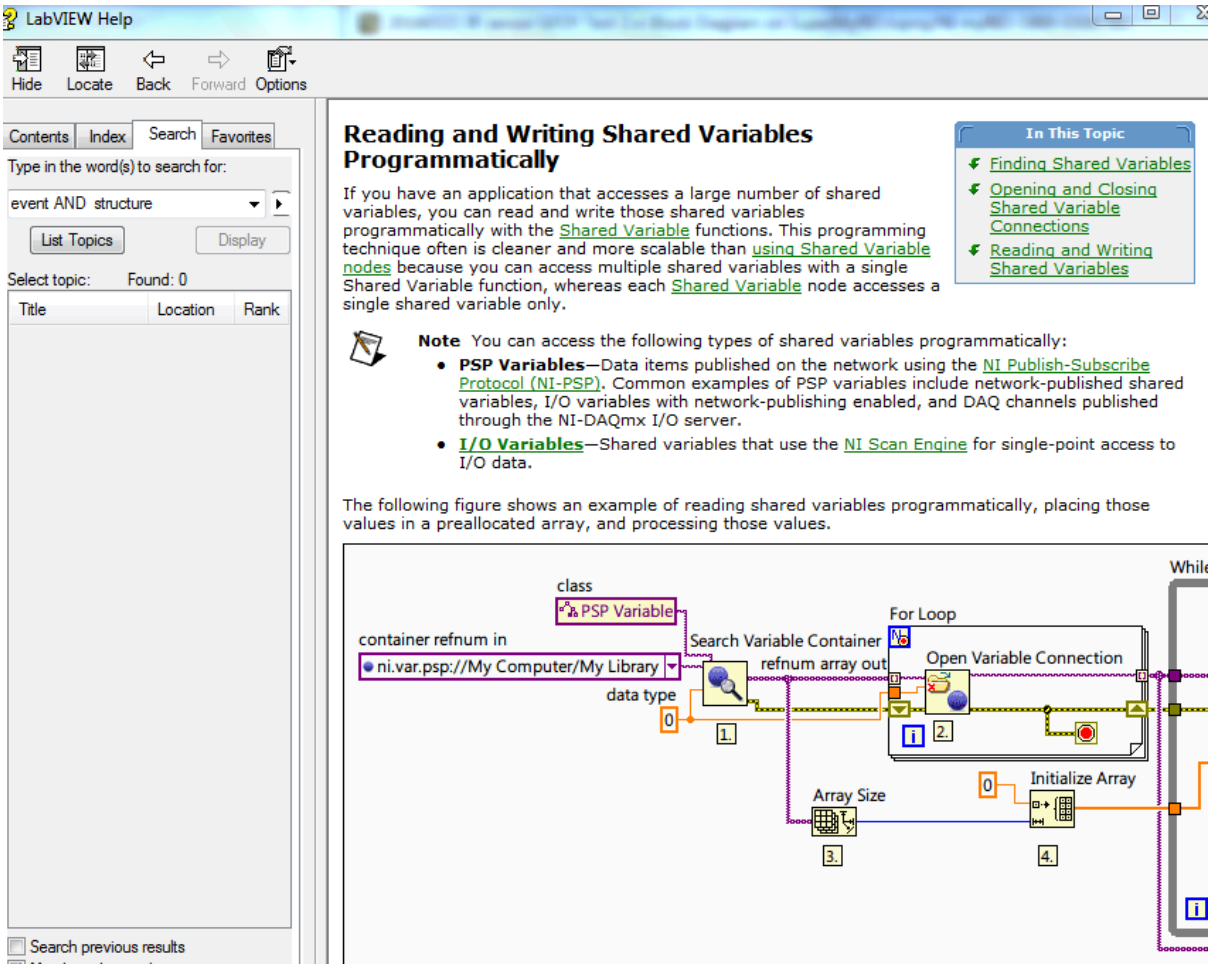
Choosing Stepper Motor

		V	A	wire	Ohm	Kgcm	Nm	Ncm	Shaft	$
N17	https://www.robot-r-us.com/motor-stepper/stepper-motor-with-cable.html	12V	0.33A	4	34	2.3	0.23	23	5mm	
N23	http://sg.rs-online.com/web/p/stepper-motors/1918356/ **191-8356**	12	0.6A	8	20		0.49		6.35 mm	
N23	http://sg.rs-online.com/web/p/stepper-motors/1918340/?origin=PSF_421244|alt **191-8340**	12	0.48	8	25		0.49		6.35	

N23	http://sg.element14.com/astrosyn/my180/stepper-motor-1-8deg-12v/dp/9598693 ASTROSYN MY180	12	0.6	8	20		0.53			71.46

