

Project: Draper 2010-11



Final Report Appendix I – LabView Code *Prepared for:* Draper Laboratory

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Daniel Grieneisen Arash Ushani
Nicholas Hobbs Ann Wu
Jacob Izraelevitz

Faculty Advisor:
David Barrett

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April 22, 2011

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**PCMain-Rev2.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\PCMain-Rev2.vi

Last modified on 4/27/2011 at 5:44 PM

Printed on 4/29/2011 at 1:51 AM

PCMain-Rev2.vi

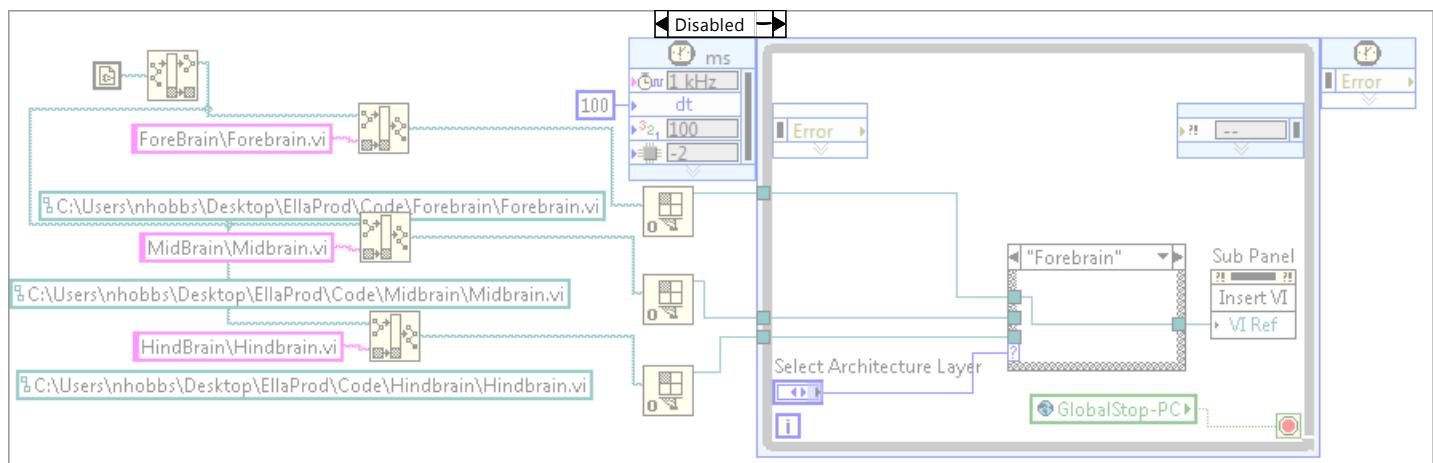
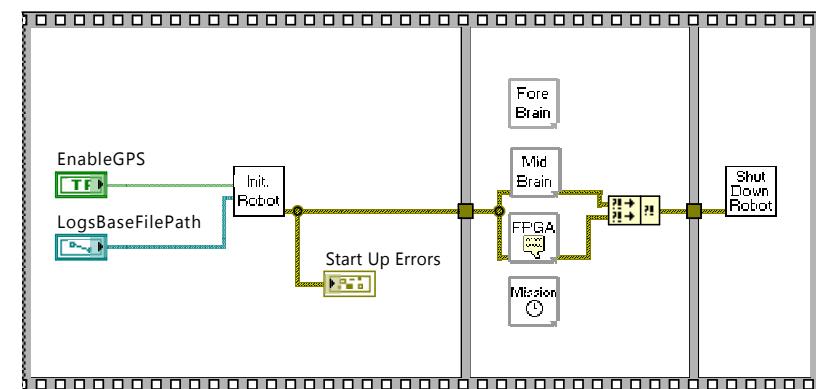
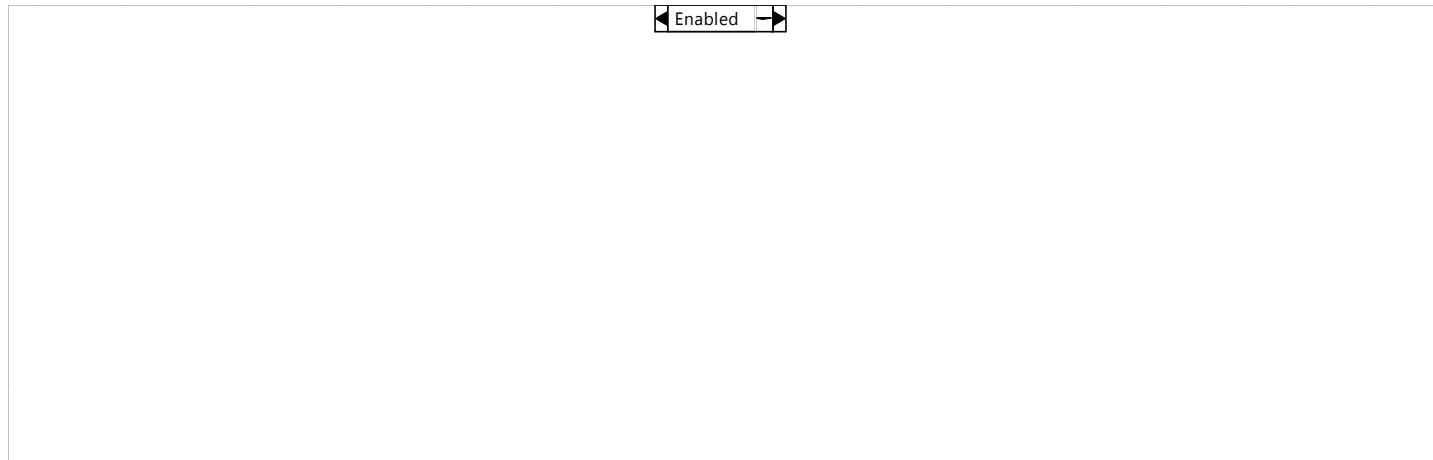


PCMain-Rev2.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\PCMain-Rev2.vi

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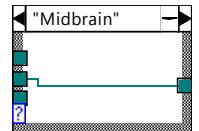


PCMain-Rev2.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\PCMain-Rev2.vi

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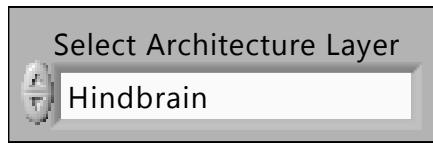
SelectLayer.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs>SelectLayer.ctl

Last modified on 3/28/2011 at 6:16 PM

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SelectLayer.ctl



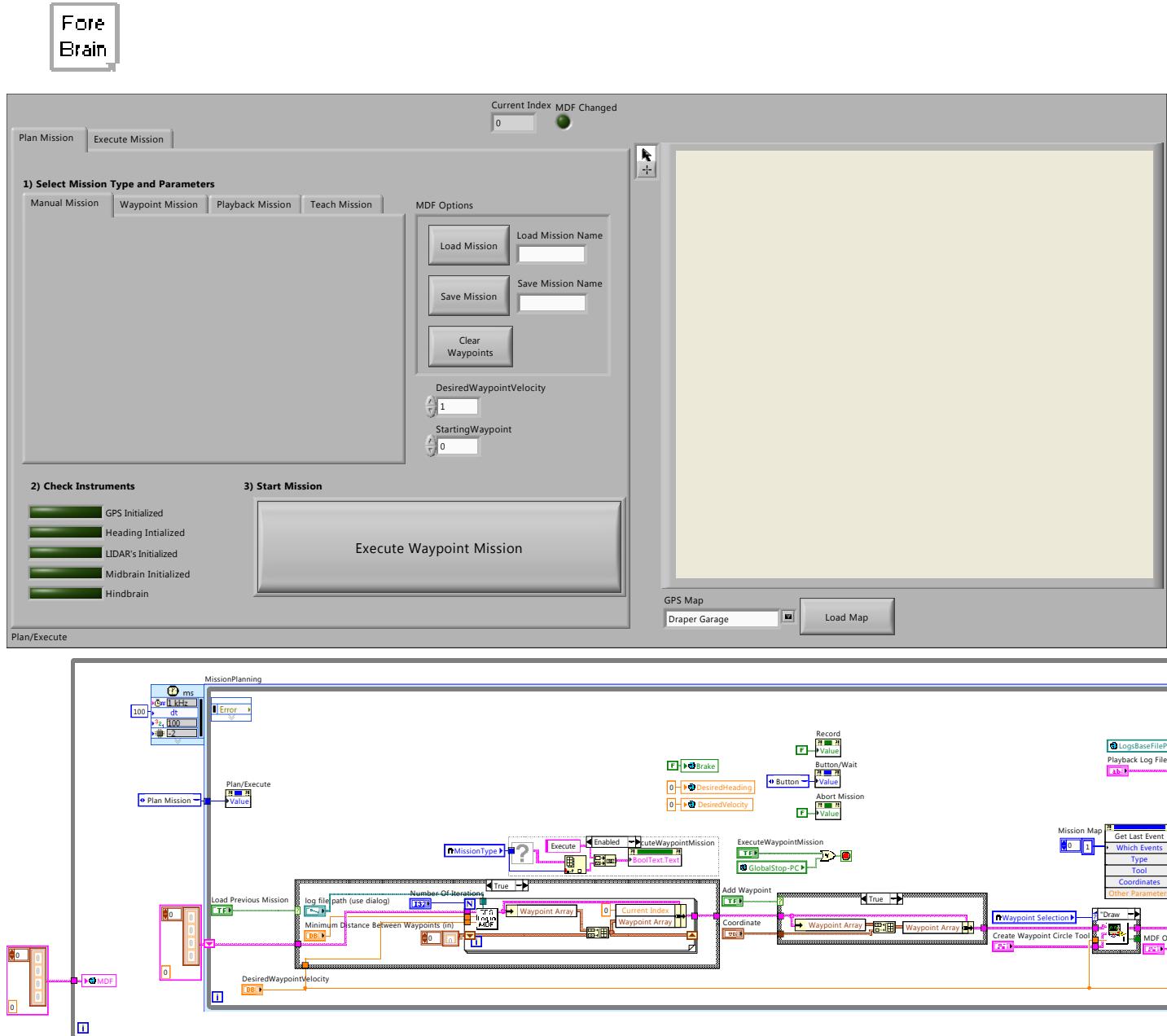
Forebrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Forebrain.vi

Last modified on 4/27/2011 at 5:37 PM

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Forebrain.vi

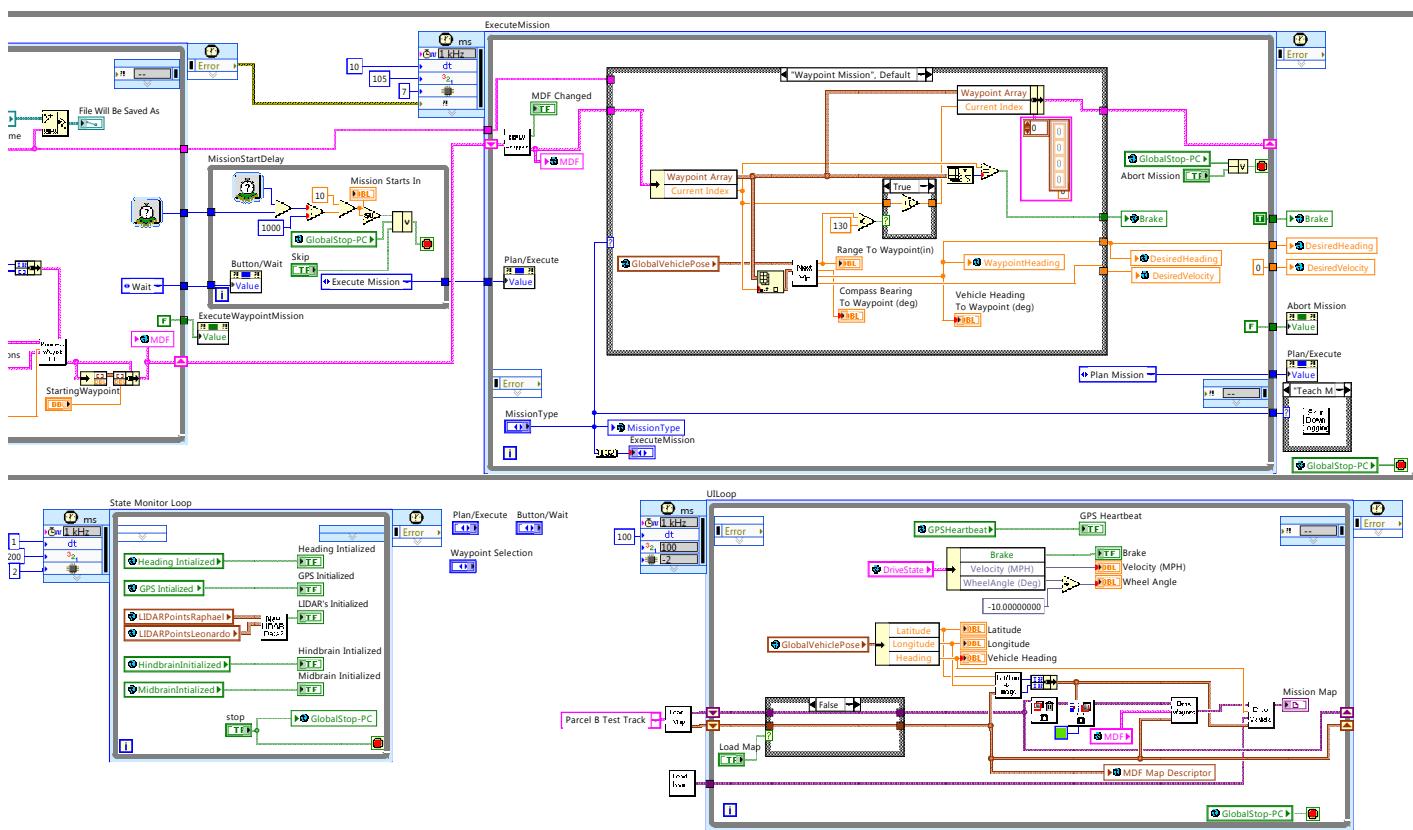


Forebrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Forebrain.vi

Last modified on 4/27/2011 at 5:37 PM

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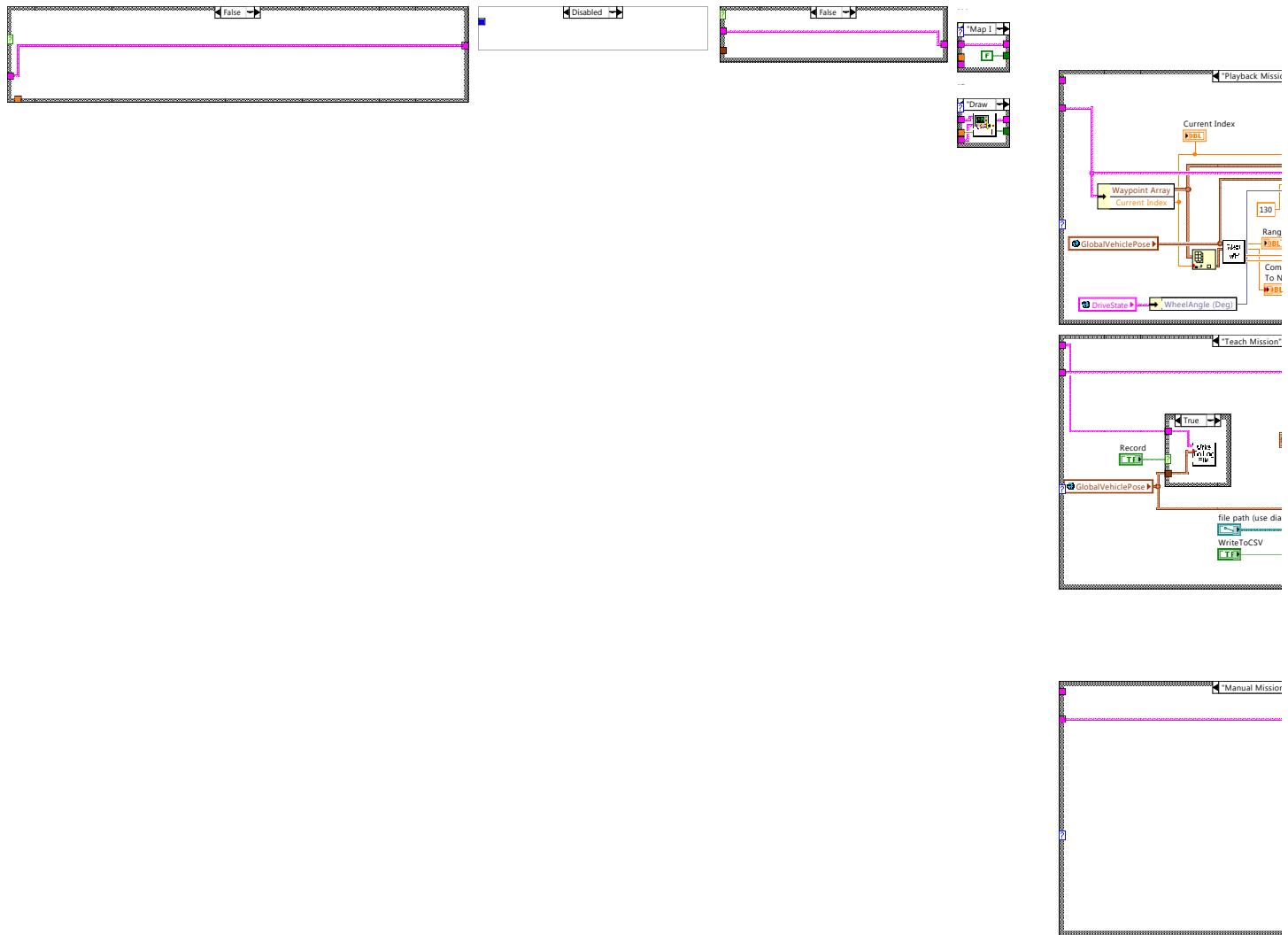


Forebrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Forebrain.vi

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Tick Count2

Tick Count

Returns the value of a free running counter in the units specified. The output and internal counter are both of the configured width.



Tick Count

Tick Count

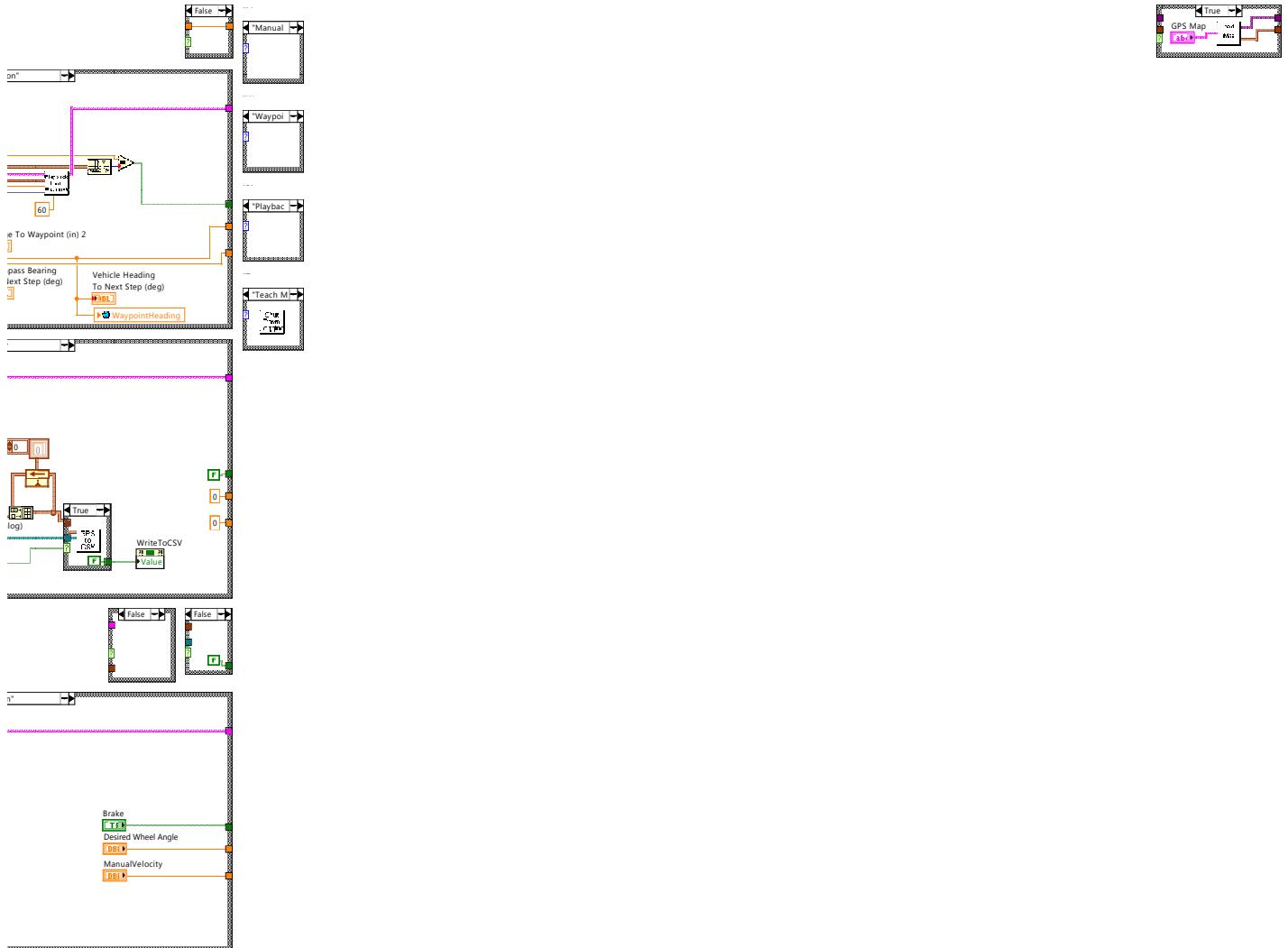
Returns the value of a free running counter in the units specified. The output and internal counter are both of the configured width.

Forebrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Forebrain.vi

Last modified on 4/27/2011 at 5:37 PM

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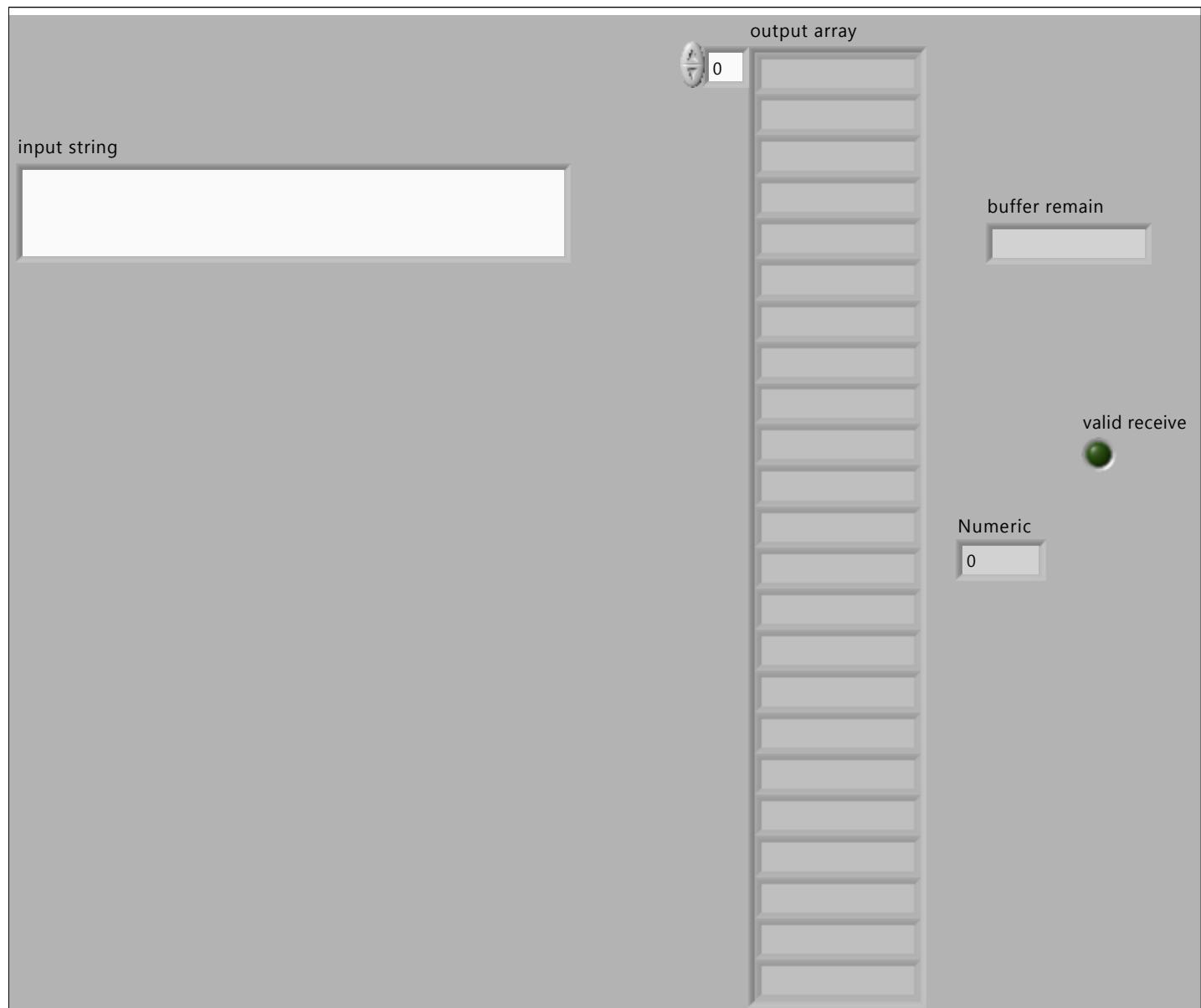


buf2strarray.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\buf2strarray.vi

Last modified on 4/28/2011 at 1:05 PM

Printed on 4/29/2011 at 1:51 AM

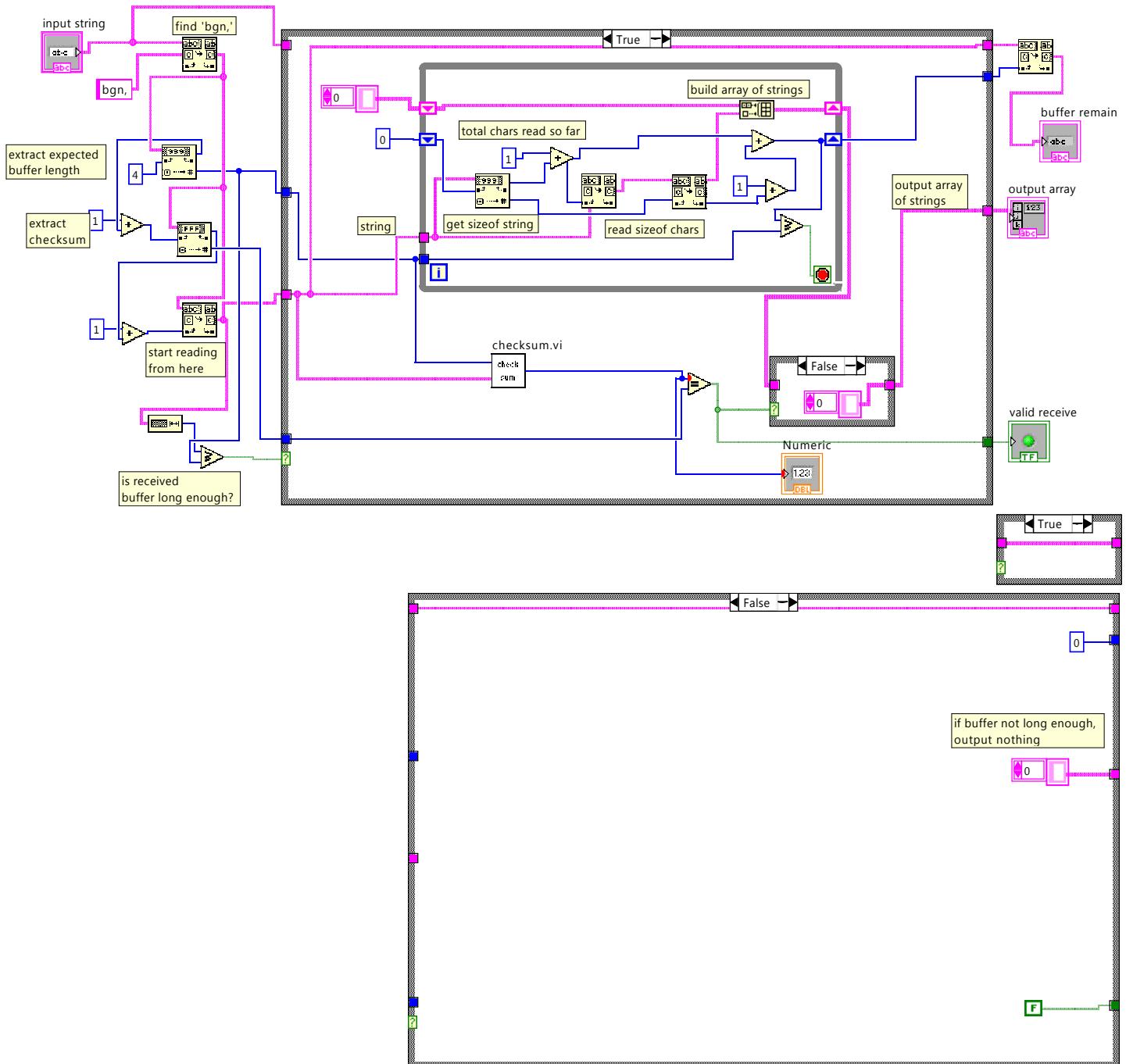
buf2strarray.vi

buf2strarray.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\buf2strarray.vi

Last modified on 4/28/2011 at 1:05 PM

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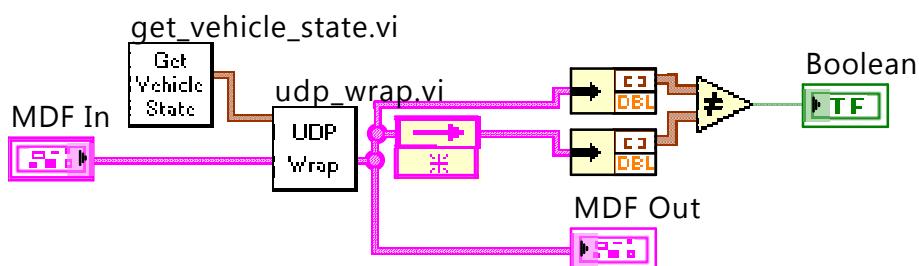
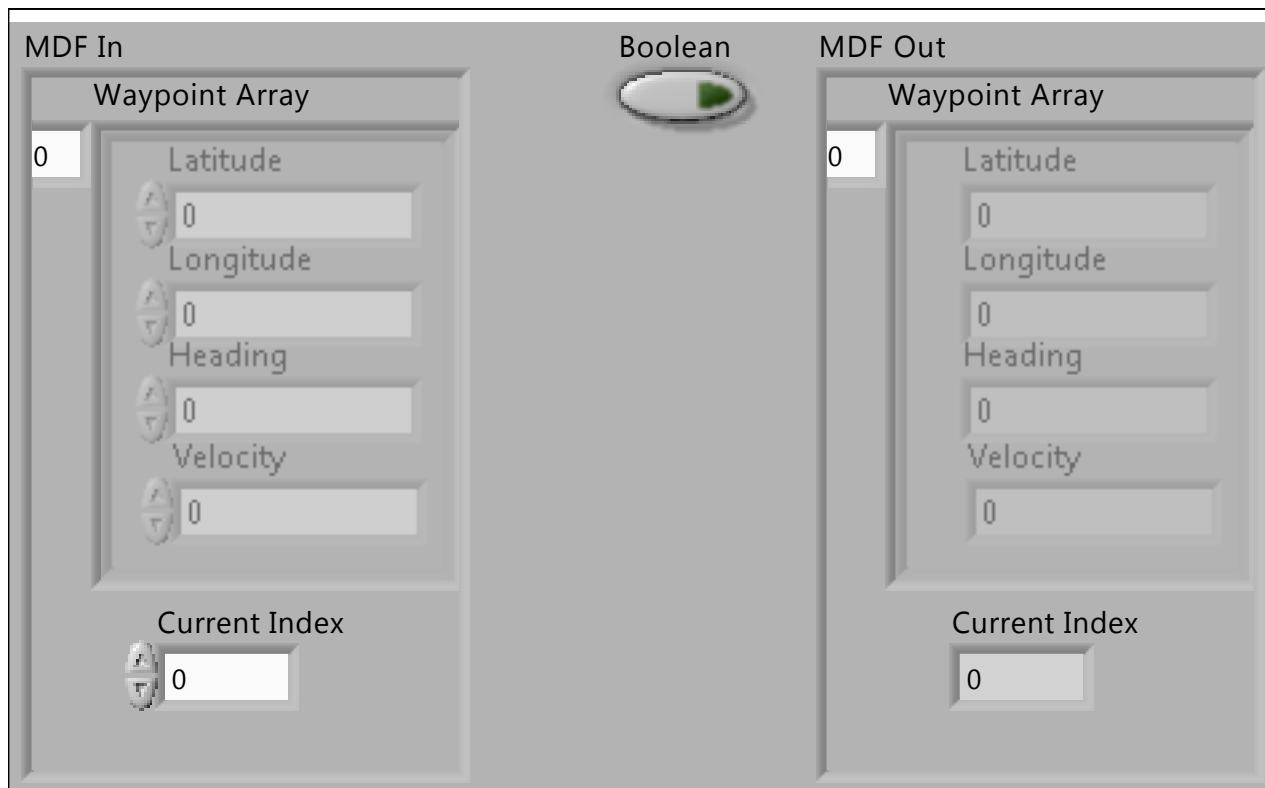


eeplv_wrapper.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\eeplv_wrapper.vi

Last modified on 4/27/2011 at 5:17 PM

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eeplv_wrapper.vi

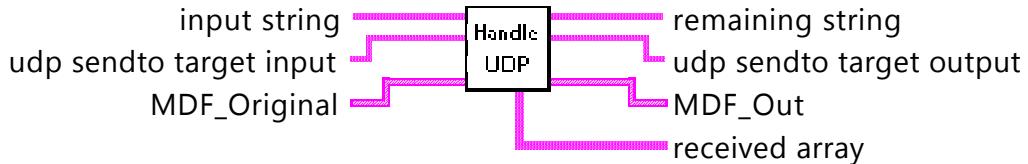
handle_udp_in.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\handle_udp_in.vi

Last modified on 4/28/2011 at 1:06 PM

Printed on 4/29/2011 at 1:51 AM

handle_udp_in.vi

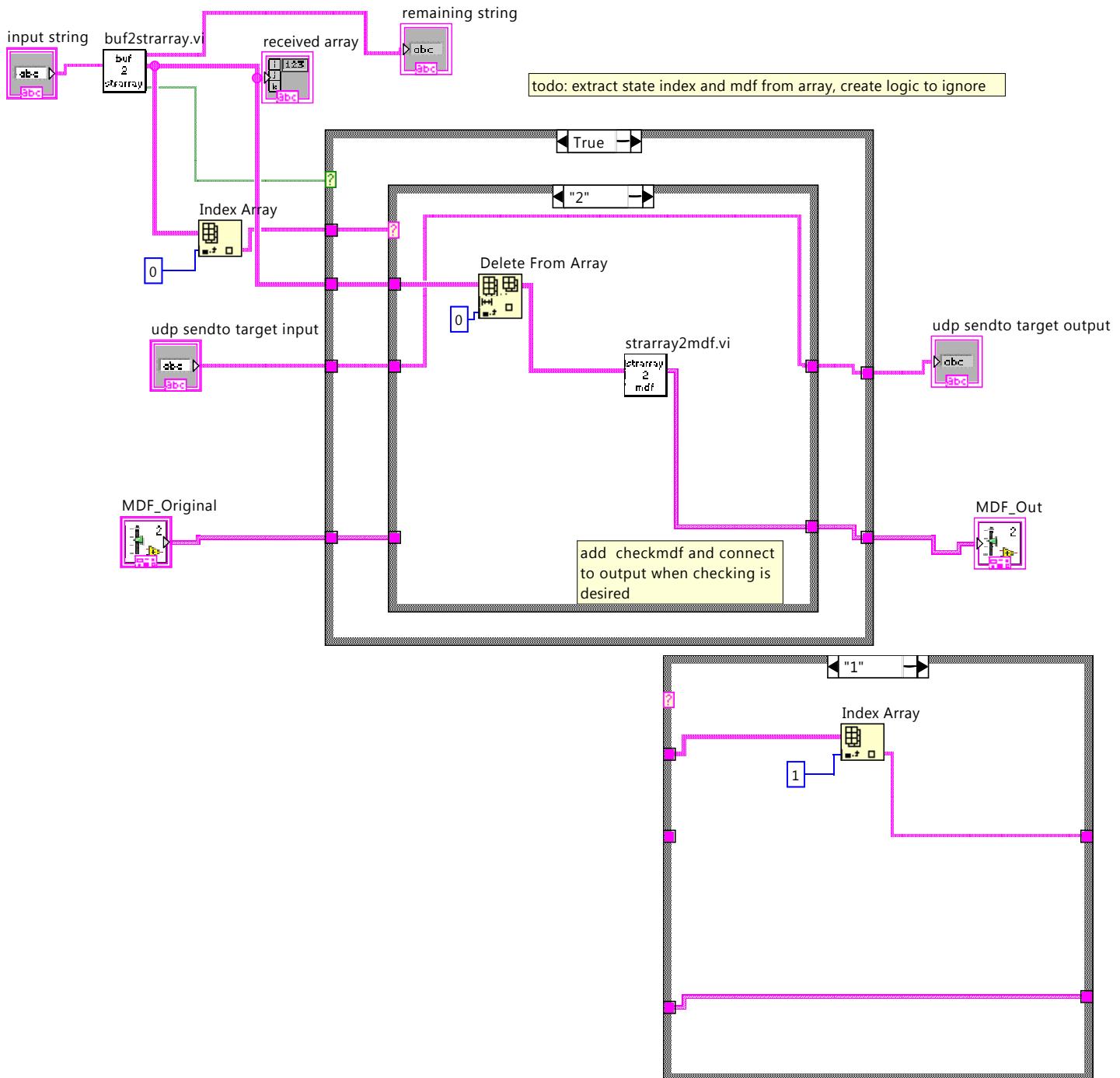


handle_udp_in.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\handle_udp_in.vi

Last modified on 4/28/2011 at 1:06 PM

Printed on 4/29/2011 at 1:51 AM

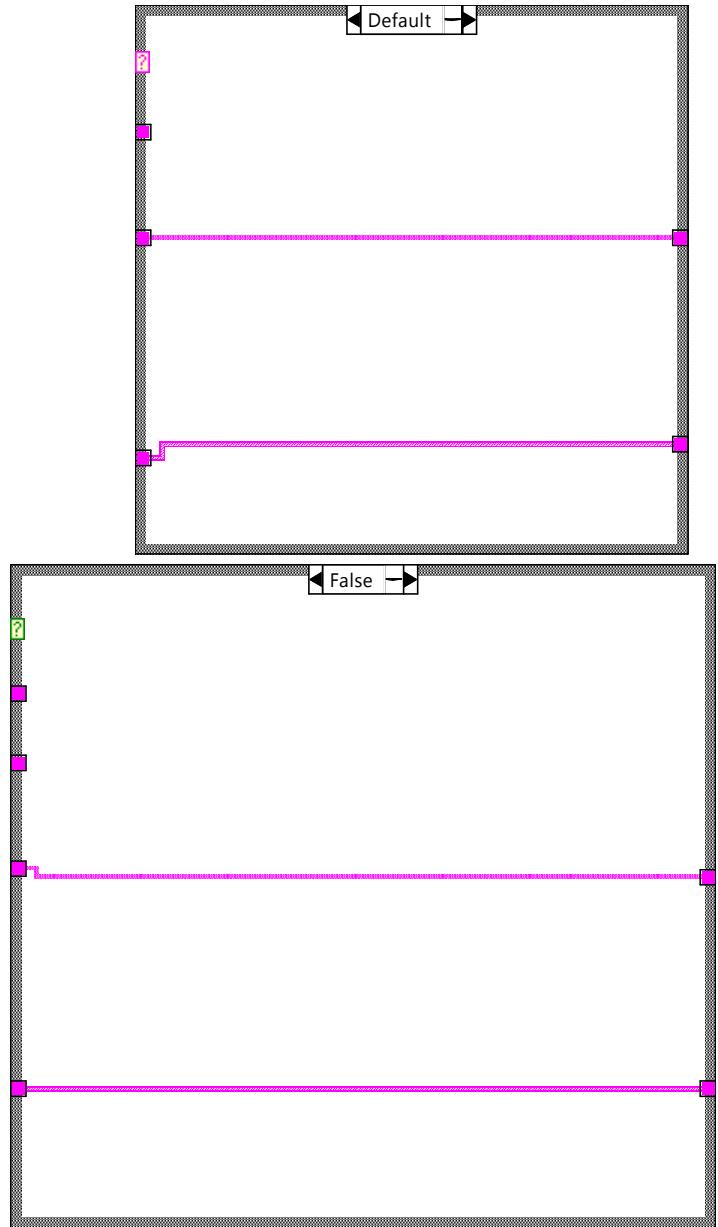


handle_udp_in.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\handle_udp_in.vi

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Waypoint.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\Waypoint.ctl

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Waypoint.ctl



Waypoint

Latitude	<input type="text" value="0"/>
Longitude	<input type="text" value="0"/>
Heading	<input type="text" value="0"/>
Velocity	<input type="text" value="0"/>

MissionType.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\MissionType.ctl

Last modified on 3/28/2011 at 6:16 PM

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MissionType.ctl



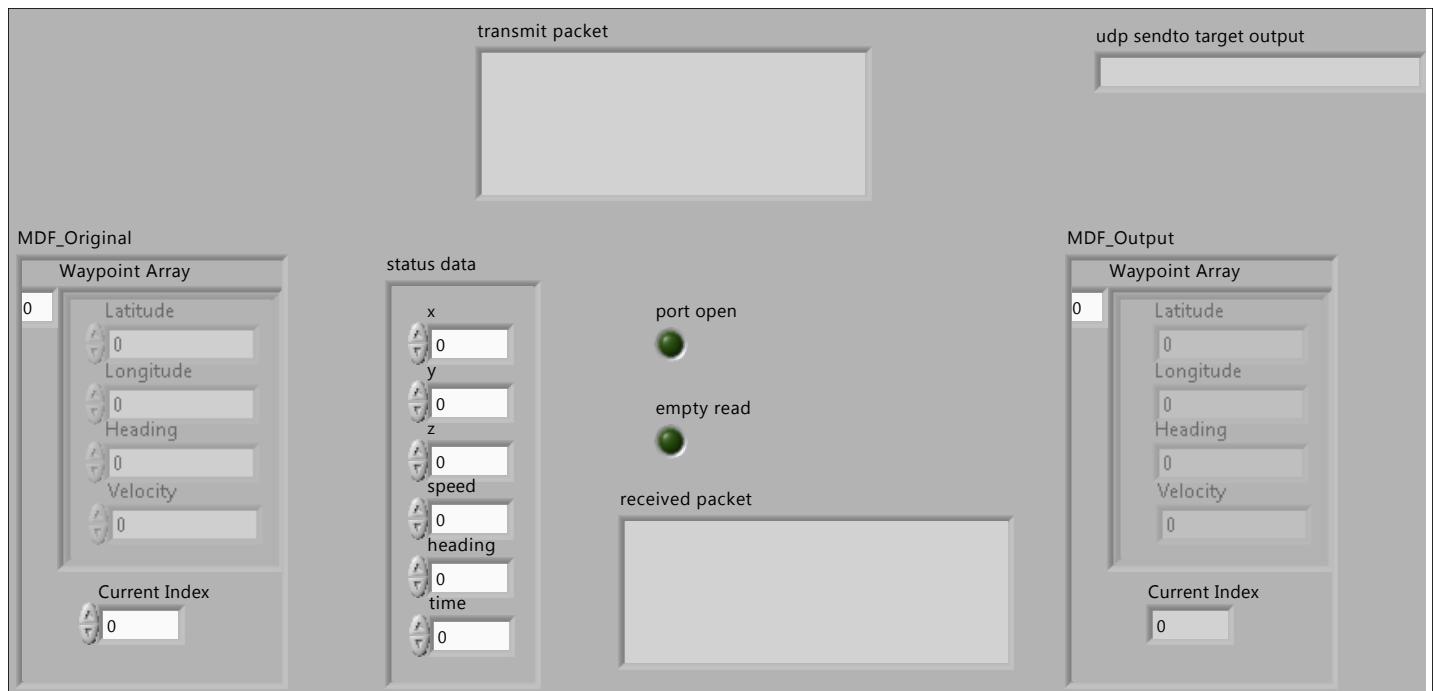
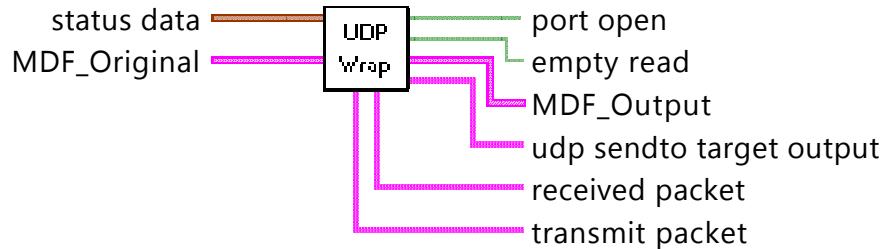
Manual Mission Waypoint Mission Playback Mission Teach Mission

udp_wrap.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\udp_wrap.vi

Last modified on 4/28/2011 at 1:04 PM

Printed on 4/29/2011 at 1:51 AM

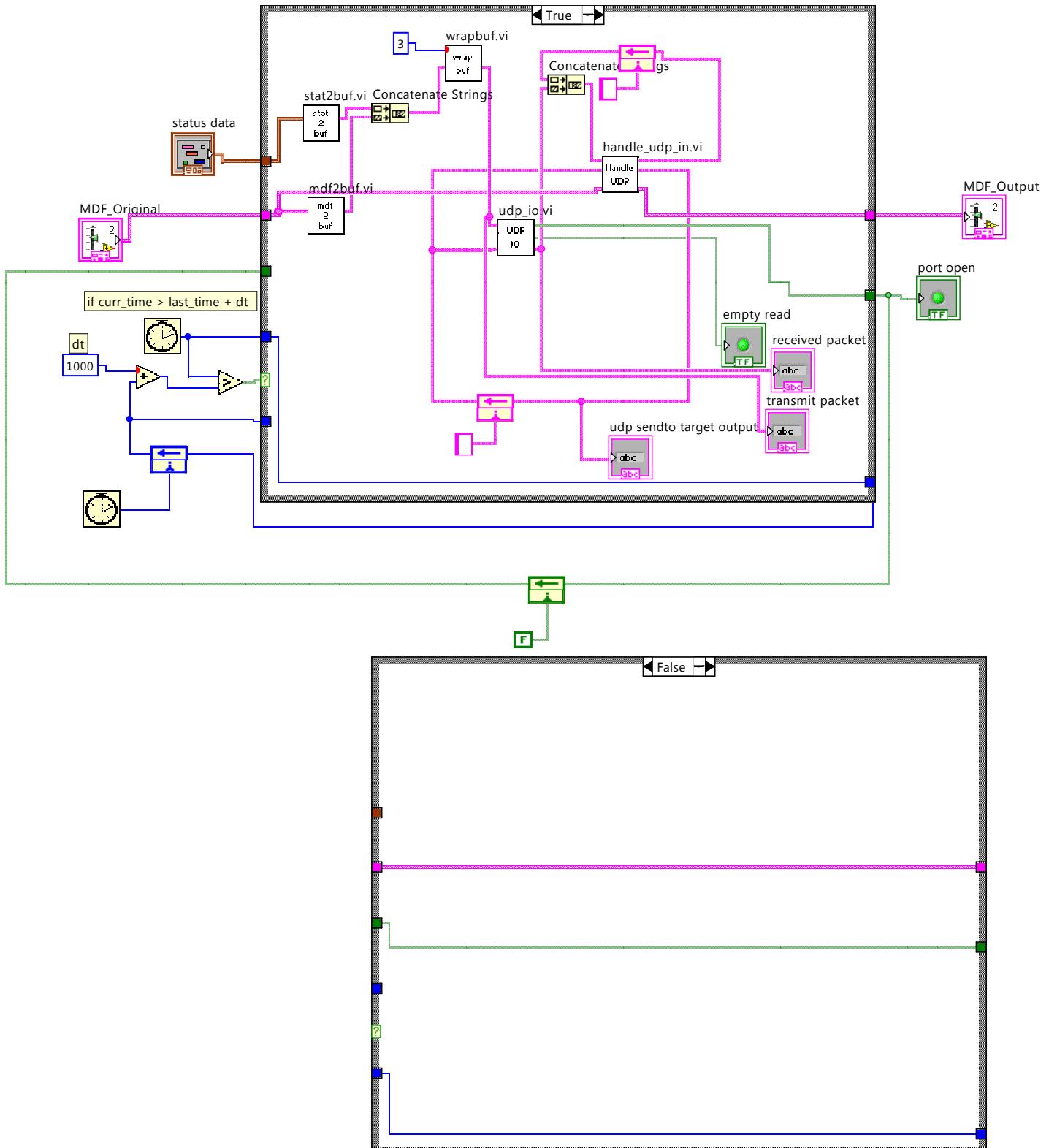
udp_wrap.vi

udp_wrap.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\udp_wrap.vi

Last modified on 4/28/2011 at 1:04 PM

Printed on 4/29/2011 at 1:51 AM



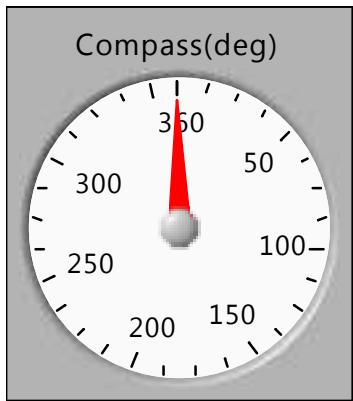
CompassControll.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\CompassControll.ctl

Last modified on 3/19/2011 at 8:52 PM

Printed on 4/29/2011 at 1:51 AM

CompassControll.ctl



ProcessWaypointUI.vi

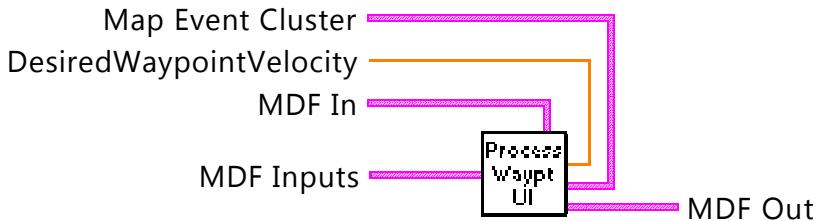
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\

ProcessWaypointUI.vi

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Printed on 4/29/2011 at 1:51 AM

ProcessWaypointUI.vi



Processes clicks on the GPS map to create waypoints.