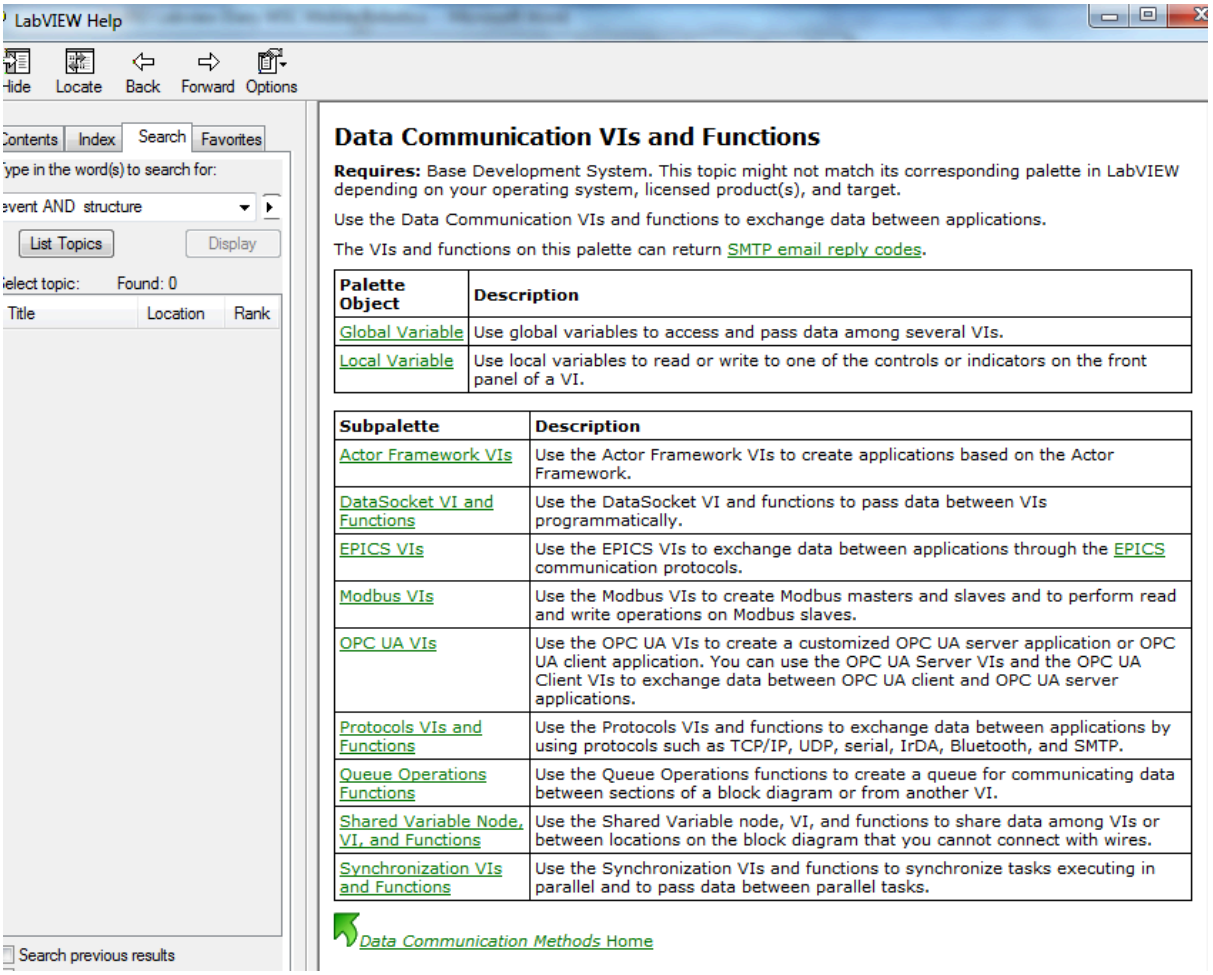
https://www.robot-r-us.com/components/slip-ring-w/-flange-22mm-dia.-12-wires-240v-2a.html

Reading and Writing Shared Variables Programmatically

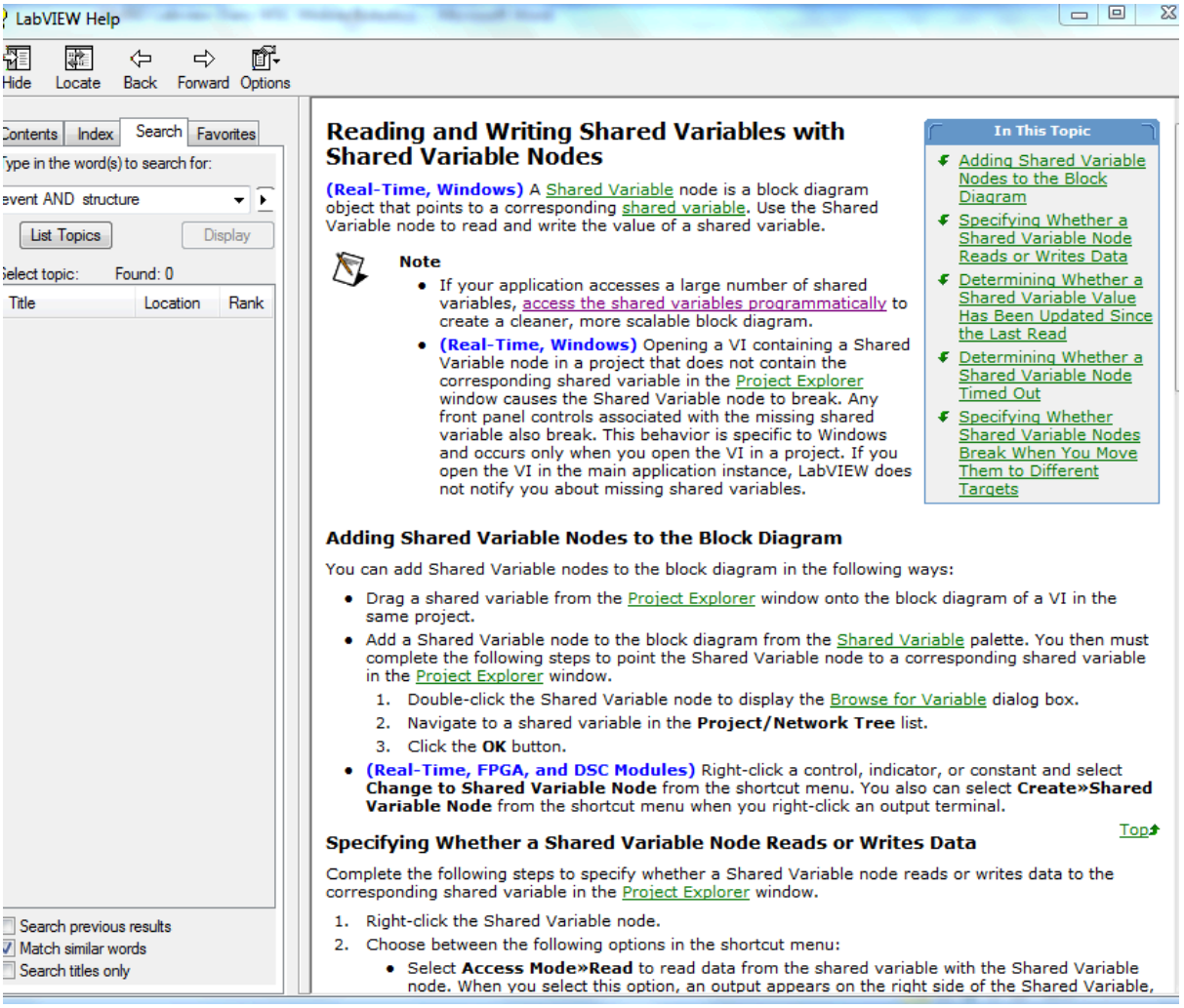


All about shared variables, Nodes, Global Variables, local variables.