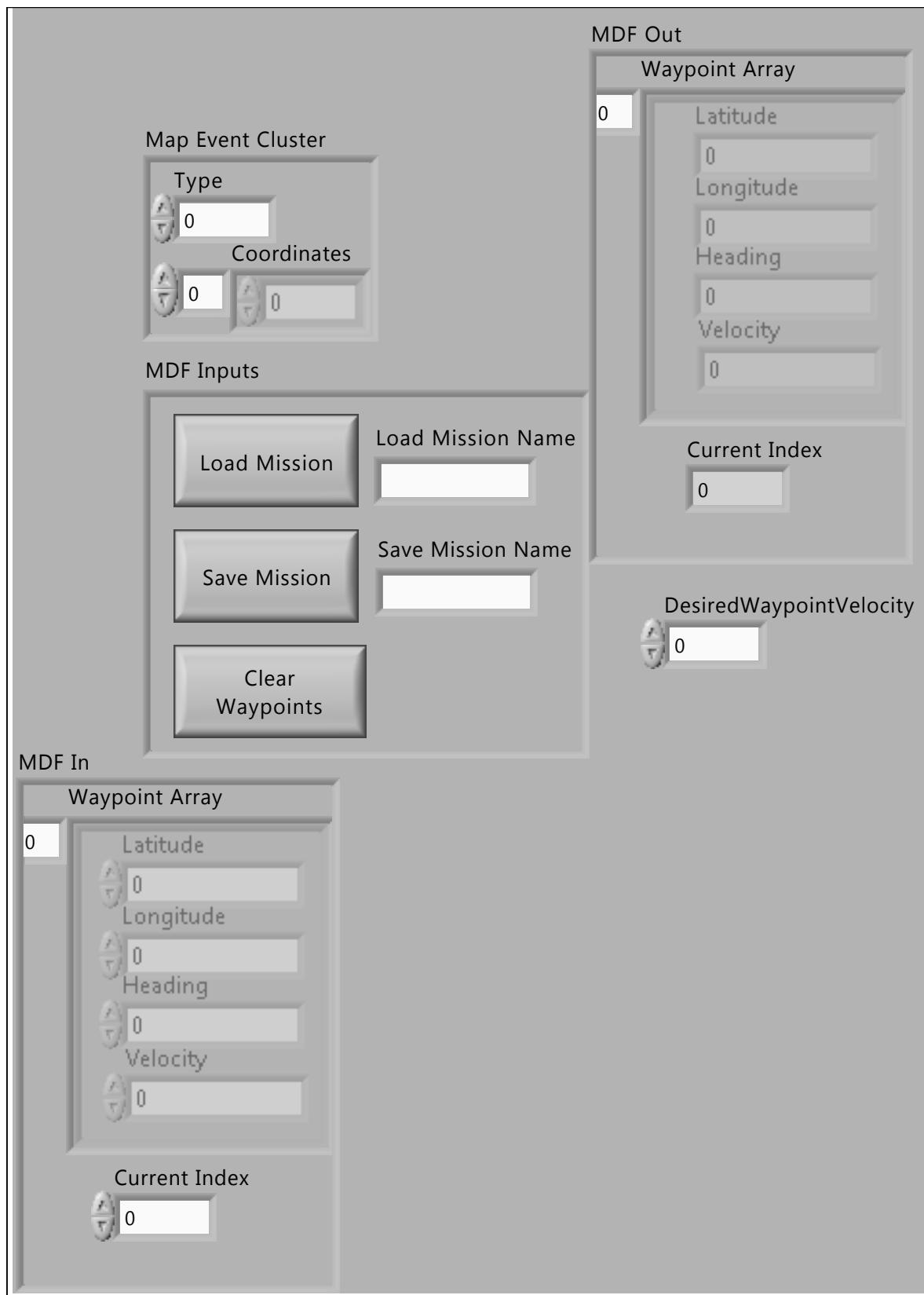
ProcessWaypointUI.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\

ProcessWaypointUI.vi

Last modified on 4/28/2011 at 12:56 PM

Printed on 4/29/2011 at 1:51 AM



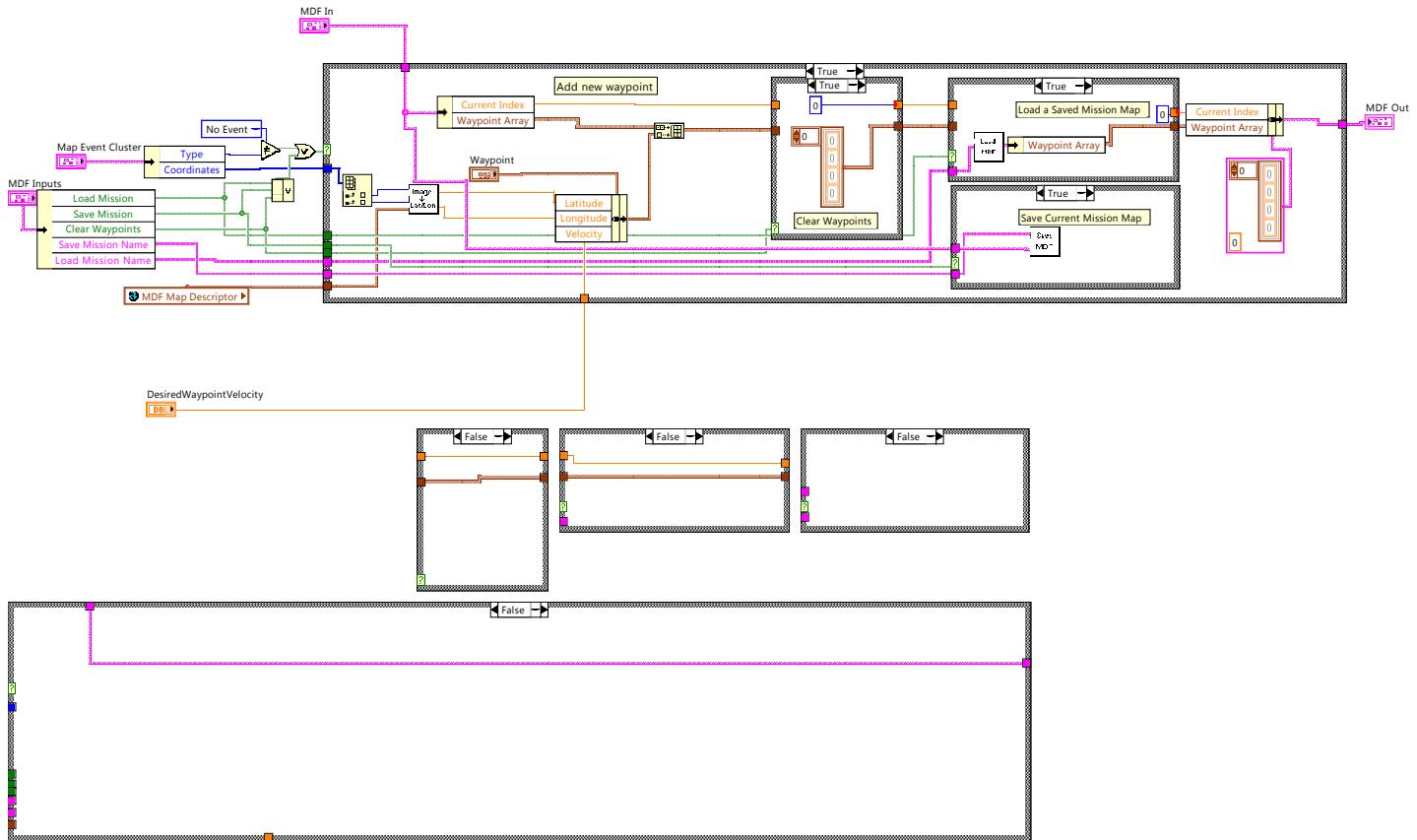
ProcessWaypointUI.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\

ProcessWaypointUI.vi

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MDFCircleCreation.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\MDFCircleCreation.ctl

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MDFCircleCreation.ctl



Waypoint Circle Creation

1. Click on map to set circle center or enter below and click "Set".

Latitude	Longitude	<input type="button" value="Set Center"/>
<input type="text" value="0"/>	<input type="text" value="0"/>	

2. Set circle parameters and click "Make Circle".

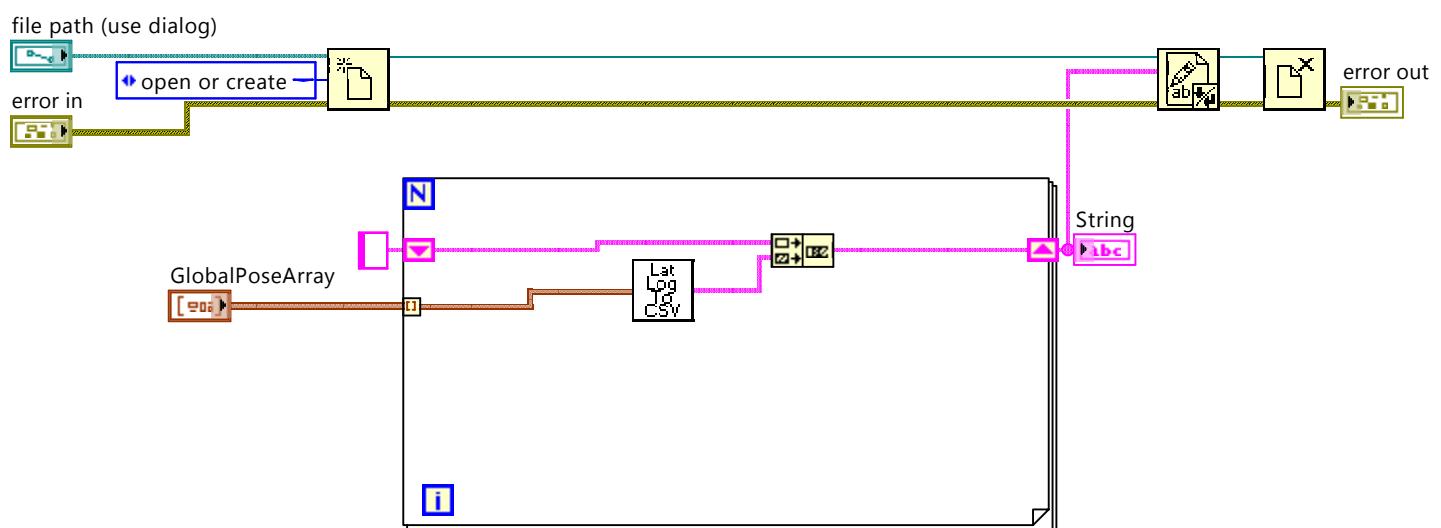
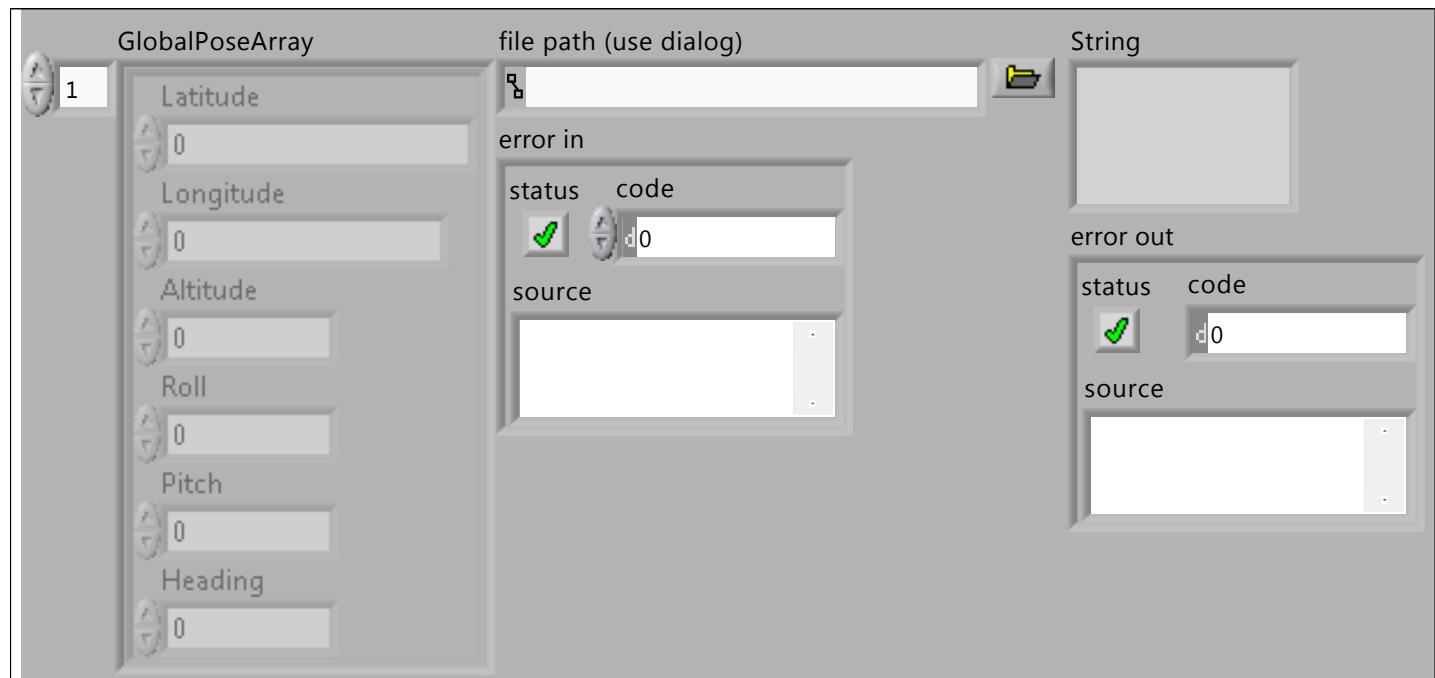
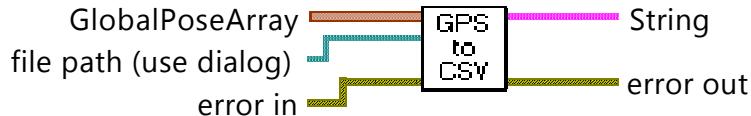
Radius	Resolution	Num Circles	Circle Spacing	Clockwise
<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input type="text" value="0"/>	<input checked="" type="radio"/>
<input type="button" value="Create Circle"/>				<input type="radio"/>
Counterclockwise				

WriteGPSCoordinatesToCSV.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\WriteGPSCoordinatesToCSV.vi

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WriteGPSCoordinatesToCSV.vi



GPSMapSelector.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\GPSMapSelector.ctl

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GPSMapSelector.ctl



EllaLogs.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Neurons\EllaLogs.vi

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EllaLogs.vi



MDFInputs.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\MDFInputs.ctl

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MDFInputs.ctl



MDF Inputs

Load Mission	Load Mission Name <input type="text"/>
Save Mission	Save Mission Name <input type="text"/>
Clear Waypoints	

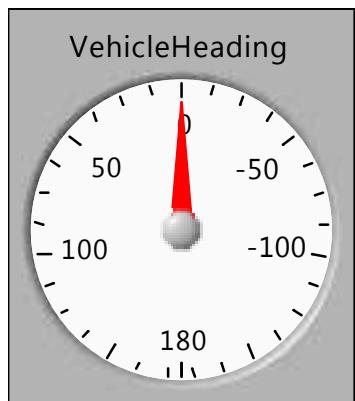
VehicleHeadingControll.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\VehicleHeadingControll.ctl

Last modified on 3/19/2011 at 8:52 PM

Printed on 4/29/2011 at 1:51 AM

VehicleHeadingControll.ctl



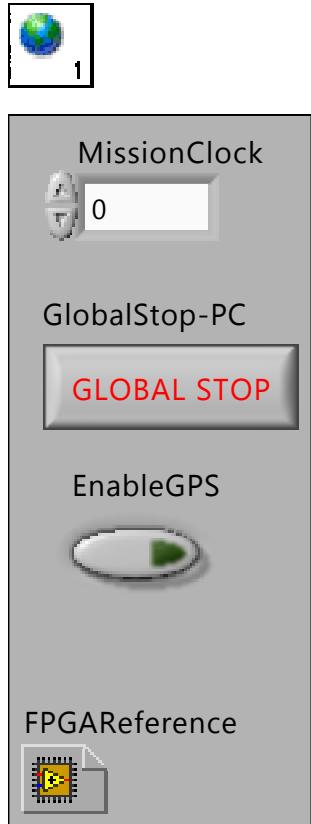
EllaMasterControls.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Neurons\EllaMasterControls.vi

Last modified on 3/25/2011 at 1:46 PM

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EllaMasterControls.vi

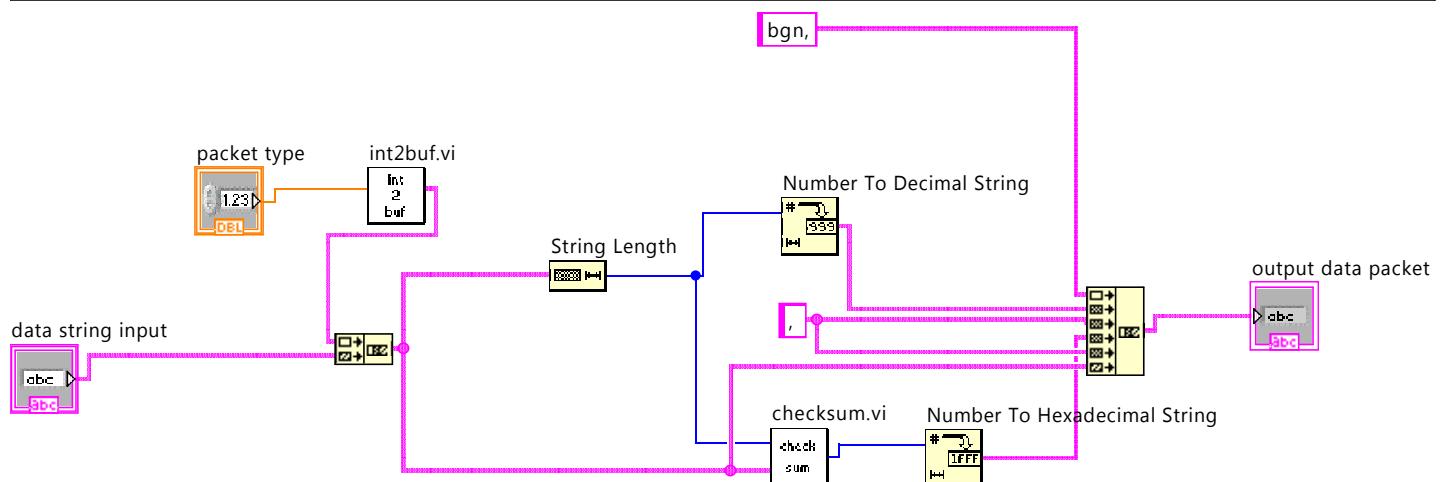
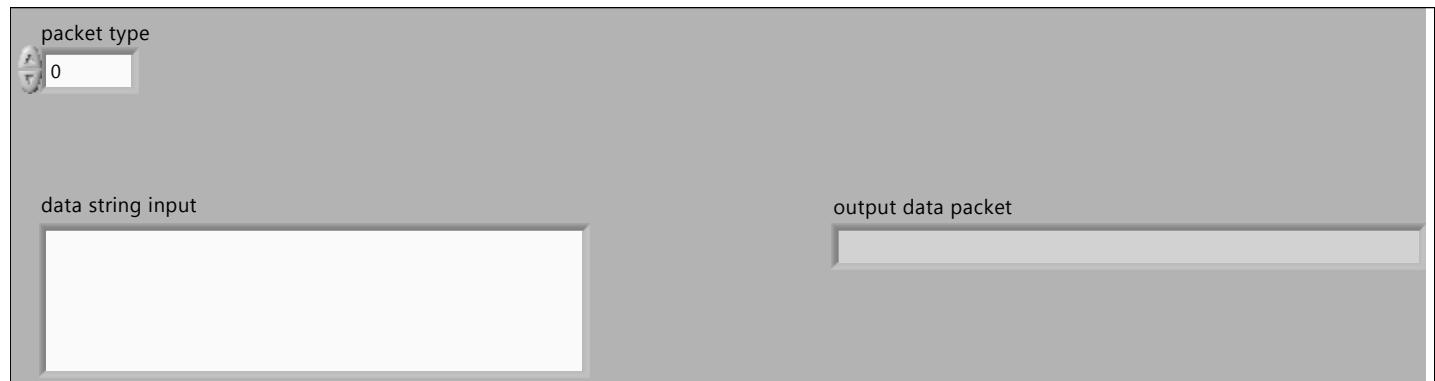


wrapbuf.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\wrapbuf.vi

Last modified on 4/28/2011 at 1:07 PM

Printed on 4/29/2011 at 1:51 AM

wrapbuf.vi

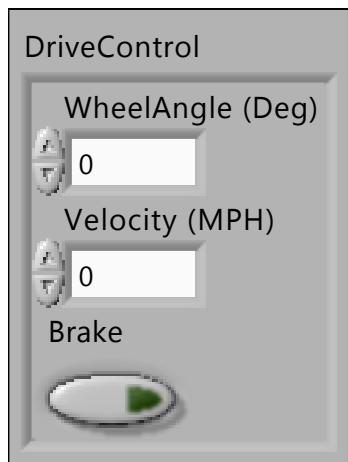
DriveControl.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\DriveControl.ctl

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Printed on 4/29/2011 at 1:51 AM

DriveControl.ctl



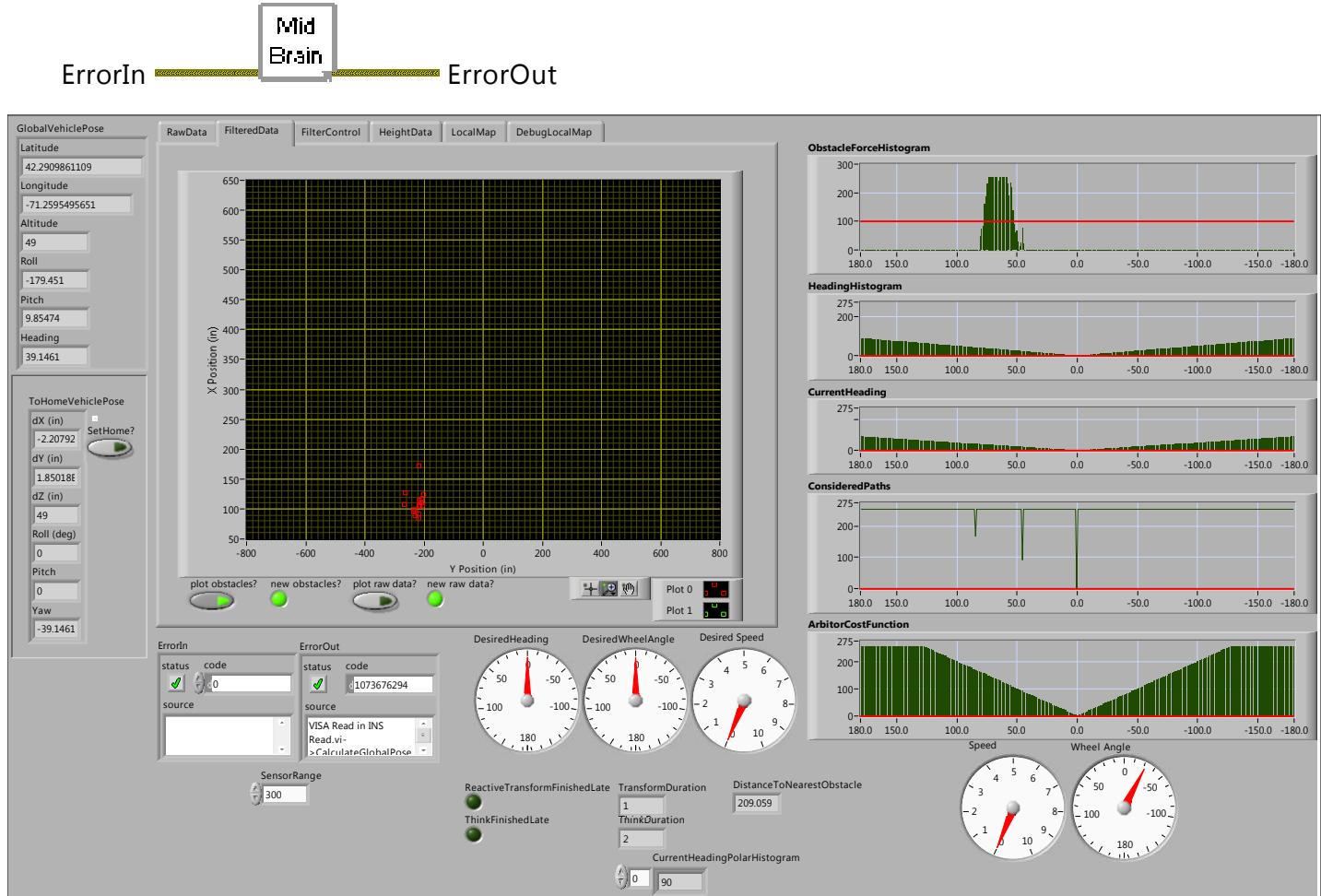
Midbrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Midbrain.vi

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Printed on 4/29/2011 at 1:51 AM

Midbrain.vi

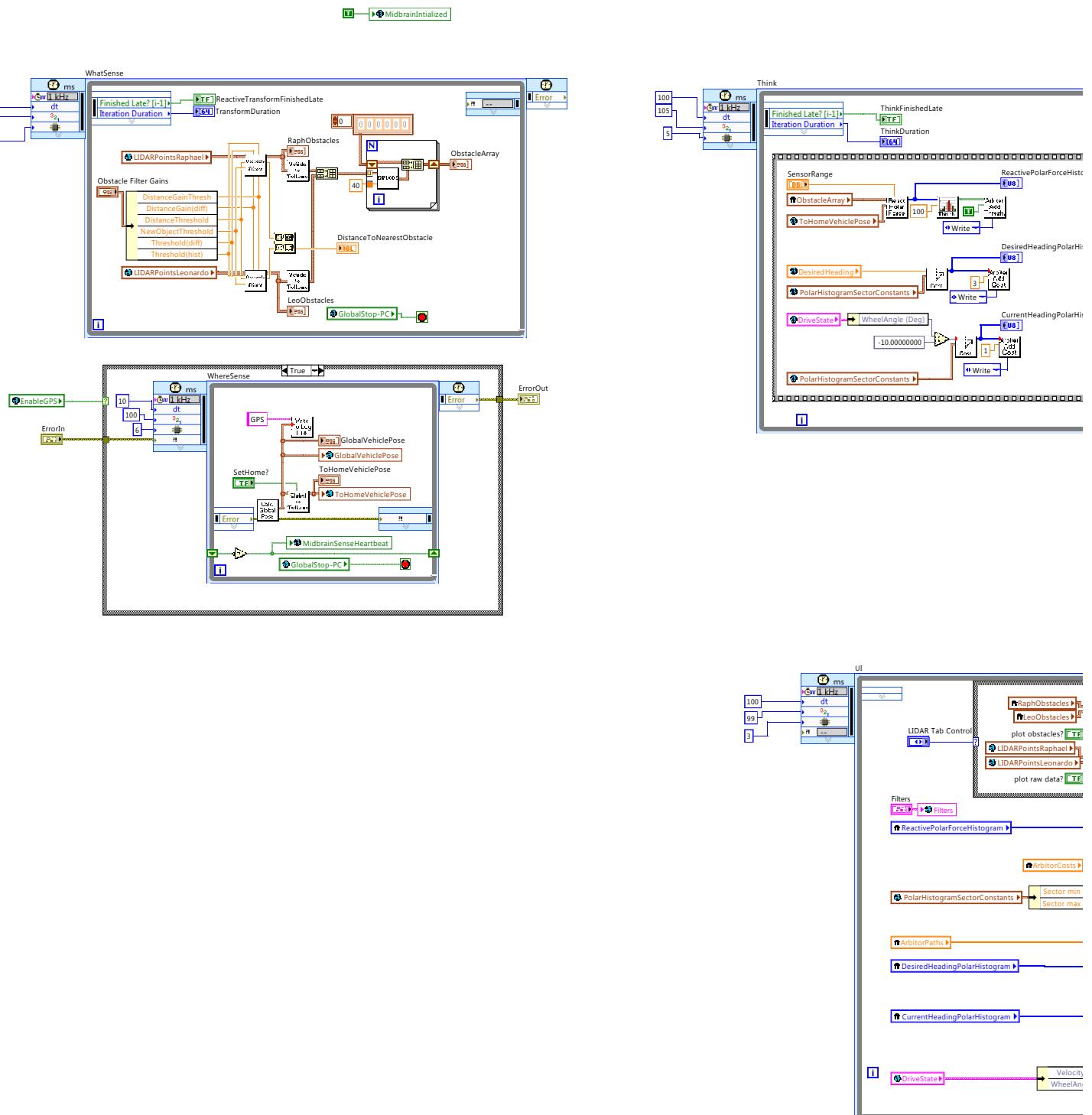


Midbrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Midbrain.vi

Last modified on 4/27/2011 at 4:18 PM

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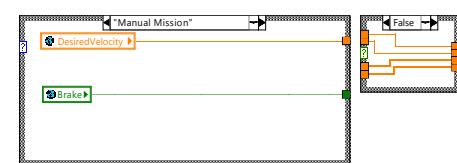
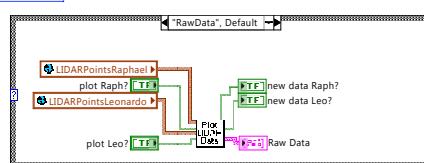
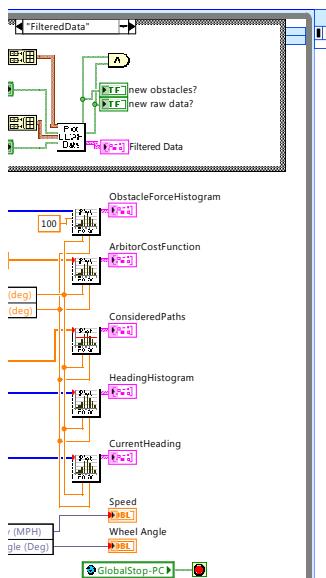
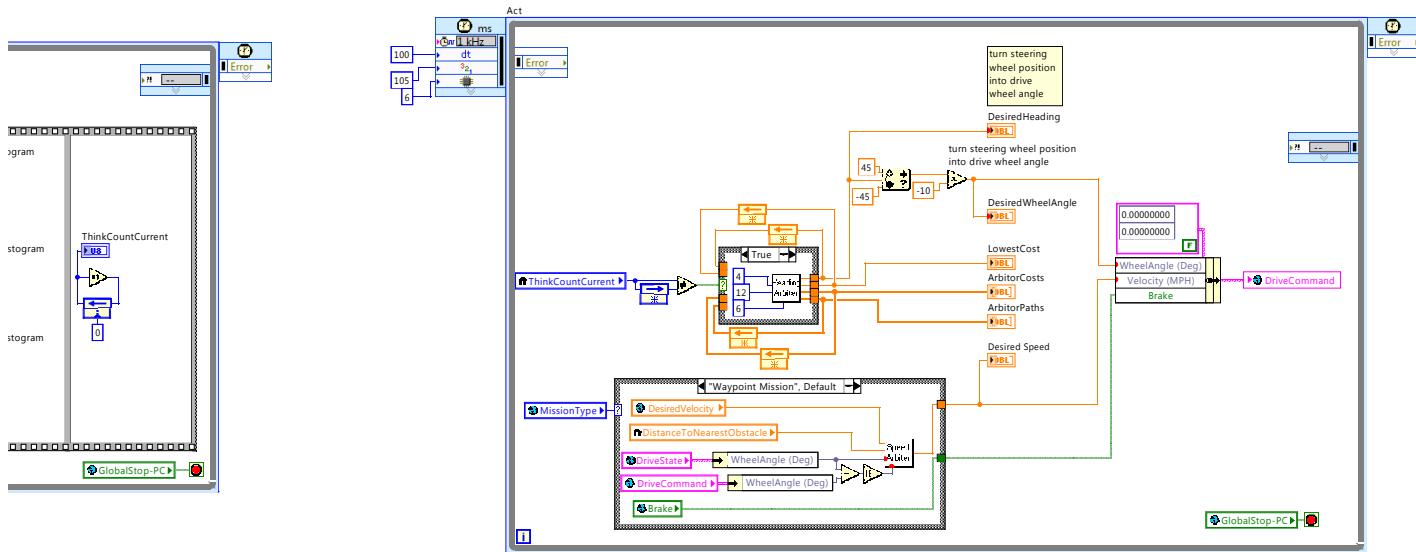


Midbrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Midbrain.vi

Last modified on 4/27/2011 at 4:18 PM

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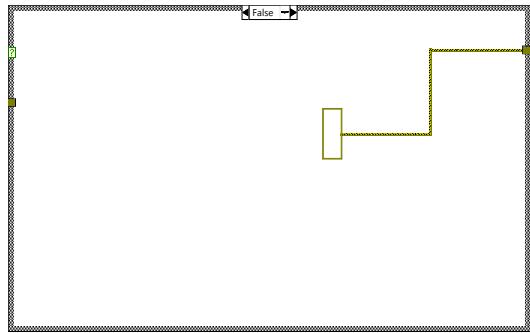


Midbrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Midbrain.vi

Last modified on 4/27/2011 at 4:18 PM

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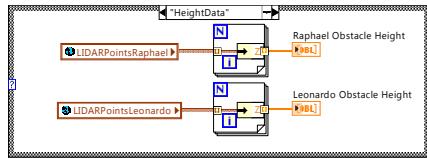


Midbrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Midbrain.vi

Last modified on 4/27/2011 at 4:18 PM

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PlaybackNextWaypoint_Rev2.vi

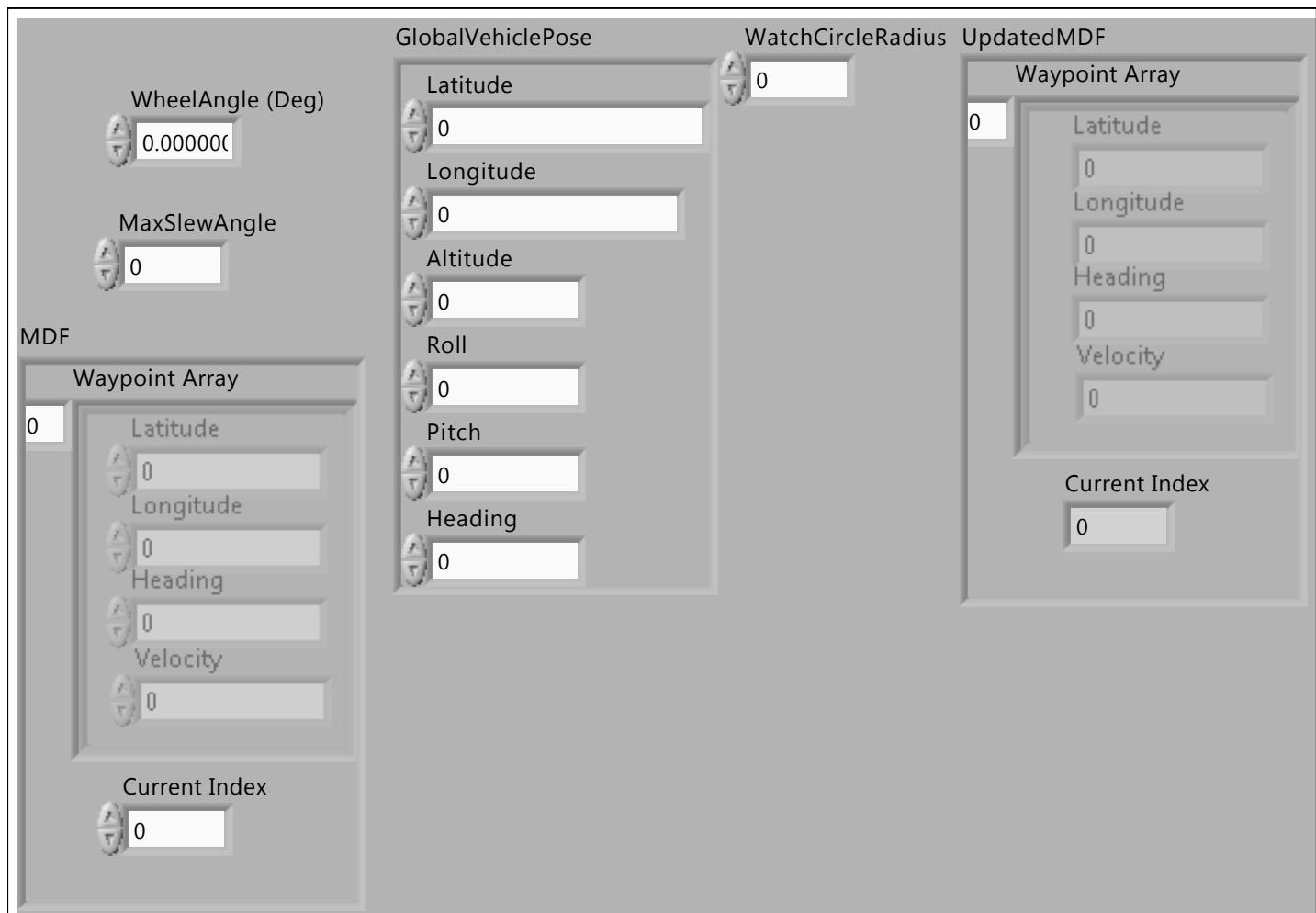
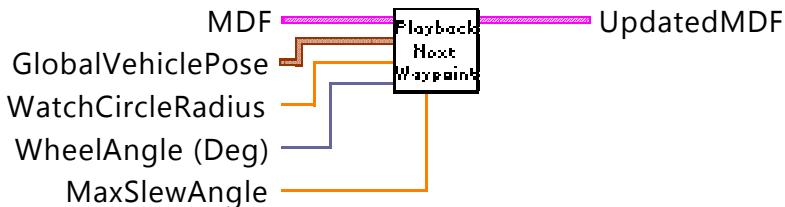
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\

PlaybackNextWaypoint_Rev2.vi

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PlaybackNextWaypoint_Rev2.vi



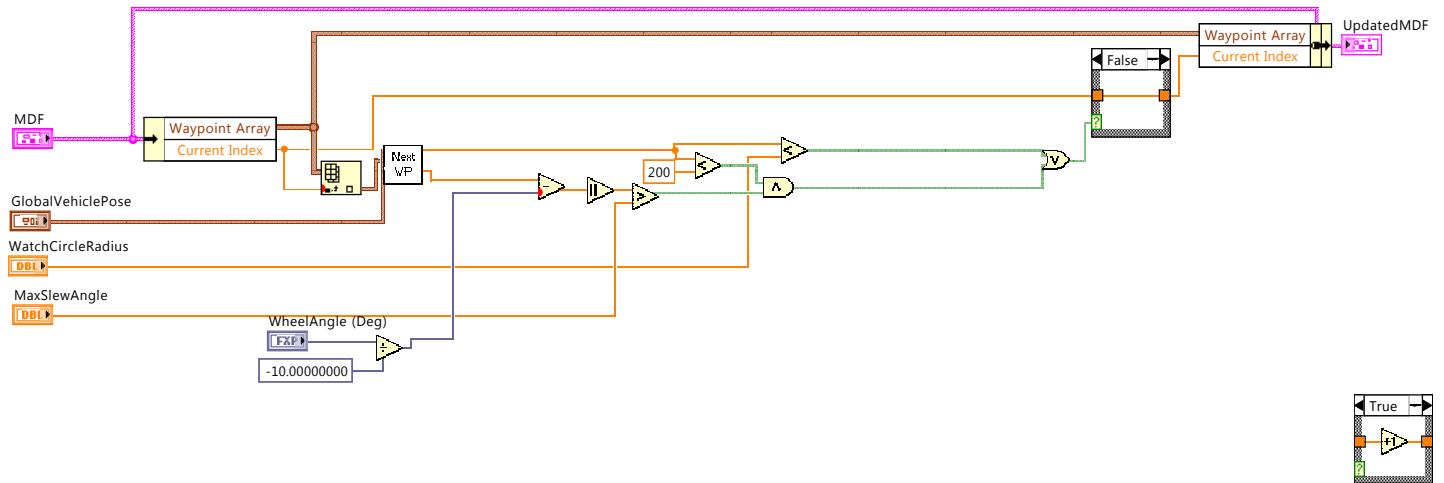
PlaybackNextWaypoint_Rev2.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\

PlaybackNextWaypoint_Rev2.vi

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mdf2buf.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\mdf2buf.vi

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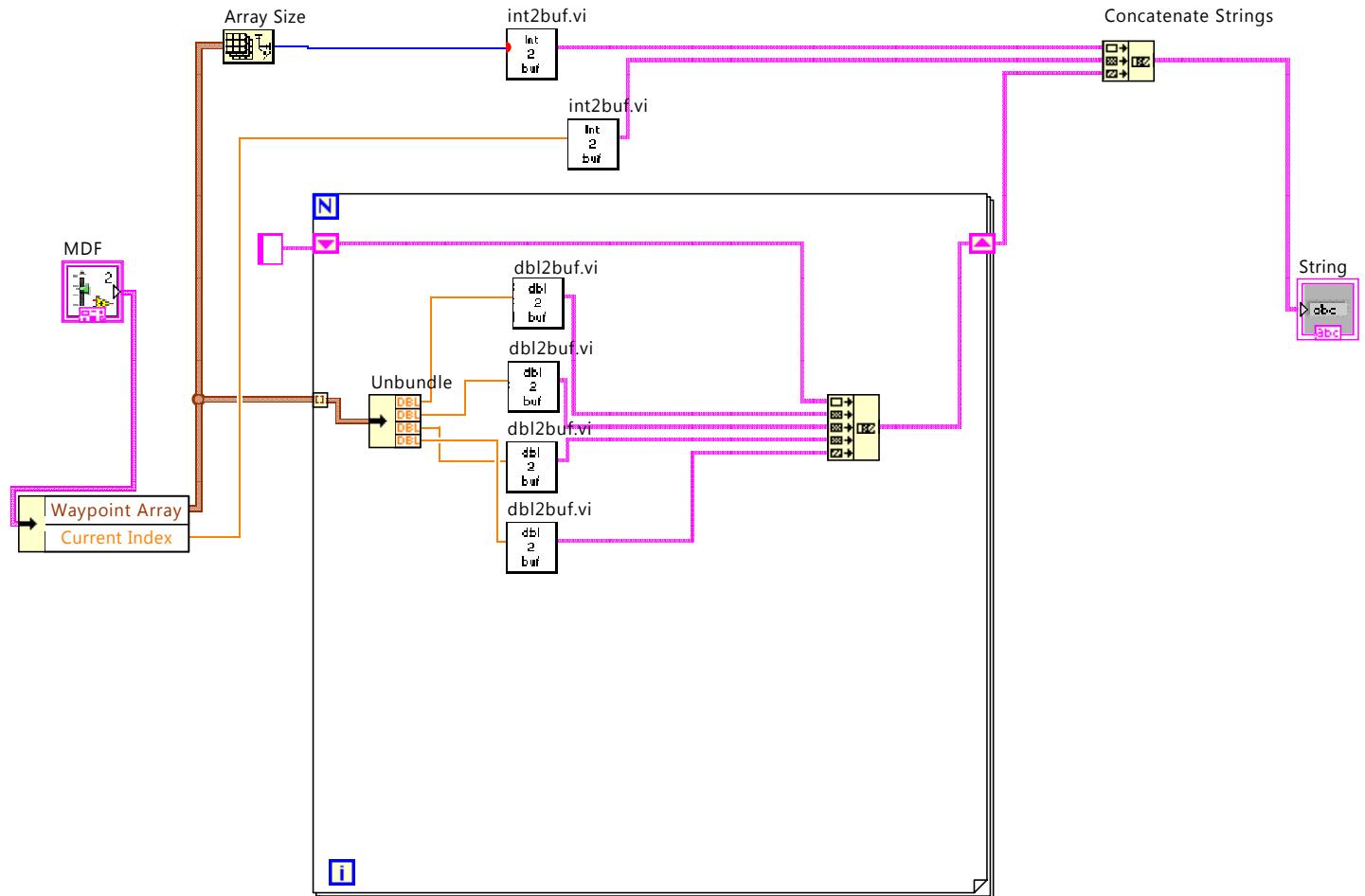
mdf2buf.vi

mdf2buf.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\mdf2buf.vi

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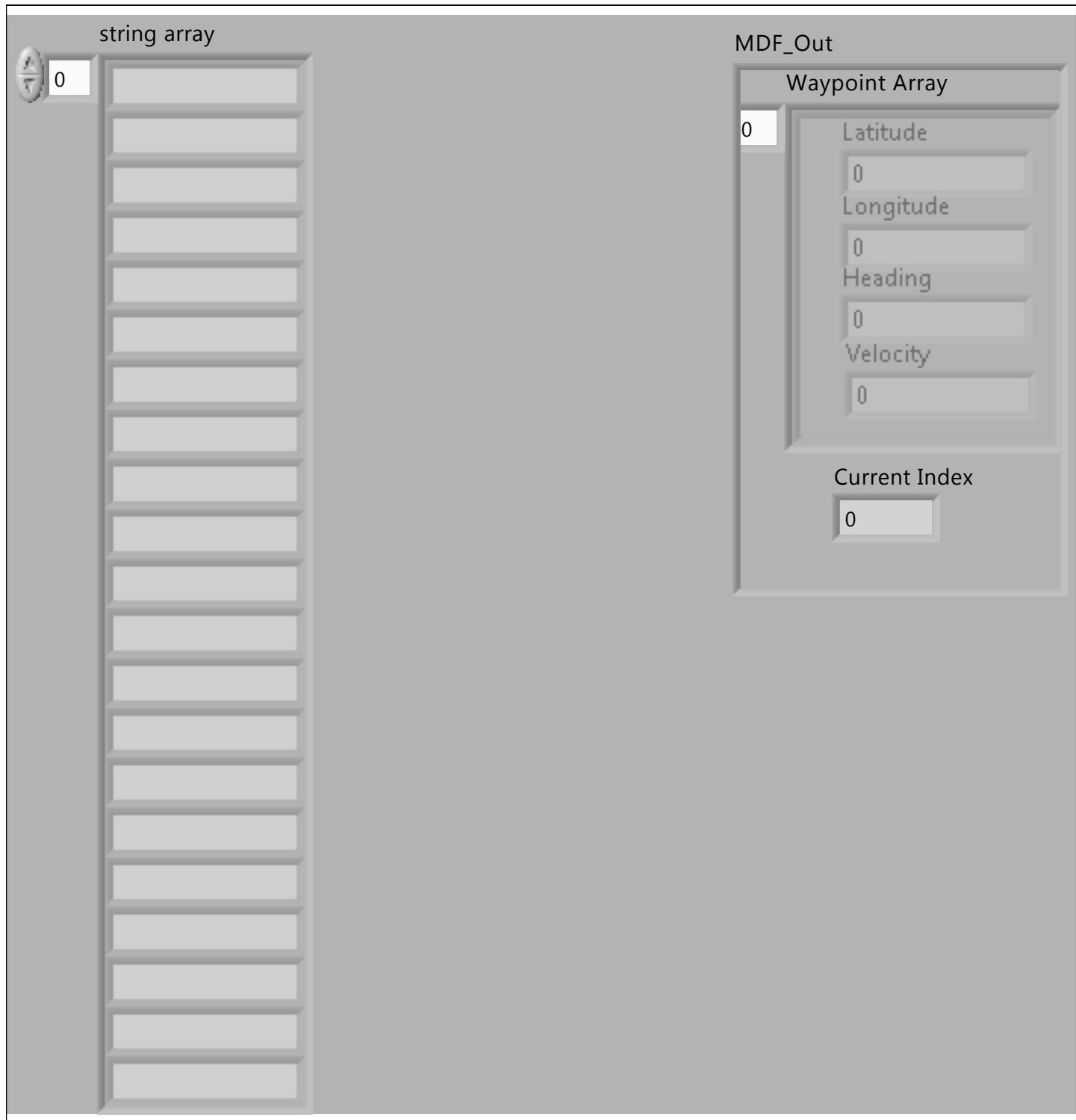
strarray2mdf.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\strarray2mdf.vi