Data Communications Vis and Functions



Reading and Writing Shared Variables with Shared Variable Nodes



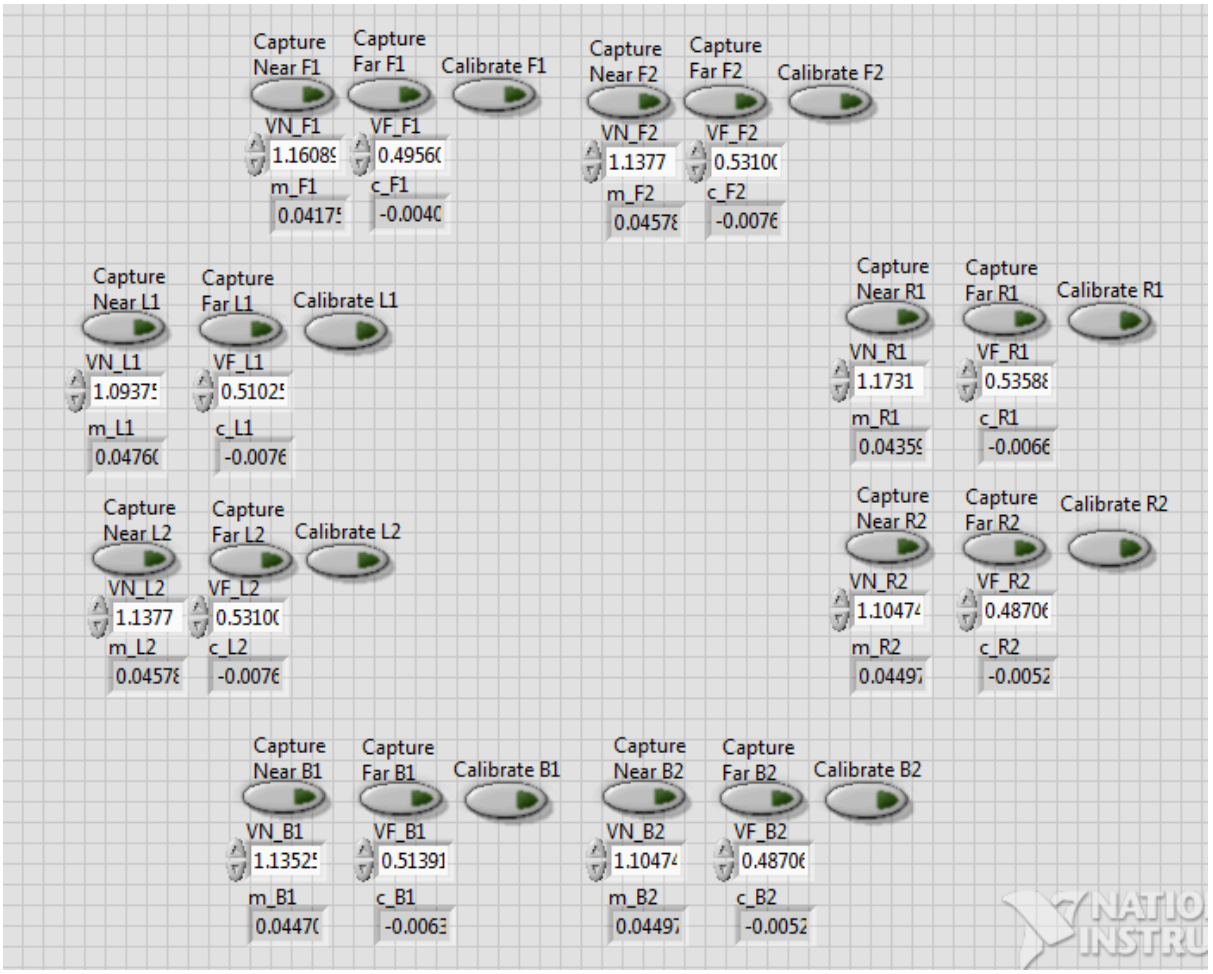
20160329 MiniHawk

- MiniHawk was installed, test and able to get it to run, but there are problems.
- Dilgent board was active low, but MiniHawk is active high

20160329 Install additional 2 sensors

- MyRIO breakout board 34pin plug was misaligned. But yet still able to plug in, causing an error, but could not be easily identified. It the end it was discovered. And problem was correct
- GP2Y scanning the same side, example left1 and left2. Cannot be of different orientations.
- GP2Y cannot be mounted too near the floor. Else, near measurement are fine, but far measurements are erratic

20160403 Auto Calibration sensor for GP2Y



20160520 Research on Vision

Robot arm able to sense color and position of square cubes
https://www.youtube.com/watch?v=QbPTCOZD3jY

Overlay Text at X-Y coordinates
https://www.youtube.com/watch?v=O5IIrPP_smA&list=PLvcPIuVaUMIX45mQyQZqj3-nNA-GQ4v-i&index=9

20160520 PI control on the new EVE with POLOLU drivers

Observations
Wheels now have regenerative brake. When its not moving, its sort of high resistance to manual movement

P=0.005. I=0, D=0, Tested optimum is around 80 cruising speed.

20160525 Adam with Mini Hawk have problem moving side

Observation
Adam wheels is weaker than Eve.
We plot out the range of DC>PWM voltage>Motor (Vo) at free running>Motor(Vo) at stalled
Tested at 0.4 or 40% duty cycle, PWM voltage from both controller is 1.25V, both free running Vo is around 11V, but Adam stall voltage is 1.2V while Eve is 5.2V

(This is tested without PID, just the simple program which drives the motor directly)
(Refer to the record found in black file)

20160526 Testing with compass Digilent Pmod CMPS

Use the essential guide as starter. (page 101)

Compass is not as direct as we expect. There's the angle tilt and offset thingy.

https://www.youtube.com/watch?v=3WkJ7ssZmEc&feature=youtu.be

Use the essential guide as starter. (page 101)

Found the formula to convert the X and Y axis reading to compass heading from

Application Note: Compass Heading Using Magnetometers AN-203 (0.07MB)