Last modified on 4/28/2011 at 1:05 PM

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strarray2mdf.vi

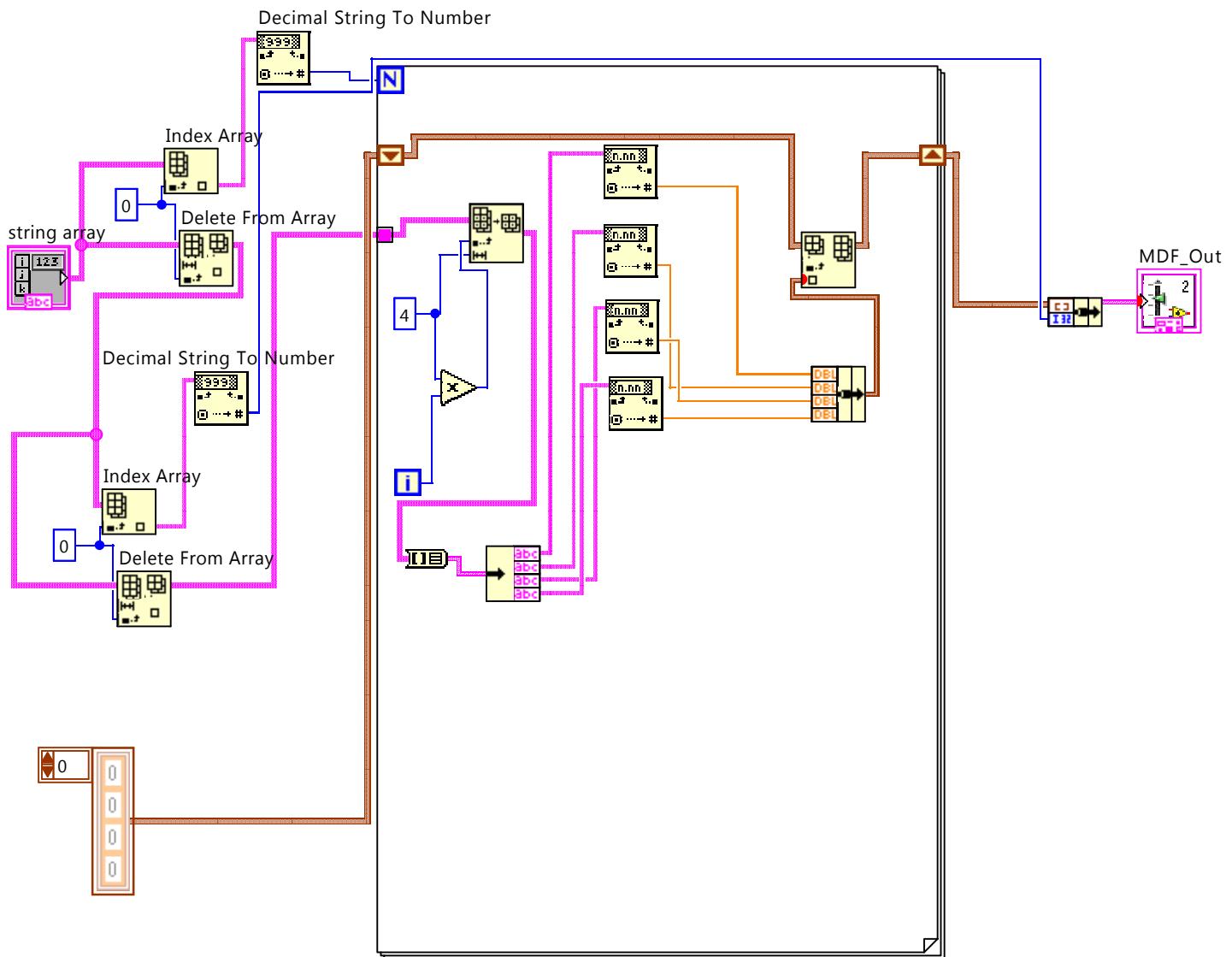


strarray2mdf.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\strarray2mdf.vi

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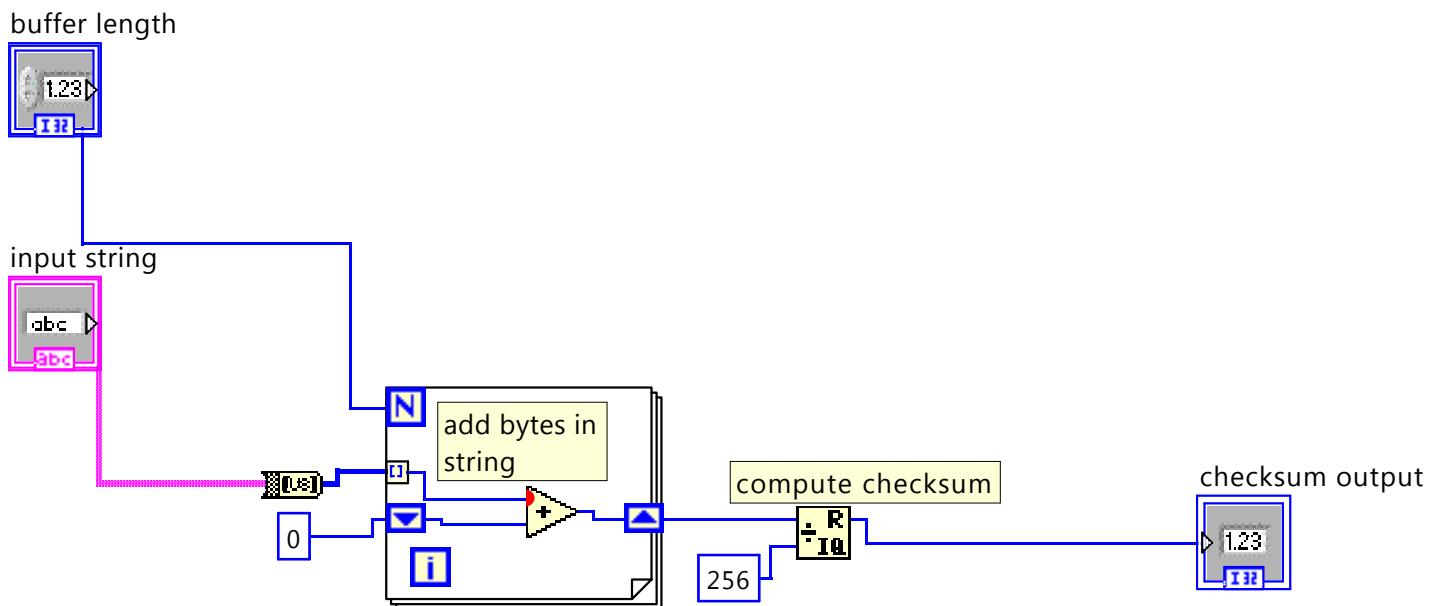
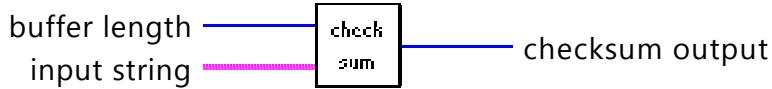


checksum.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\checksum.vi

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Printed on 4/29/2011 at 1:51 AM

checksum.vi

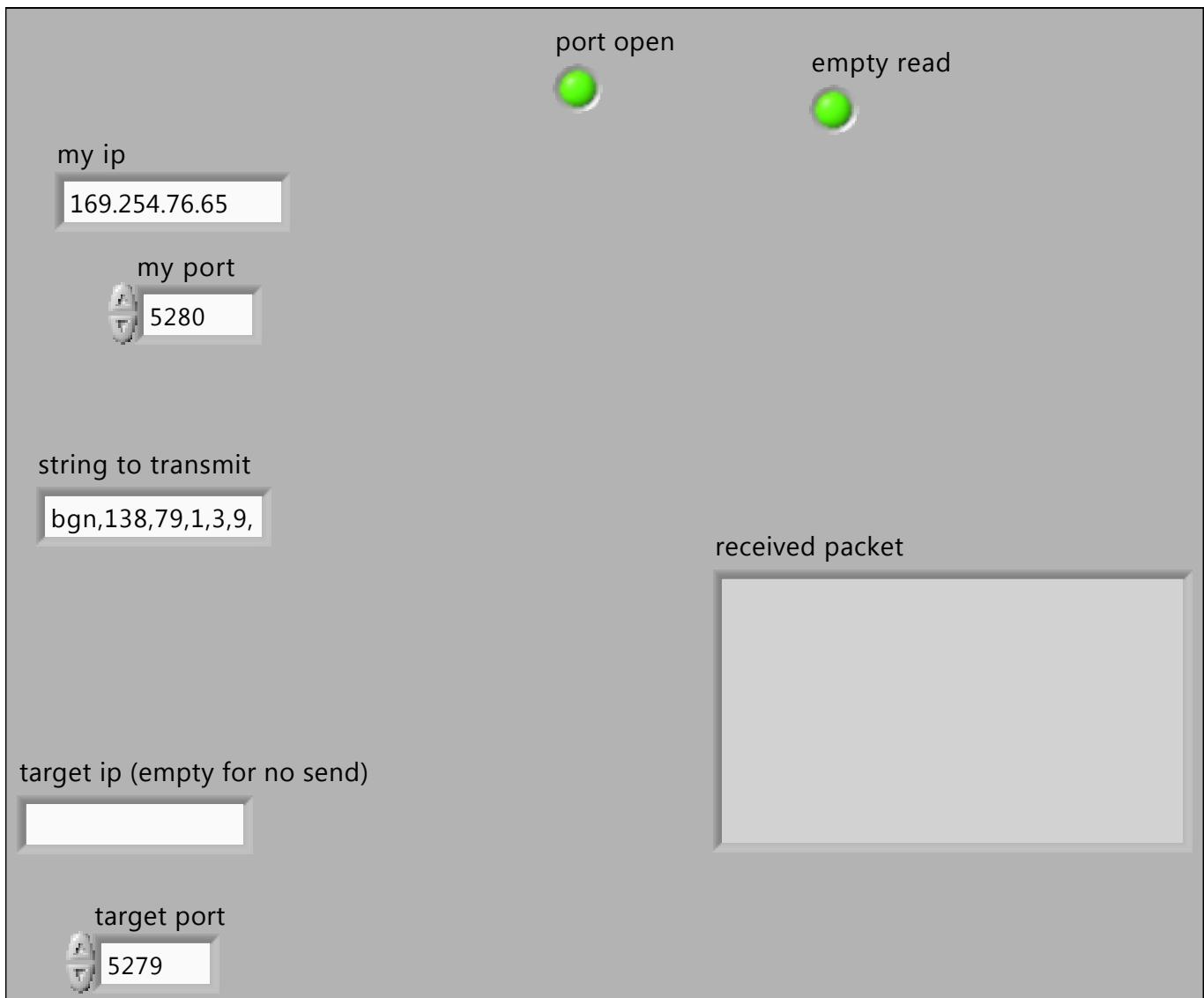
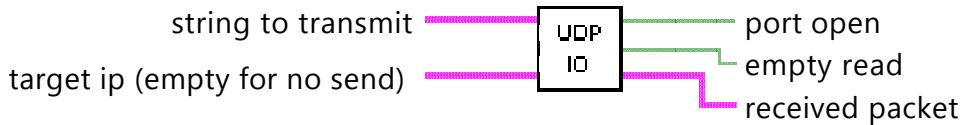
udp_io.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\udp_io.vi

Last modified on 4/28/2011 at 1:04 PM

Printed on 4/29/2011 at 1:51 AM

udp_io.vi

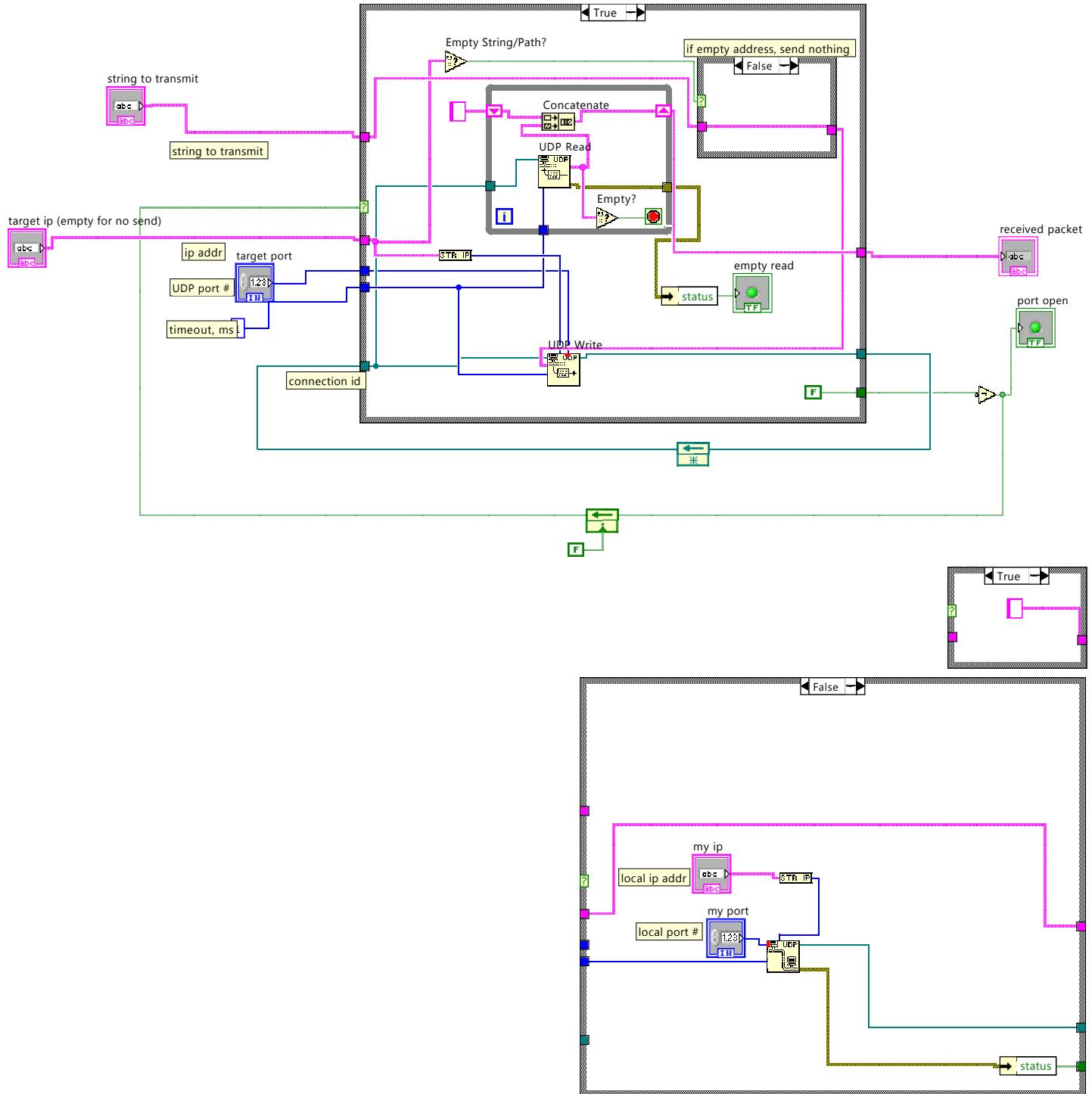


udp_io.vi

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Printed on 4/29/2011 at 1:51 AM



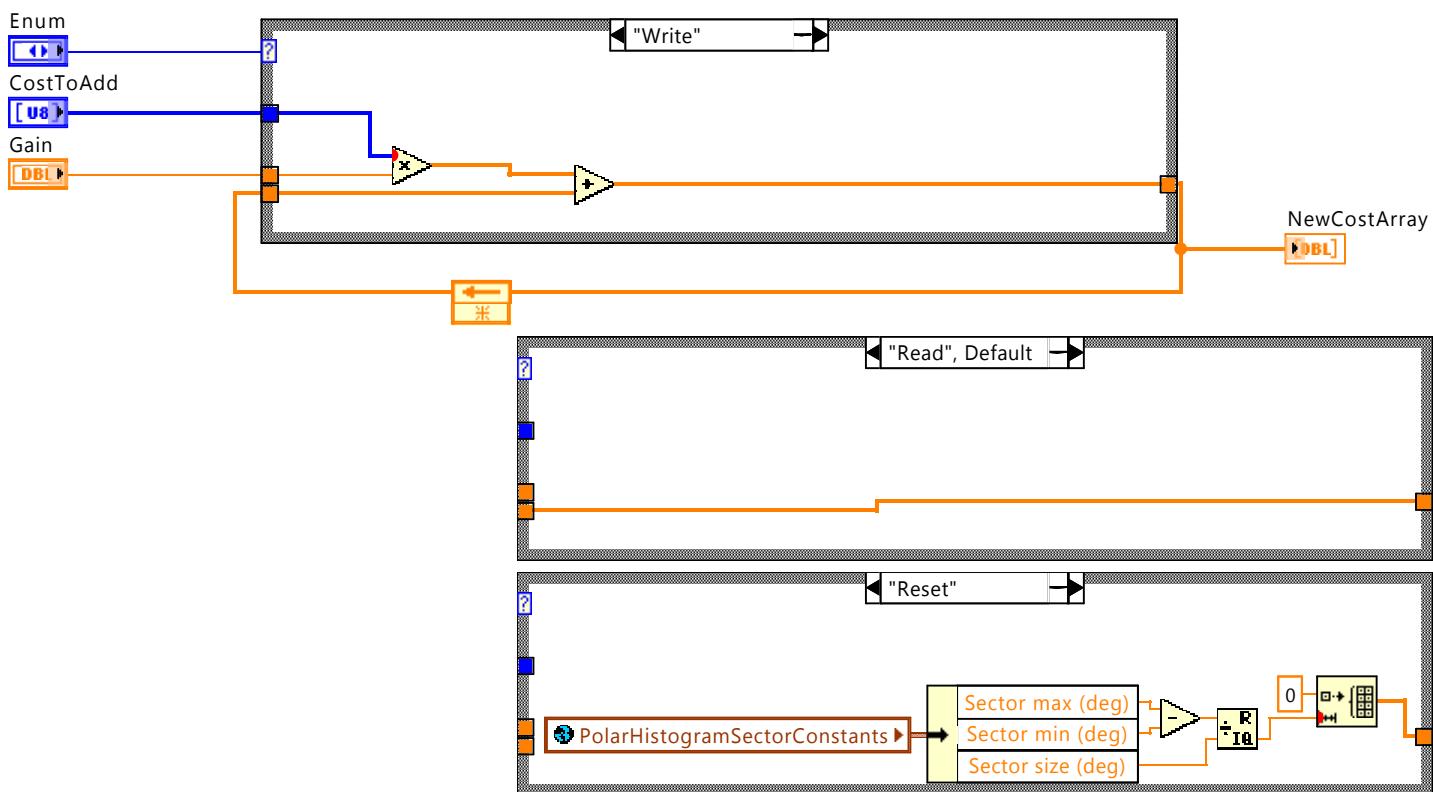
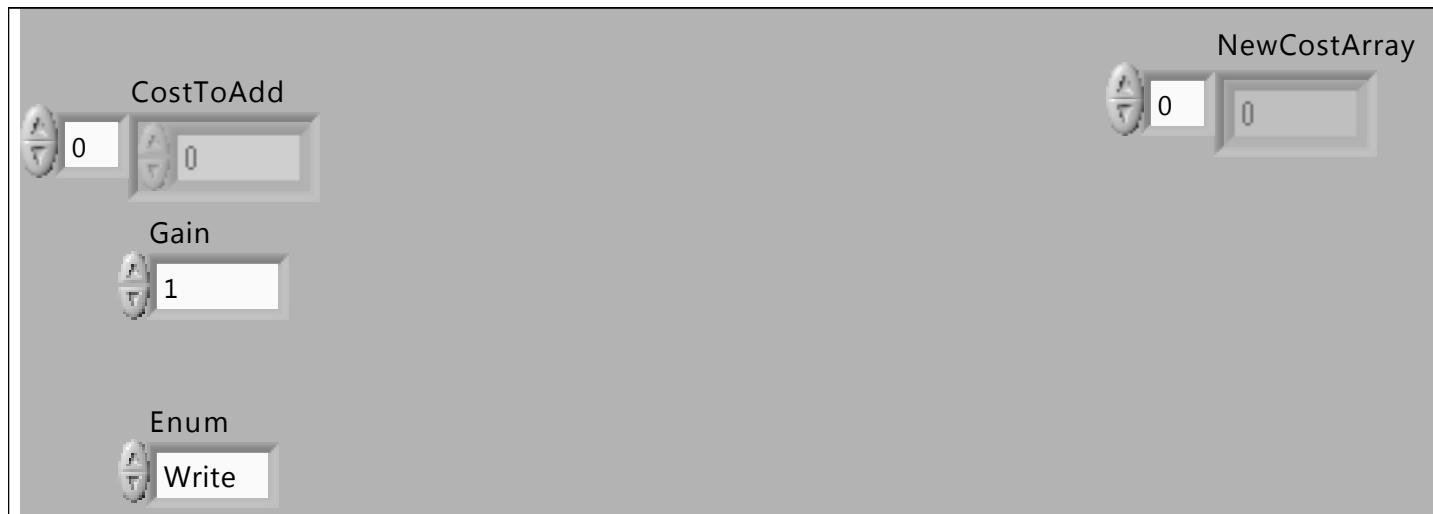
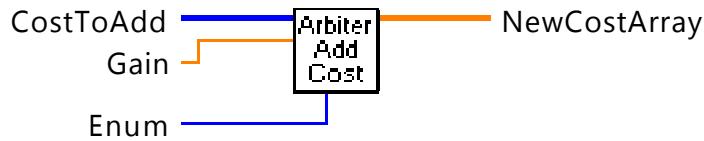
AddCostToArbiter.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\ActuatorThalamus\

AddCostToArbiter.vi

Last modified on 4/27/2011 at 4:37 PM

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AddCostToArbiter.vi

MDF.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\MDF.ctl

Last modified on 4/13/2011 at 4:07 PM

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MDF.ctl



MDF

Waypoint Array

0	Latitude	0
	Longitude	0
	Heading	0
	Velocity	0
	Current Index	0



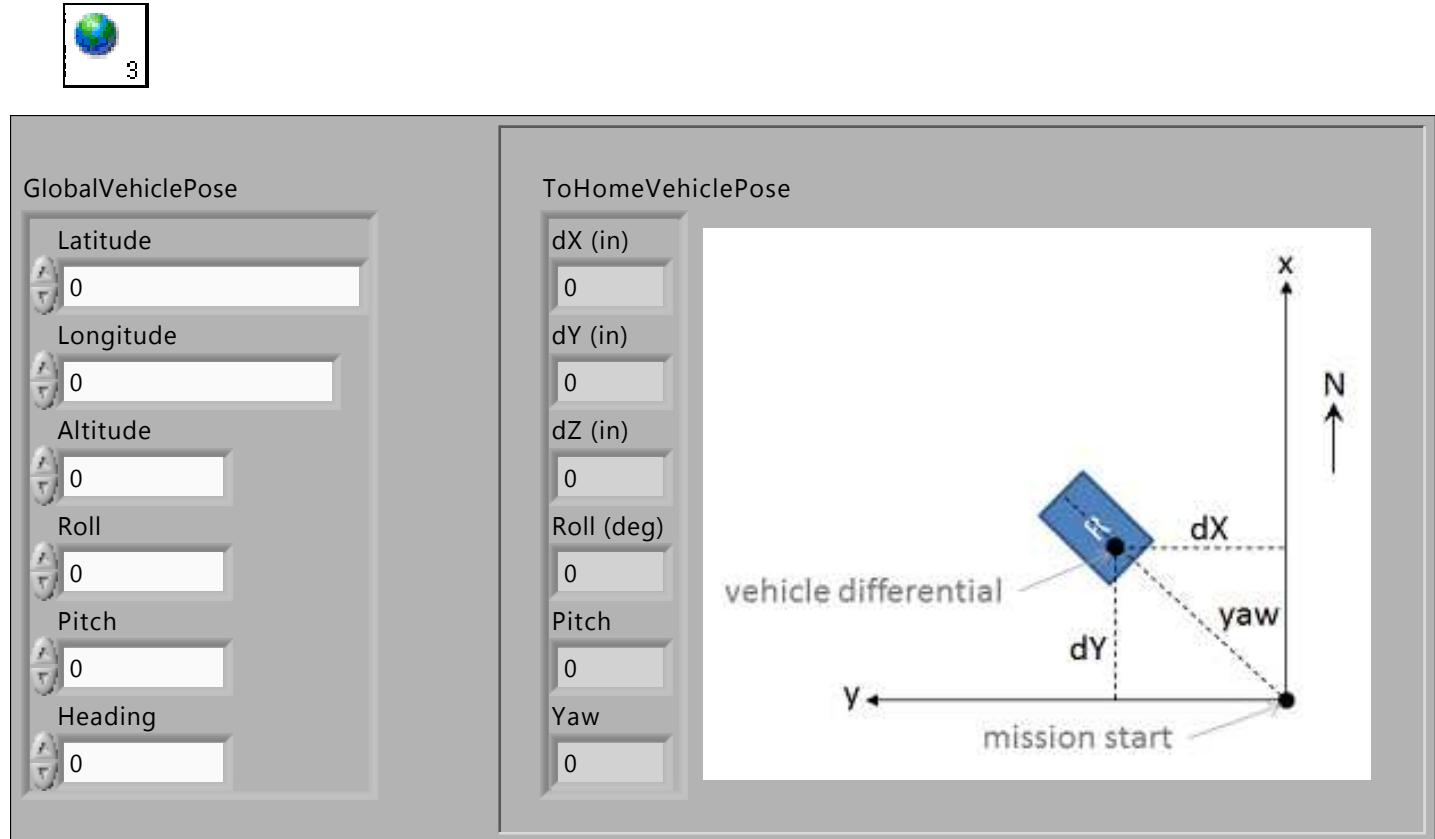
WhereNeuron.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Neurons\Sense\WhereNeuron.vi

Last modified on 3/8/2011 at 9:04 PM

Printed on 4/29/2011 at 1:51 AM

WhereNeuron.vi

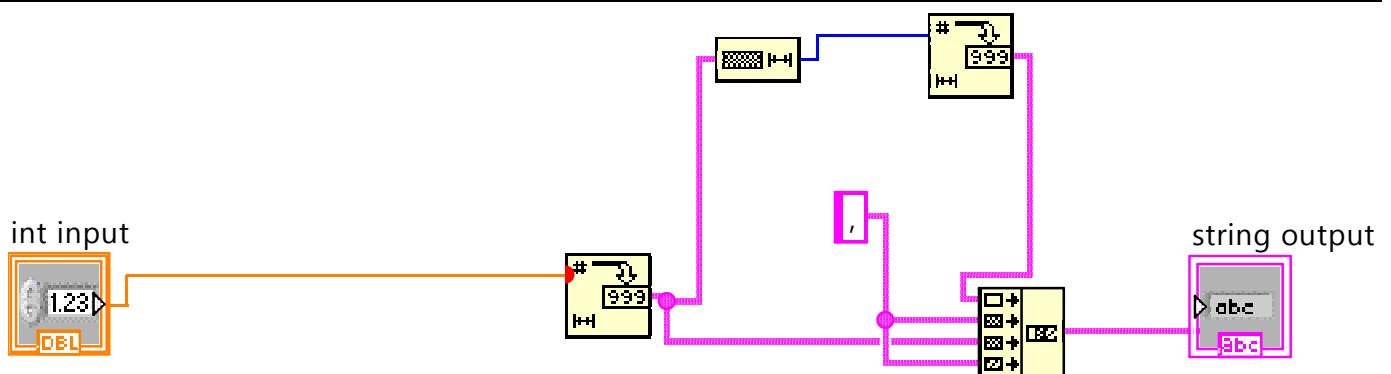
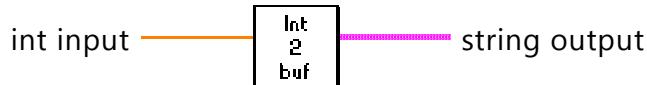


int2buf.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\int2buf.vi

Last modified on 4/28/2011 at 1:07 PM

Printed on 4/29/2011 at 1:51 AM

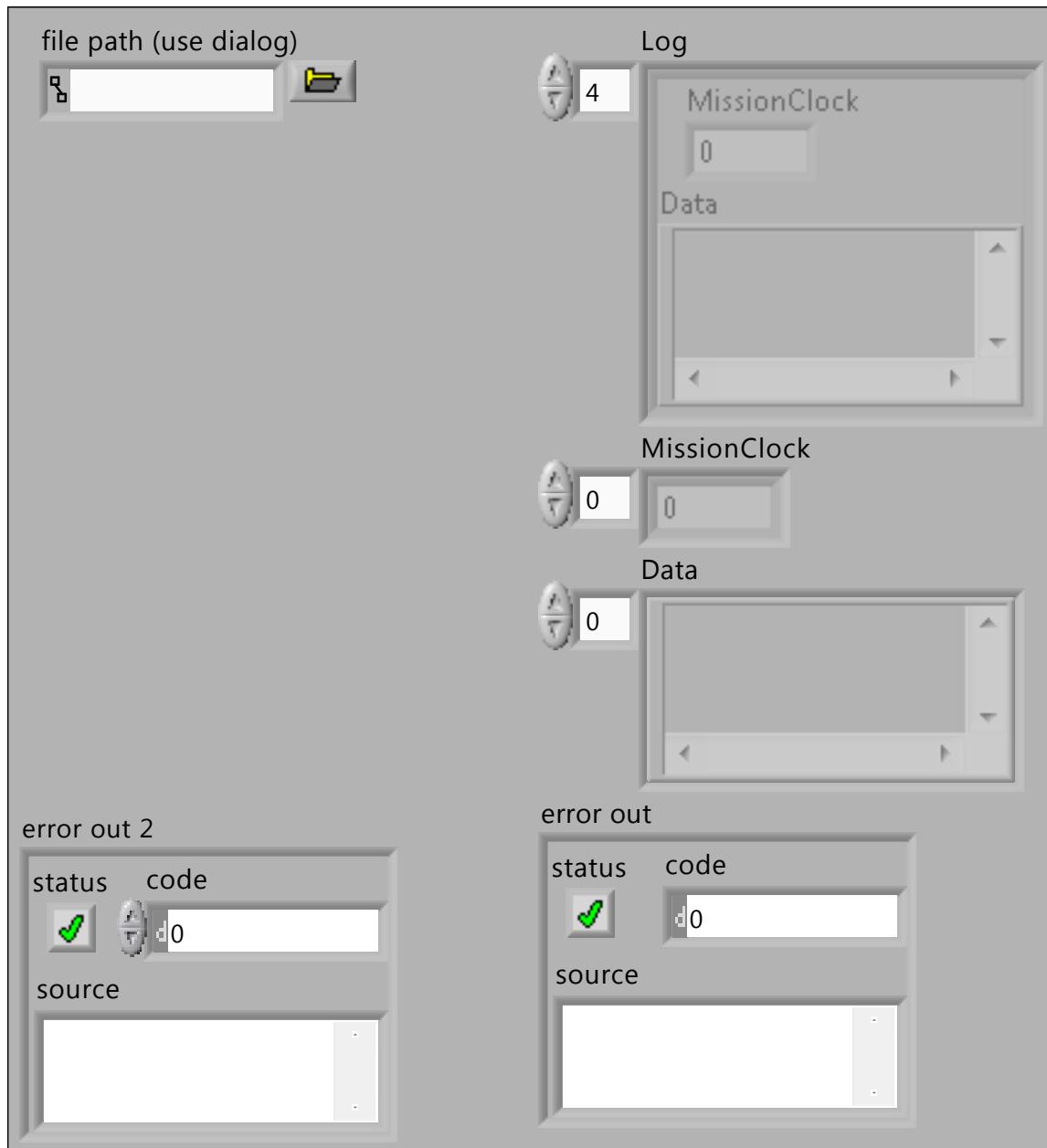
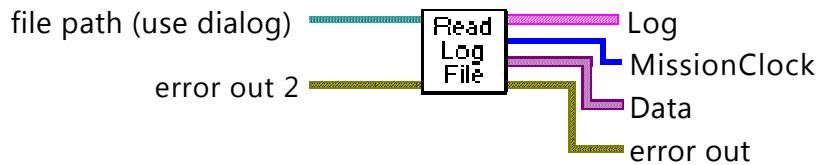
int2buf.vi

Read Log.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\Logging\Read Log.vi

Last modified on 3/26/2011 at 5:46 PM

Printed on 4/29/2011 at 1:51 AM

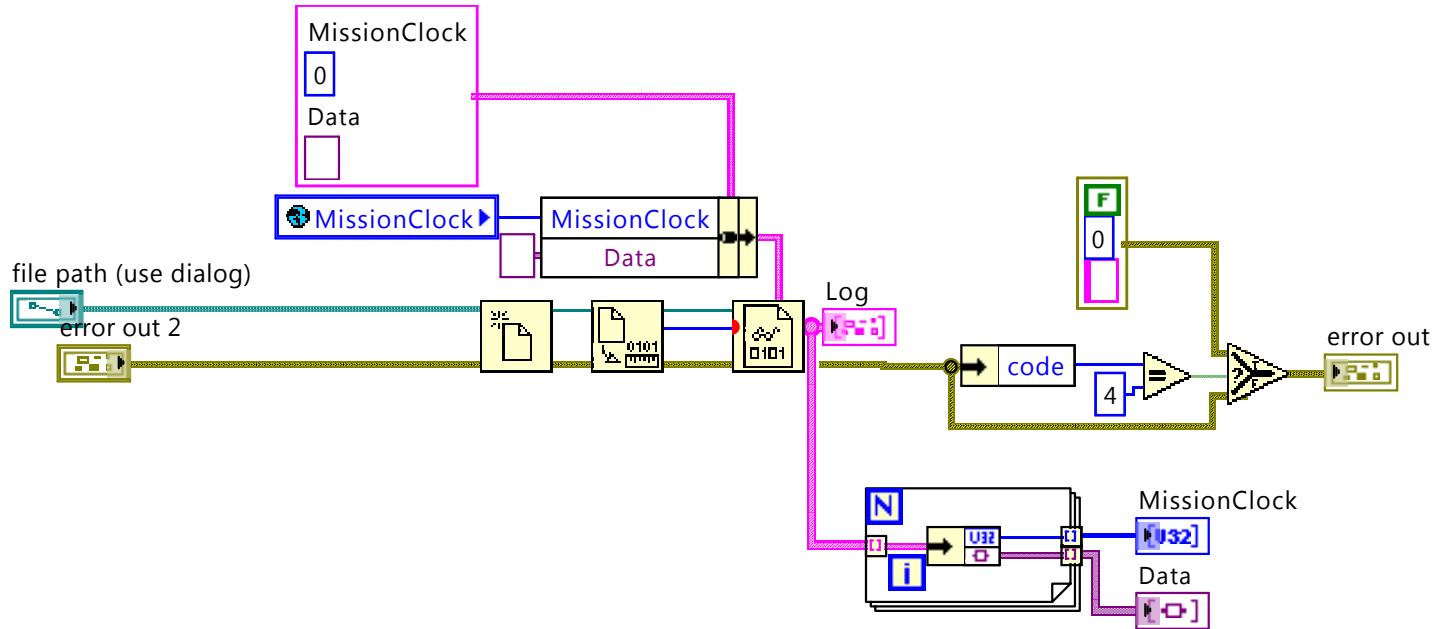
Read Log.vi

Read Log.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\Logging\Read Log.vi

Last modified on 3/26/2011 at 5:46 PM

Printed on 4/29/2011 at 1:51 AM



**LatLongToCSV.vi**

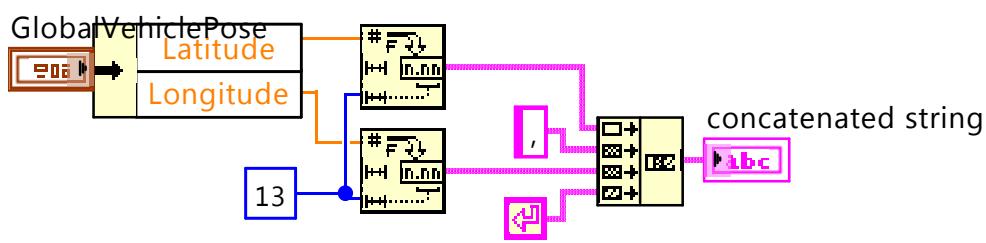
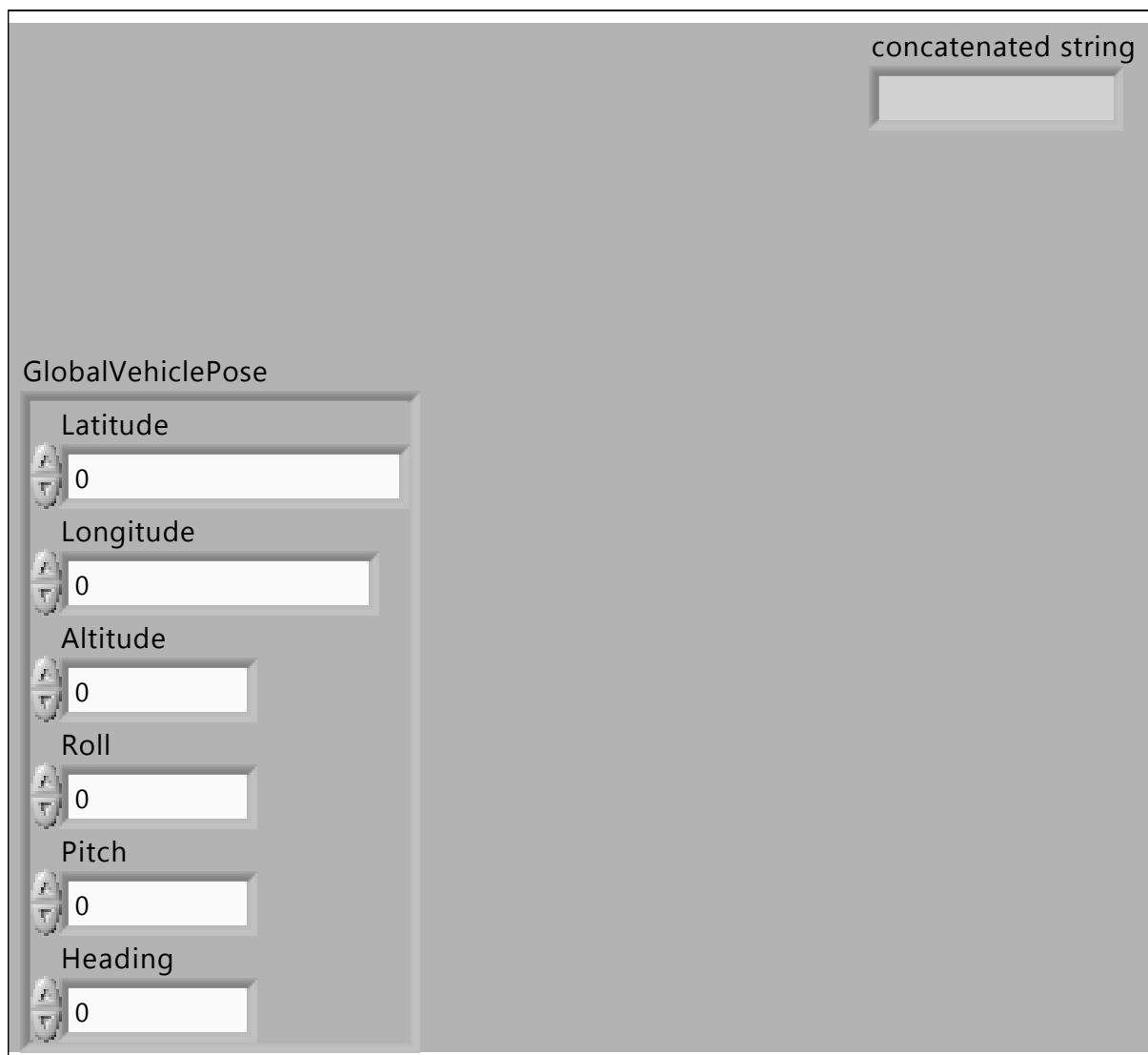
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\LatLongToCSV.vi

Last modified on 4/27/2011 at 11:05 AM

Printed on 4/29/2011 at 1:51 AM

LatLongToCSV.vi

GlobalVehiclePose ————— concatenated string



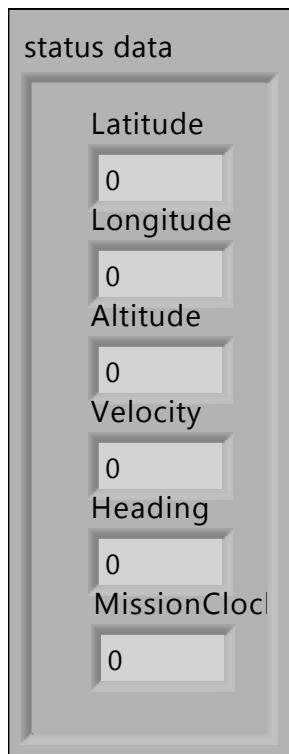
get_vehicle_state.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\get_vehicle_state.vi

Last modified on 4/28/2011 at 1:03 PM

Printed on 4/29/2011 at 1:51 AM

get_vehicle_state.vi

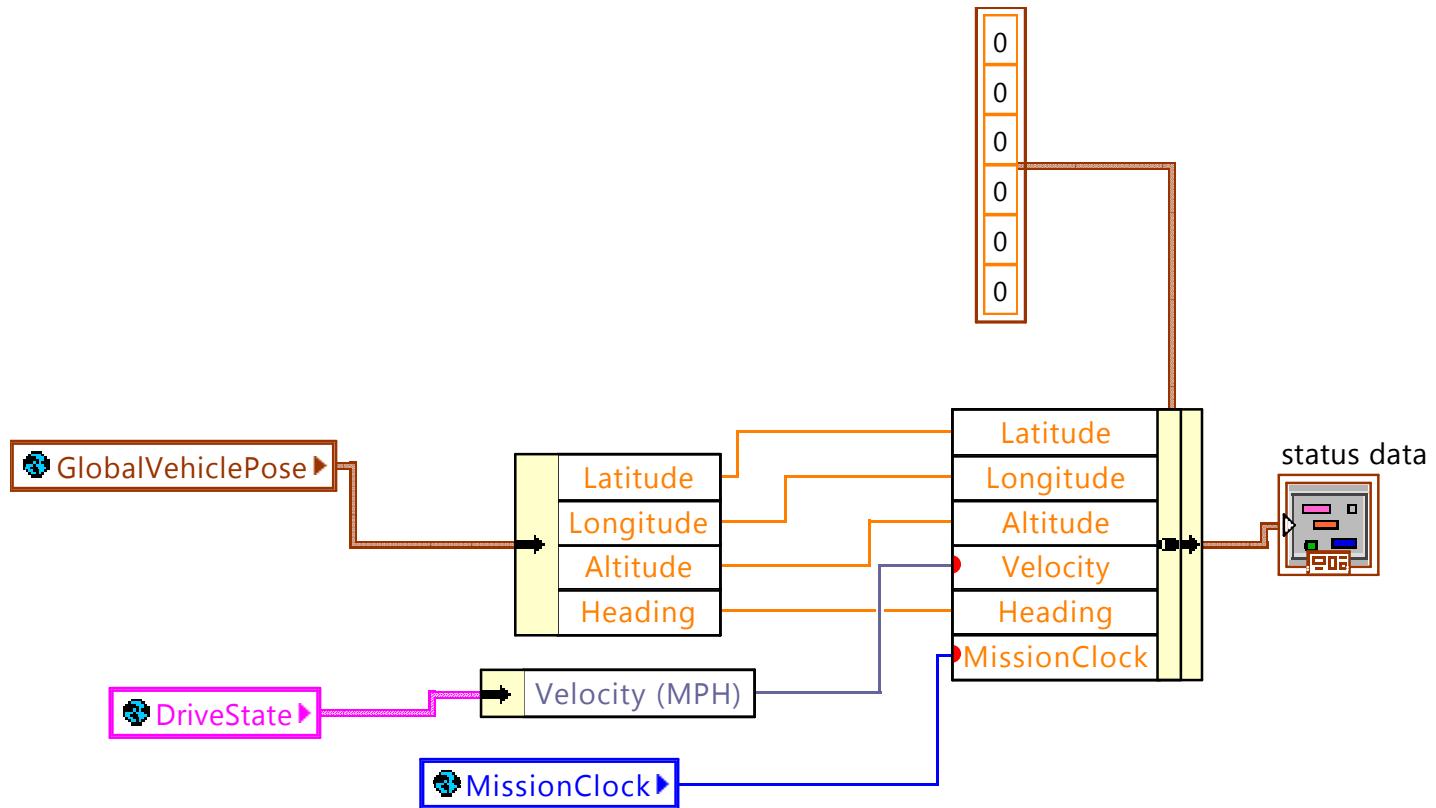


get_vehicle_state.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\get_vehicle_state.vi

Last modified on 4/28/2011 at 1:03 PM

Printed on 4/29/2011 at 1:51 AM

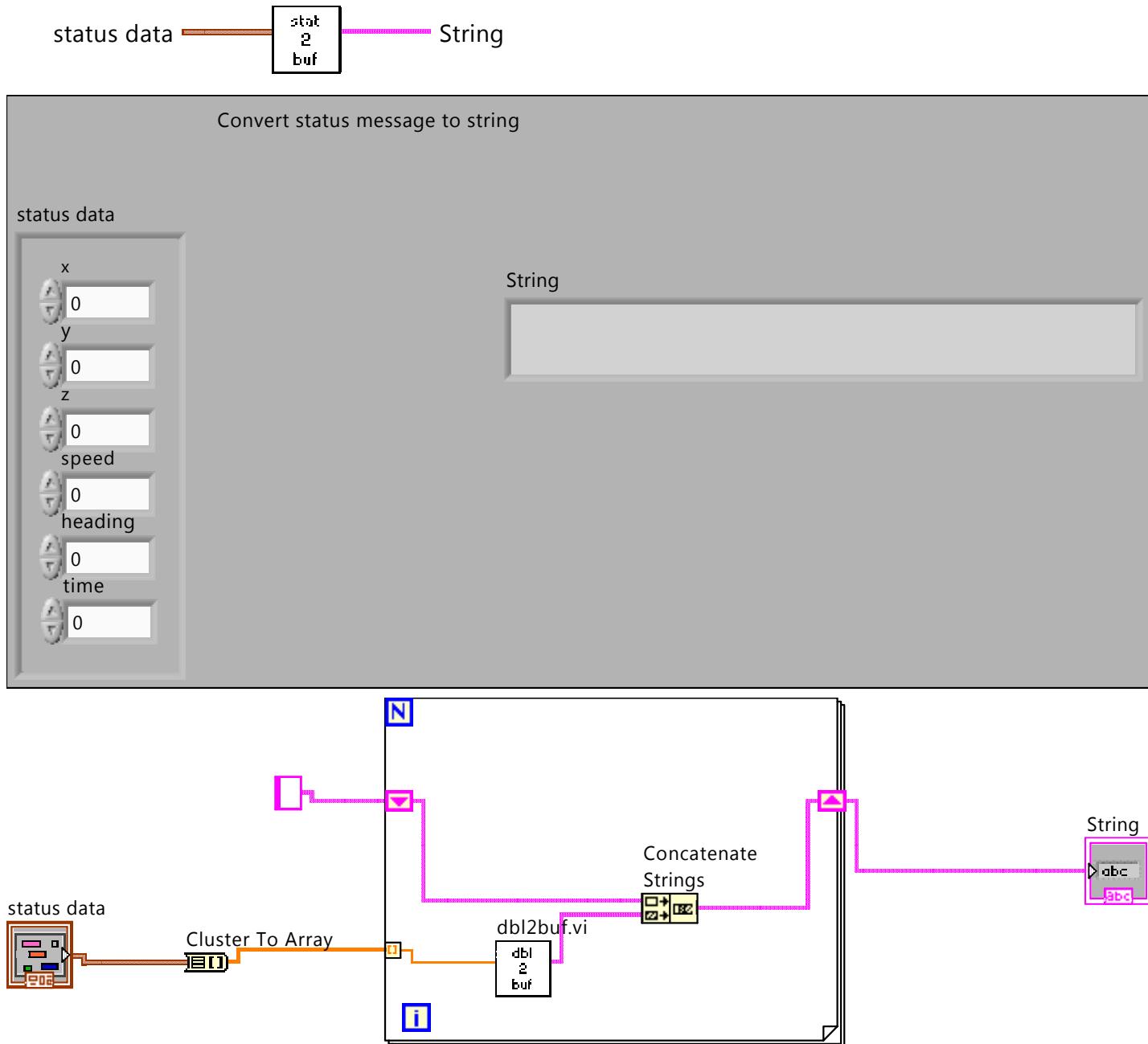


stat2buf.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\stat2buf.vi

Last modified on 4/28/2011 at 1:08 PM

Printed on 4/29/2011 at 1:51 AM

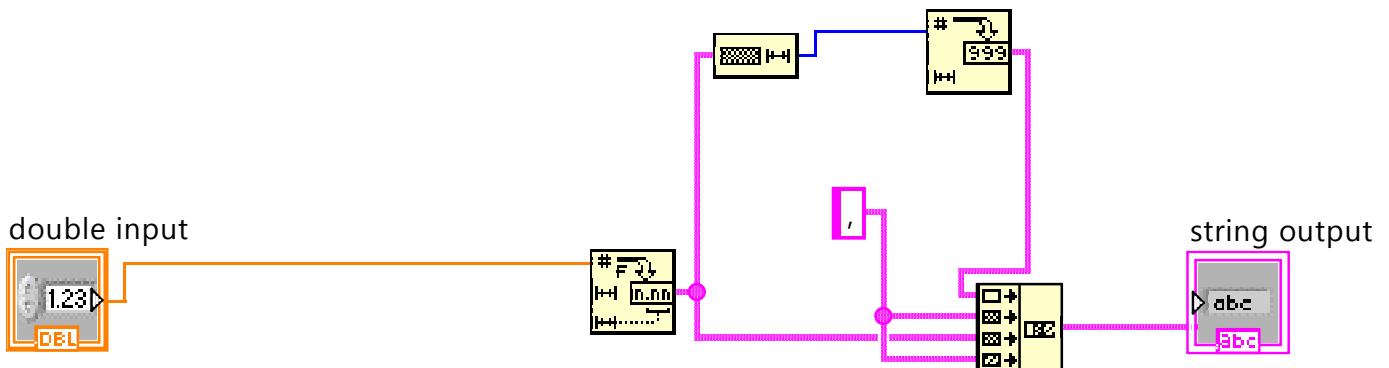
stat2buf.vi

dbl2buf.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\eeplv_vehicle_a\dbl2buf.vi

Last modified on 4/28/2011 at 1:07 PM

Printed on 4/29/2011 at 1:51 AM

dbl2buf.vi

DriveControl.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Neurons\Act\DriveControl.vi

Last modified on 4/11/2011 at 12:26 PM

Printed on 4/29/2011 at 1:51 AM

DriveControl.vi



DriveCommand	DriveState
WheelAngle (Deg) <input type="text" value="0"/>	WheelAngle (Deg) <input type="text" value="0"/>
Velocity (MPH) <input type="text" value="0"/>	Velocity (MPH) <input type="text" value="0"/>
Brake <input type="button" value=""/>	Brake <input type="button" value=""/>

HindbrainFPGAReference.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\HindbrainFPGAReference.ctl

Last modified on 3/27/2011 at 12:08 PM

Printed on 4/29/2011 at 1:51 AM

HindbrainFPGAReference.ctl



FPGA VI Reference Out

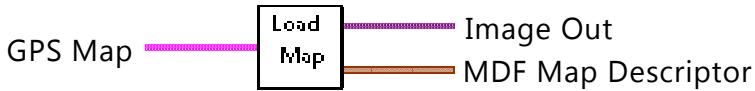


Load Map.vi

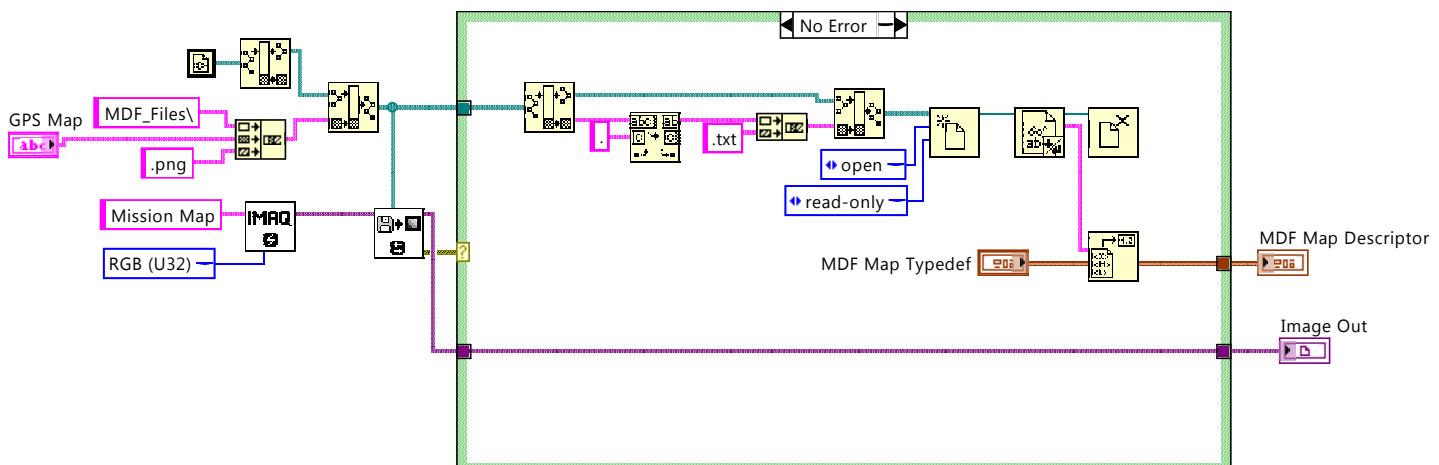
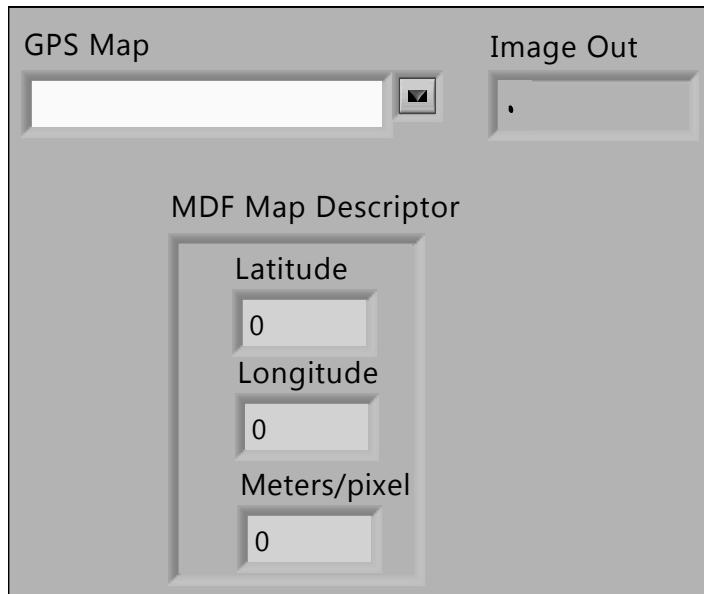
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Load Map.vi

Last modified on 4/27/2011 at 5:07 PM

Printed on 4/29/2011 at 1:51 AM

Load Map.vi

Loads a map and its corresponding descriptor text file from the given path. The image and the descriptor file must have the same filename.