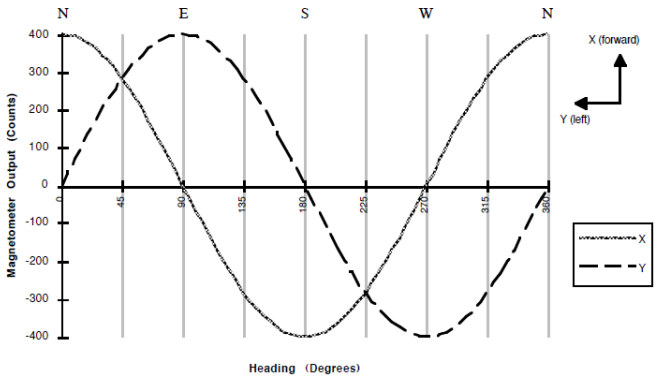


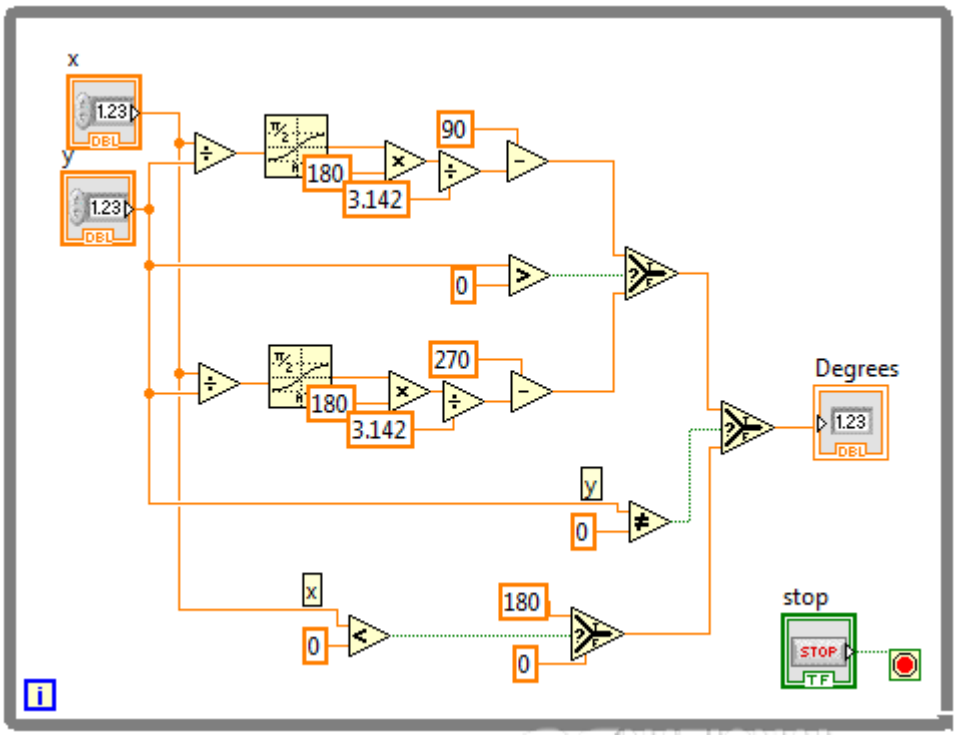
Figure 4 - Hx and Hy Magnetometer Readings for Different Compass Headings

The maximum value of Hx and Hy depend on the strength of the earthÕs field at that point. The magnetic compass heading can be determined (in degrees) from the magnetometerÕs x and y readings by using the following set of equations:
Direction (y>0) = 90 - [arcTAN(x/y)]*180/1
Direction (y<0) = 270 - [arcTAN(x/y)]*180/1
Direction (y=0, x<0) = 180.0
Direction (y=0, x>0) = 0.0
To determine true north heading, add or subtract the appropriate declination angle.

Created Standalone program to test the above

Online resources

Genuine compass indicator
http://forums.ni.com/t5/LabVIEW/Genuine-compass-indicator/m-p/983752#M440517
http://forums.ni.com/t5/LabVIEW/Does-anyone-have-an-indicator-that-works-like-a-compass/m-p/156309?query.id=432459#M93182
http://mythopoeic.org/magnetometer/
http://mythopoeic.org/magnetometer-real-data/
http://www.timzaman.com/2011/04/heading-calculating-heading-with-tilted-compass/



20160528 Revisiting getting speed from encoder

How to Estimate Encoder Velocity Without Making Stupid Mistakes: Part I
https://www.embeddedrelated.com/showarticle/158.php
How to Estimate Encoder Velocity Without Making Stupid Mistakes: Part II (Tracking Loops and PLLs)
https://www.embeddedrelated.com/showarticle/530.php

The simplest approach is to estimate velocity = Δpos/Δt: measure the change in position and divide by the change in time. There are two classic options here:

- execute code at fixed time increments (constant Δt), measure position, and take Δpos = the difference between two successive position measurements
- execute code triggered by changes in encoder count (constant Δpos), measure elapsed time, and take Δt = the difference between two successive time measurements

The usual explanation is that the first approach (constant Δt) is better for moderate speeds and the second approach (constant Δpos) is better for low speeds. Texas Instruments has a user's guide (SPRUG05A) discussing this in detail

(pg9) http://www.ti.com/lit/ug/sprug05a/sprug05a.pdf

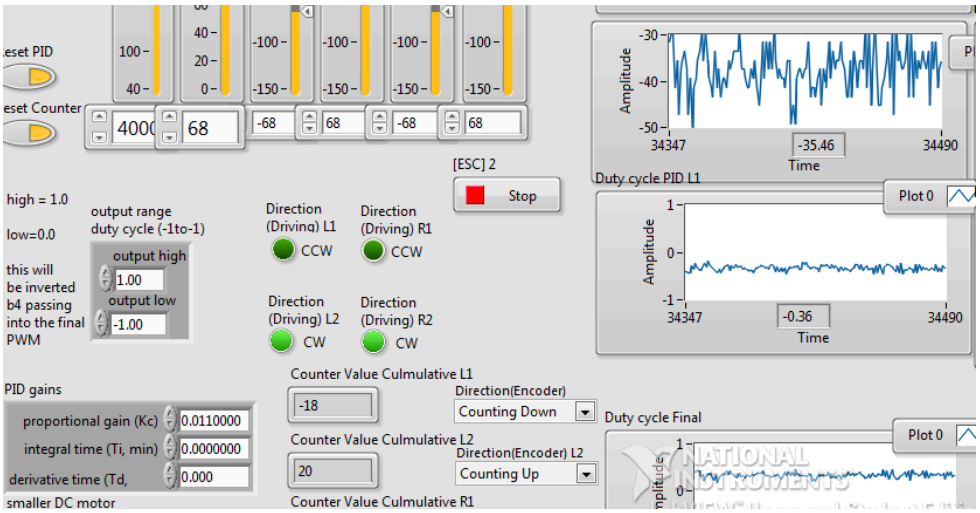
General Issues: Estimating velocity from a digital position sensor is a cost-effective strategy in motor control. Two different first order approximations for velocity may be written as:

$$v(k) \approx \frac{x(k) - x(k-1)}{T} = \frac{\Delta X}{T} \quad (1)$$

$$v(k) \approx \frac{X}{t(k) - t(k-1)} = \frac{X}{\Delta T} \quad (2)$$

20160530 Test of PID for movement of ADAM

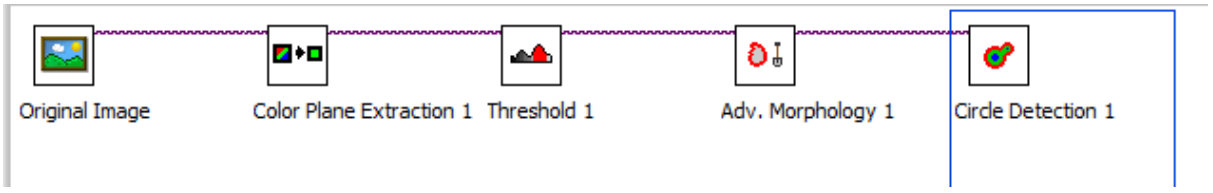
P=0.018 and Speed = 50 seems to work rather well for Adam for me. I prefer. (Kenneth they all seem to be testing P=0.011 and 70).



20160530 Straightening drift by compensation of L1 and R1

When moving sideways, the front wheels is always jammed, while the back wheels is always ok. This led to discovery that the front axis is heavy and loads the wheel. The discovery led to us changing the drivers. While it is no longer jamming, there is still a persistent slight drift in ADAM and even smaller one in EVE. To compensate for the weight, I decided to separate Proportional gain of L1 and R1 from the other wheels. Upon testing, a multiplier of 1.16 or increase of 16% is used. Perfect straight movement is achieve. (Note that the setpoint is 50rpm at original P=0.018 for ADAM. At differing setpoint and PID, the compensation needed may be different