To create a new map:

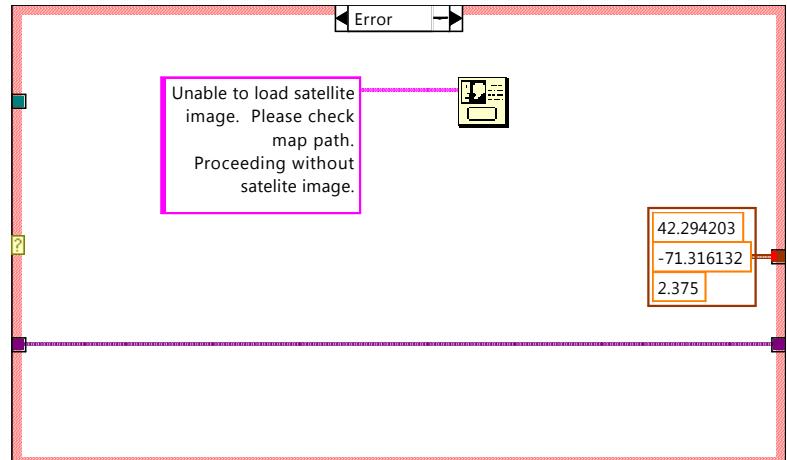
- 1) Open Google Earth and zoom to the location you are interested in.
- 2) Use the distance measurement tool to determine the number of meters in the image from left to right.
- 3) Determine the lat/long of the top left corner of the image.
- 4) Screenshot google earth and crop with photoshop/gimp
- 5) Use **Create Map Description.vi** to create the parameter file.
- 6) Put both files ie "lake.png" and "lake.txt" in the same directory and then you're done!

Load Map.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Load Map.vi

Last modified on 4/27/2011 at 5:07 PM

Printed on 4/29/2011 at 1:51 AM



ToHomePose.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\ToHomePose.ctl

Last modified on 3/2/2011 at 10:44 AM

Printed on 4/29/2011 at 1:51 AM

ToHomePose.ctl



ToHomeVehiclePose

dX (in)	0
dY (in)	0
dZ (in)	0
Roll (deg)	0
Pitch	0
Yaw	0

vehicle differential

mission start

x

N

y

dx

dy

yaw

The diagram shows a vehicle represented by a blue diamond labeled 'vehicle differential'. It is positioned relative to a 'mission start' point marked by a black dot. A coordinate system is defined with the x-axis pointing upwards, the y-axis pointing to the left, and the N (North) arrow pointing upwards and to the right. Dashed lines indicate the vehicle's position: dx is the horizontal distance from the mission start to the vehicle, and dy is the vertical distance. The yaw angle is shown as the angle between the vehicle's orientation and the x-axis.

GlobalPose.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\GlobalPose.ctl

Last modified on 3/8/2011 at 9:04 PM

Printed on 4/29/2011 at 1:51 AM

GlobalPose.ctl



GlobalVehiclePose

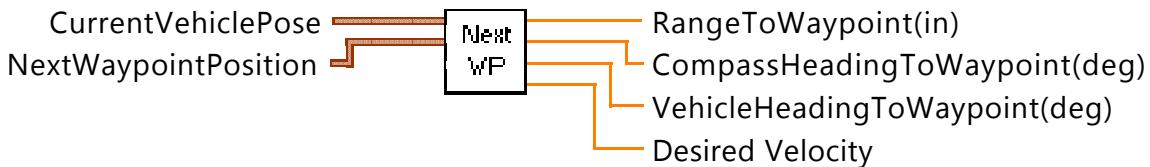
Latitude	<input type="text" value="0"/>
Longitude	<input type="text" value="0"/>
Altitude	<input type="text" value="0"/>
Roll	<input type="text" value="0"/>
Pitch	<input type="text" value="0"/>
Heading	<input type="text" value="0"/>

NextWaypoint.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\NextWaypoint.vi

Last modified on 4/27/2011 at 4:18 PM

Printed on 4/29/2011 at 1:51 AM

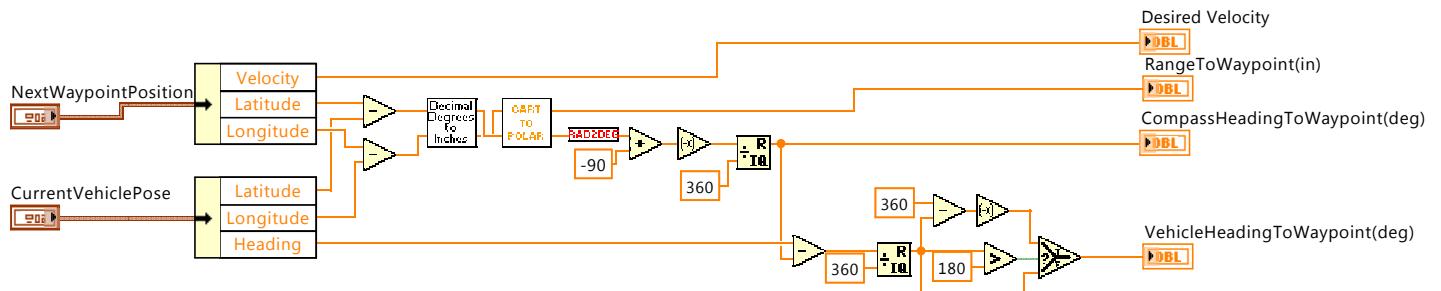
NextWaypoint.vi

NextWaypoint.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\NextWaypoint.vi

Last modified on 4/27/2011 at 4:18 PM

Printed on 4/29/2011 at 1:51 AM



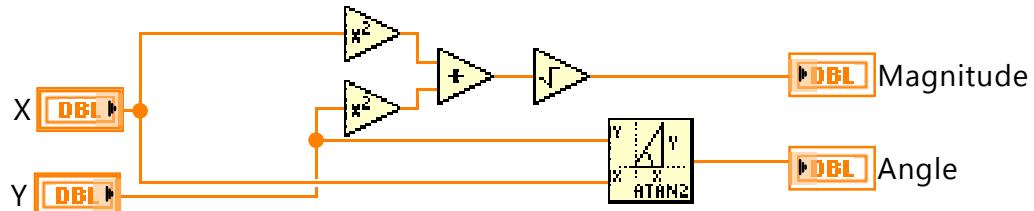
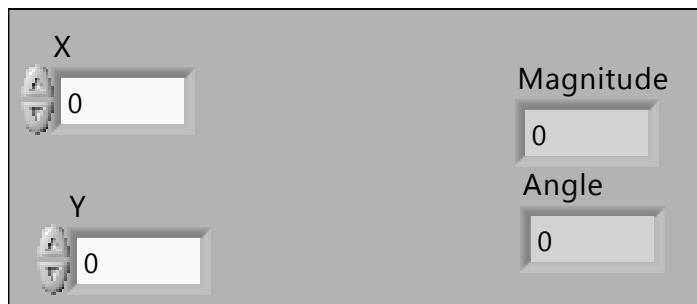
Cartesian2Polar.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\

HistogramToPolarForceSubVIs\Cartesian2Polar.vi

Last modified on 3/7/2011 at 11:31 AM

Printed on 4/29/2011 at 1:51 AM

Cartesian2Polar.vi

Rad2Deg.vi

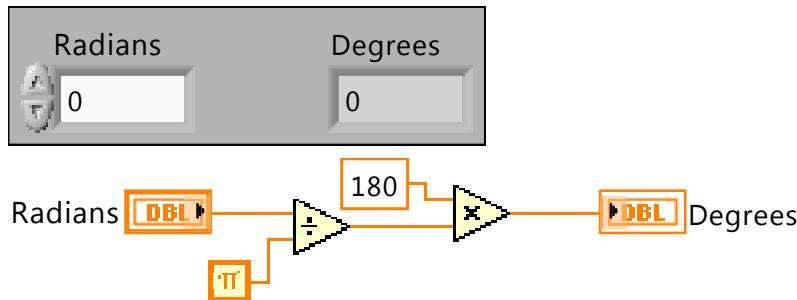
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\Rad2Deg.vi

Last modified on 4/27/2011 at 4:28 PM

Printed on 4/29/2011 at 1:51 AM

Rad2Deg.vi

Radians ————— RAD2DEG ————— Degrees

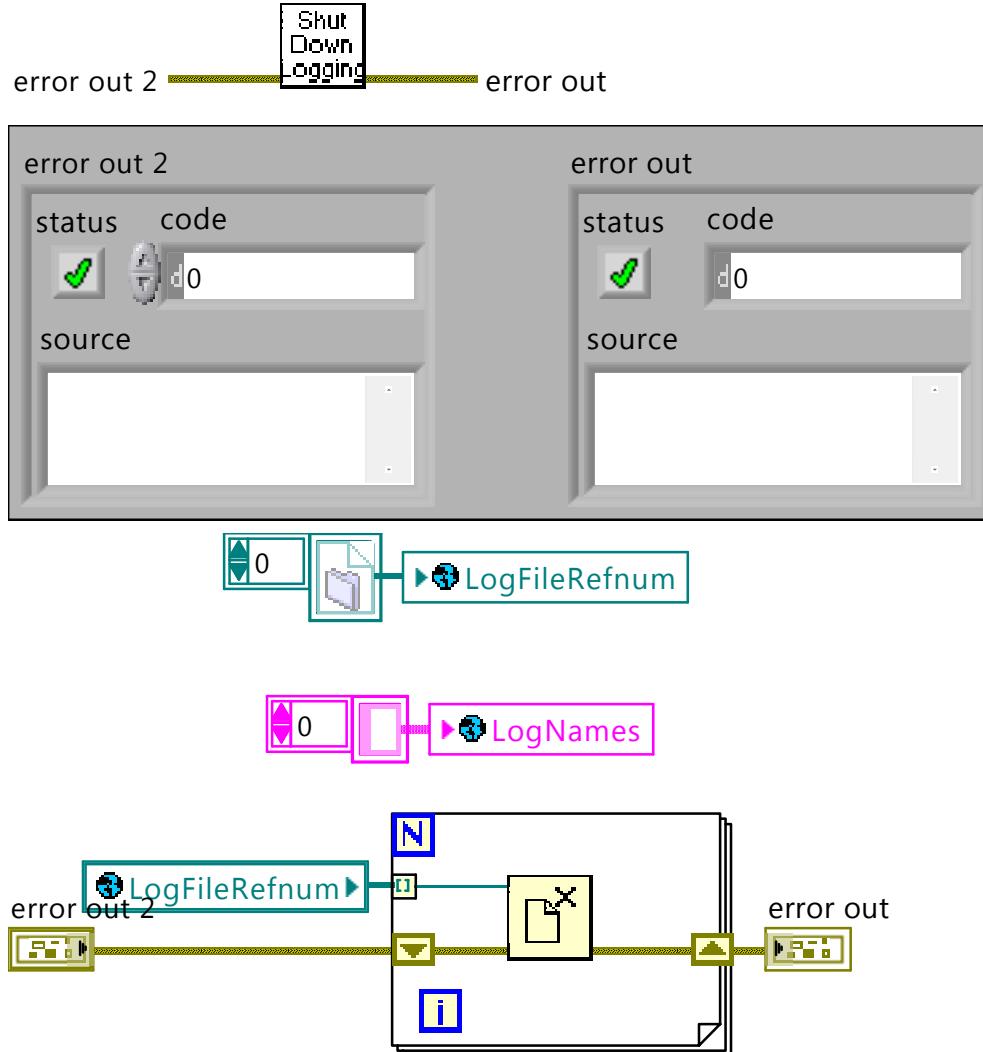


ShutDownLogging.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\Logging\ShutDownLogging.vi

Last modified on 3/26/2011 at 5:46 PM

Printed on 4/29/2011 at 1:51 AM

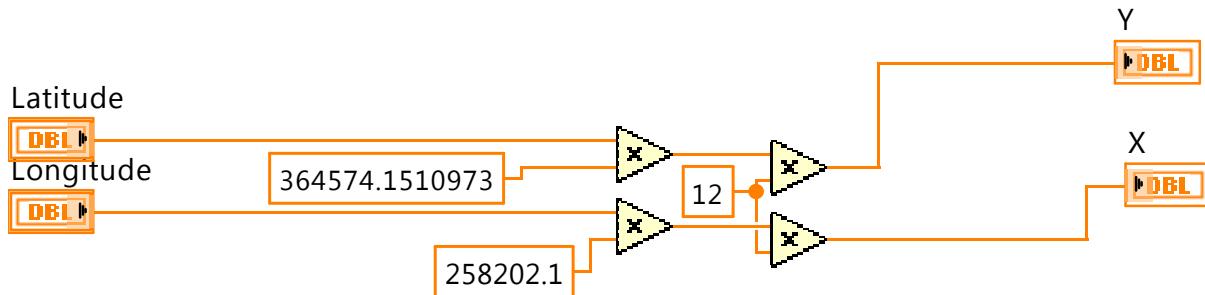
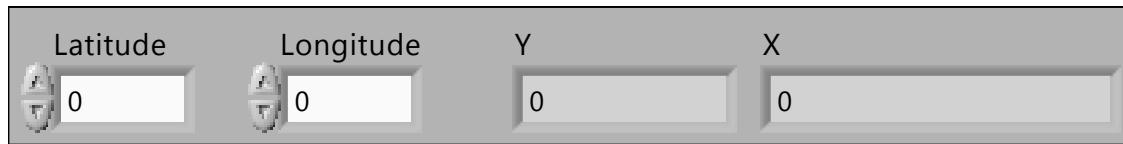
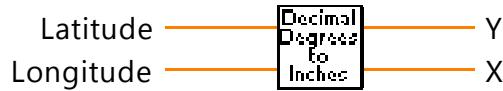
ShutDownLogging.vi

DecimalDegreesToInches.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\DecimalDegreesToInches.vi

Last modified on 3/23/2011 at 4:50 PM

Printed on 4/29/2011 at 1:51 AM

DecimalDegreesToInches.vi

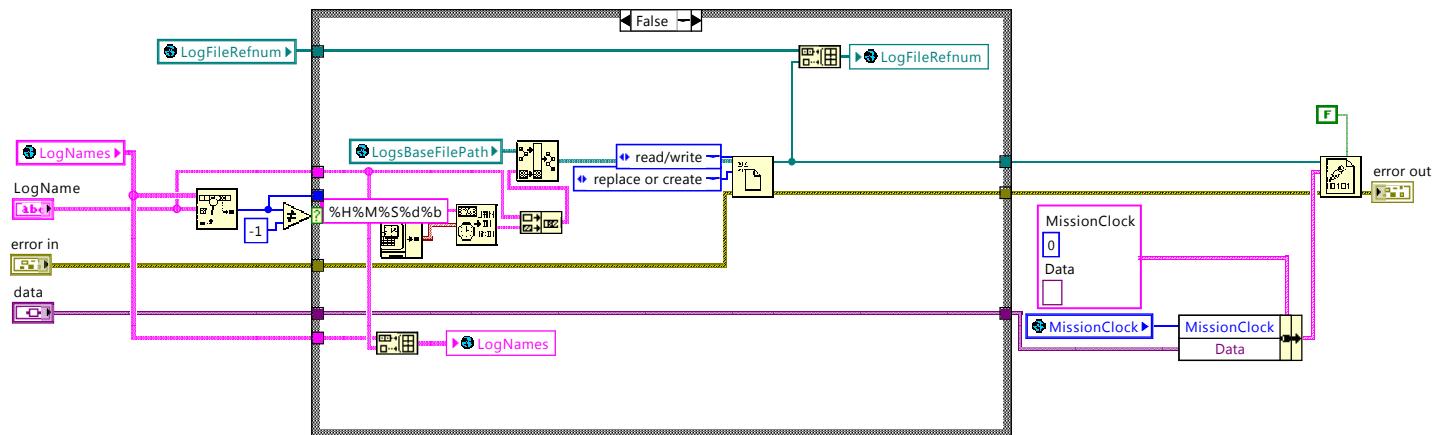
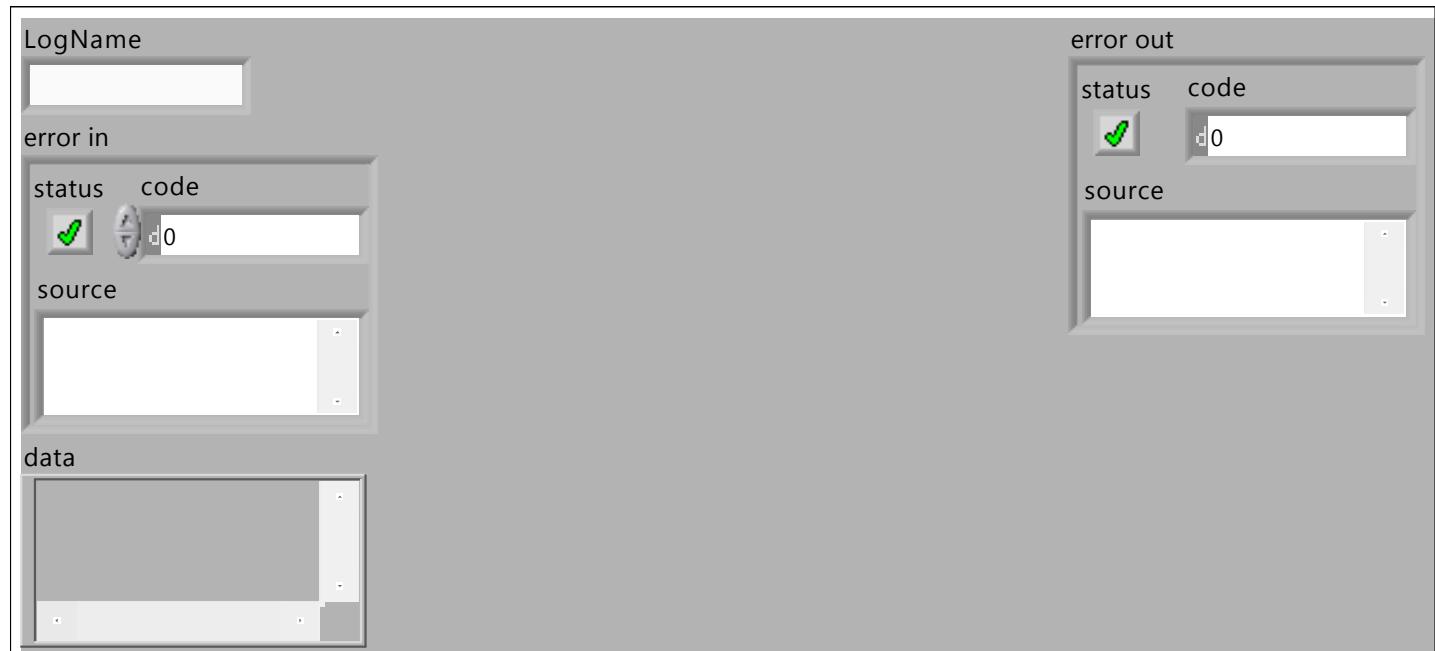
WriteToLog.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\Logging\WriteToLog.vi

Last modified on 4/6/2011 at 9:52 AM

Printed on 4/29/2011 at 1:51 AM

WriteToLog.vi

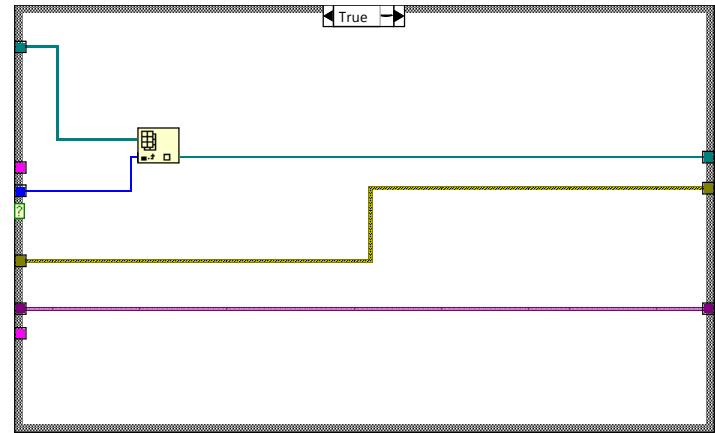


WriteToLog.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\Logging\WriteToLog.vi

Last modified on 4/6/2011 at 9:52 AM

Printed on 4/29/2011 at 1:51 AM

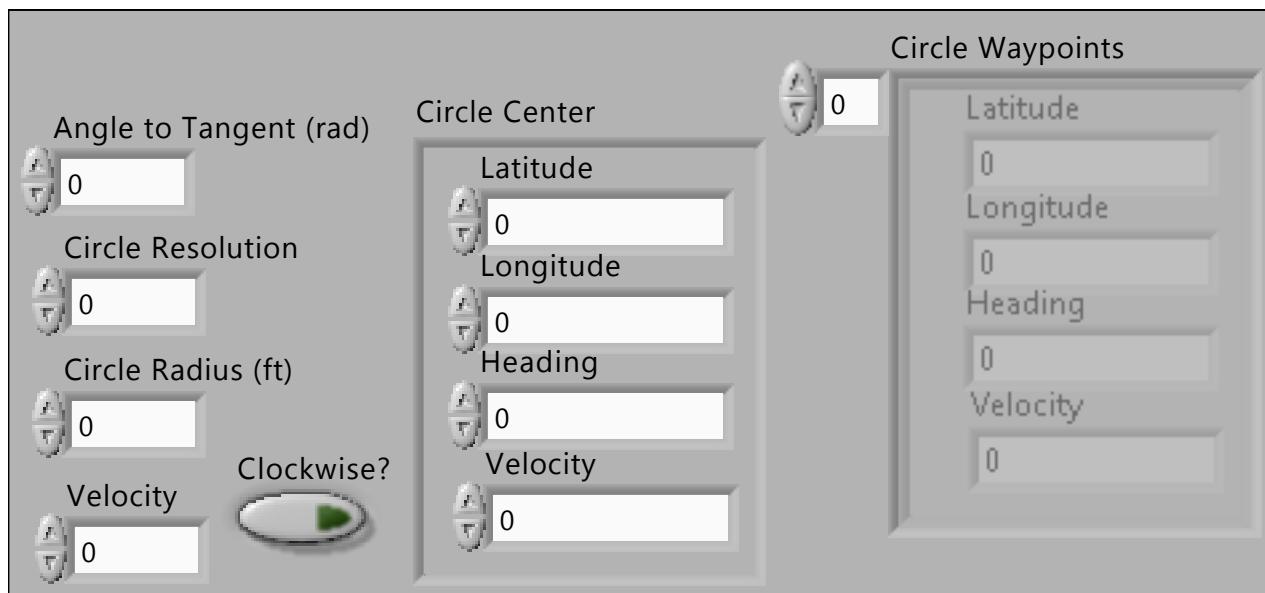
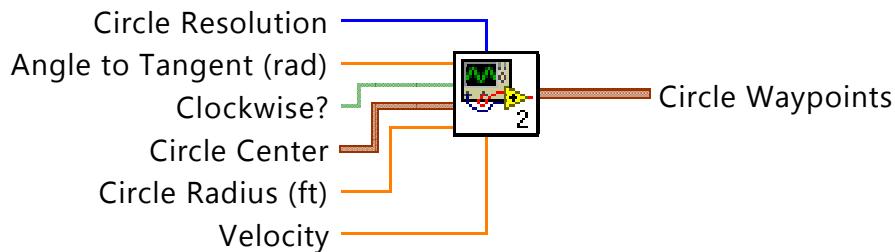


**CreateCirclePath.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\CreateCirclePath.vi

Last modified on 4/27/2011 at 11:05 AM

Printed on 4/29/2011 at 1:51 AM

CreateCirclePath.vi

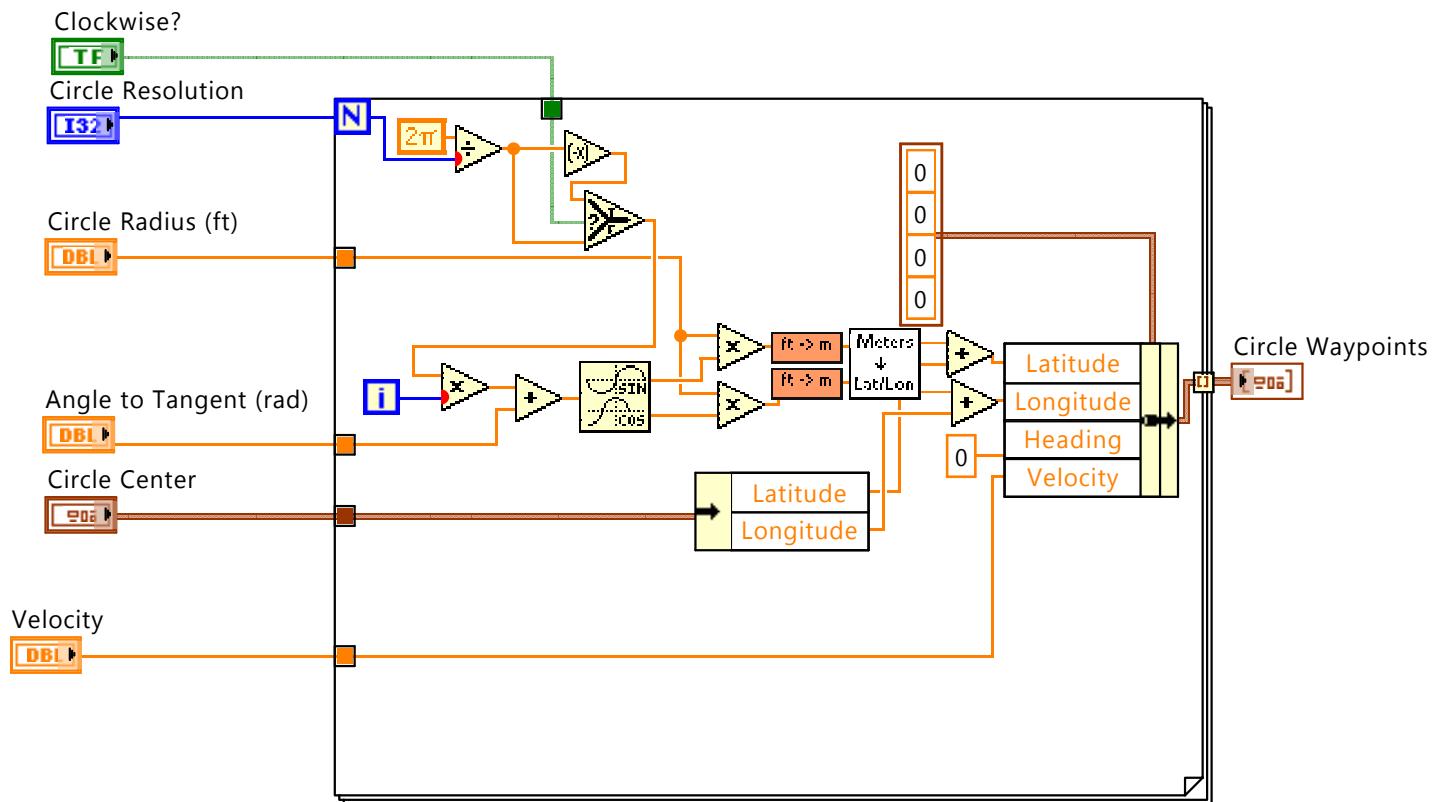


CreateCirclePath.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF>CreateCirclePath.vi

Last modified on 4/27/2011 at 11:05 AM

Printed on 4/29/2011 at 1:51 AM

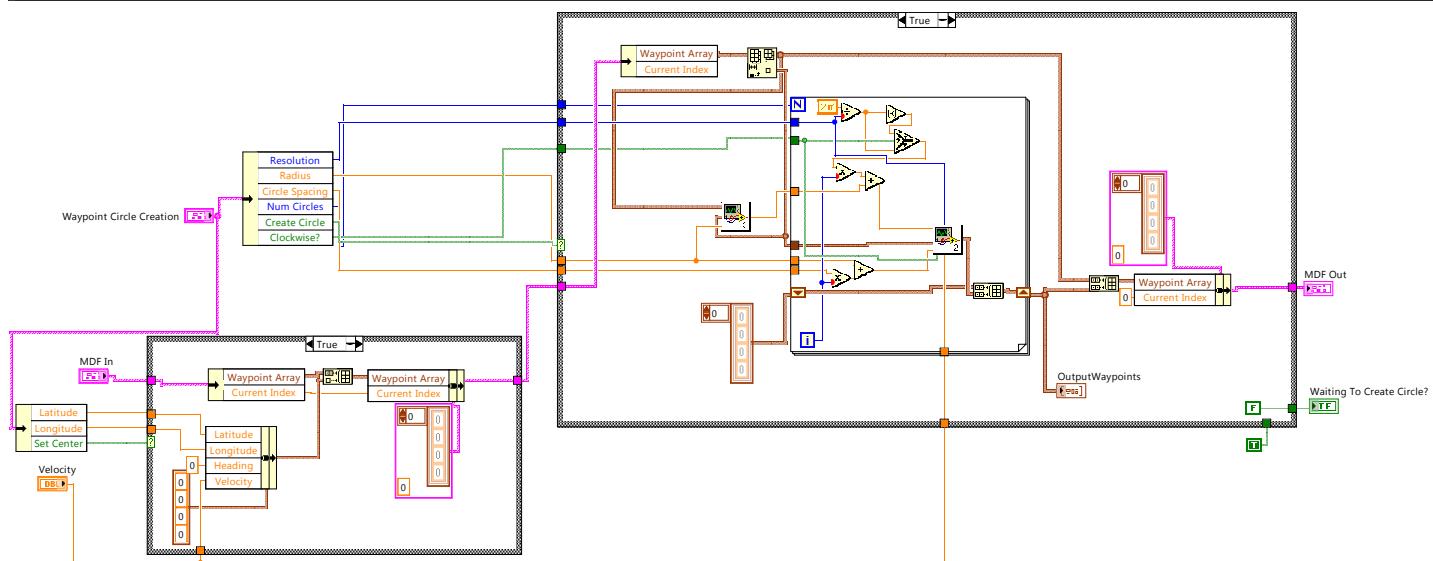
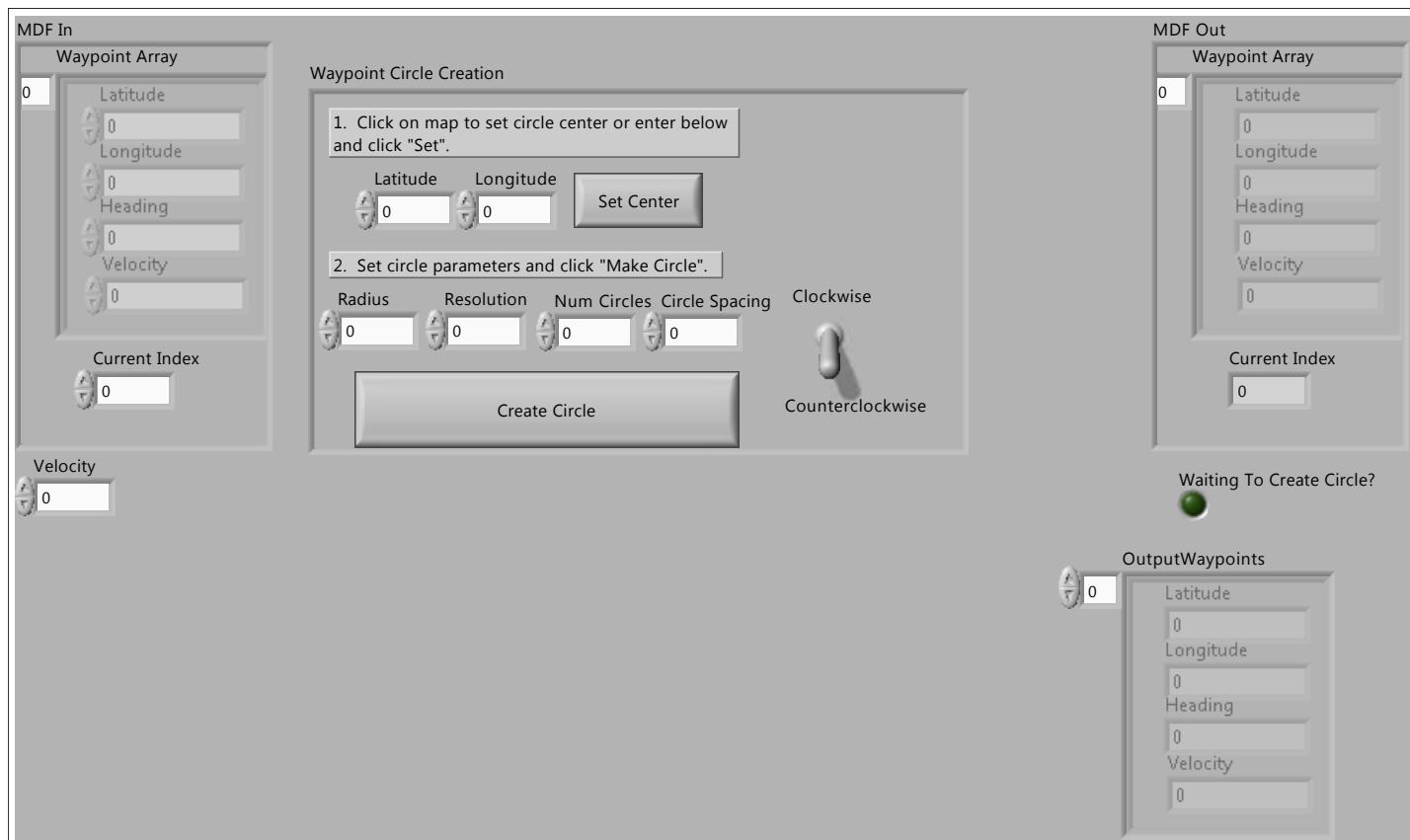
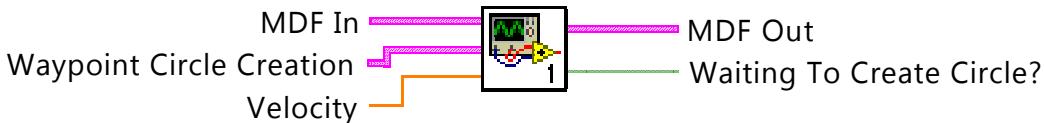


**CirclePaths.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\CirclePaths.vi

Last modified on 4/27/2011 at 4:51 PM

Printed on 4/29/2011 at 1:51 AM

CirclePaths.vi

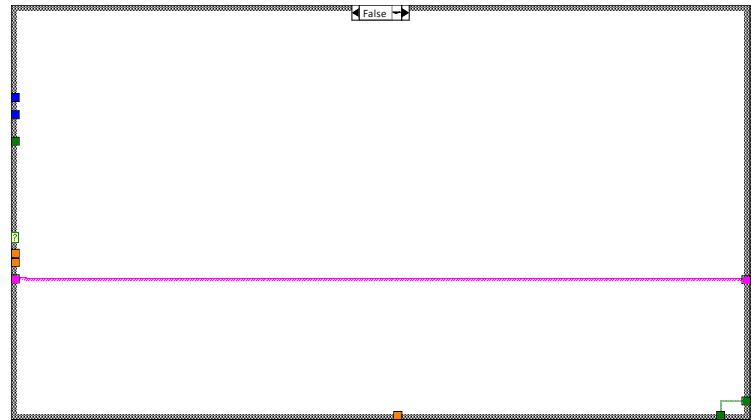
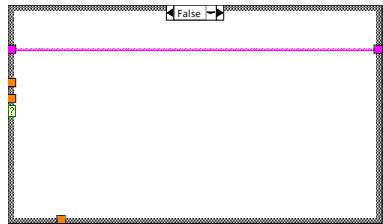


CirclePaths.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\CirclePaths.vi

Last modified on 4/27/2011 at 4:51 PM

Printed on 4/29/2011 at 1:51 AM

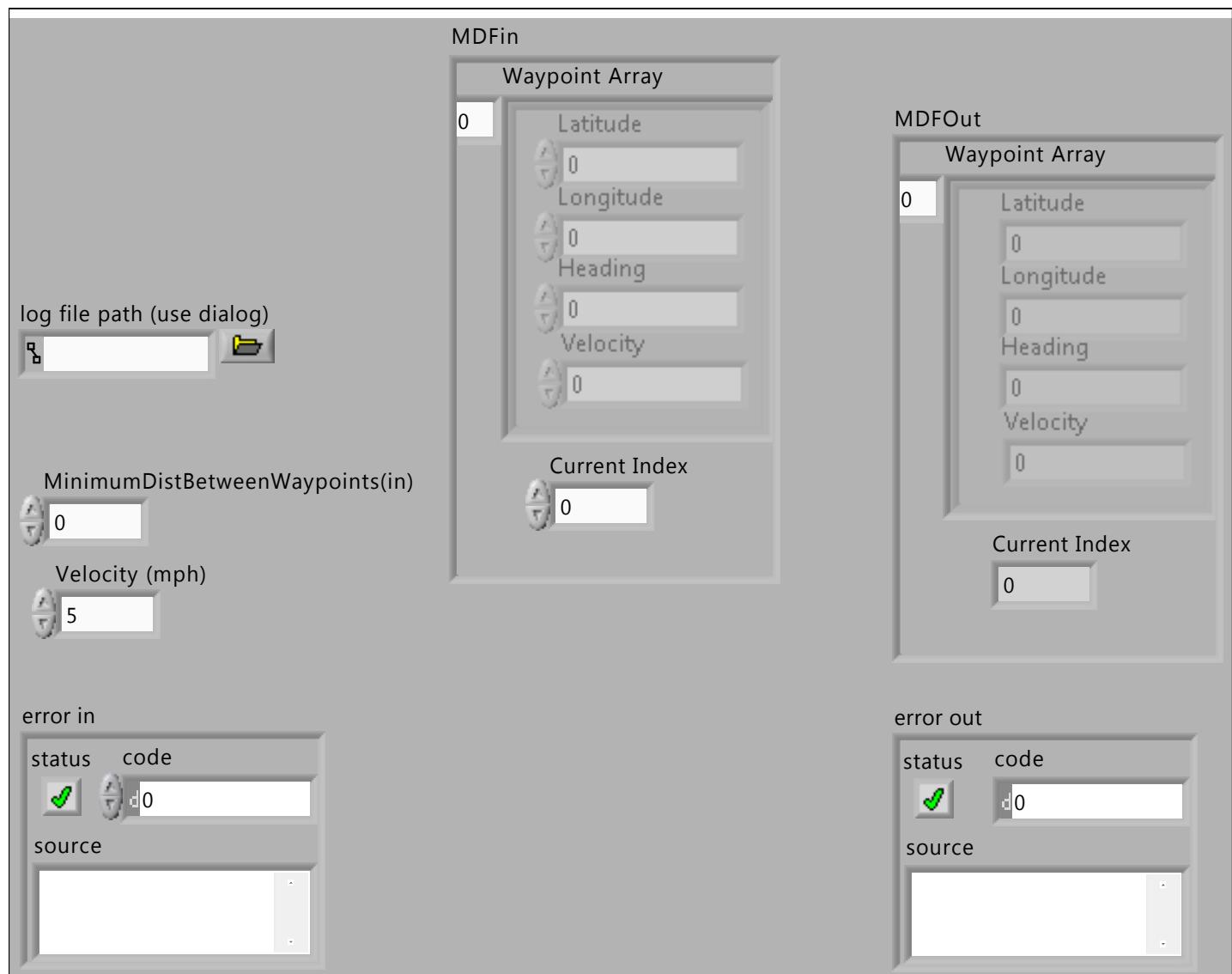
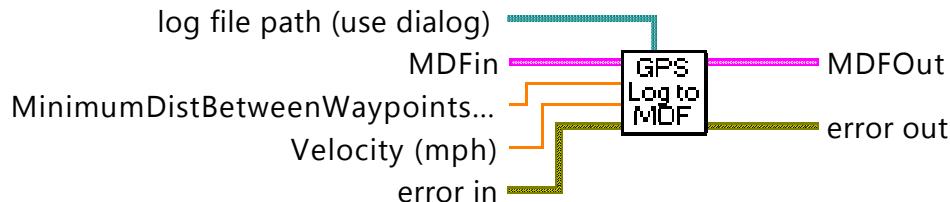


ConvertGPSLogToMDF.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\ConvertGPSLogToMDF.vi

Last modified on 4/27/2011 at 4:18 PM

Printed on 4/29/2011 at 1:51 AM

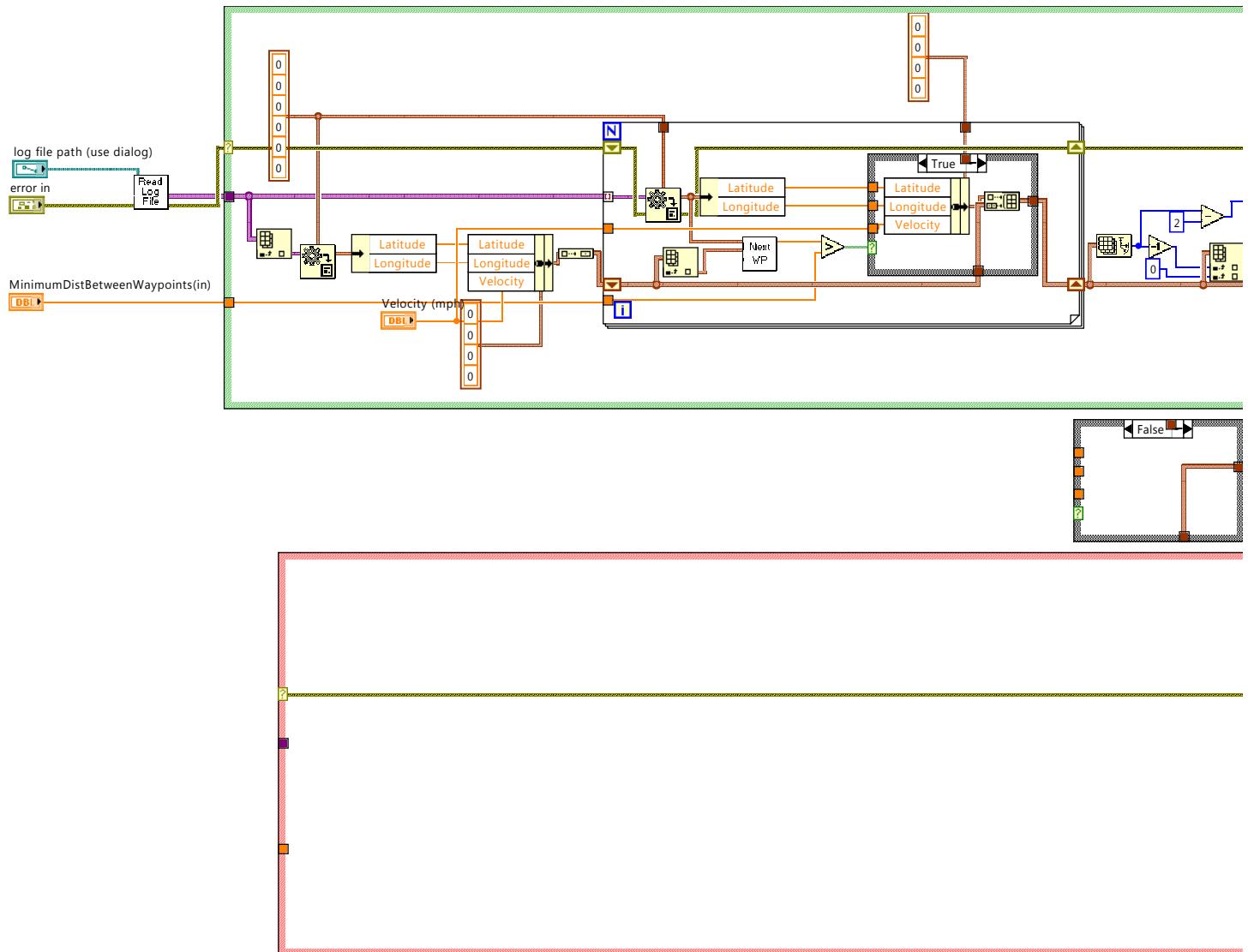
ConvertGPSLogToMDF.vi

ConvertGPSLogToMDF.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\ConvertGPSLogToMDF.vi

Last modified on 4/27/2011 at 4:18 PM

Printed on 4/29/2011 at 1:51 AM

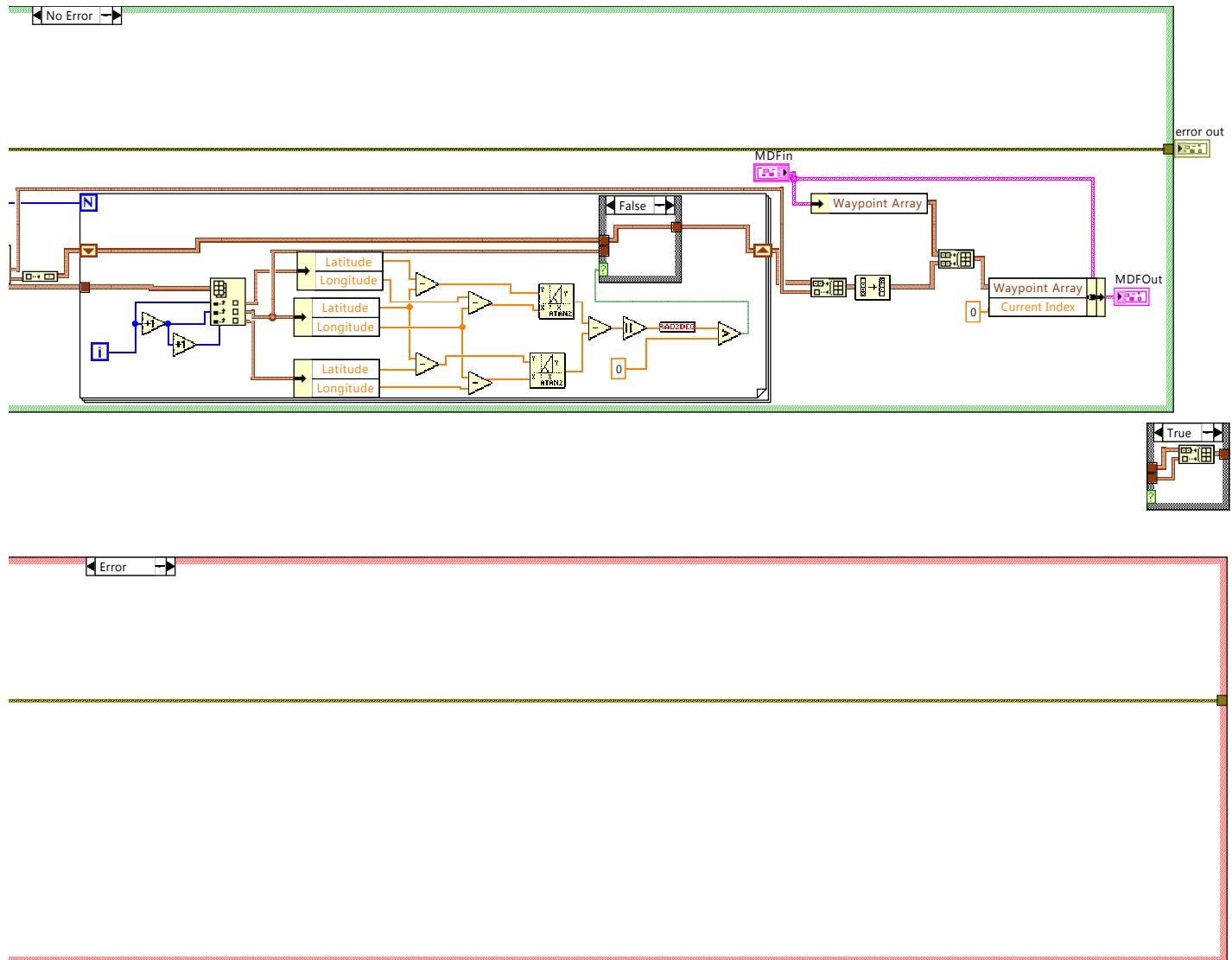


ConvertGPSLogToMDF.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\ConvertGPSLogToMDF.vi

Last modified on 4/27/2011 at 4:18 PM

Printed on 4/29/2011 at 1:51 AM



Load Vehicle Icon.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Load Vehicle Icon.vi

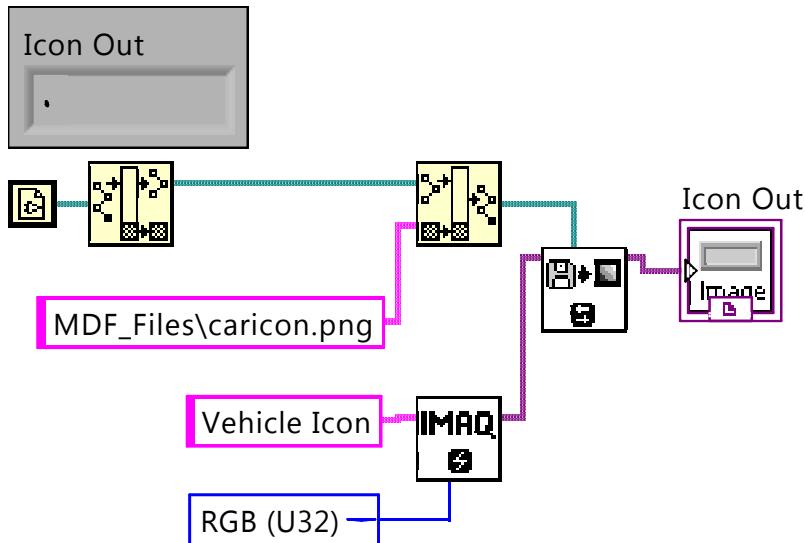
Last modified on 4/27/2011 at 4:46 PM

Printed on 4/29/2011 at 1:51 AM

Load Vehicle Icon.vi



Loads the boat icon for use on the map. Also, replaces all the black pixels with transparent pixels.



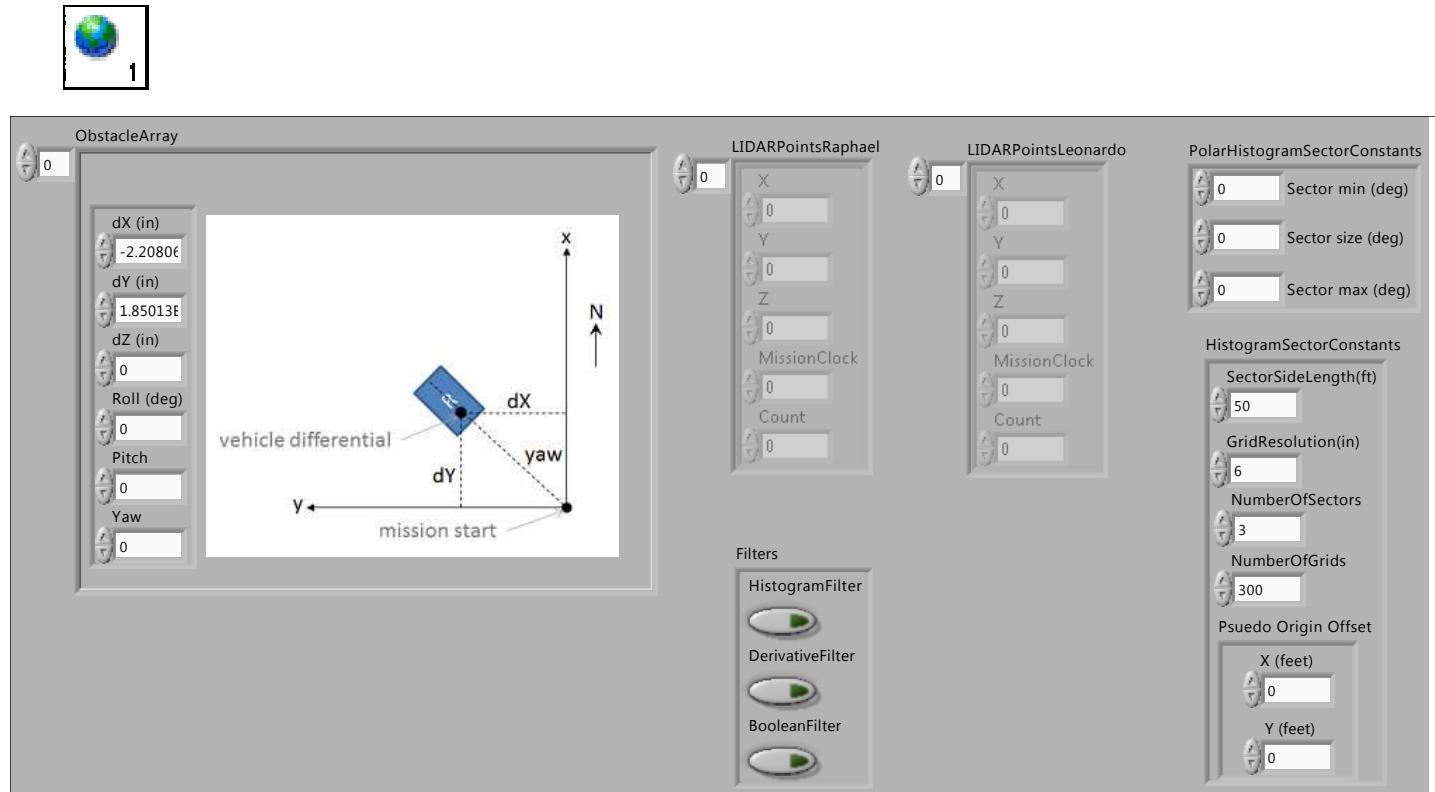
WhatNeuron.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Neurons\Sense\WhatNeuron.vi

Last modified on 4/6/2011 at 9:52 AM

Printed on 4/29/2011 at 1:51 AM

WhatNeuron.vi

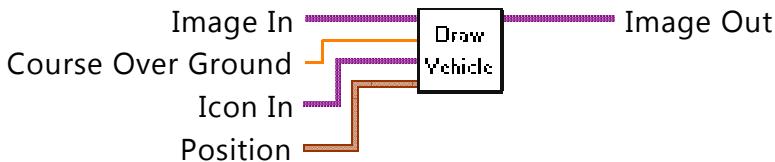


Draw Vehicle Icon.vi

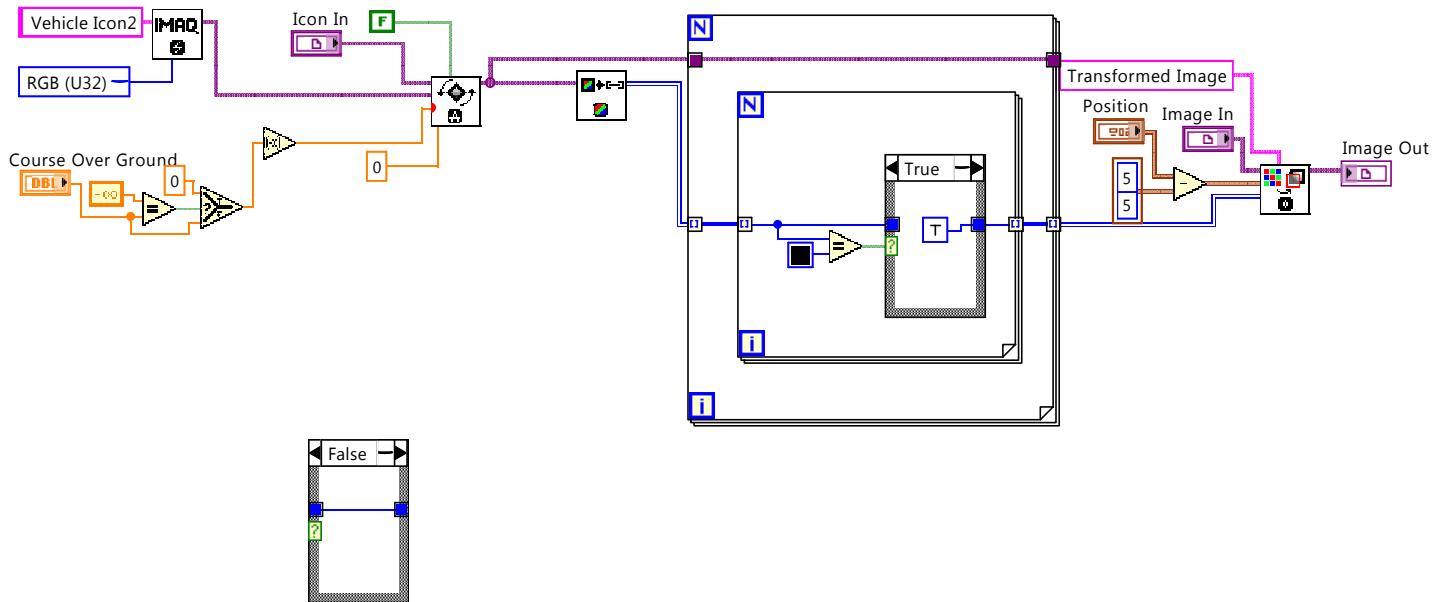
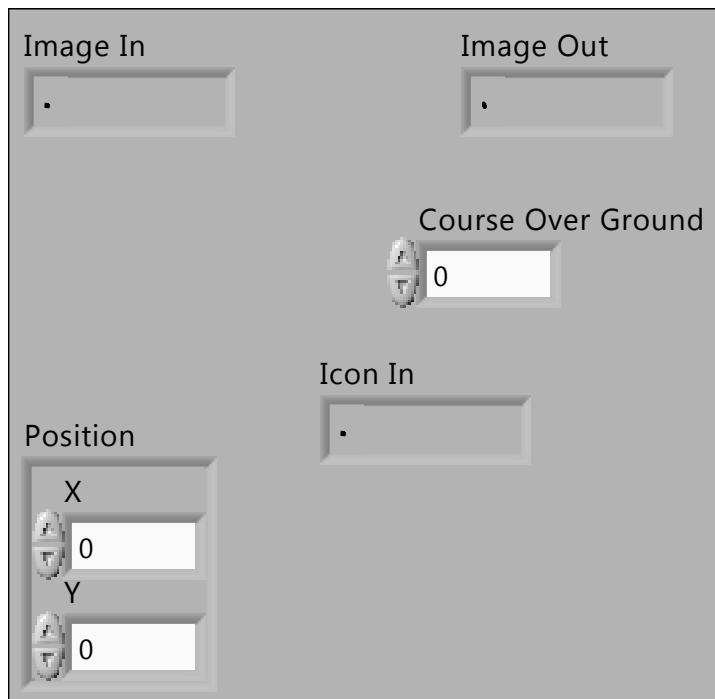
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Draw Vehicle Icon.vi

Last modified on 3/25/2011 at 1:46 PM

Printed on 4/29/2011 at 1:51 AM

Draw Vehicle Icon.vi

Draws the boat icon onto the map at the current location of the boat.



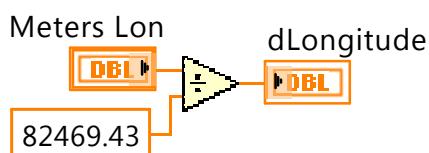
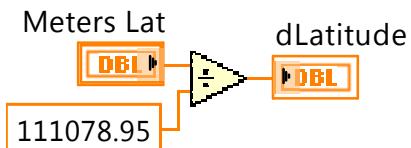
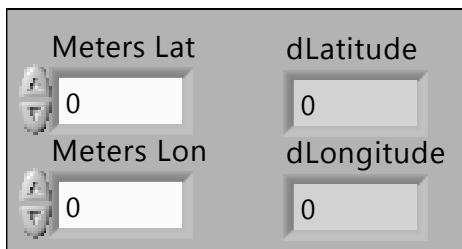
dMeters to dLat Lon.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\dMeters to dLat Lon.vi

Last modified on 3/26/2011 at 1:43 PM

Printed on 4/29/2011 at 1:51 AM

dMeters to dLat Lon.vi



FindTanAngleToStartCircle.vi

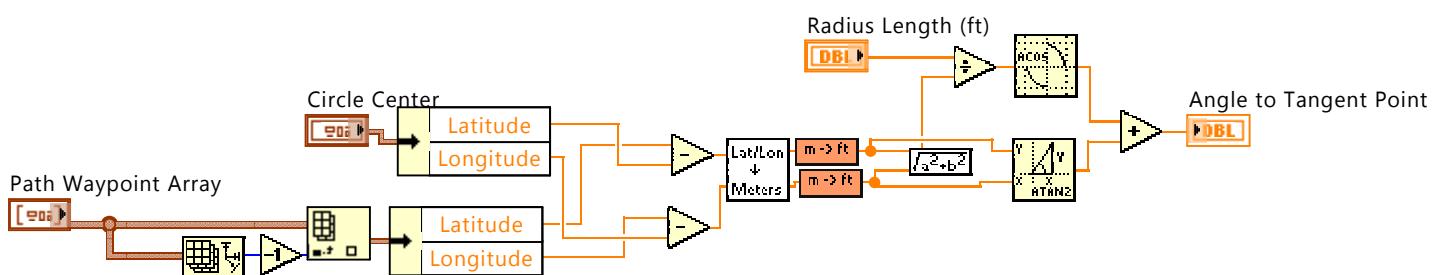
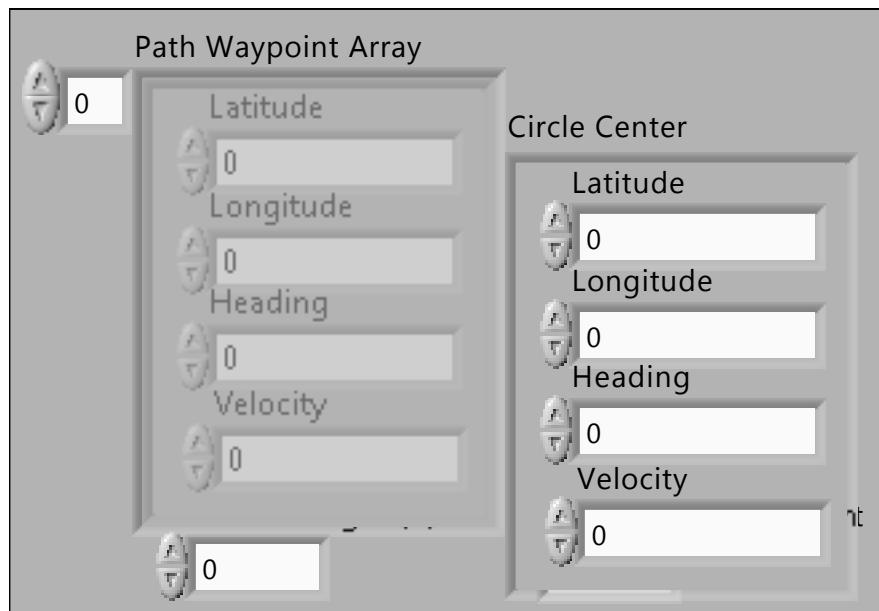
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\

FindTanAngleToStartCircle.vi

Last modified on 4/13/2011 at 4:08 PM

Printed on 4/29/2011 at 1:51 AM

FindTanAngleToStartCircle.vi

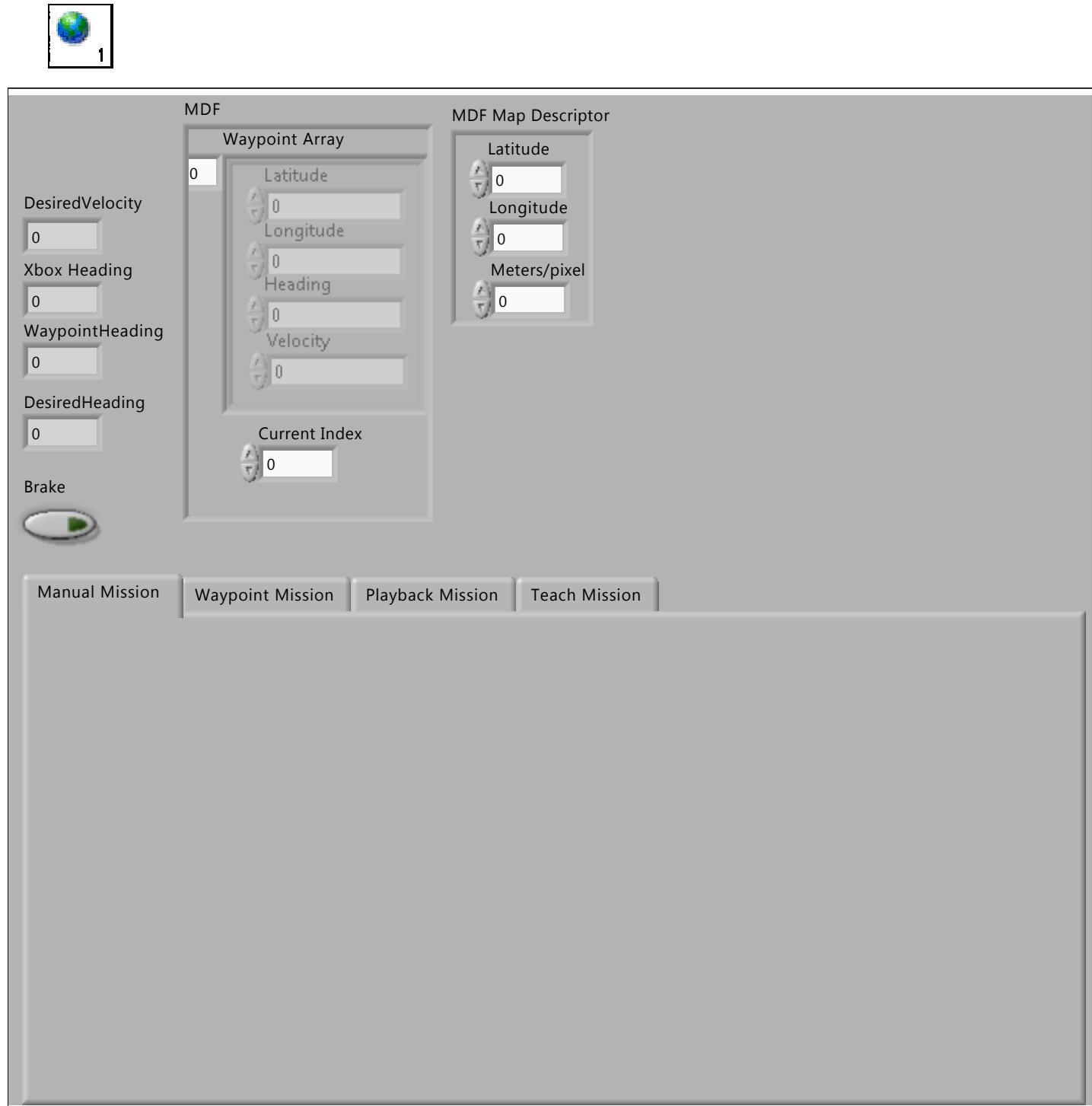


ThinkNeuron.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Neurons\Think\ThinkNeuron.vi

Last modified on 4/27/2011 at 11:05 AM

Printed on 4/29/2011 at 1:51 AM

ThinkNeuron.vi

Meters2Feet.vi

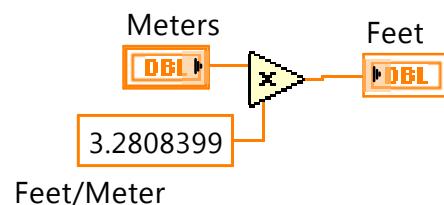
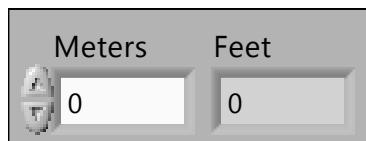
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Meters2Feet.vi

Last modified on 3/26/2011 at 1:51 PM

Printed on 4/29/2011 at 1:51 AM

Meters2Feet.vi

Meters ————— ————— Feet



Feet/Meter

dLat Lon to dMeters.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\dLat Lon to dMeters.vi

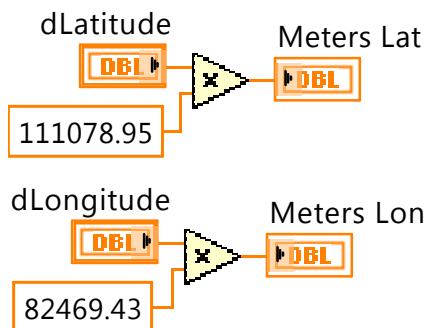
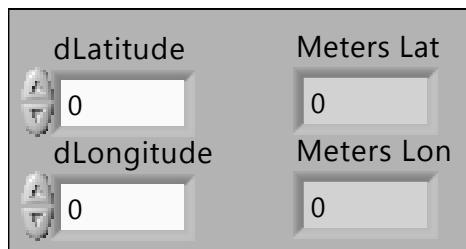
Last modified on 3/26/2011 at 1:42 PM

Printed on 4/29/2011 at 1:51 AM

dLat Lon to dMeters.vi



Converts a Lat/Lon difference to distance in meters.



Feet2Meters.vi

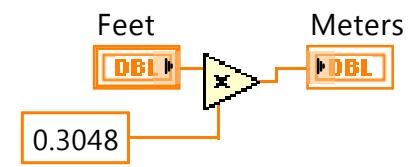
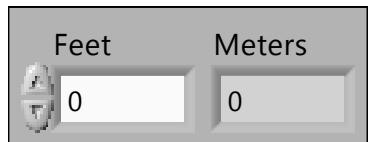
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Feet2Meters.vi

Last modified on 3/26/2011 at 1:51 PM

Printed on 4/29/2011 at 1:51 AM

Feet2Meters.vi

Feet —————  ————— Meters



PythagoreanTheorem.vi

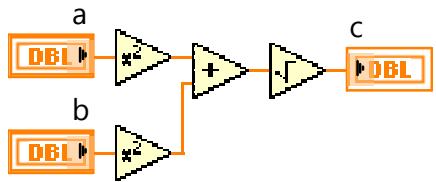
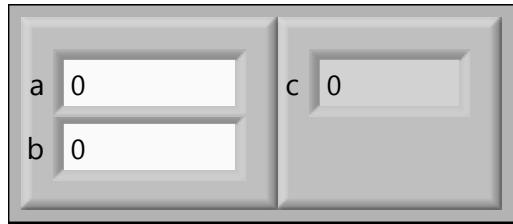
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\

PythagoreanTheorem.vi

Last modified on 3/25/2011 at 5:54 PM

Printed on 4/29/2011 at 1:51 AM

PythagoreanTheorem.vi



MDFMapDescriptor.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\MDFMapDescriptor.ctl

Last modified on 3/22/2011 at 3:57 PM

Printed on 4/29/2011 at 1:51 AM

MDFMapDescriptor.ctl



MDF Map Descriptor

Latitude	<input type="text" value="0"/>
Longitude	<input type="text" value="0"/>
Meters/pixel	<input type="text" value="0"/>

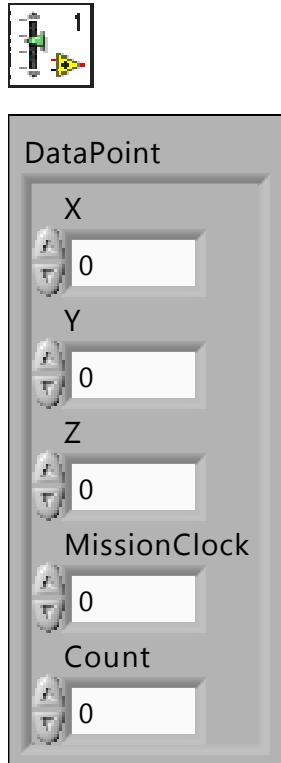
DataPoint.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\DataPoint.ctl

Last modified on 3/8/2011 at 1:37 AM

Printed on 4/29/2011 at 1:51 AM

DataPoint.ctl



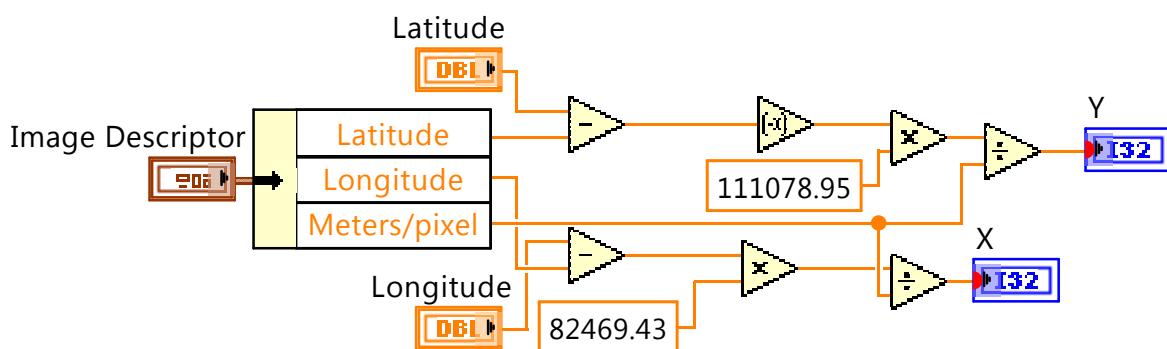
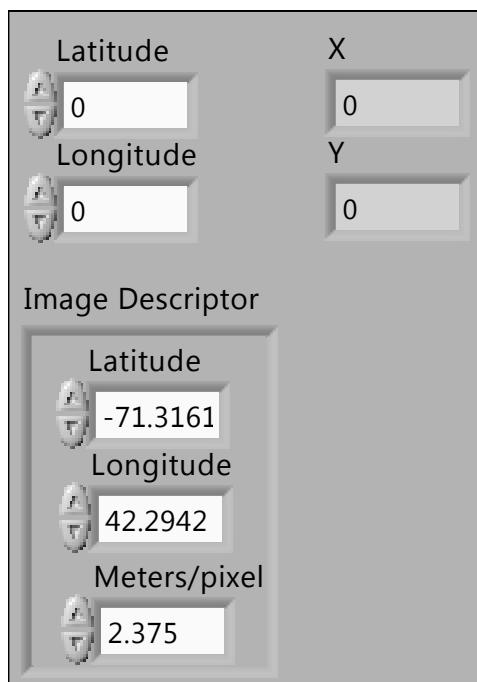
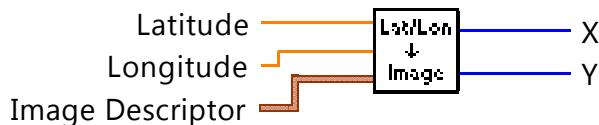
Lat Lon to Image.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Lat Lon to Image.vi

Last modified on 3/22/2011 at 5:00 PM

Printed on 4/29/2011 at 1:51 AM

Lat Lon to Image.vi



Draw Waypoints.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Draw Waypoints.vi

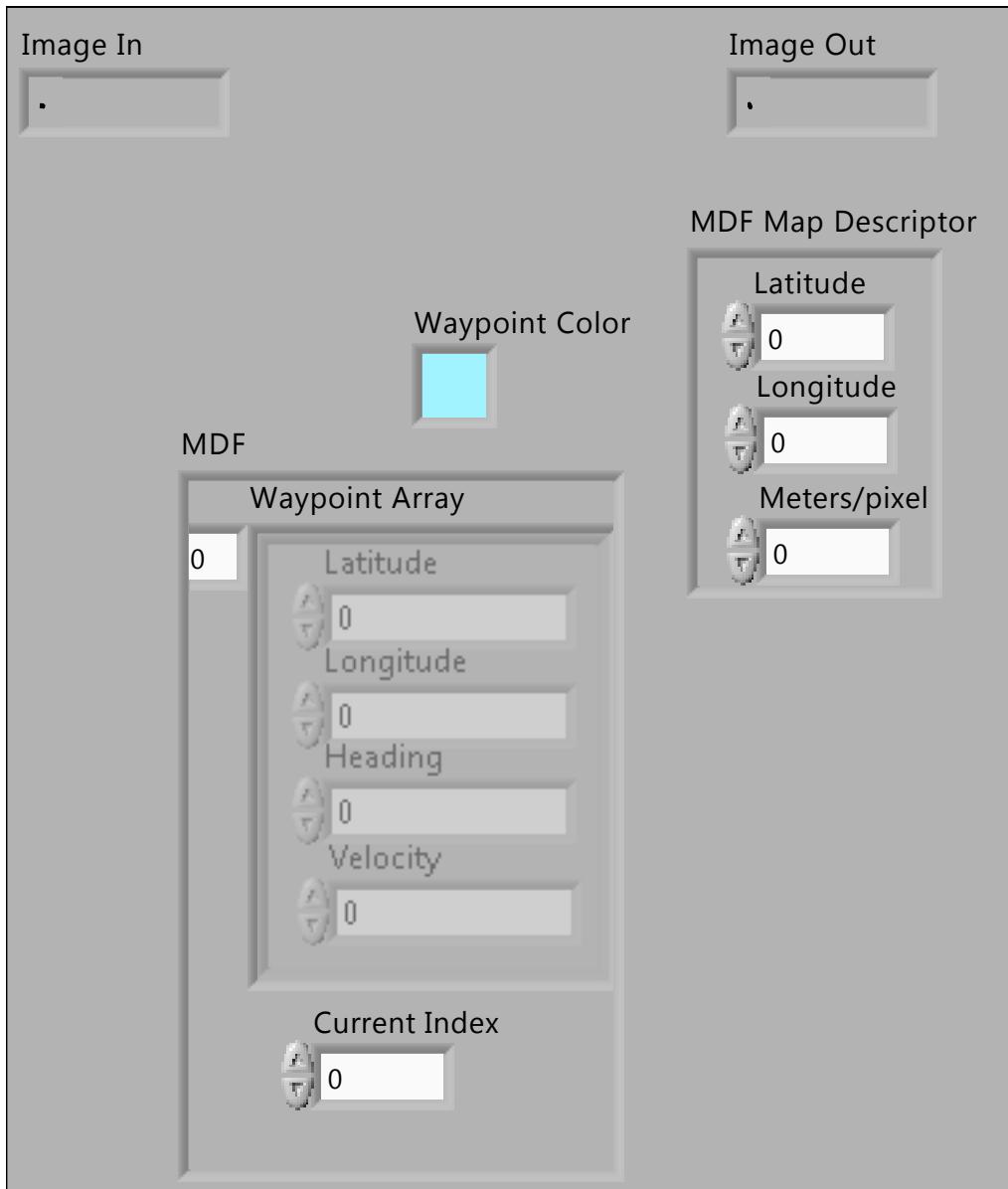
Last modified on 4/27/2011 at 11:05 AM

Printed on 4/29/2011 at 1:51 AM

Draw Waypoints.vi

MDF Map Descriptor

Overlays waypoints onto the map image.

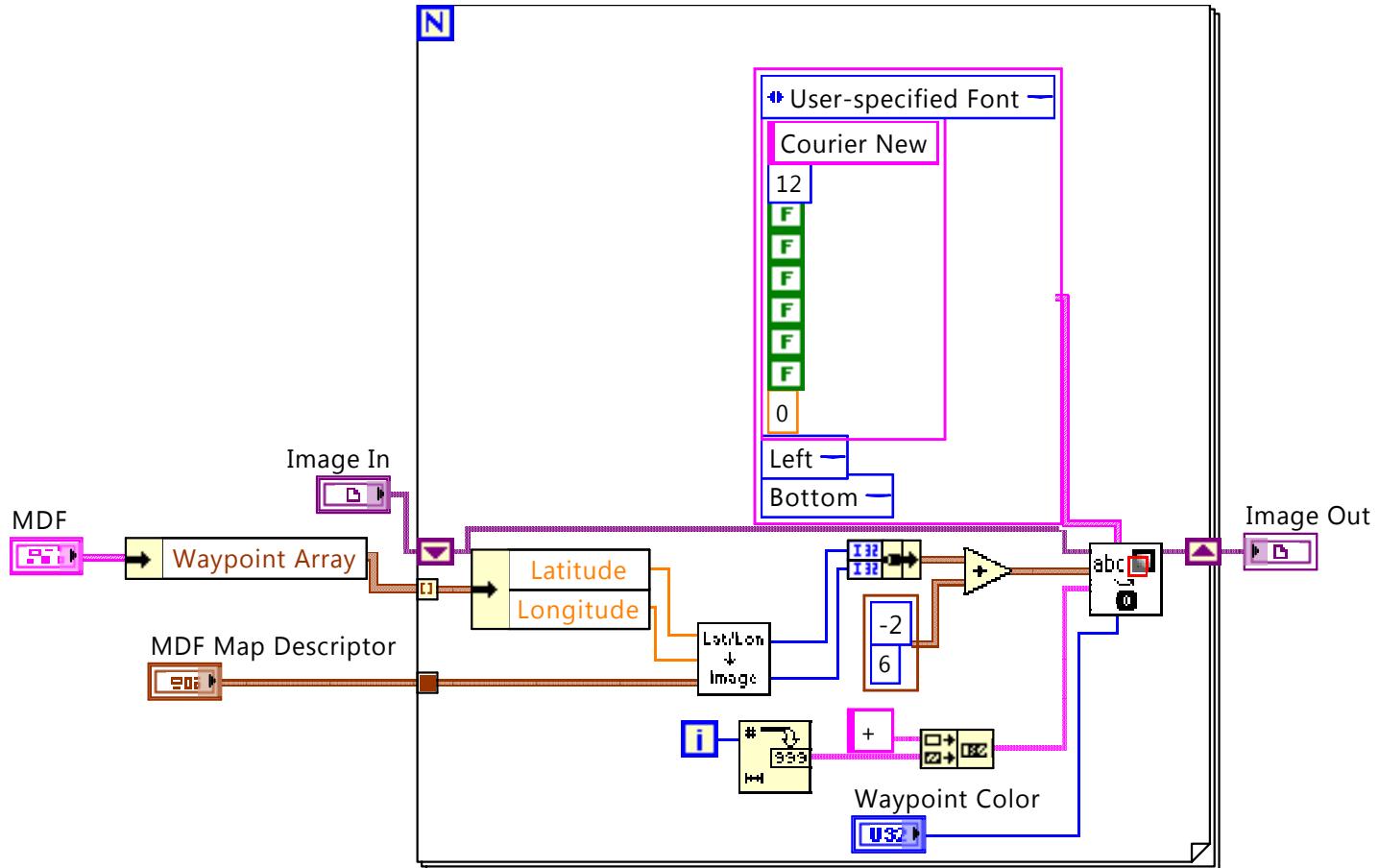


Draw Waypoints.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Draw Waypoints.vi

Last modified on 4/27/2011 at 11:05 AM

Printed on 4/29/2011 at 1:51 AM

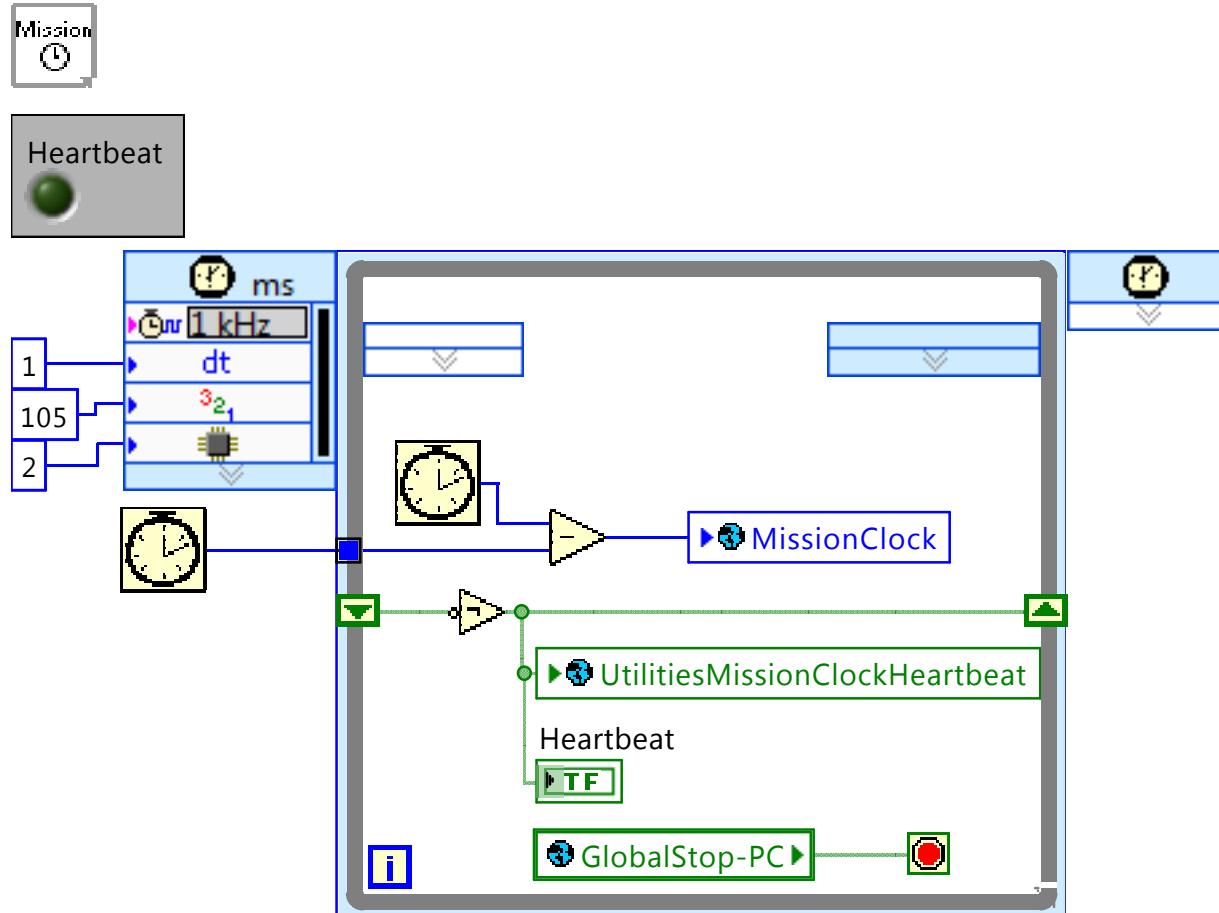


**MaintainMissionClock.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\MaintainMissionClock.vi

Last modified on 4/11/2011 at 12:26 PM

Printed on 4/29/2011 at 1:51 AM

MaintainMissionClock.vi

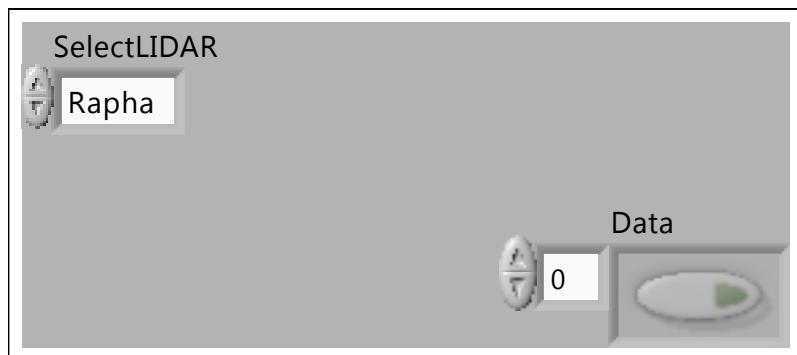
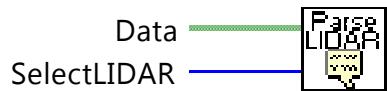
ParseLIDARMessage.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\FPGACommunication\
ParseLIDARMessage.vi

Last modified on 4/6/2011 at 9:52 AM

Printed on 4/29/2011 at 1:51 AM

ParseLIDARMessage.vi



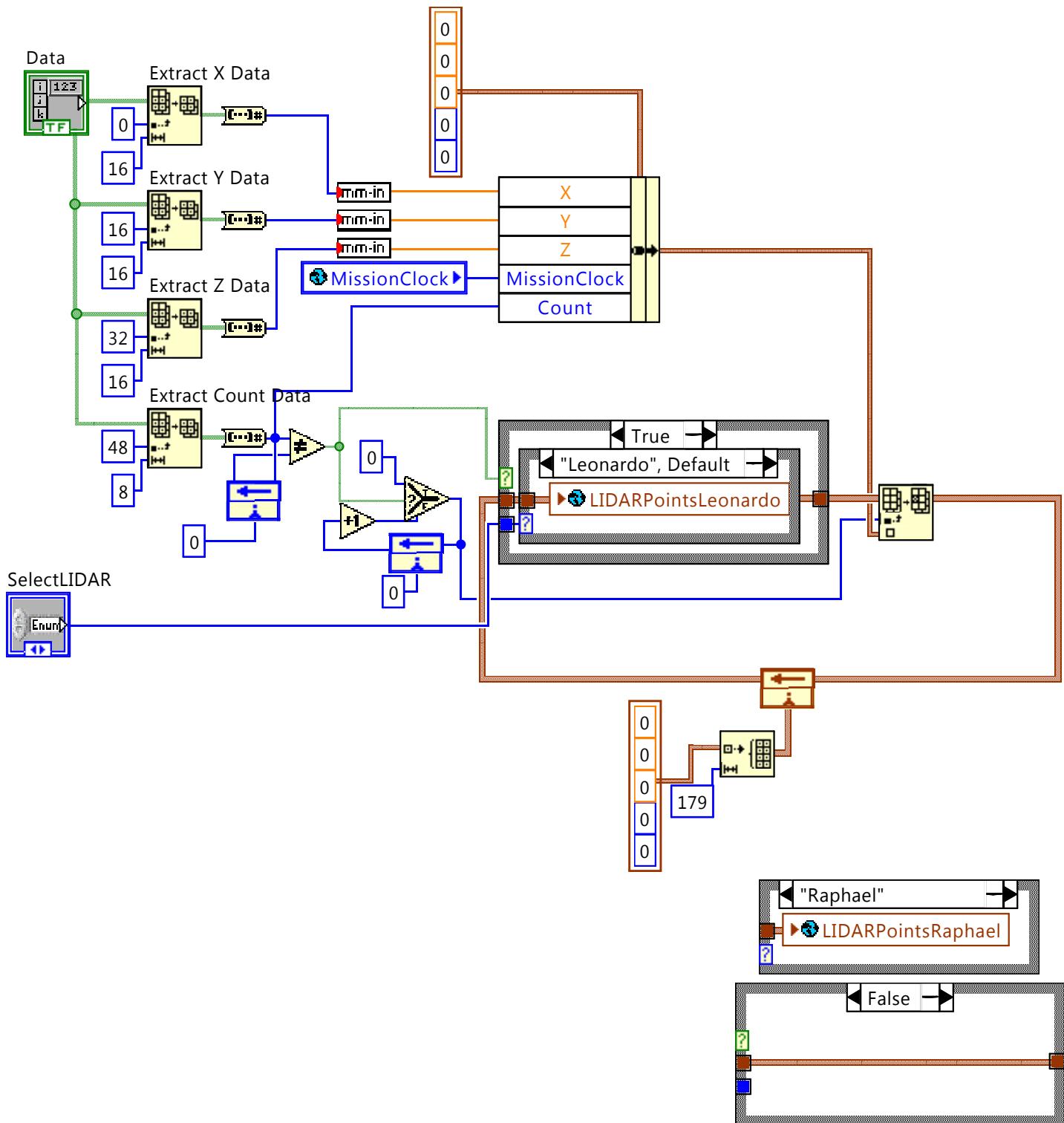
ParseLIDARMessage.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\FPGACommunication\