20160602 Vision Identifying the largest red object.



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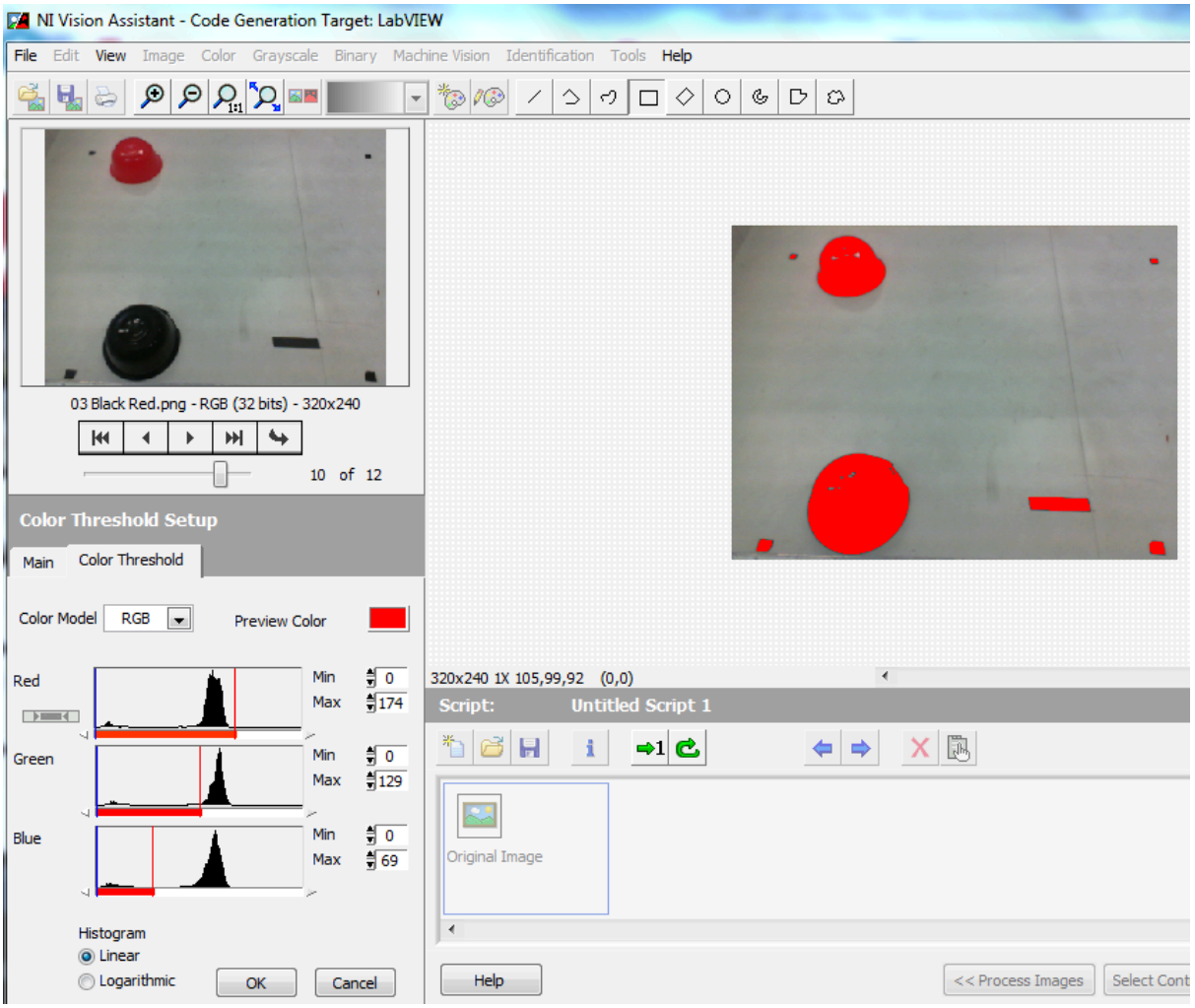
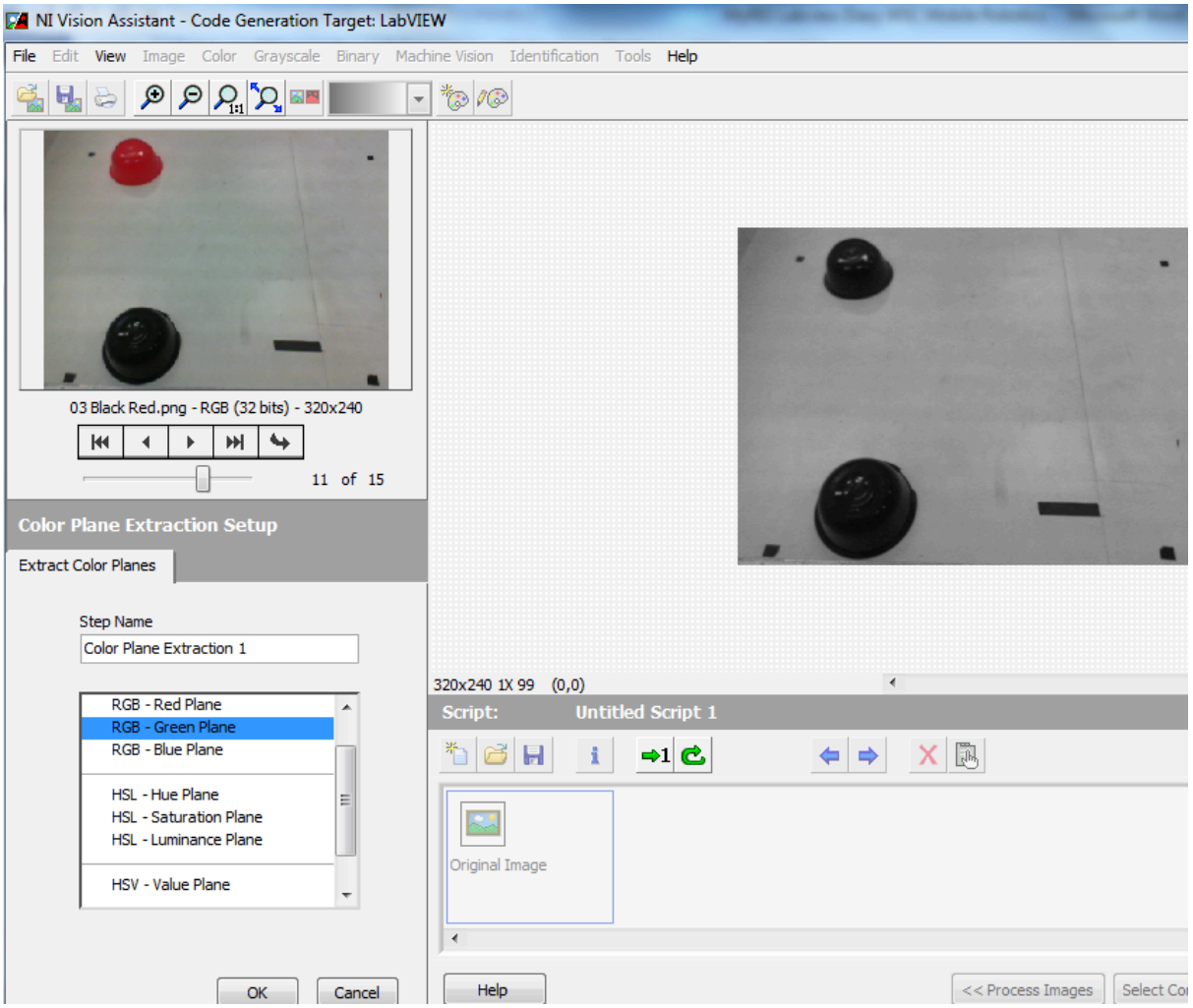
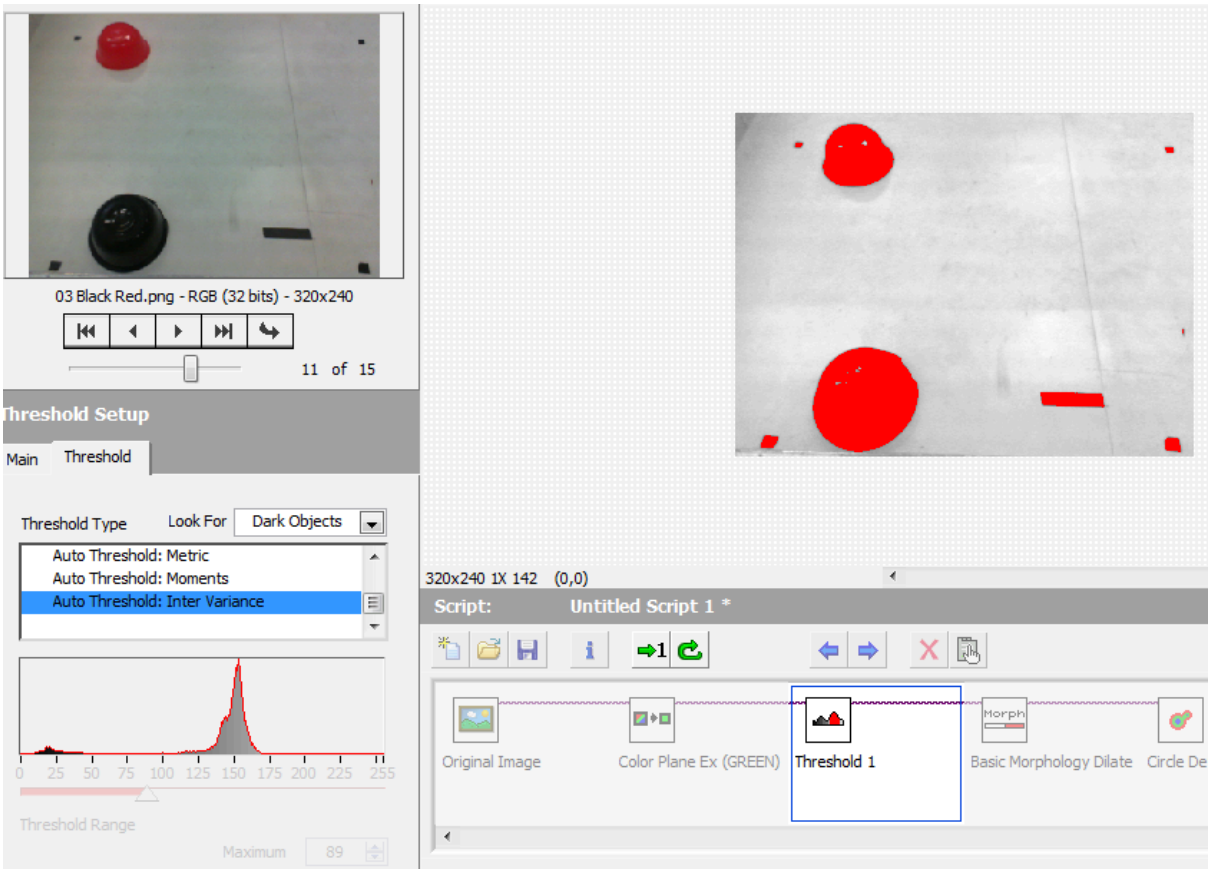
Using Color Threshold finds both red and also black objects