ParseLIDARMessage.vi

Last modified on 4/6/2011 at 9:52 AM

Printed on 4/29/2011 at 1:51 AM

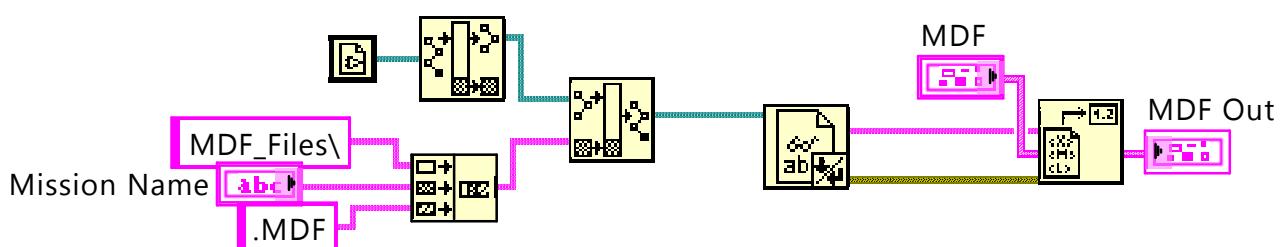


Load MDF.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Load MDF.vi

Last modified on 4/28/2011 at 12:55 PM

Printed on 4/29/2011 at 1:51 AM

Load MDF.vi

NewLIDARData.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus>Status\

NewLIDARData.vi

Last modified on 3/19/2011 at 11:38 PM

Printed on 4/29/2011 at 1:51 AM

NewLIDARData.vi

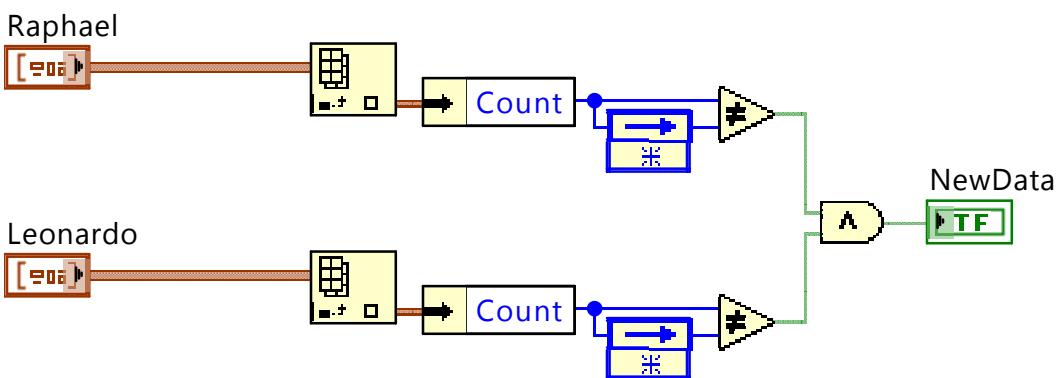
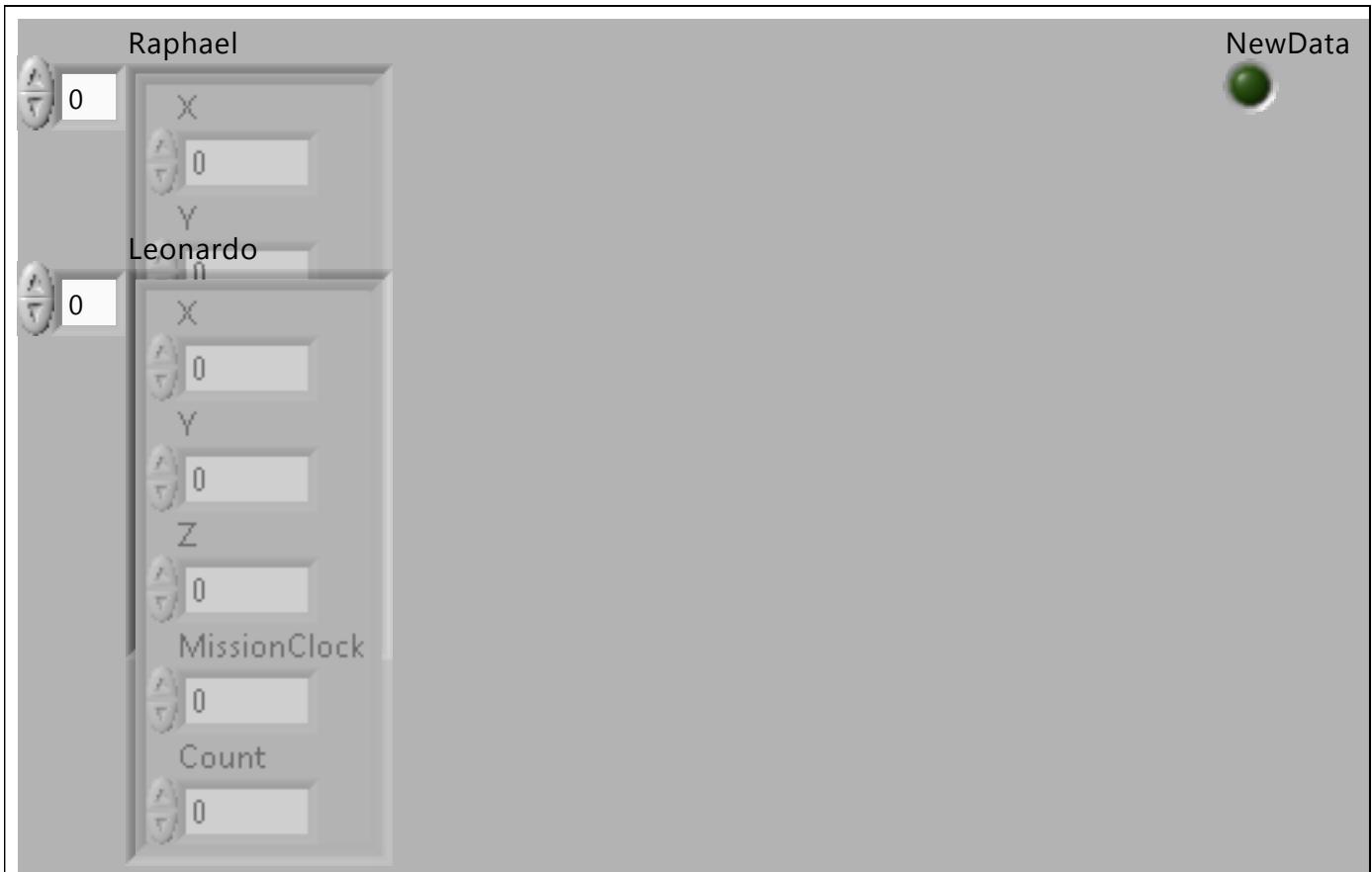


Image to Lat Lon.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Image to Lat Lon.vi

Last modified on 3/22/2011 at 4:34 PM

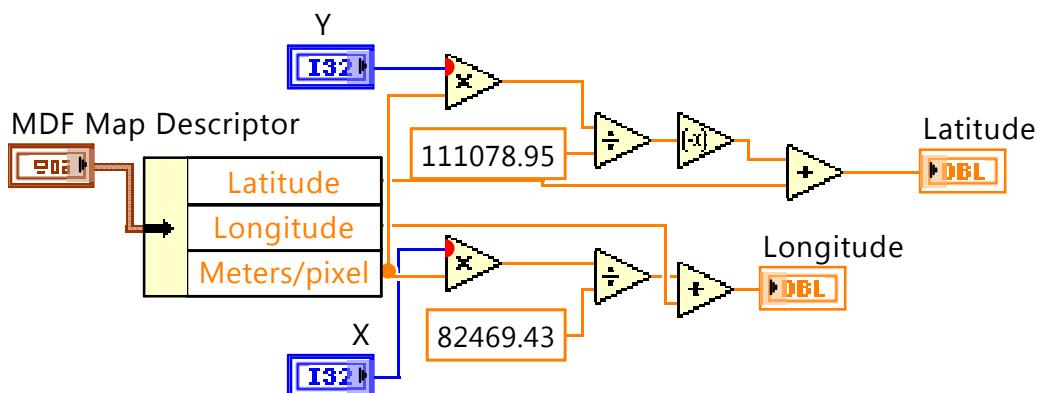
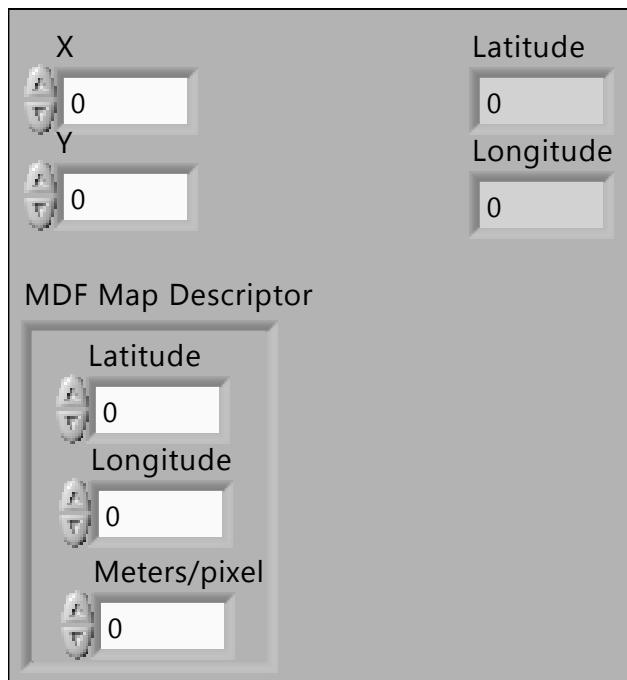
Printed on 4/29/2011 at 1:51 AM

Image to Lat Lon.vi



MDF Map Descriptor

Converts image pixels to Lat/Lon coordinates using the Image Descriptor.



Save MDF.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Save MDF.vi

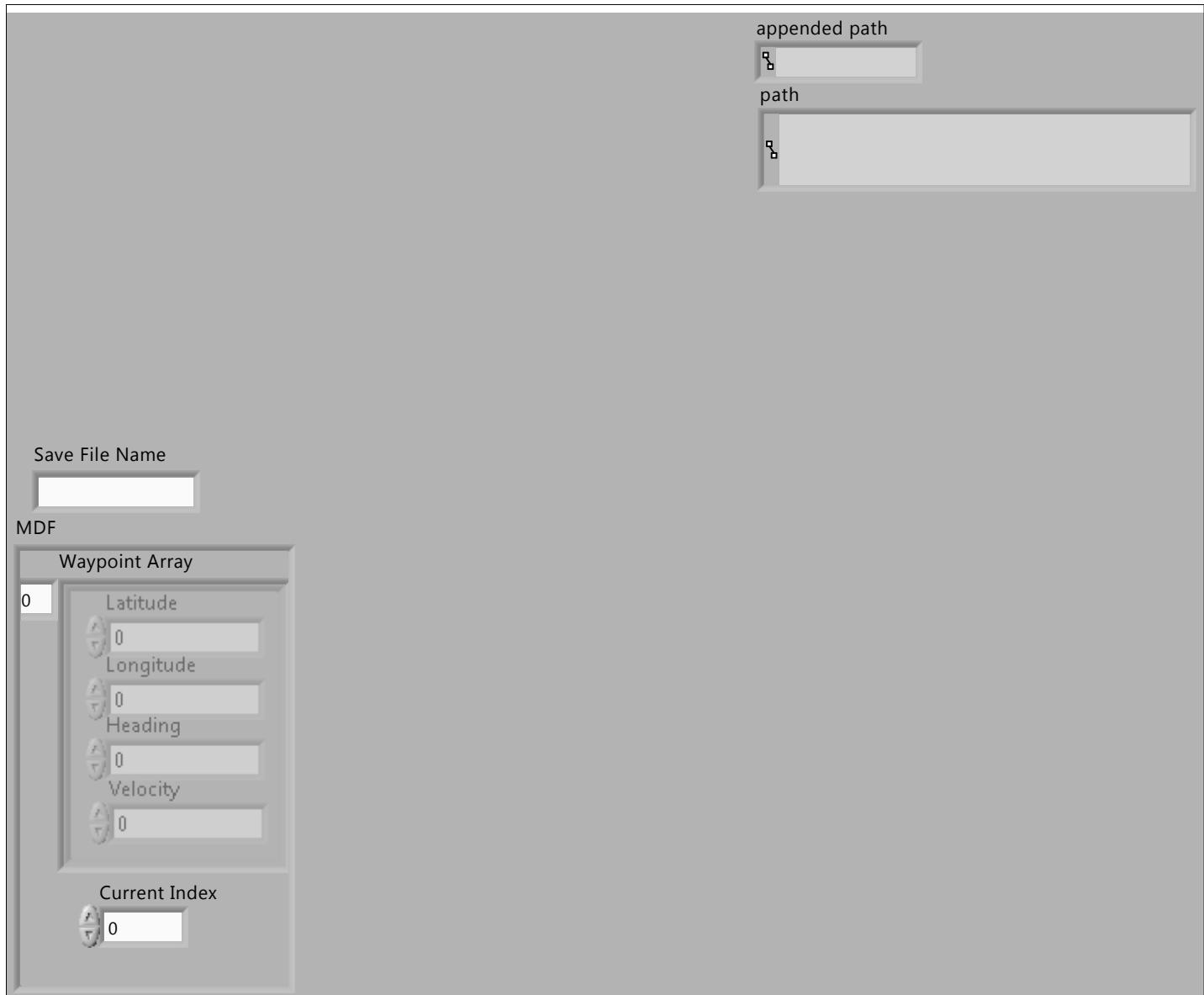
Last modified on 4/28/2011 at 12:56 PM

Printed on 4/29/2011 at 1:51 AM

Save MDF.vi

Save File Name —————

MDF —————

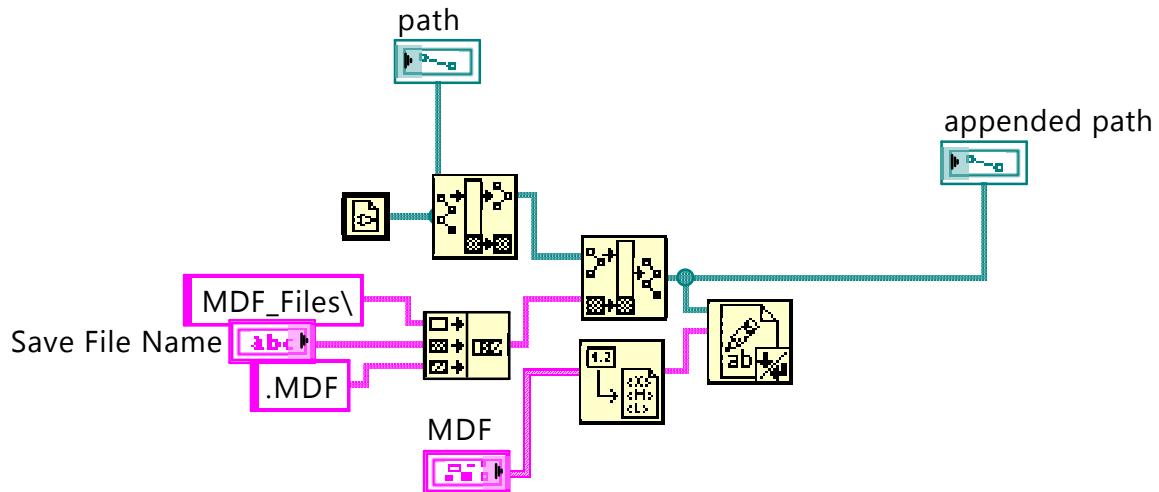


Save MDF.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Forebrain\Think\MDF\Save MDF.vi

Last modified on 4/28/2011 at 12:56 PM

Printed on 4/29/2011 at 1:51 AM





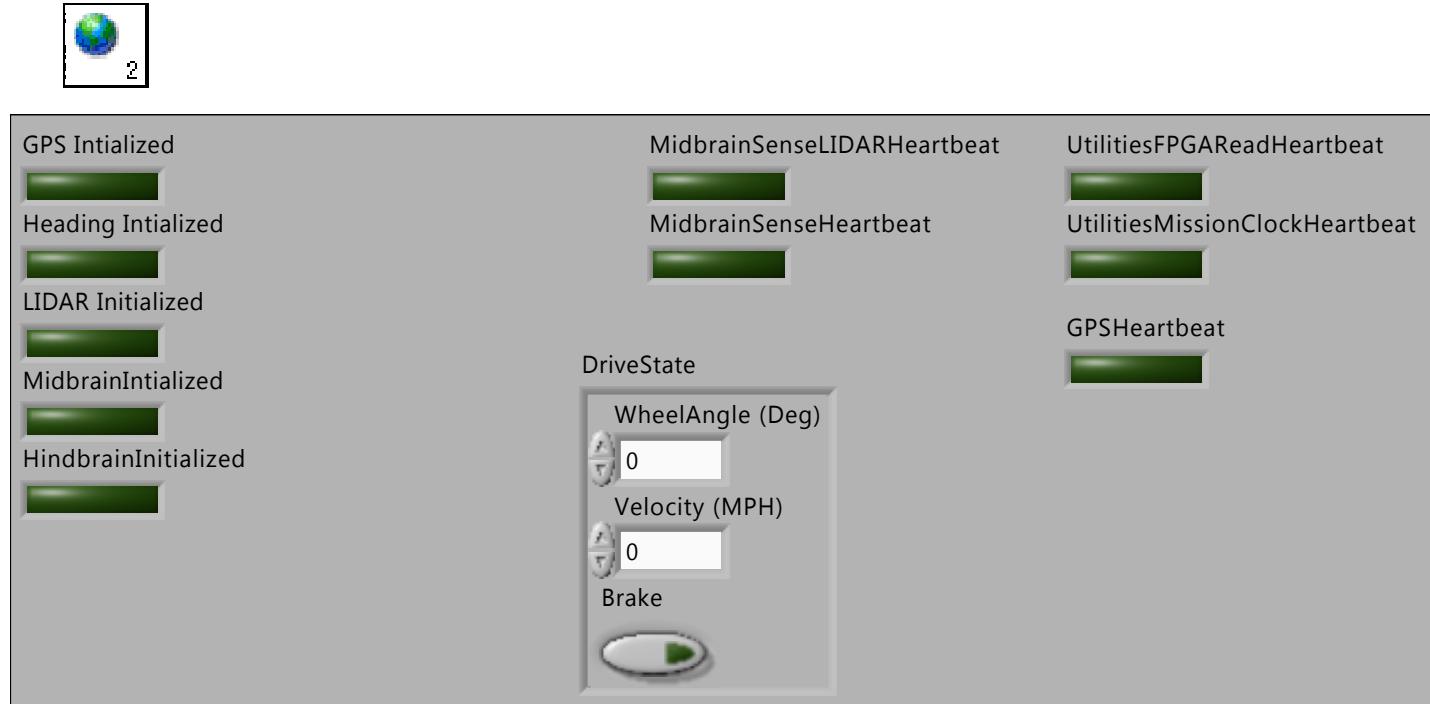
HowNeuron.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Neurons\Sense\HowNeuron.vi

Last modified on 4/11/2011 at 12:26 PM

Printed on 4/29/2011 at 1:51 AM

HowNeuron.vi



PolarHistogramSectorConstants.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\

PolarHistogramSectorConstants.ctl

Last modified on 3/7/2011 at 11:30 AM

Printed on 4/29/2011 at 1:51 AM

PolarHistogramSectorConstants.ctl



Sector constants

<input type="button" value="F1"/>	<input type="text" value="0"/>	Sector min (deg)
<input type="button" value="F2"/>	<input type="text" value="0"/>	Sector size (deg)
<input type="button" value="F3"/>	<input type="text" value="0"/>	Sector max (deg)

HistogramSectorConstants.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\HistogramSectorConstants.ctl

Last modified on 3/19/2011 at 8:56 PM

Printed on 4/29/2011 at 1:51 AM

HistogramSectorConstants.ctl



HistogramSectorConstants

SectorSideLength(ft)	<input type="text" value="50"/>
GridResolution(in)	<input type="text" value="6"/>
NumberOfSectors	<input type="text" value="3"/>
NumberOfGrids	<input type="text" value="300"/>
Psuedo Origin Offset	
X (feet)	<input type="text" value="0"/>
Y (feet)	<input type="text" value="0"/>



MaintainFPGACommunication.vi

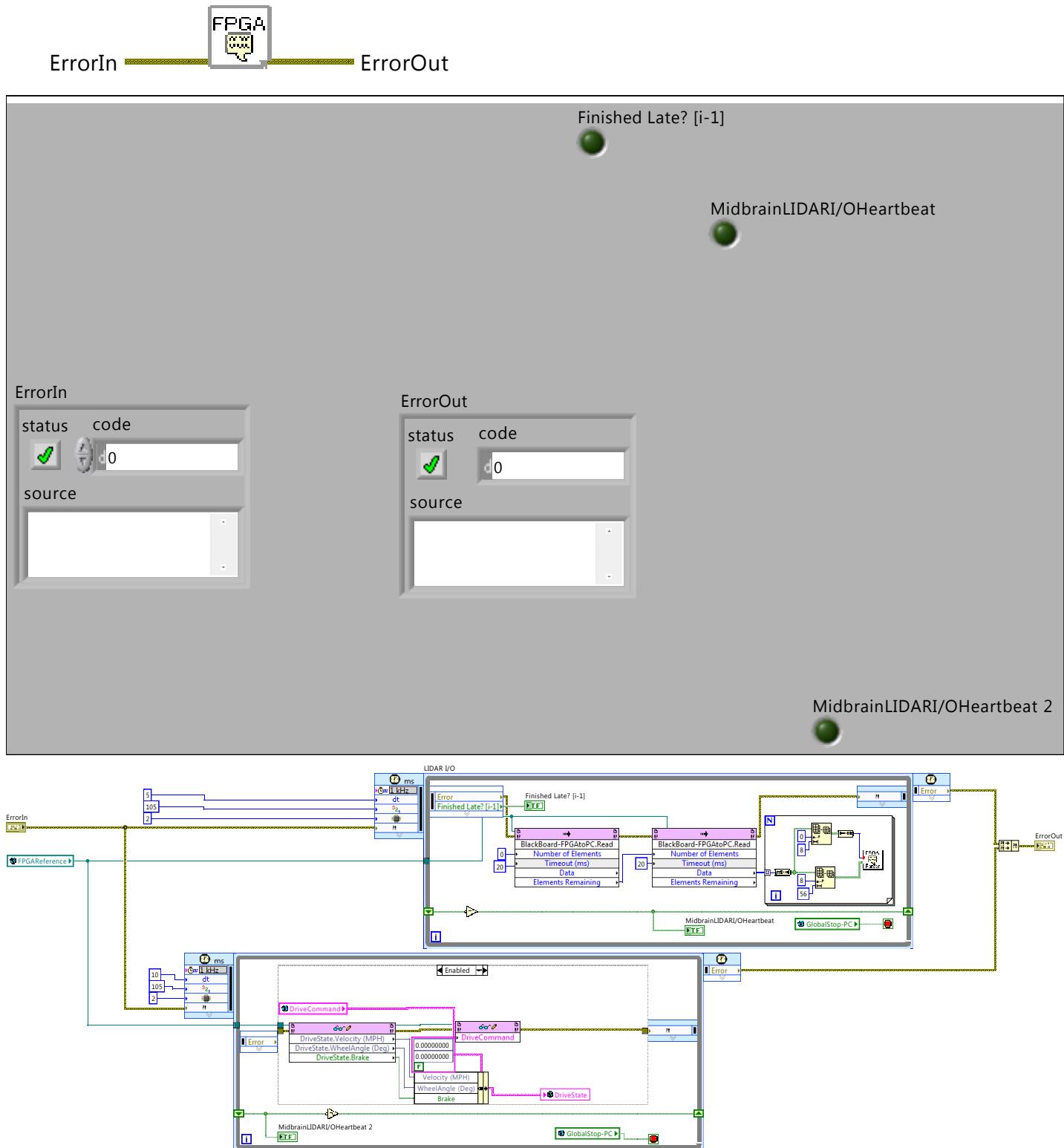
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\FPGACommunication\

MaintainFPGACommunication.vi

Last modified on 4/27/2011 at 5:40 PM

Printed on 4/29/2011 at 1:51 AM

MaintainFPGACommunication.vi



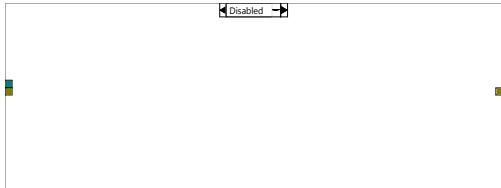
MaintainFPGACommunication.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\FPGACommunication\

MaintainFPGACommunication.vi

Last modified on 4/27/2011 at 5:40 PM

Printed on 4/29/2011 at 1:51 AM

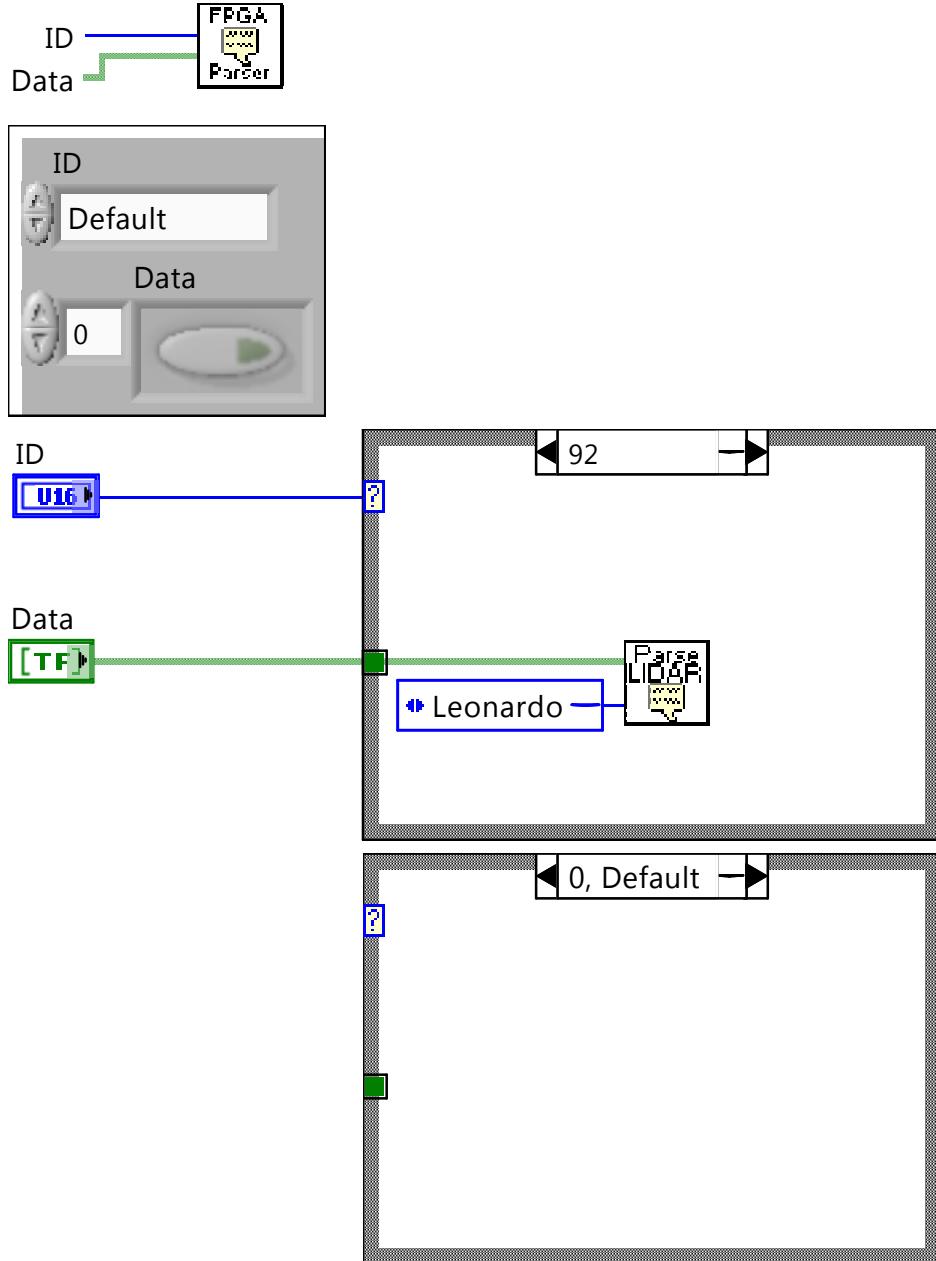


**FPGAMessageParser.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\FPGAMessageParser.vi

Last modified on 3/7/2011 at 11:31 AM

Printed on 4/29/2011 at 1:51 AM

FPGAMessageParser.vi

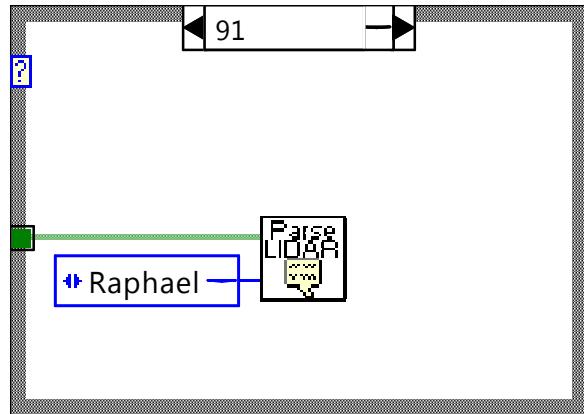


FPGAMessageParser.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\FPGAMessageParser.vi

Last modified on 3/7/2011 at 11:31 AM

Printed on 4/29/2011 at 1:51 AM



mm to in.vi

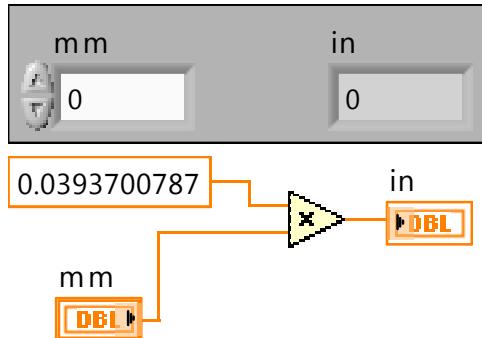
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\mm to in.vi

Last modified on 3/7/2011 at 11:31 AM

Printed on 4/29/2011 at 1:51 AM

mm to in.vi

mm ————— [mm-in] ————— in



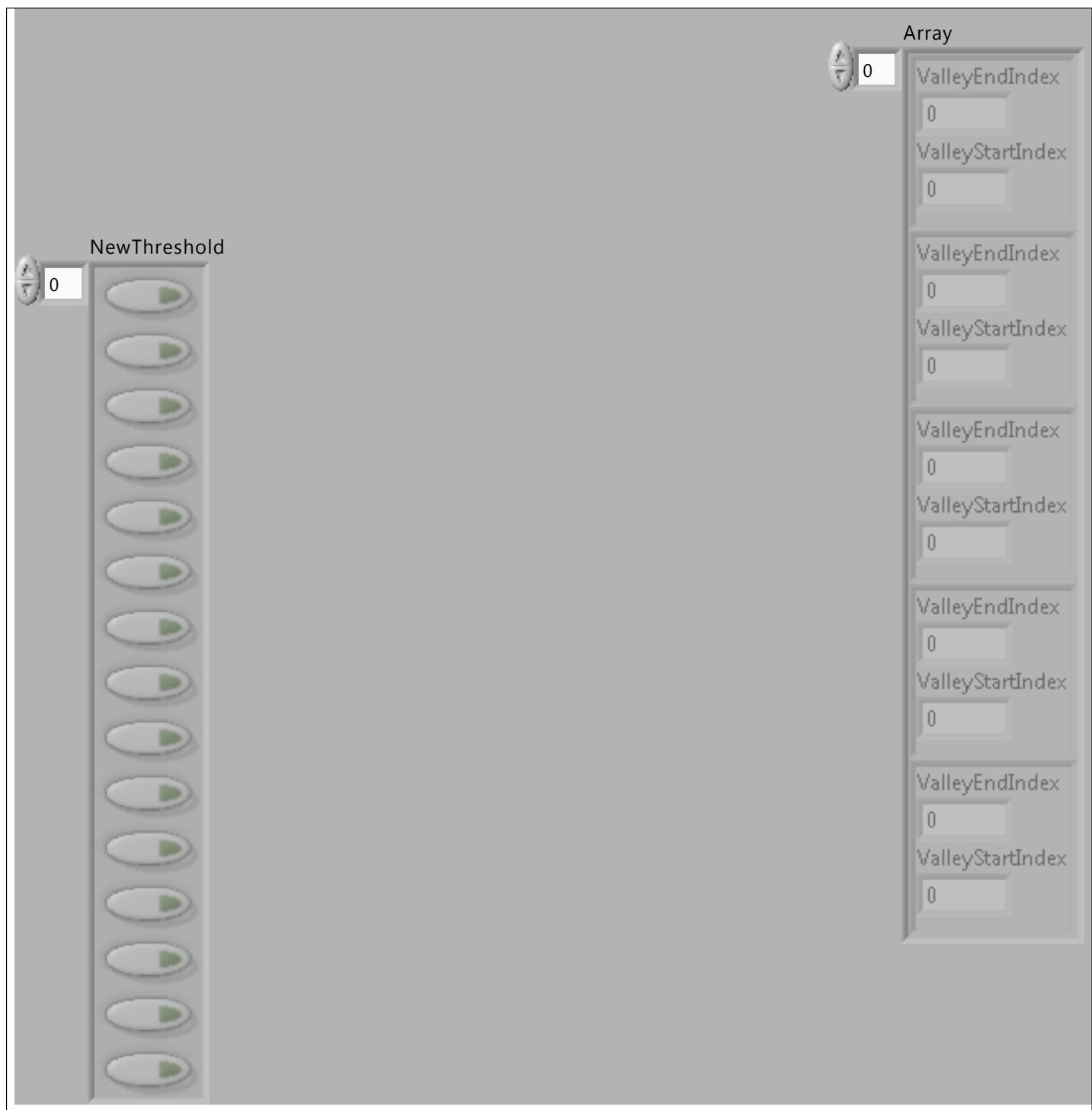
FindValleysInThresholds.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\ActuatorThalamus\
FindValleysInThresholds.vi

Last modified on 3/19/2011 at 11:38 PM

Printed on 4/29/2011 at 1:51 AM

FindValleysInThresholds.vi

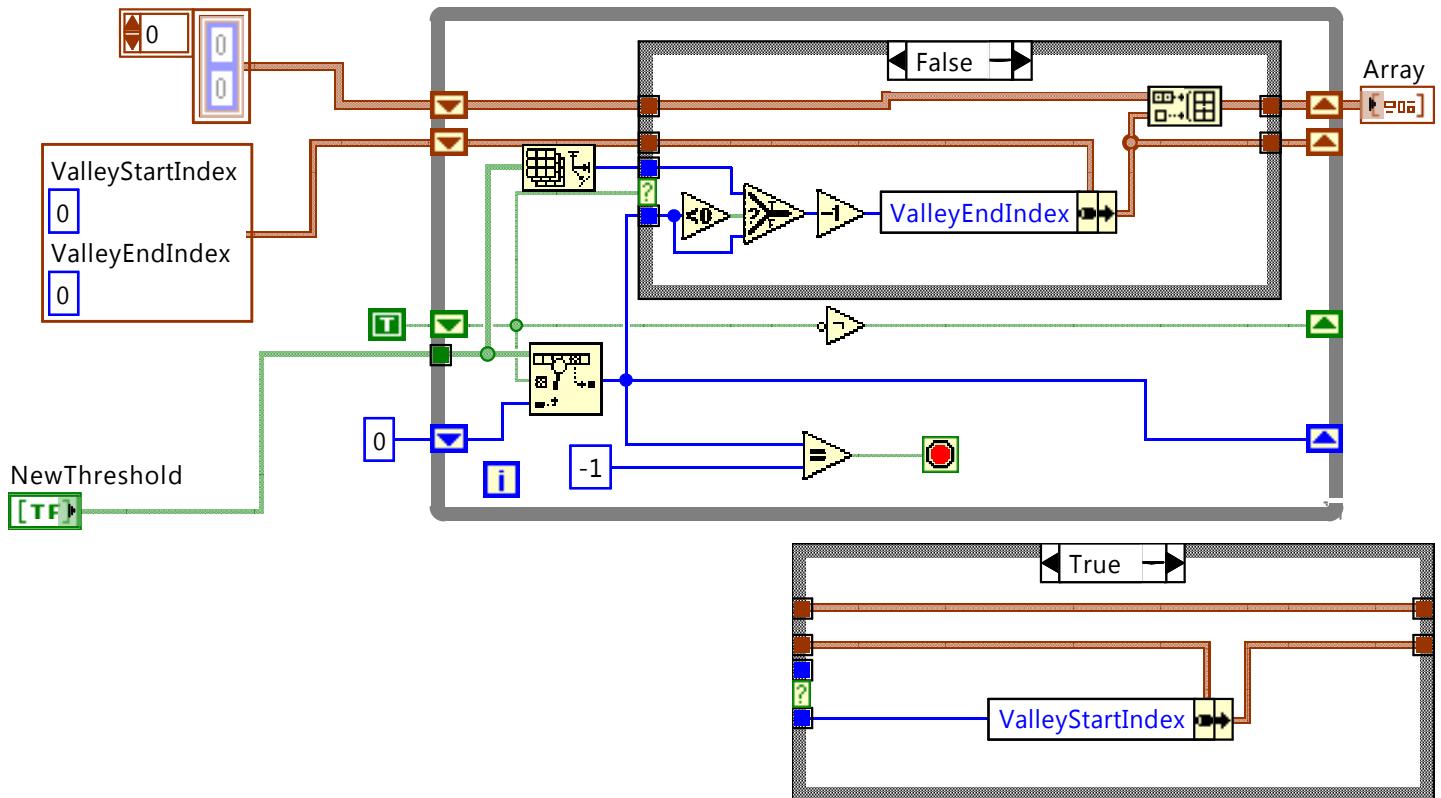


FindValleysInThresholds.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\ActuatorThalamus\
FindValleysInThresholds.vi

Last modified on 3/19/2011 at 11:38 PM

Printed on 4/29/2011 at 1:51 AM



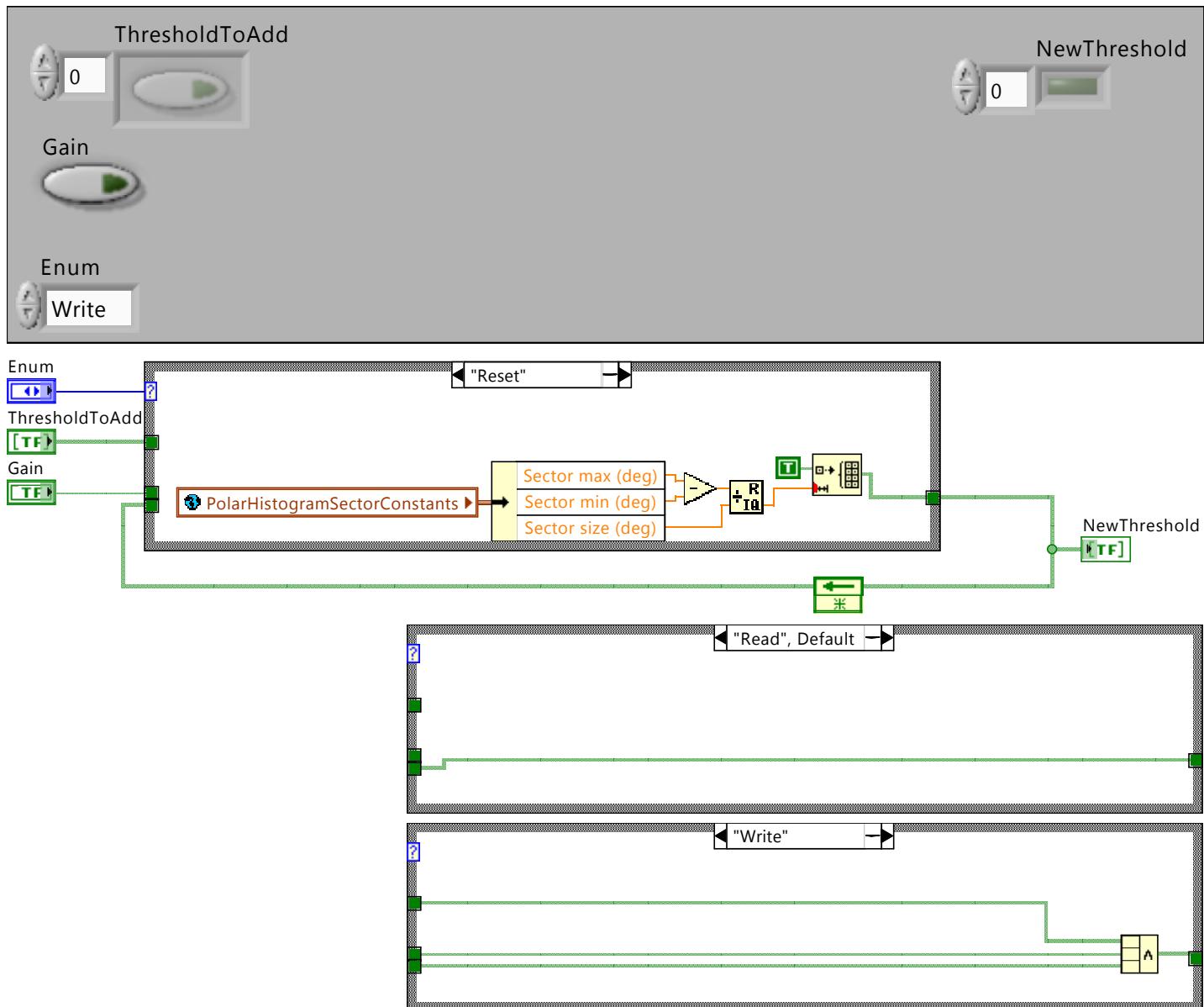
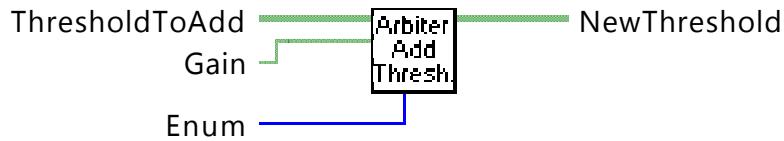
AddThresholdToArbitor.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\ActuatorThalamus\

AddThresholdToArbitor.vi

Last modified on 4/27/2011 at 4:18 PM

Printed on 4/29/2011 at 1:51 AM

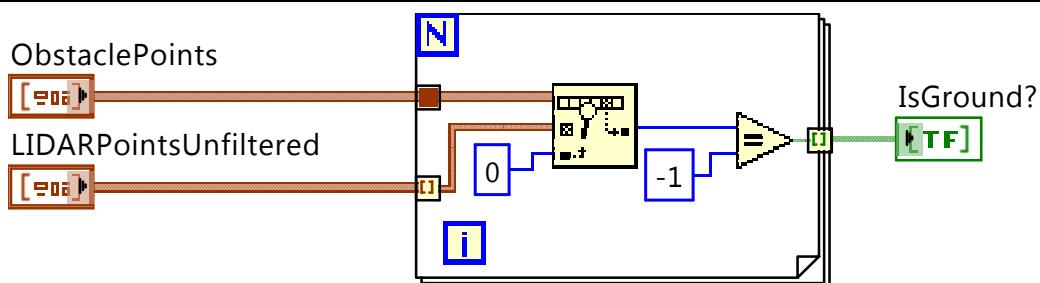
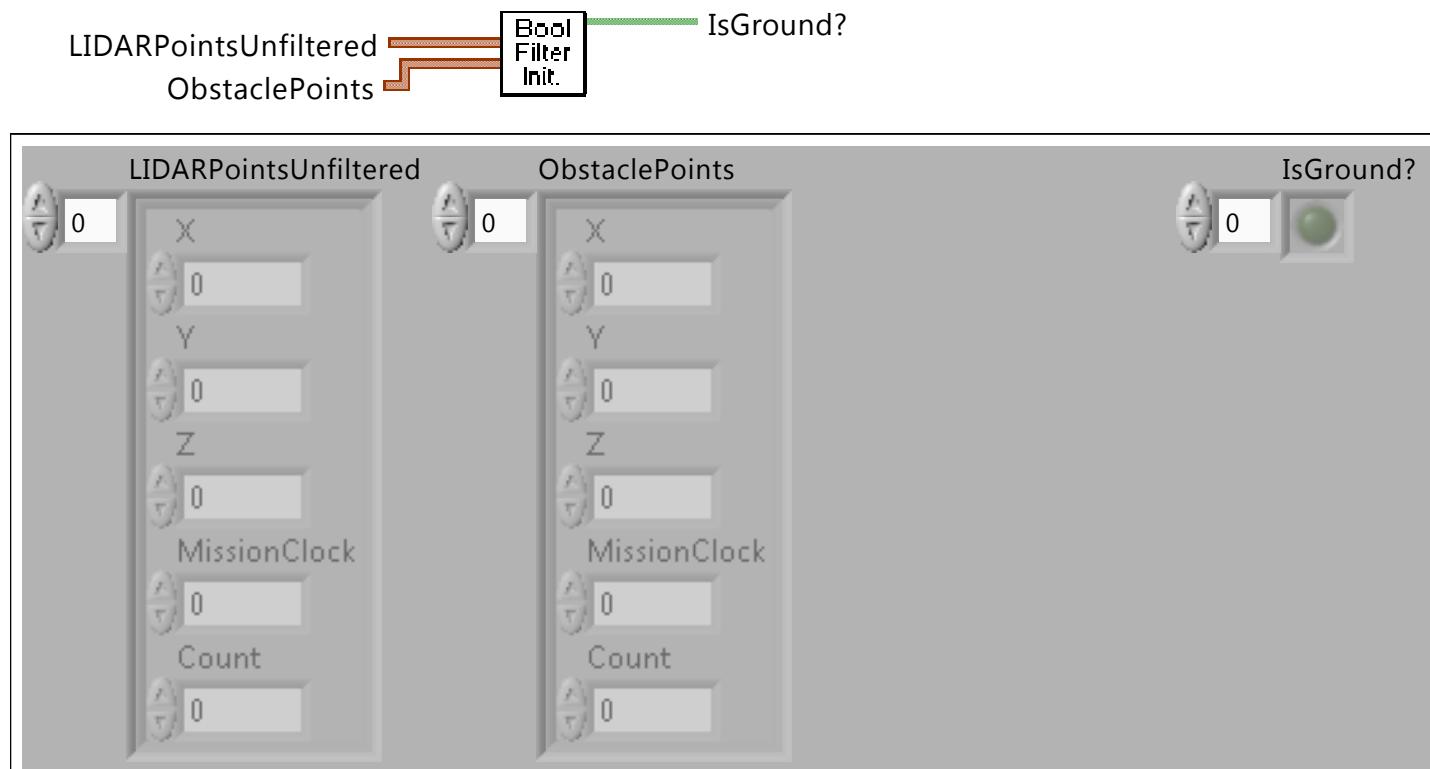
AddThresholdToArbitor.vi

InitializeBooleanArray.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\ObstacleFilterSubVIs\InitializeBooleanArray.vi

Last modified on 3/25/2011 at 3:21 PM

Printed on 4/29/2011 at 1:51 AM

InitializeBooleanArray.vi

ReactivePolarForce.vi

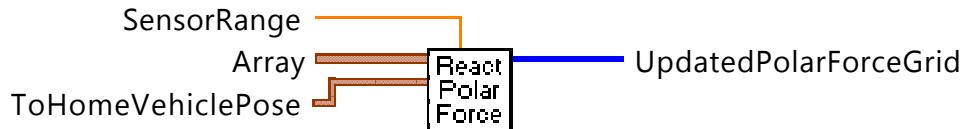
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ReactivePolarForce.vi

Last modified on 4/27/2011 at 5:40 PM

Printed on 4/29/2011 at 1:51 AM

ReactivePolarForce.vi



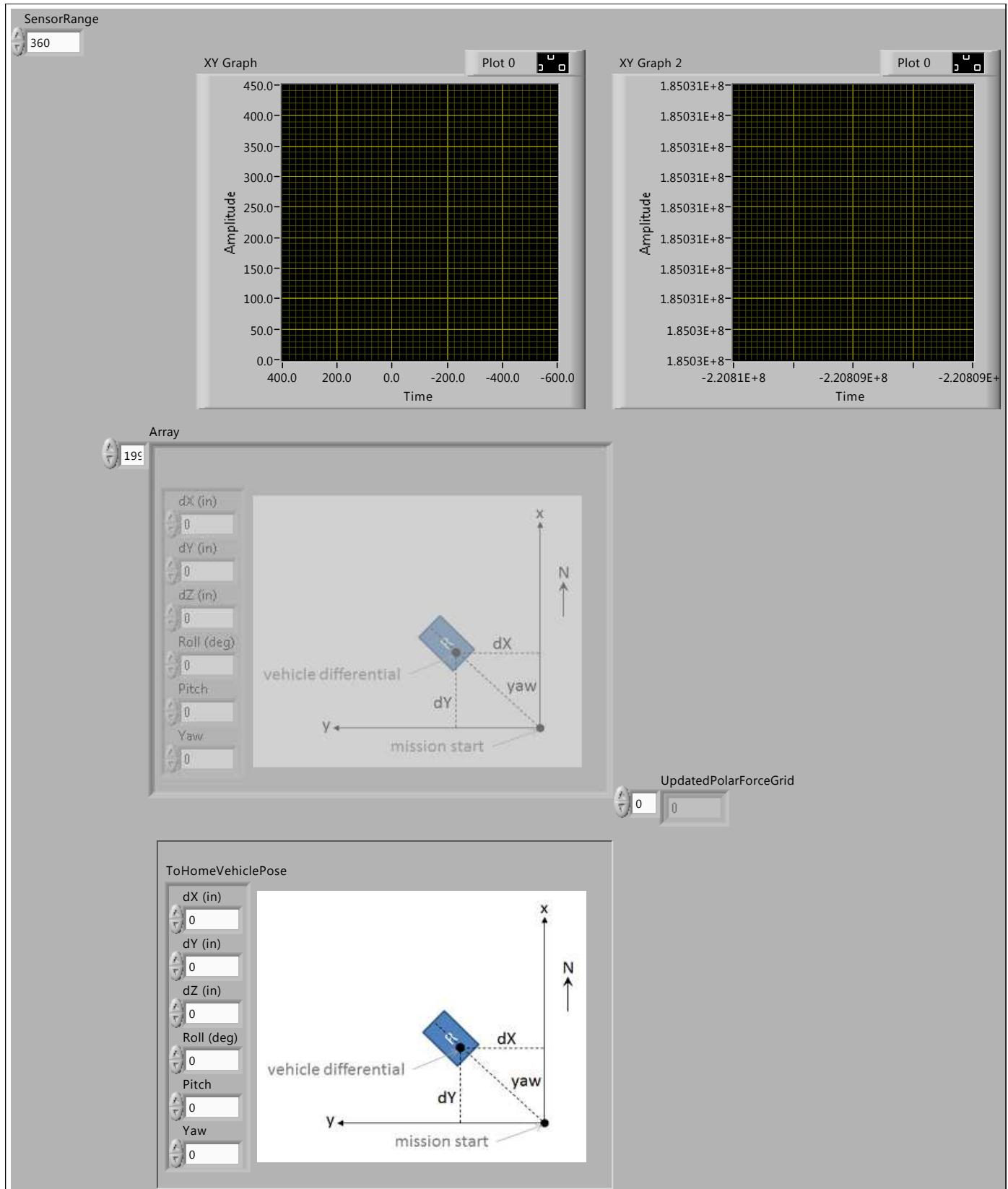
ReactivePolarForce.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ReactivePolarForce.vi

Last modified on 4/27/2011 at 5:40 PM

Printed on 4/29/2011 at 1:51 AM



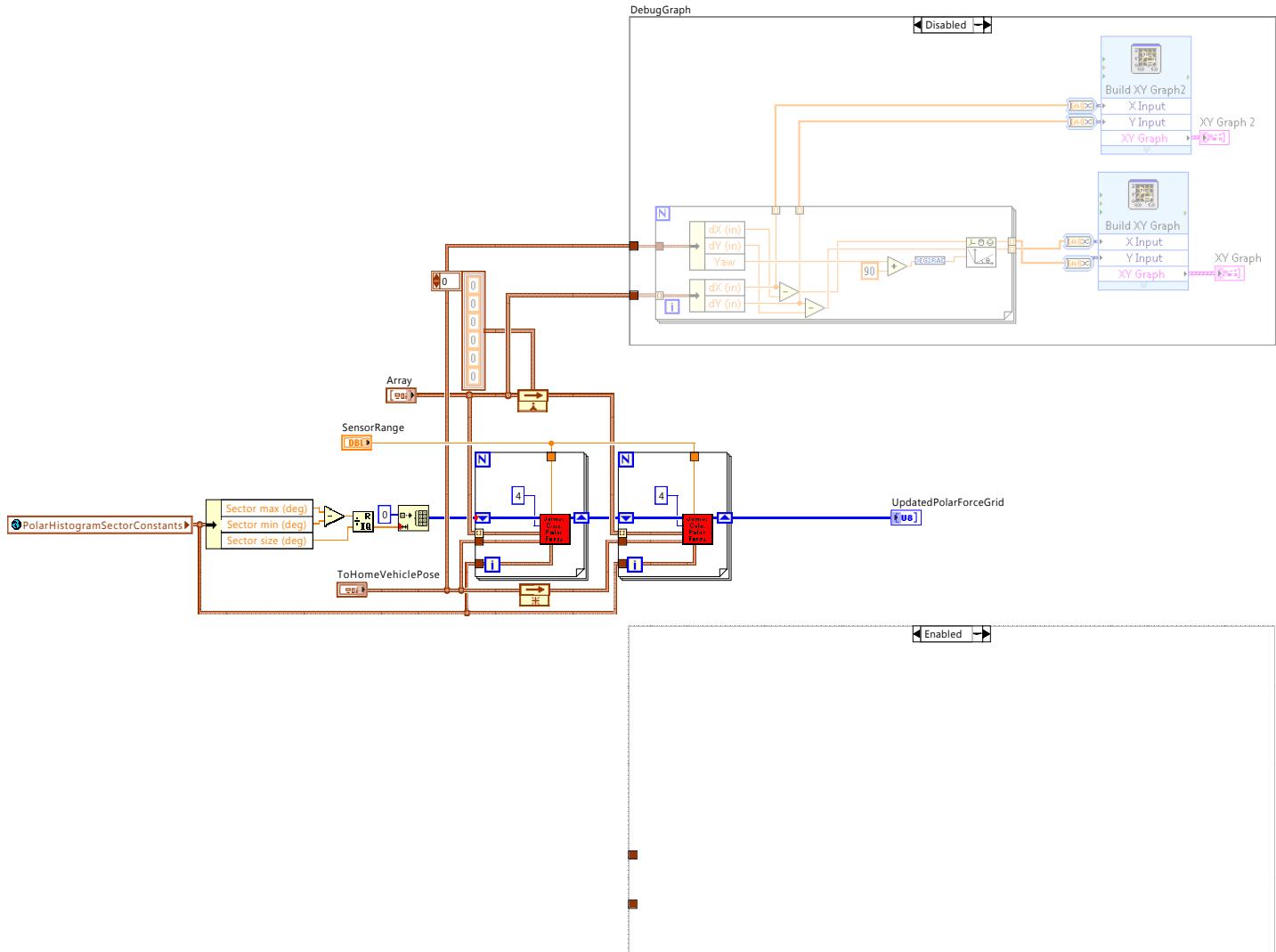
ReactivePolarForce.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ReactivePolarForce.vi

Last modified on 4/27/2011 at 5:40 PM

Printed on 4/29/2011 at 1:51 AM



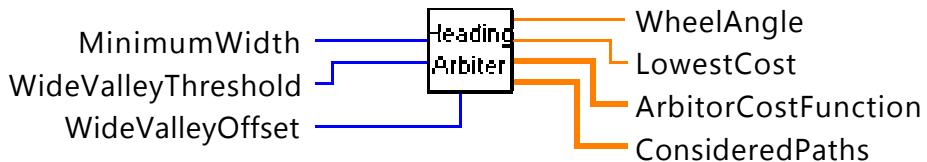
HeadingArbiterRev2.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\ActuatorThalamus\
HeadingArbiterRev2.vi

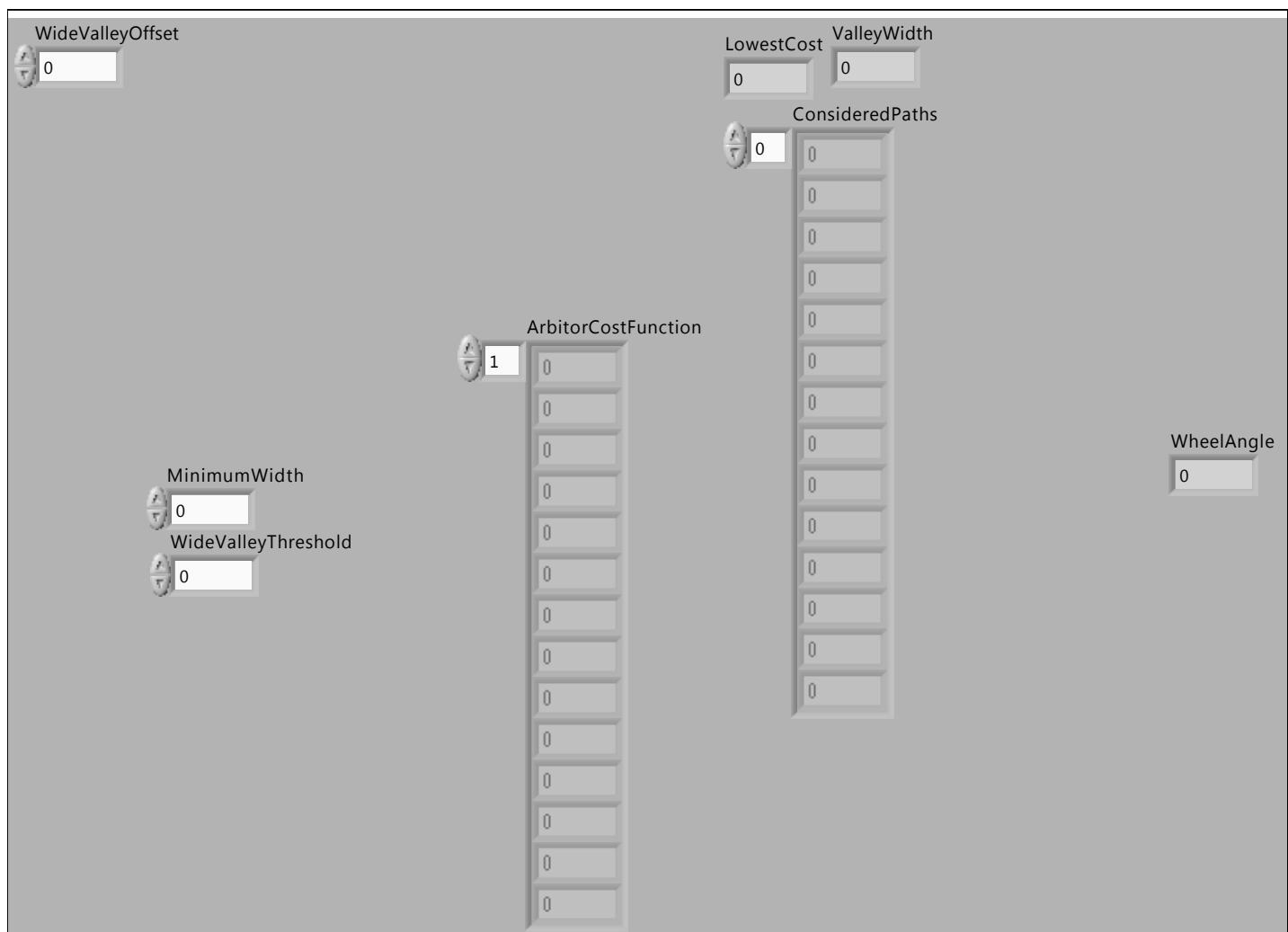
Last modified on 4/27/2011 at 4:37 PM

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HeadingArbiterRev2.vi



Considers all of the cost and threshold proposals and then selects the lowest cost permissible heading.

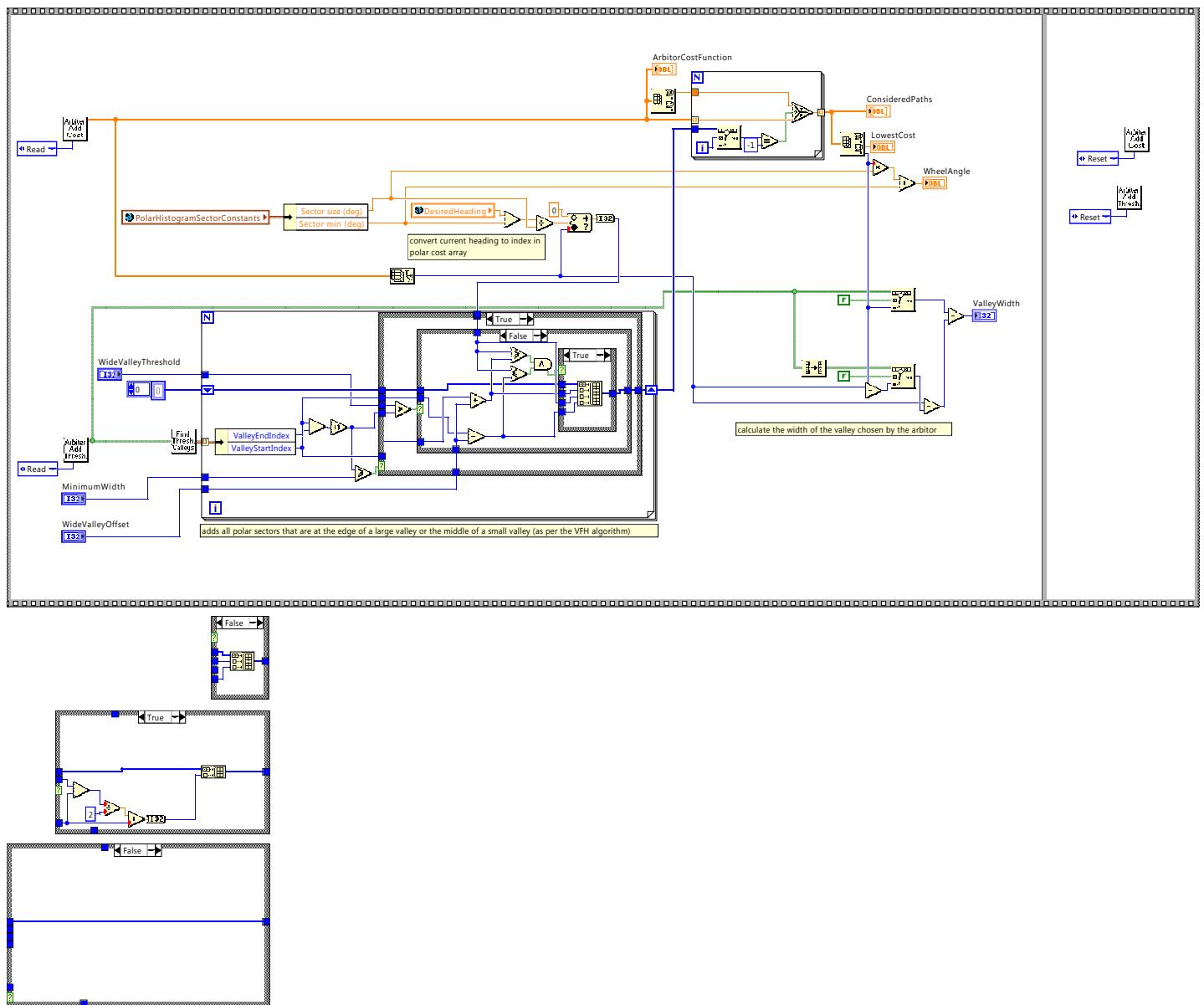


HeadingArbiterRev2.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\ActuatorThalamus\
HeadingArbiterRev2.vi

Last modified on 4/27/2011 at 4:37 PM

Printed on 4/29/2011 at 1:51 AM



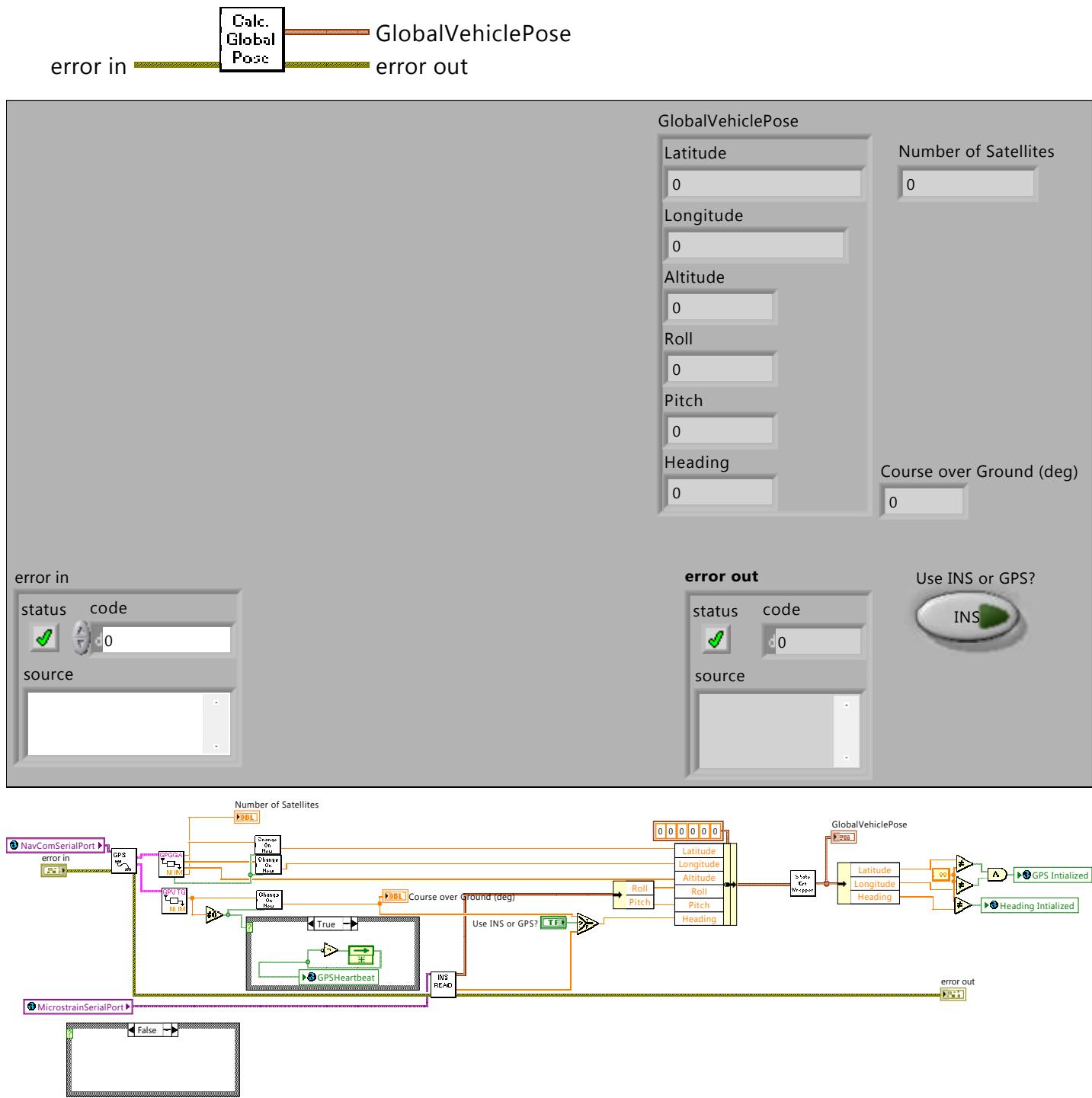
CalculateGlobalPose.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\Where\

CalculateGlobalPose.vi

Last modified on 4/27/2011 at 4:45 PM

Printed on 4/29/2011 at 1:51 AM

CalculateGlobalPose.vi

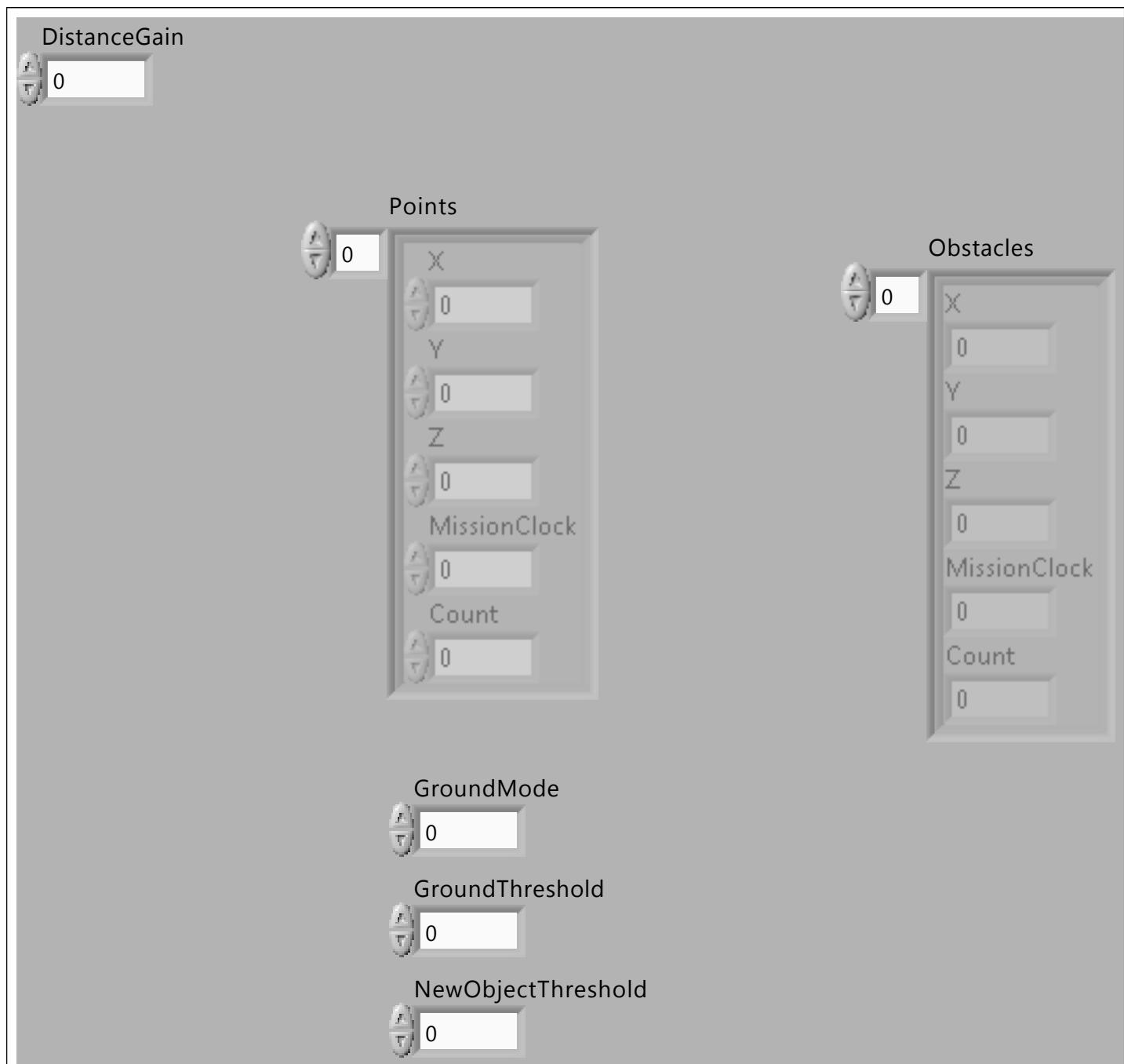
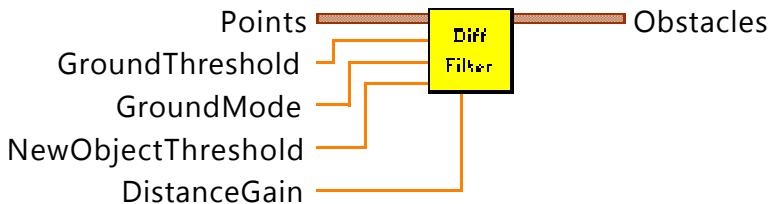
Derivative Filter.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ObstacleFilterSubVIs\Derivative Filter.vi

Last modified on 3/27/2011 at 12:08 PM

Printed on 4/29/2011 at 1:51 AM

Derivative Filter.vi

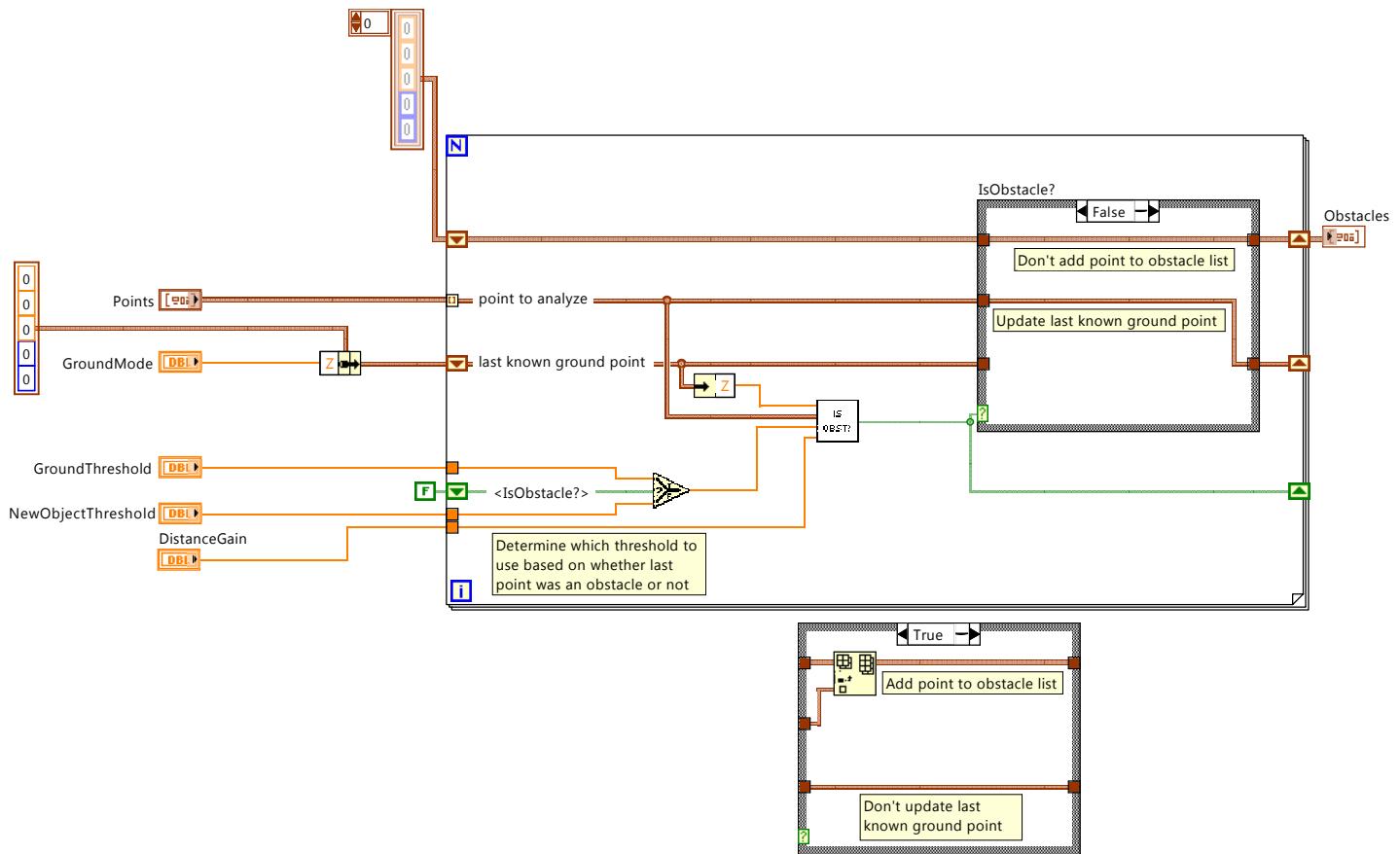
Derivative Filter.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ObstacleFilterSubVIs\Derivative Filter.vi

Last modified on 3/27/2011 at 12:08 PM

Printed on 4/29/2011 at 1:51 AM





PolarCostHistorgam.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\PolarCostHistorgam.ctl

Last modified on 3/8/2011 at 11:29 PM

Printed on 4/29/2011 at 1:51 AM

PolarCostHistorgam.ctl



PolarCostHistogram.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\PolarCostHistogram.ctl

Last modified on 3/8/2011 at 10:12 PM

Printed on 4/29/2011 at 1:51 AM

PolarCostHistogram.ctl



PlotLIDARData.vi

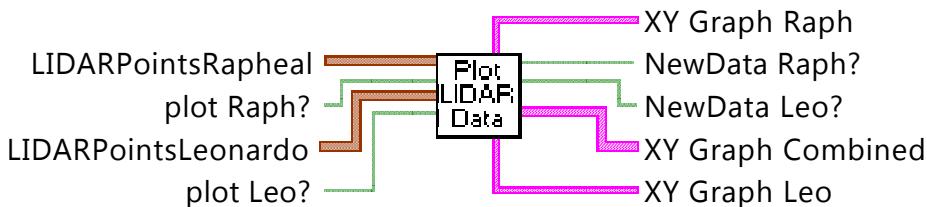
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

PlotLIDARData.vi

Last modified on 3/18/2011 at 3:33 PM

Printed on 4/29/2011 at 1:51 AM

PlotLIDARData.vi



ReadAndPlotLIDARData.vi reads in the LIDAR data and displays them together on a single plot.

Inputs

plot Leo? - plot the data from Leo
 plot Raph? - plot the data from Raphael
 error in

Outputs

NewData Leo? - boolean to indicate if new data is being received for Leonardo
 NewData Raph? - boolean to indicate if new data is being received for Raphael
 XY Graph Leo - graph of data from Leonardo
 XY Graph Raph - graph of data from Raphael
 XY Graph Combined - combined graph of LIDAR data
 error out

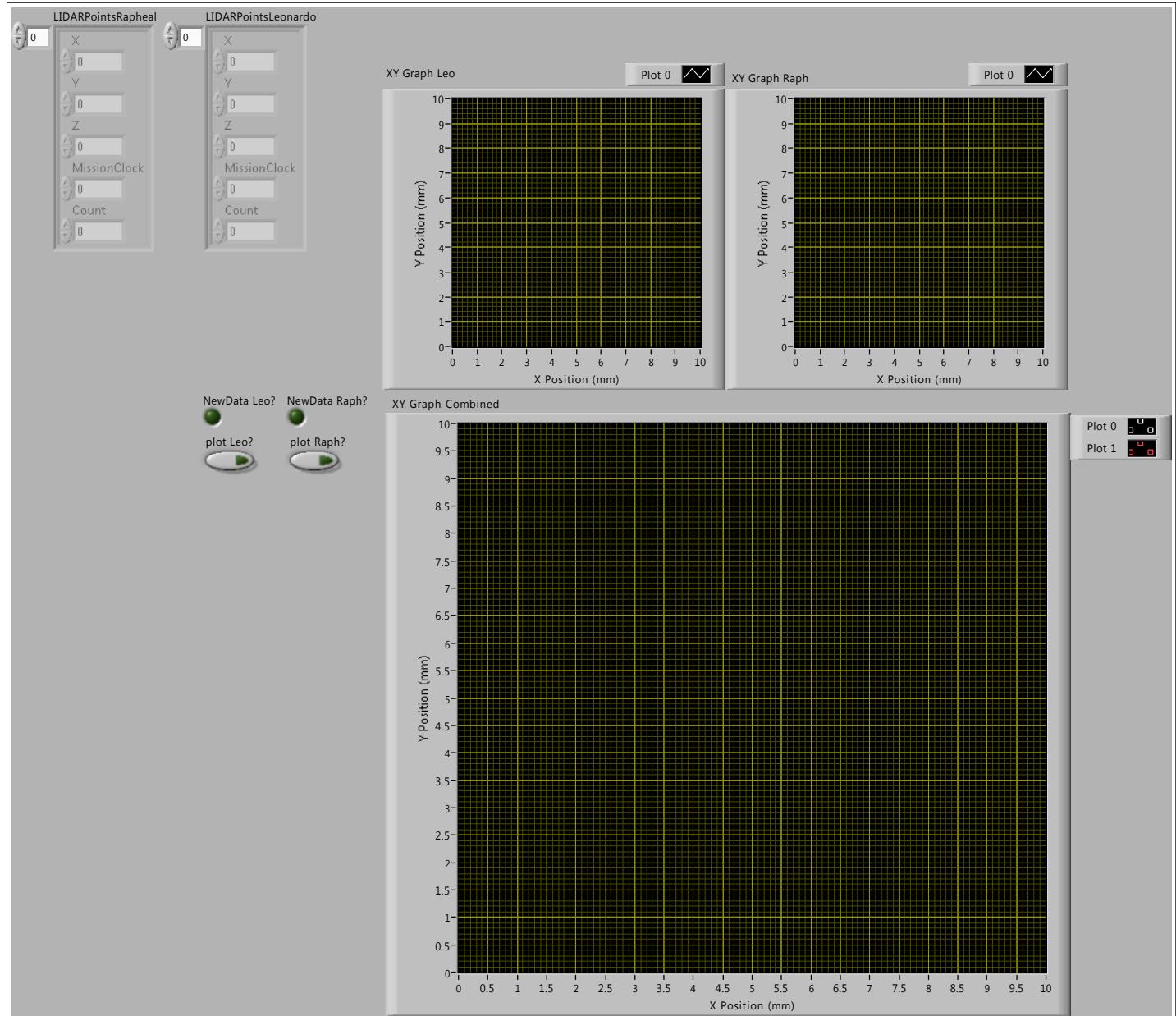
PlotLIDARData.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

PlotLIDARData.vi

Last modified on 3/18/2011 at 3:33 PM

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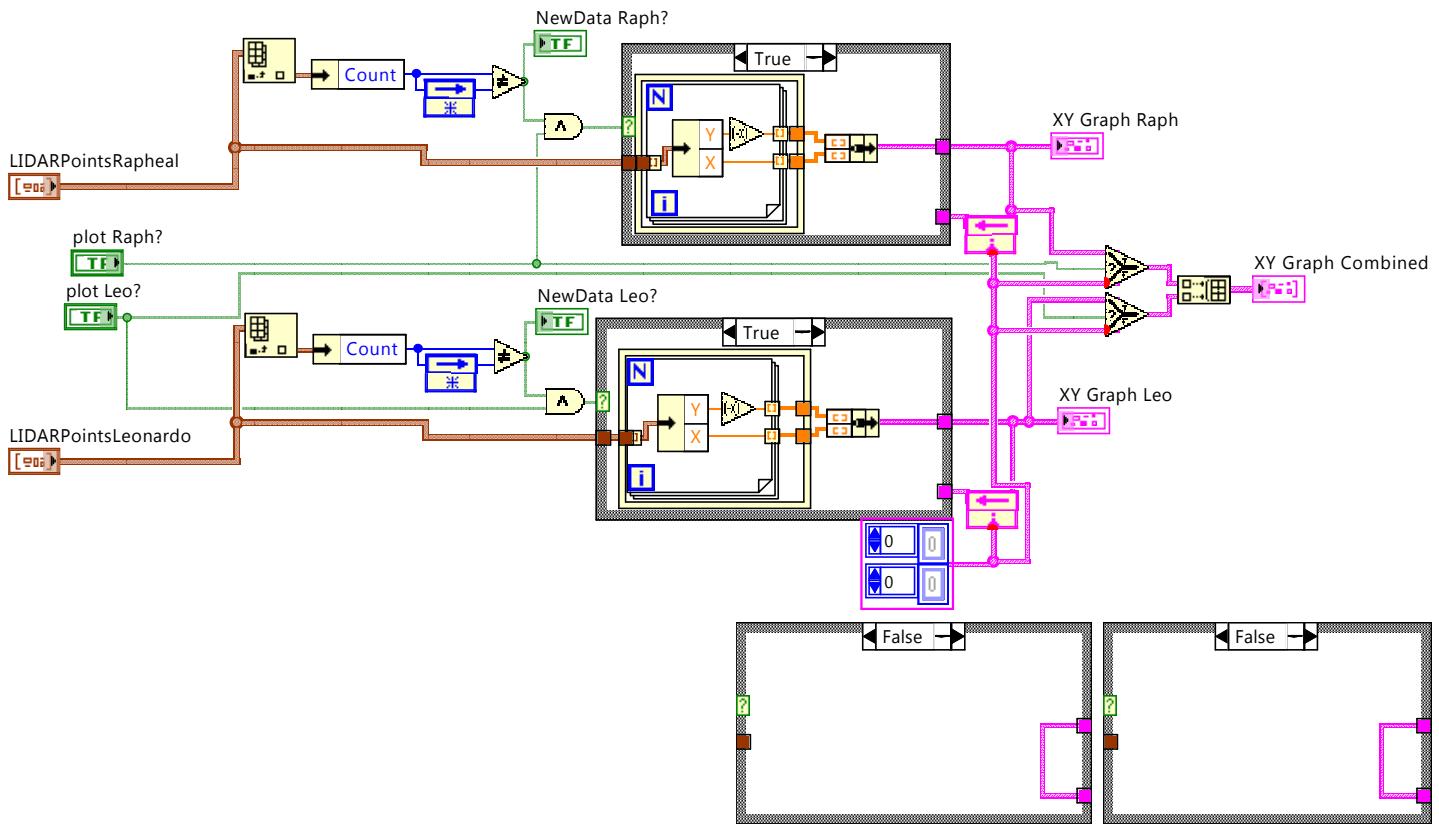
PlotLIDARData.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

PlotLIDARData.vi

Last modified on 3/18/2011 at 3:33 PM

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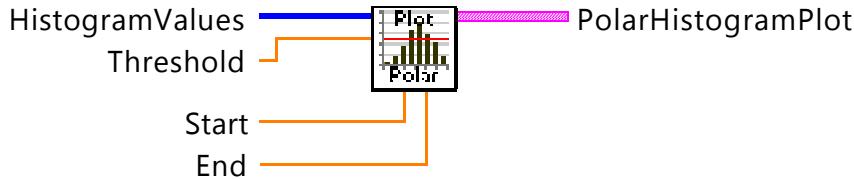
PolarHistogramPlotter.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\PolarHistogramPlotter.vi

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PolarHistogramPlotter.vi



plots the sector values of a polar histogram, and, if provided, a horizontal line to represent a threshold

Inputs

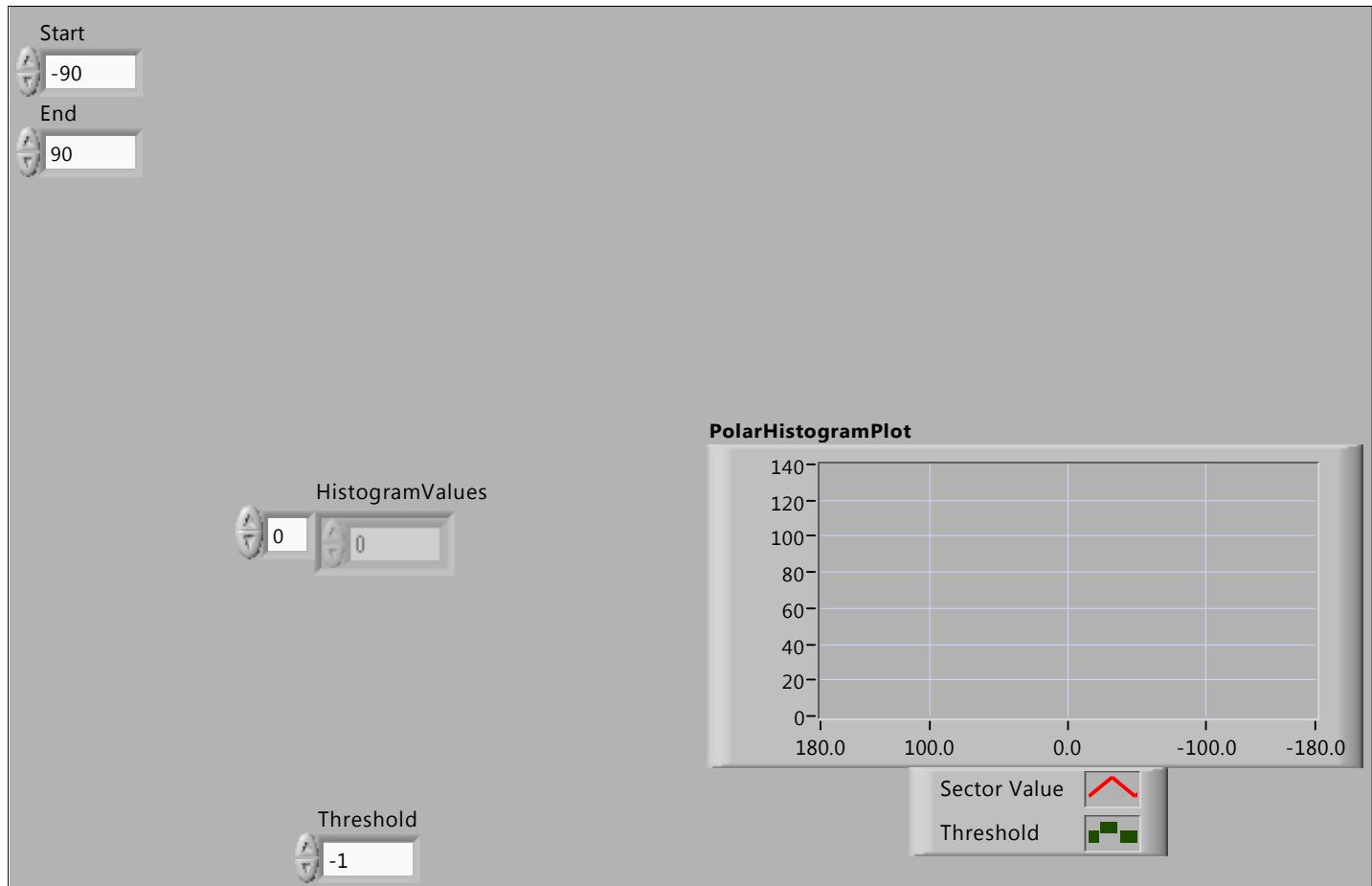
HistogramValues - the values of each sector, starting with the lowest degree sector

Start - the degree value of the starting sector

End - the degree value of the ending sector

Output

PolarHistogramPlot - the plot of the polar histogram



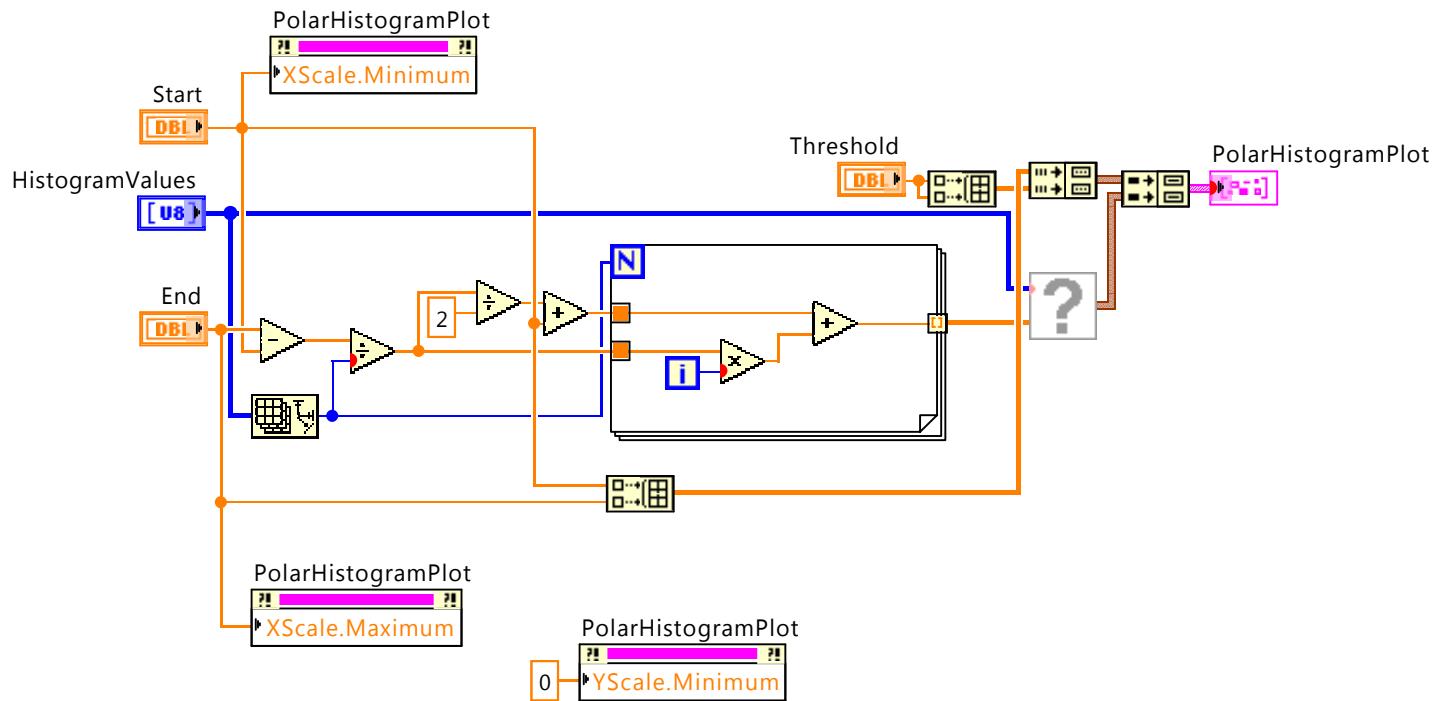


PolarHistogramPlotter.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\PolarHistogramPlotter.vi

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CoordinateTransform--Vehicle-ToHome.vi

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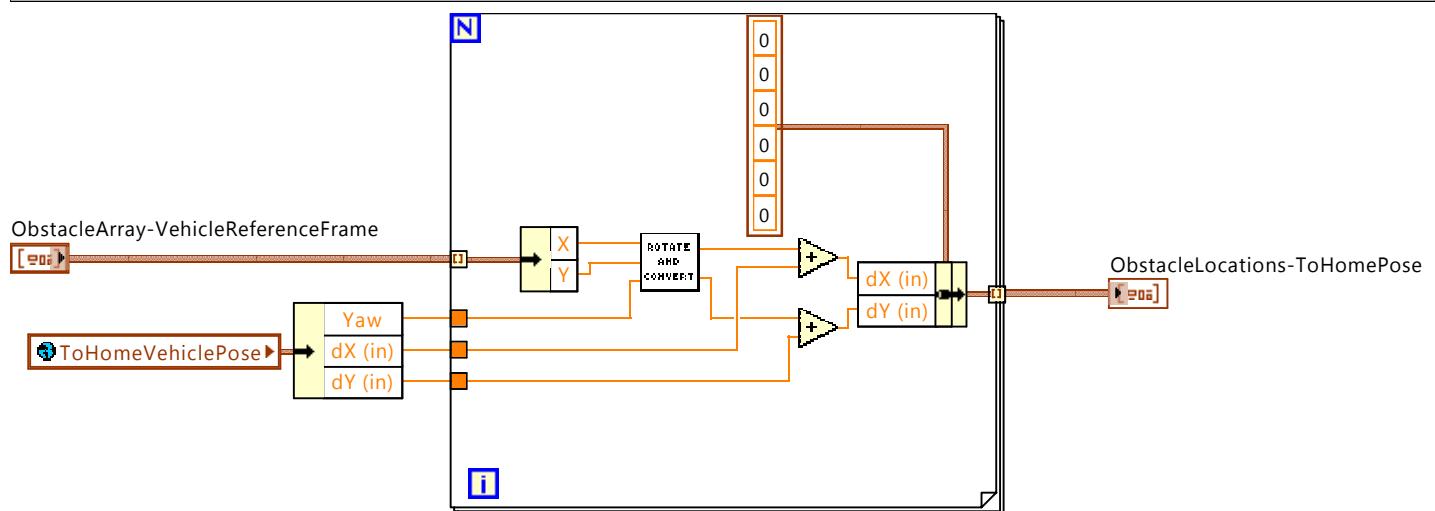
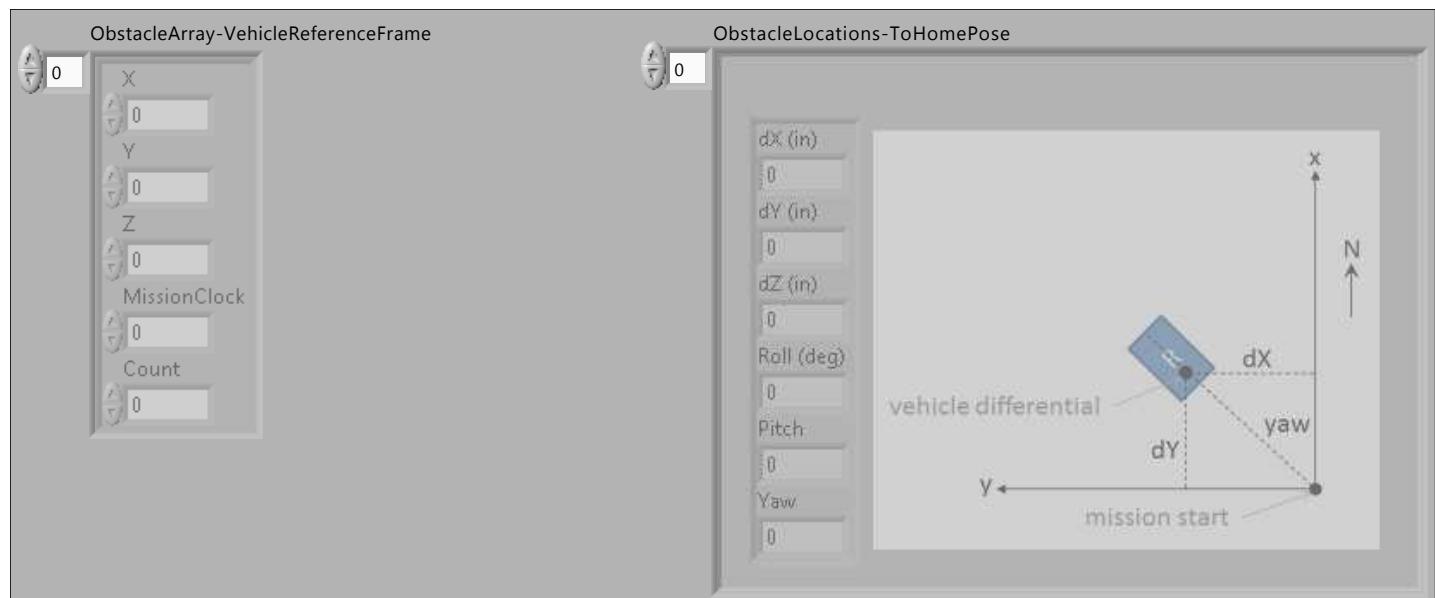
CoordinateTransform--Vehicle-ToHome.vi

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CoordinateTransform--Vehicle-ToHome.vi

ObstacleArray-VehicleReferenceFrame —————  ————— ObstacleLocations-ToHomePose



ObstacleFilter.vi

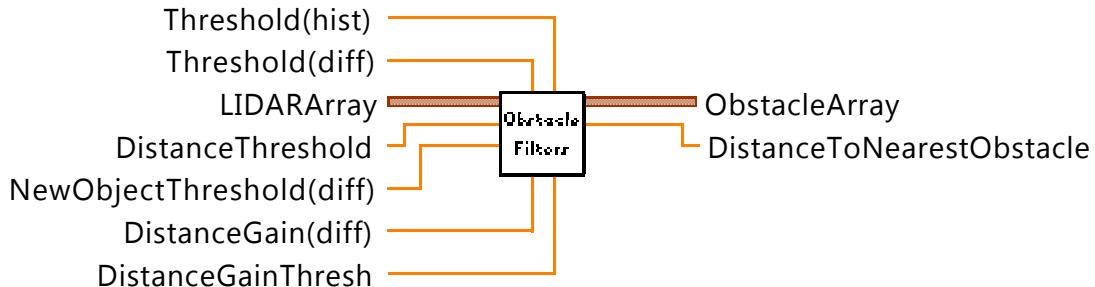
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ObstacleFilter.vi

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ObstacleFilter.vi



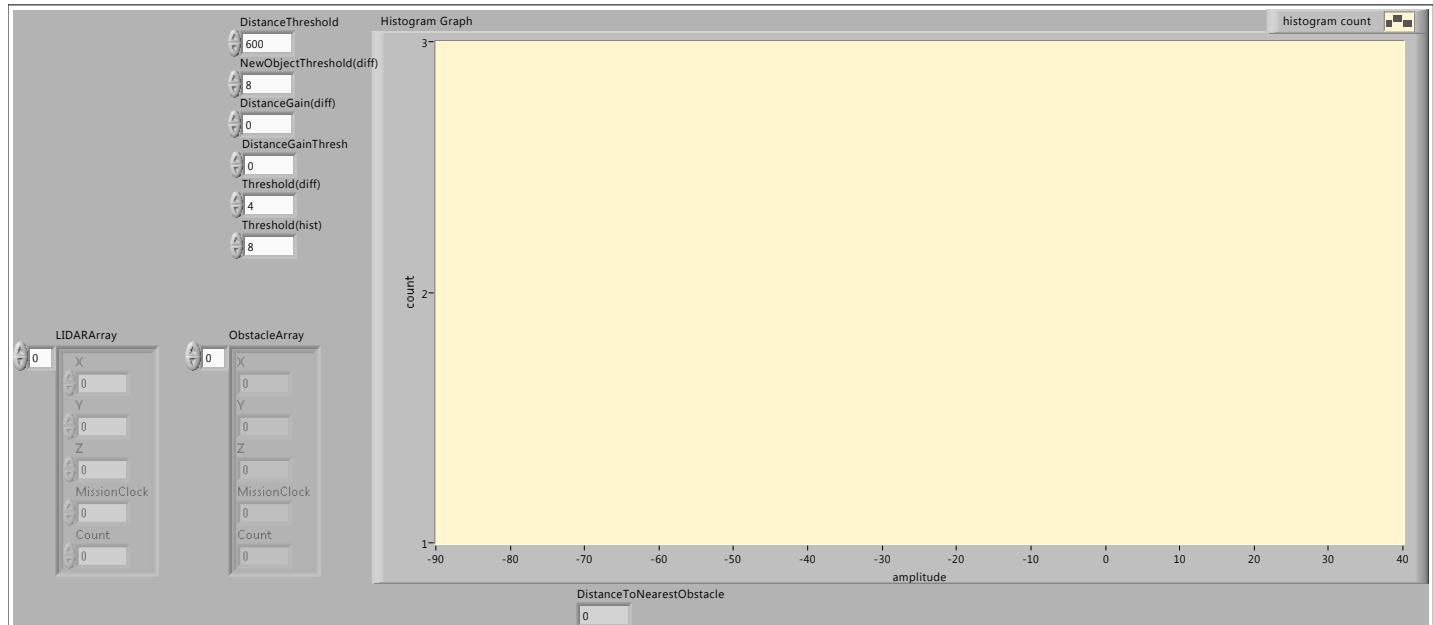
Takes a scan of LIDAR points and passes out all of the points that are obstacles.