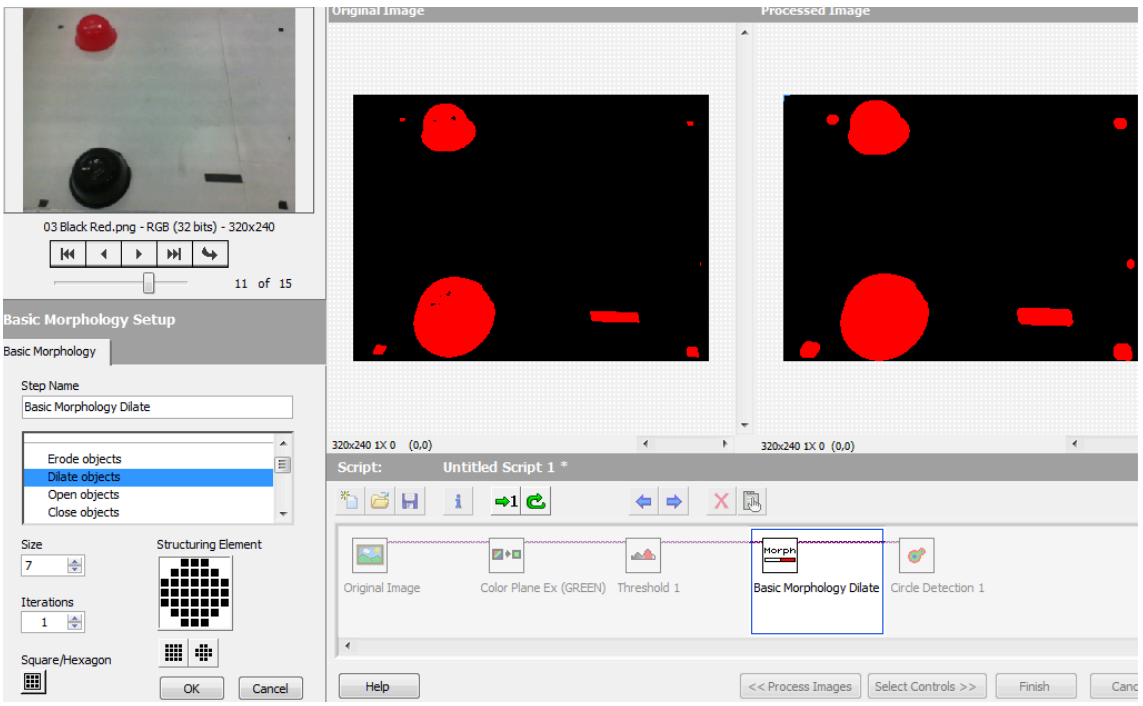
STEP1: Using Color Plane Extraction (Green) to detect both Red and Black bowls (easier than the last method)



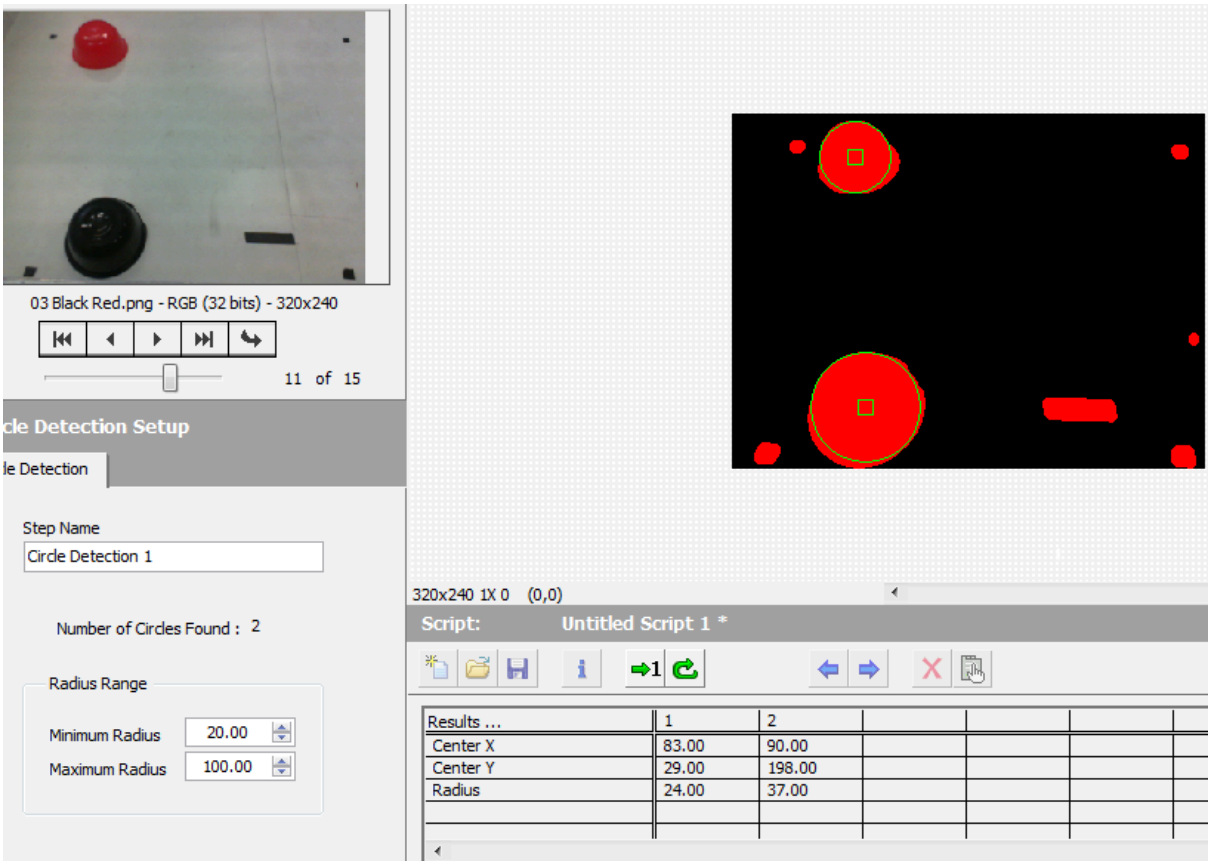
STEP2: Using Threshold to binarise the image. Set to look for “Dark Objects” and set to “Auto Threshold Inter Variance



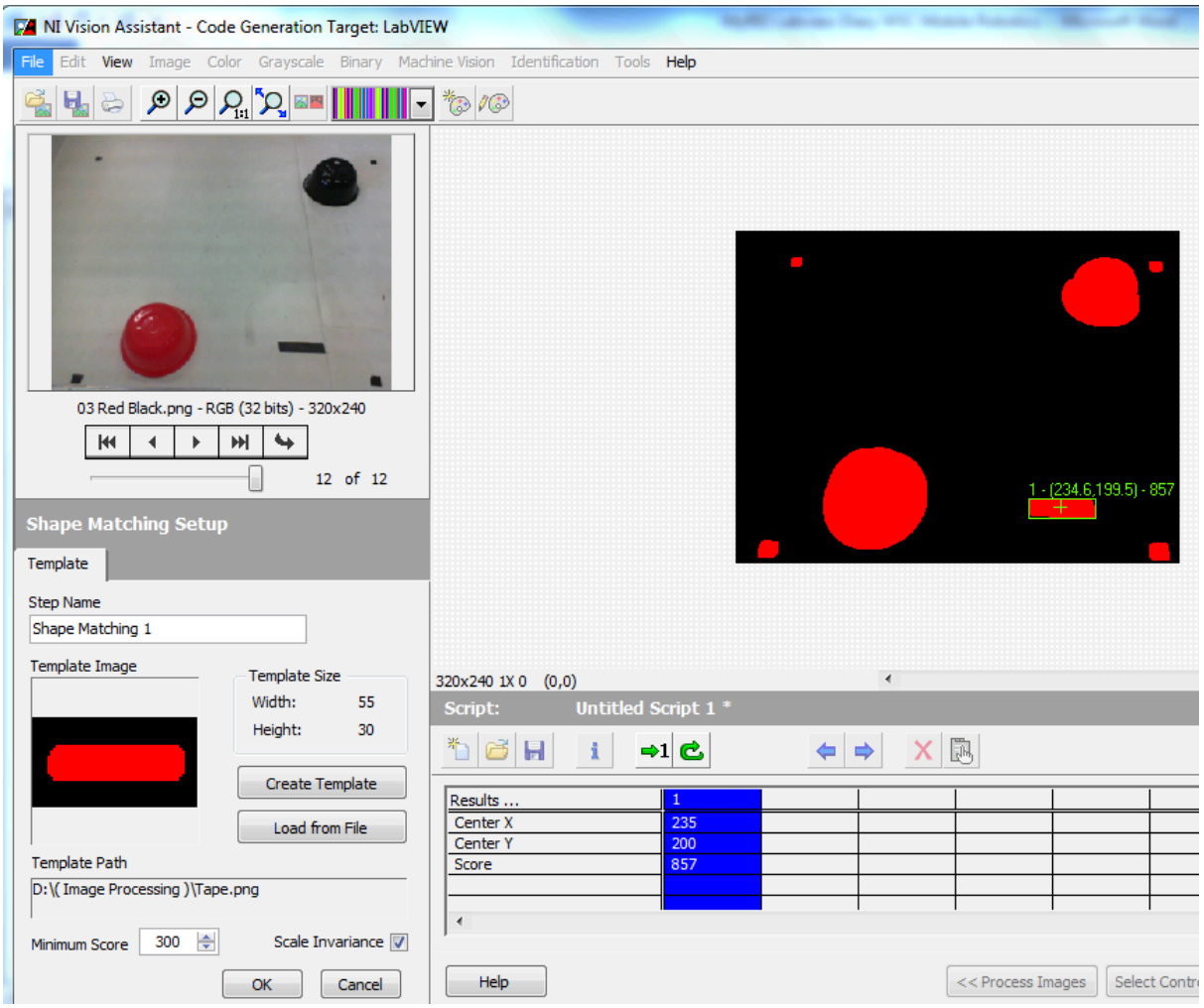
STEP 3: Basic Morphology - This will get rid of the “holes” in the detected bowl (which was caused by reflection). I can either use “Dilate” setting 7 or “Close” setting 7. If I don’t get rid, I cannot get the true size of the bowl in STEP4



STEP4 : Identify the bowl using circle detection. Set the minimum to



Using Shape Matching to find the tape. Minimum score I set to 300. (800 is exactly alike). Scale Invariance I also ticked.



20160608 Testing for Standalone

1. Created a simple VI to test the running LED. USB is connected and the VI is deployed and running. It works.
2. A few ways to disconnect and still keep the VI running standalone (until power is removed)
    a. Disconnect the USB cable.
    b. Exit the “project explorer” and choose “disconnect” instead of “close” when prompted.
    c. While in “project explorer>NI-myRIO-1900-030bdxxx (172.xxx)”, right click, “disconnect”
3. The above is a simple way to run standalone
4. Advantages
    a. Fast, simple. Suitable if frequent amendments are made.
5. Disadvantages
    a. Upon power off/ rebooting, the program disappears from myRIO and has redeployed and run. Troubleso

APPENDIX A Websites

John's 機器人技能競賽筆記
https://worldskill.wordpress.com/2015/06/23/worldskills-mobile-robotics-collection-iii-%E9%A6%AC%E9%81%94%E9%A9%85%E5%8B%95%E6%9D%BF-digilent-motor-adapter-for-ni-myrio/

TEAM ICHIBOT – Mobile Robotics 2015 http://team-ichibot.com/?p=921

Myrio Project Essential Guide www.ni.com/academic/**myrio**/project-guide.pdf

Author Topic: GP2Y0A2YK0F Sharp Distance Sensor (Read 48541 times)
http://www.societyofrobots.com/robotforum/index.php?topic=2712.0

http://www.robotroom.com/DistanceSensor3.html

To Sao Paulo With A Robot http://thebridge.psgtech.ac.in/?p=2809

APPENDIX B Good Reads for Labview

Local, Global and Shared Variable https://decibel.ni.com/content/docs/DOC-25095

APPENDIX C Where to buy

Servocity, Actobotics Beams and U channel
https://www.servocity.com/html/aluminum_beams_set__639012_.html#.Vw9_Pvl97IU
https://www.servocity.com/html/actoboticsr_kits.html
http://www.robotshop.com/uk/actobotics-parts.html

Studica Worldskills
http://www.studica.com/WorldSkills