Inputs

LIDARArray - array of points with x,y,z component in inches the vehicle's local reference frame (pois are scan order from 180 to 0 degrees)

Outputs

ObstacleArray - array of points with x,y,z component in inches in the global reference frame (difference from the mission start)

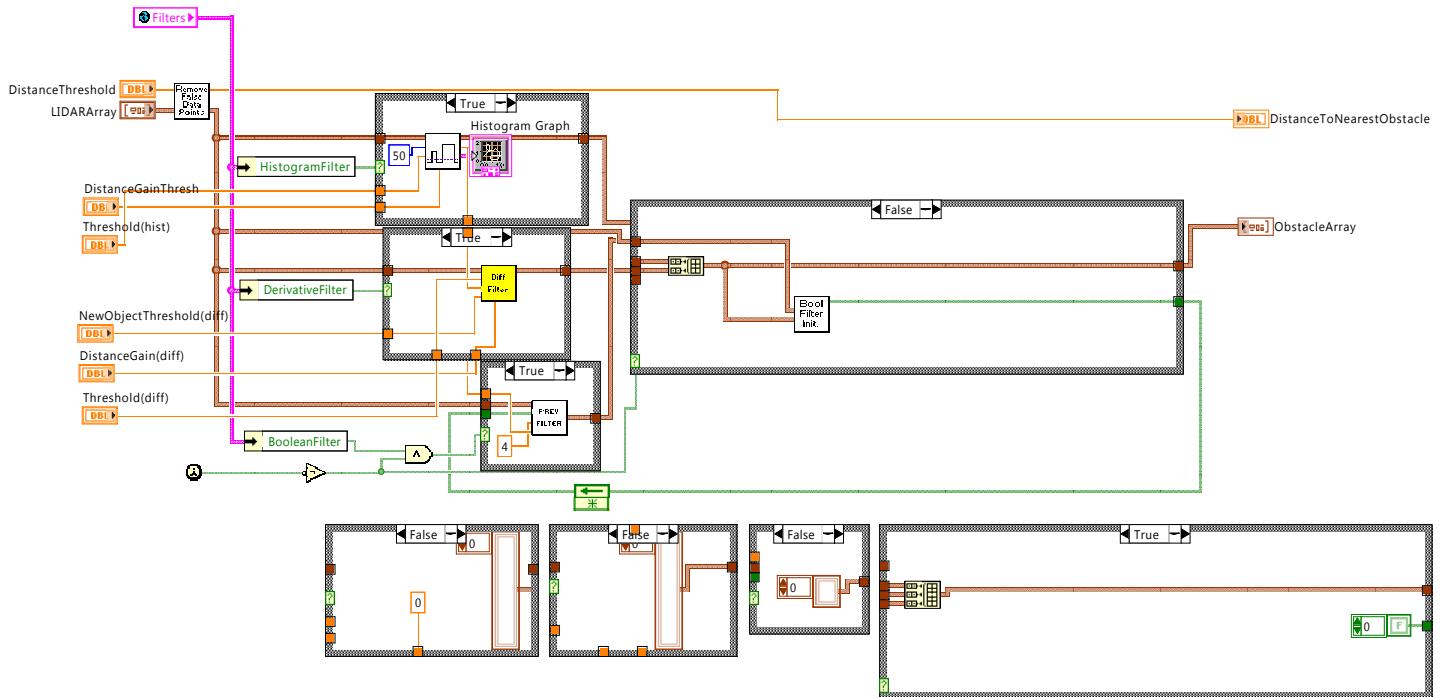


ObstacleFilter.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\ObstacleFilter.vi

Last modified on 4/27/2011 at 4:35 PM

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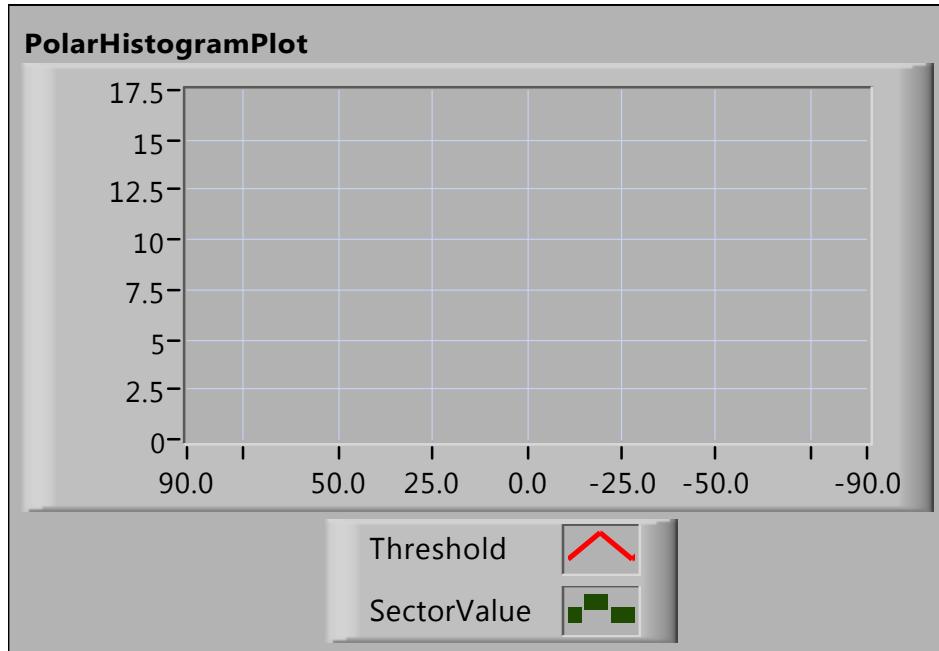
PolarHistogramPlot.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\PolarHistogramPlot.ctl

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PolarHistogramPlot.ctl



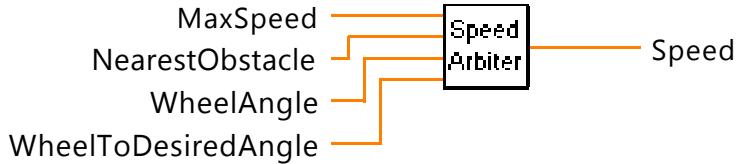
SpeedArbiterRev3.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\SpeedArbiterRev3.vi

Last modified on 4/27/2011 at 4:18 PM

Printed on 4/29/2011 at 1:51 AM

SpeedArbiterRev3.vi



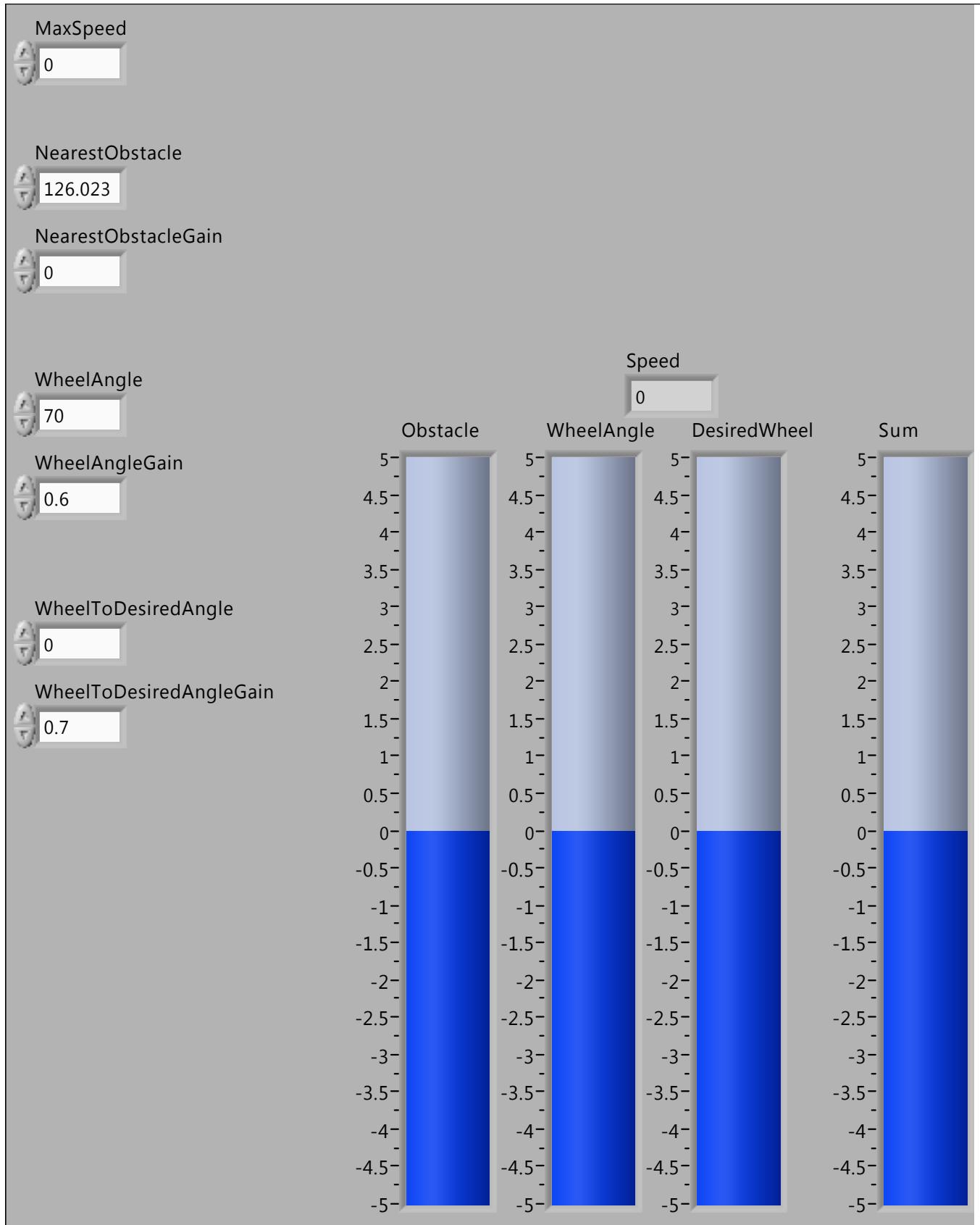
Determines the velocity of the vehicle. This is a selection (not blending) arbiter that slows the vehicle to the slowest proposed speed.

SpeedArbiterRev3.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\SpeedArbiterRev3.vi

Last modified on 4/27/2011 at 4:18 PM

Printed on 4/29/2011 at 1:51 AM

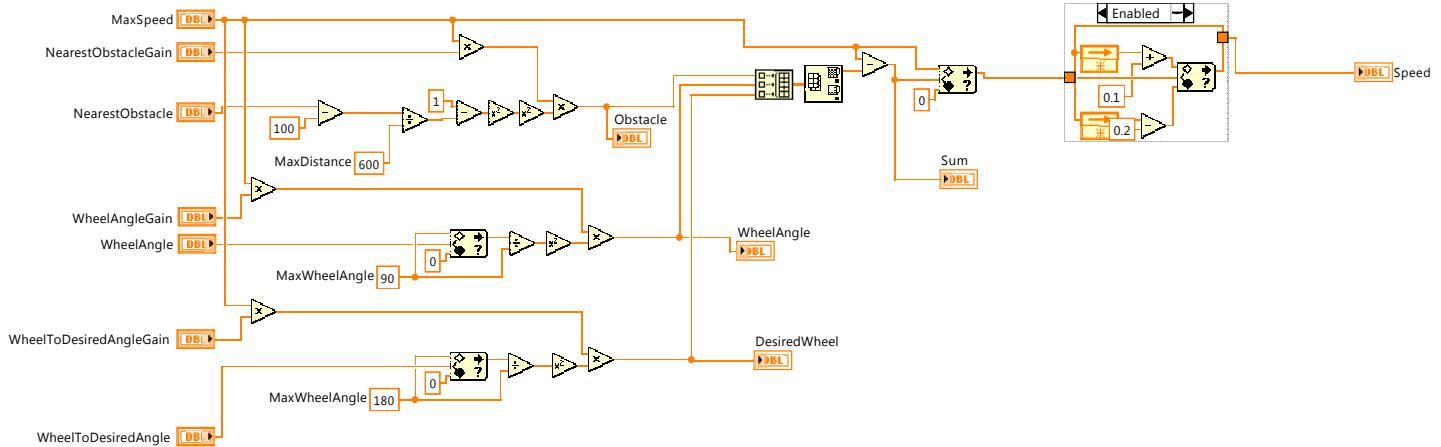


SpeedArbiterRev3.vi

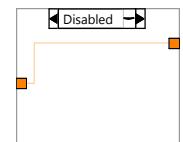
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\SpeedArbiterRev3.vi

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Maximum angles are in degrees. I added some (probably unnecessary) coercion blocks for extra safety.





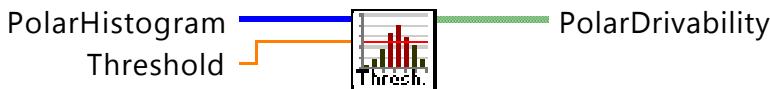
Threshold.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\Threshold.vi

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Threshold.vi



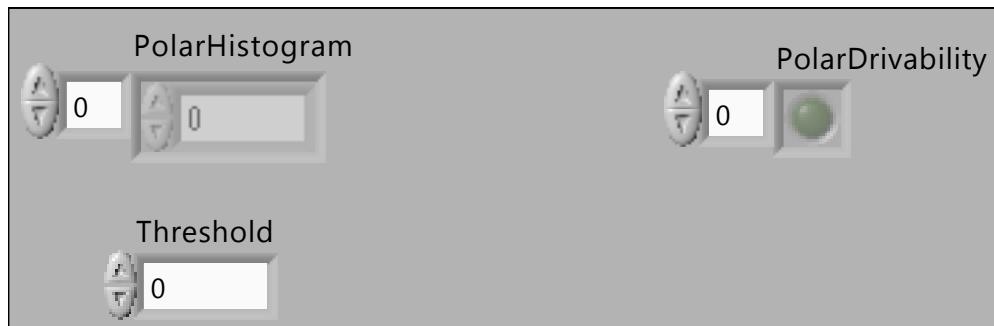
marks sectors as drivable or undrivable based on whether or not the sector value exceeds the specific threshold

Inputs

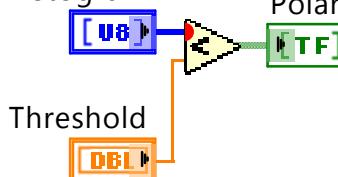
PolarHistogram - a polar histogram of values

Threshold - the maximum value a sector can hold while still being drivable

PolarDrivability - sectors that are driveable are denoted by Boolean True values



Block Diagram of Threshold.vi



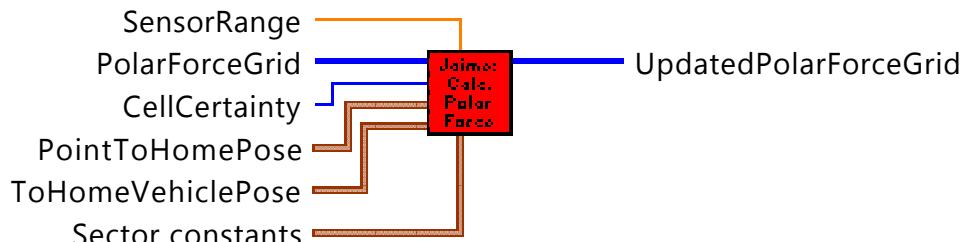
CalculatePolarForce.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\

HistogramToPolarForceSubVIs\CalculatePolarForce.vi

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CalculatePolarForce.vi

adds the force exerted by specified cell to the appropriate sector in the polar force grid

Inputs

PolarForceGrid - a representation of the forces exerted on the vehicle by the obstacles in each of the defined polar sectors

VehicleYaw - the yaw component of the ToHomeVehiclePose

SectorSize - the size of an individual sector (in degrees)

CellLocation - the location of the cell being added to the polar force grid

CellCertainty - the certainty that an obstacle lies in the given sector

Outputs

UpdatedPolarForceGrid - the polar force grid with incremented sector

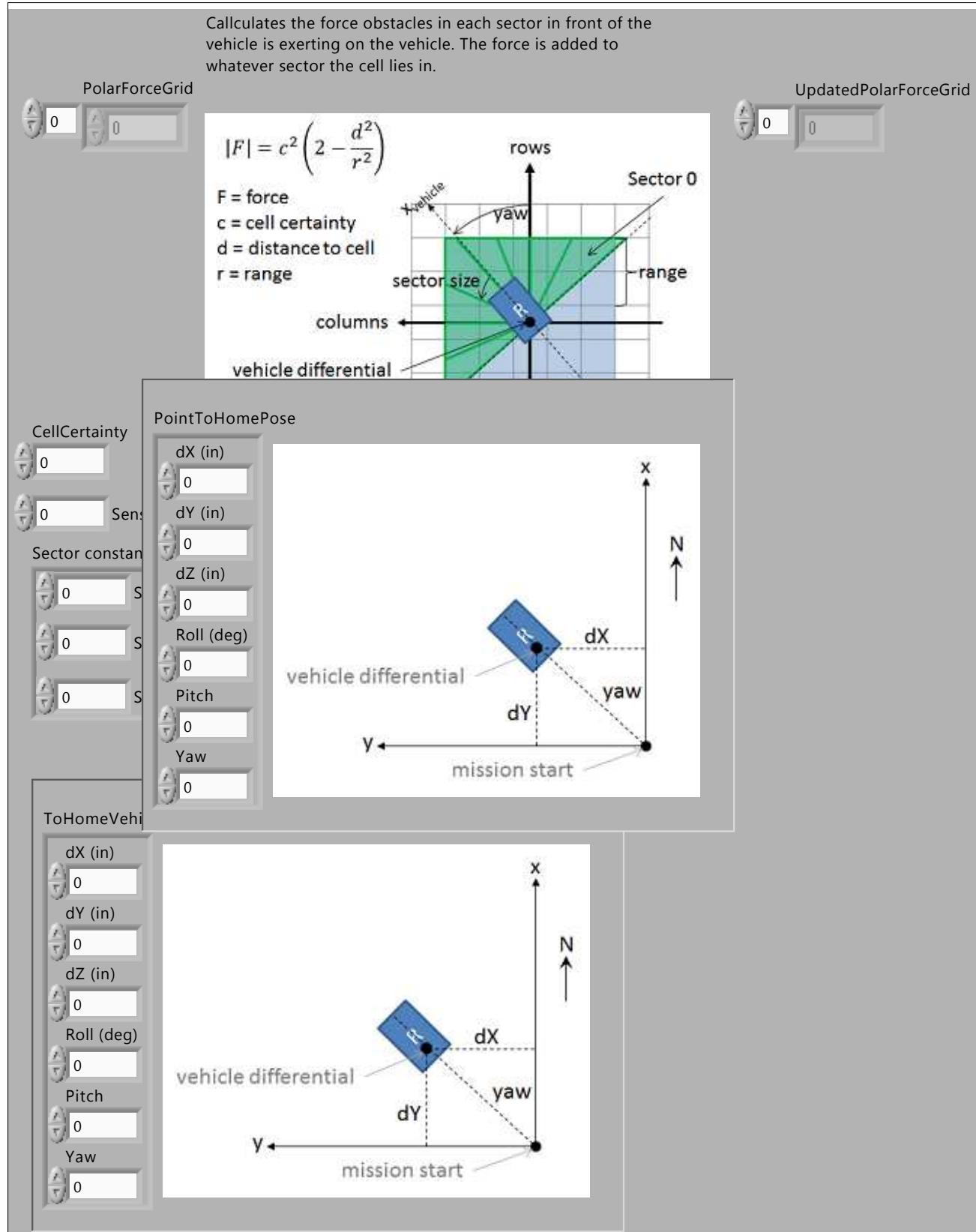
CalculatePolarForce.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\

HistogramToPolarForceSubVIs\CalculatePolarForce.vi

Last modified on 3/18/2011 at 3:33 PM

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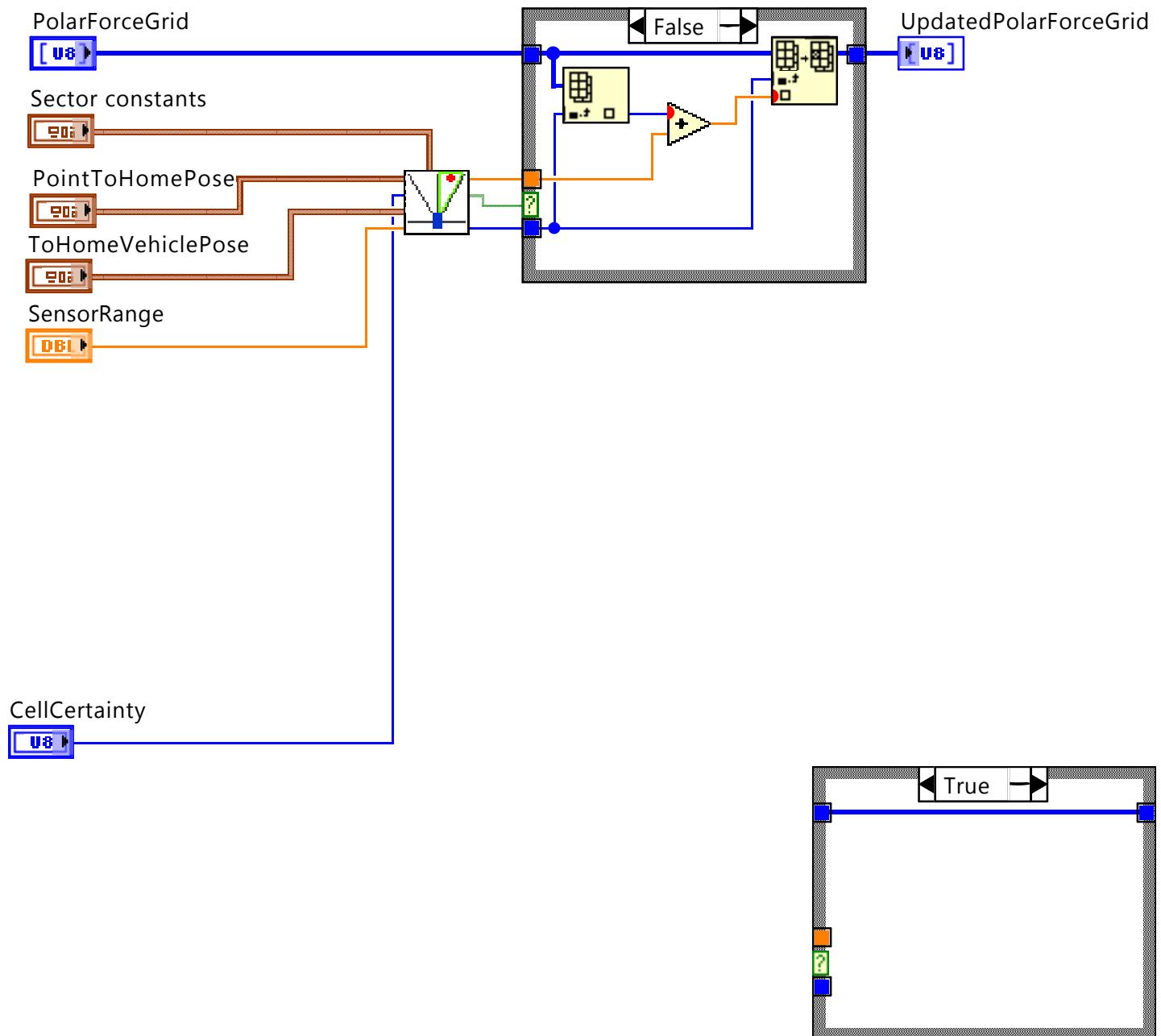
CalculatePolarForce.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\

HistogramToPolarForceSubVIs\CalculatePolarForce.vi

Last modified on 3/18/2011 at 3:33 PM

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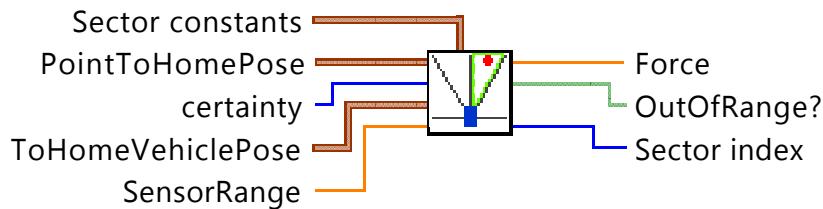
PointPolarConversion.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\

HistogramToPolarForceSubVIs\PointPolarConversion.vi

Last modified on 4/27/2011 at 5:40 PM

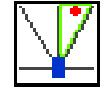
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PointPolarConversion.vi

This VI takes in the global location and heading of the vehicle and the location of a point of interest, and determines the polar sector index of the point relative to the vehicle. It then calculates the "force" this point exerts on the vehicle, based on gain, certainty, and distance. It returns this force and the sector index.

Notes:

The angle of the point relative to the vehicle is defined normally (i.e. zero is along the x-axis, and angle increases ccw). Sectors are divided into slices of degree width determined by the "Sector width" input and indexed starting with 0 at the x-axis and increasing ccw.



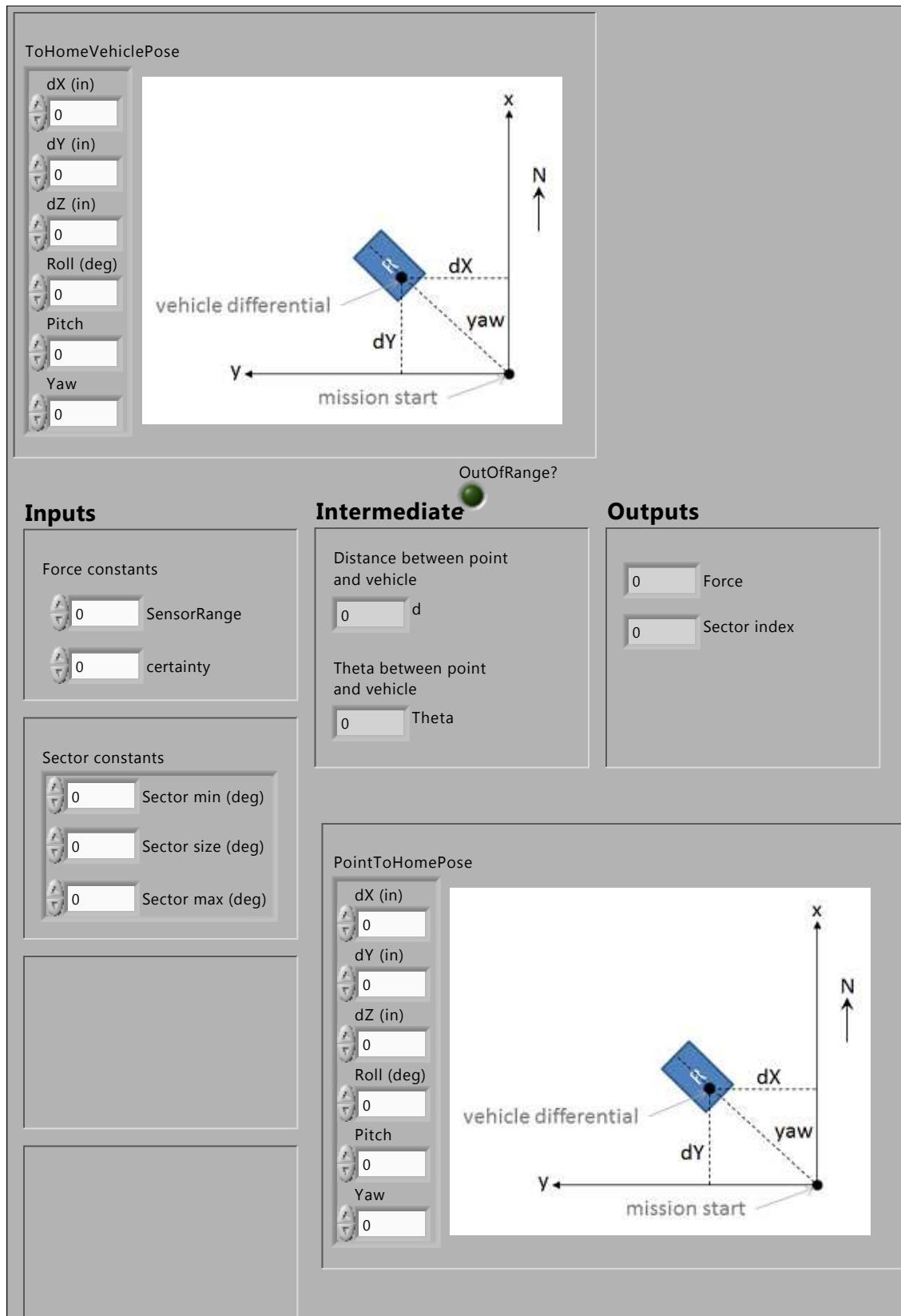
PointPolarConversion.vi

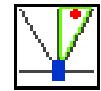
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\

HistogramToPolarForceSubVIs\PointPolarConversion.vi

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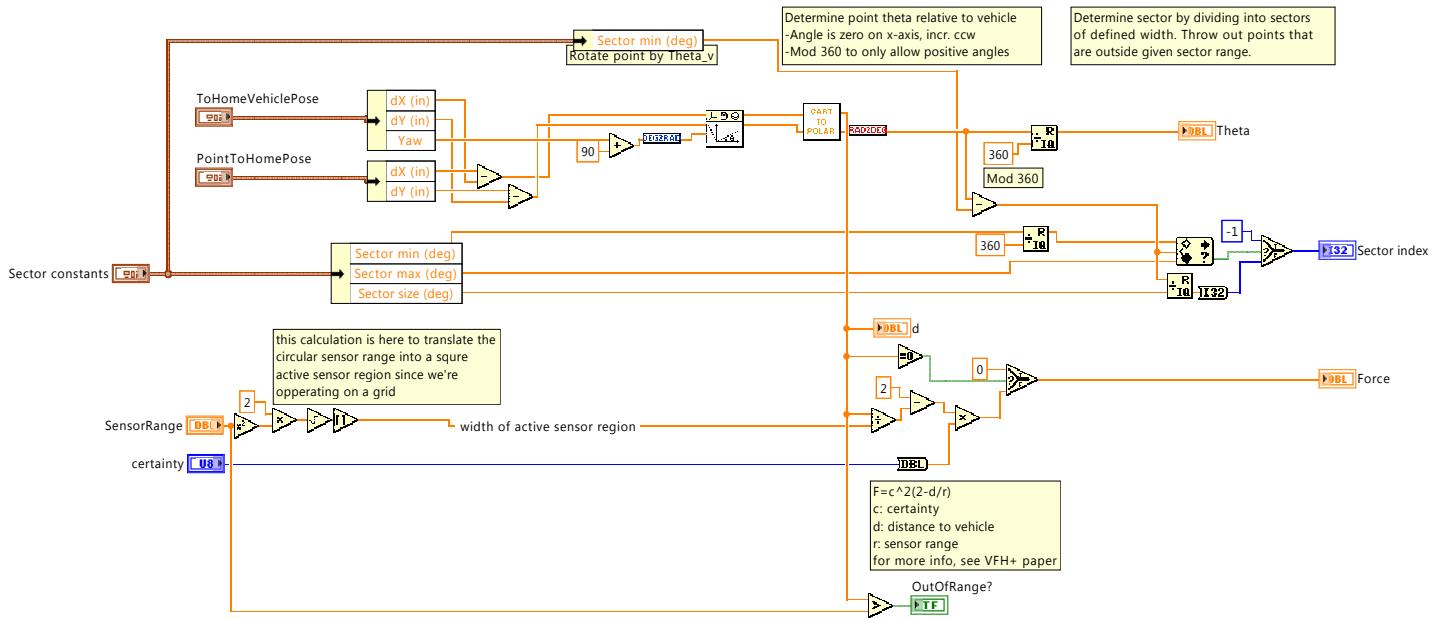
PointPolarConversion.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\

HistogramToPolarForceSubVIs\PointPolarConversion.vi

Last modified on 4/27/2011 at 5:40 PM

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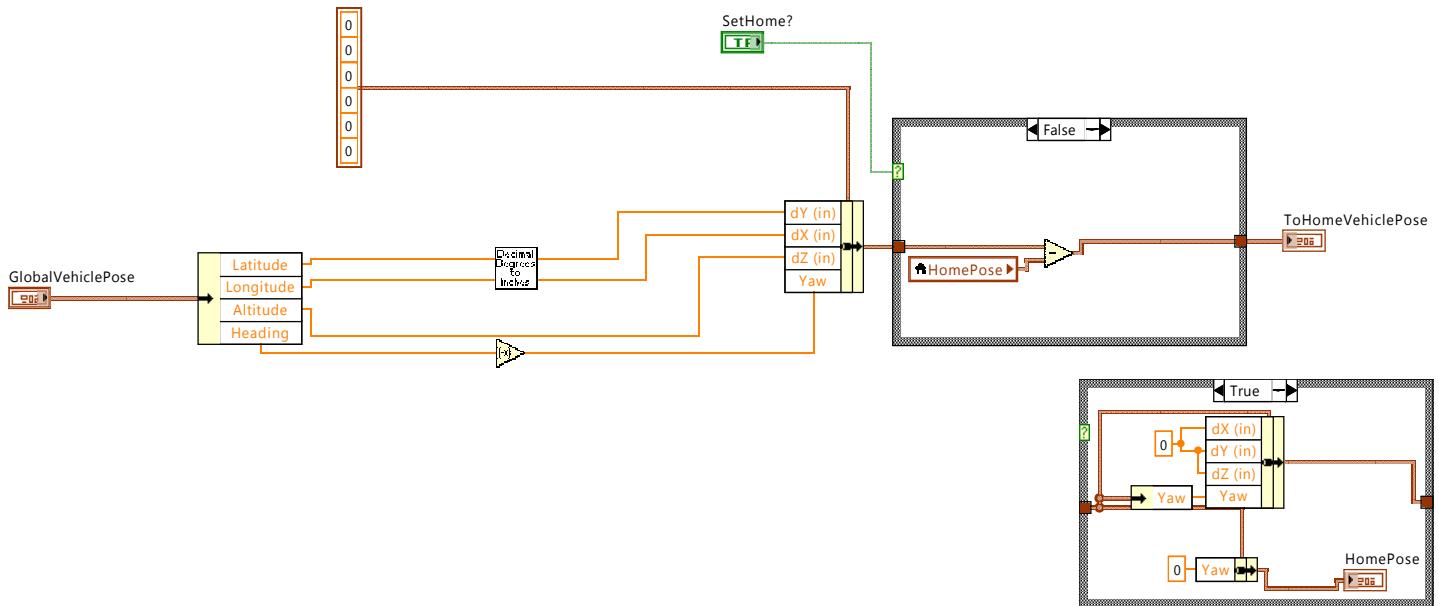
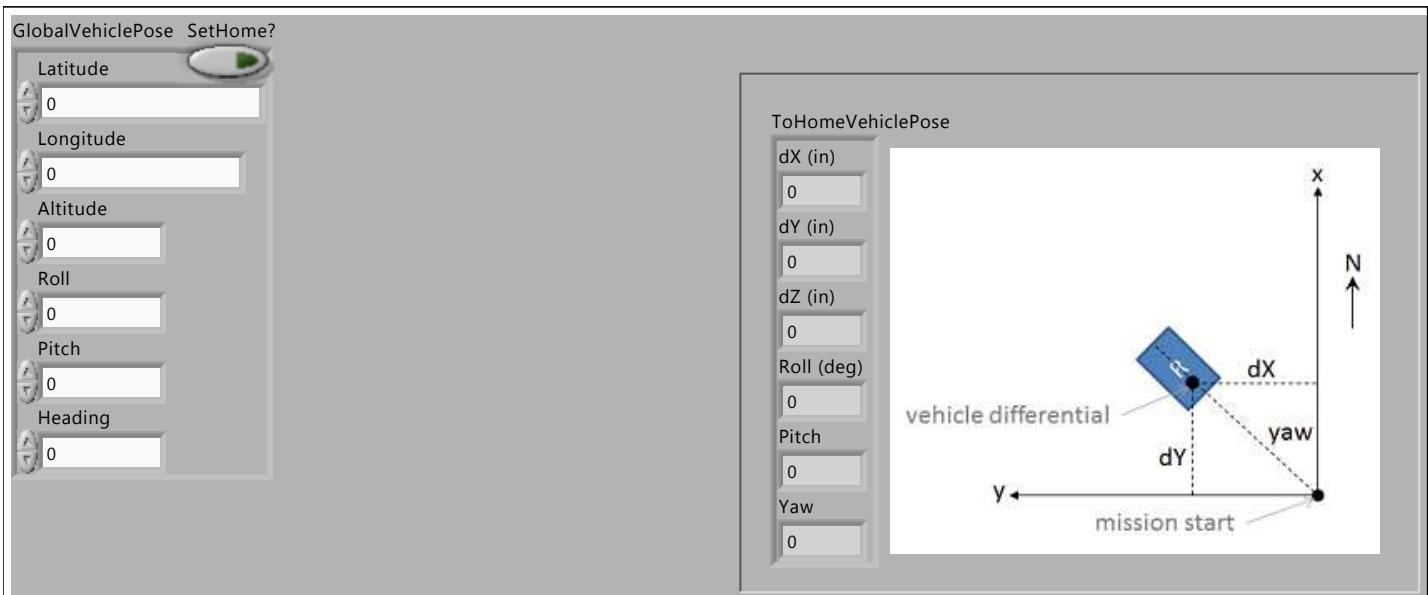


GlobalToToHome.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\GlobalToToHome.vi

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GlobalToToHome.vi

Deg2Rad.vi

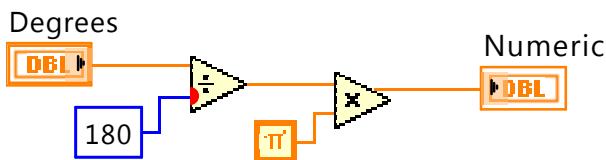
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\Deg2Rad.vi

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Deg2Rad.vi

Degrees —————  ————— Numeric



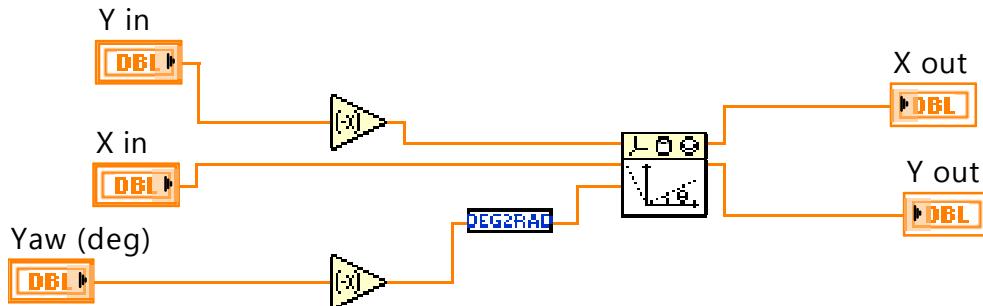
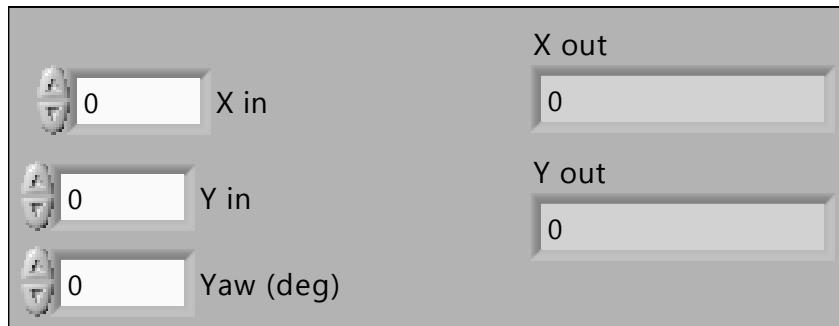
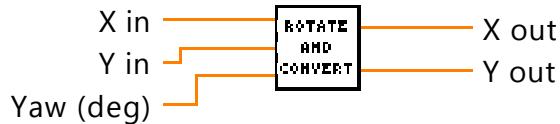
RotateAndConvert.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

HistogramGridPopSubVIs\RotateAndConvert.vi

Last modified on 4/27/2011 at 5:40 PM

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RotateAndConvert.vi

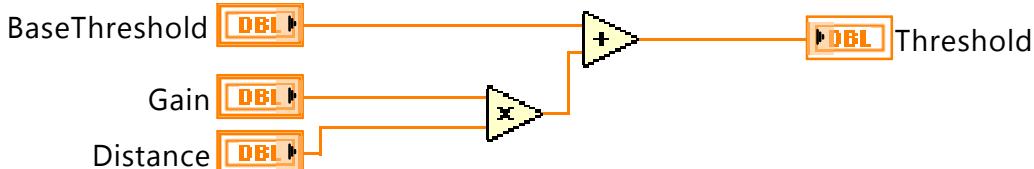
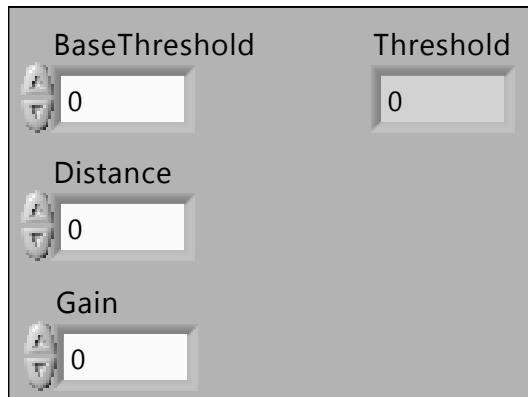
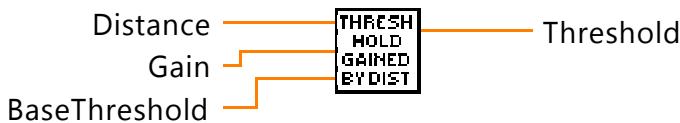
ThresholdGainedByDistance.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\ObstacleFilterSubVIs\ThresholdGainedByDistance.vi

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ThresholdGainedByDistance.vi



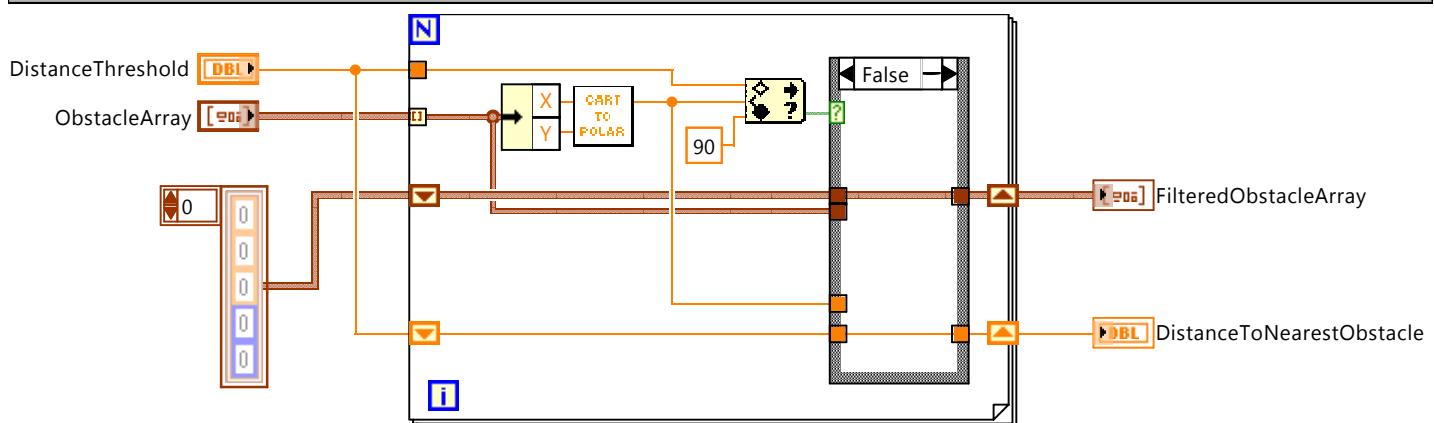
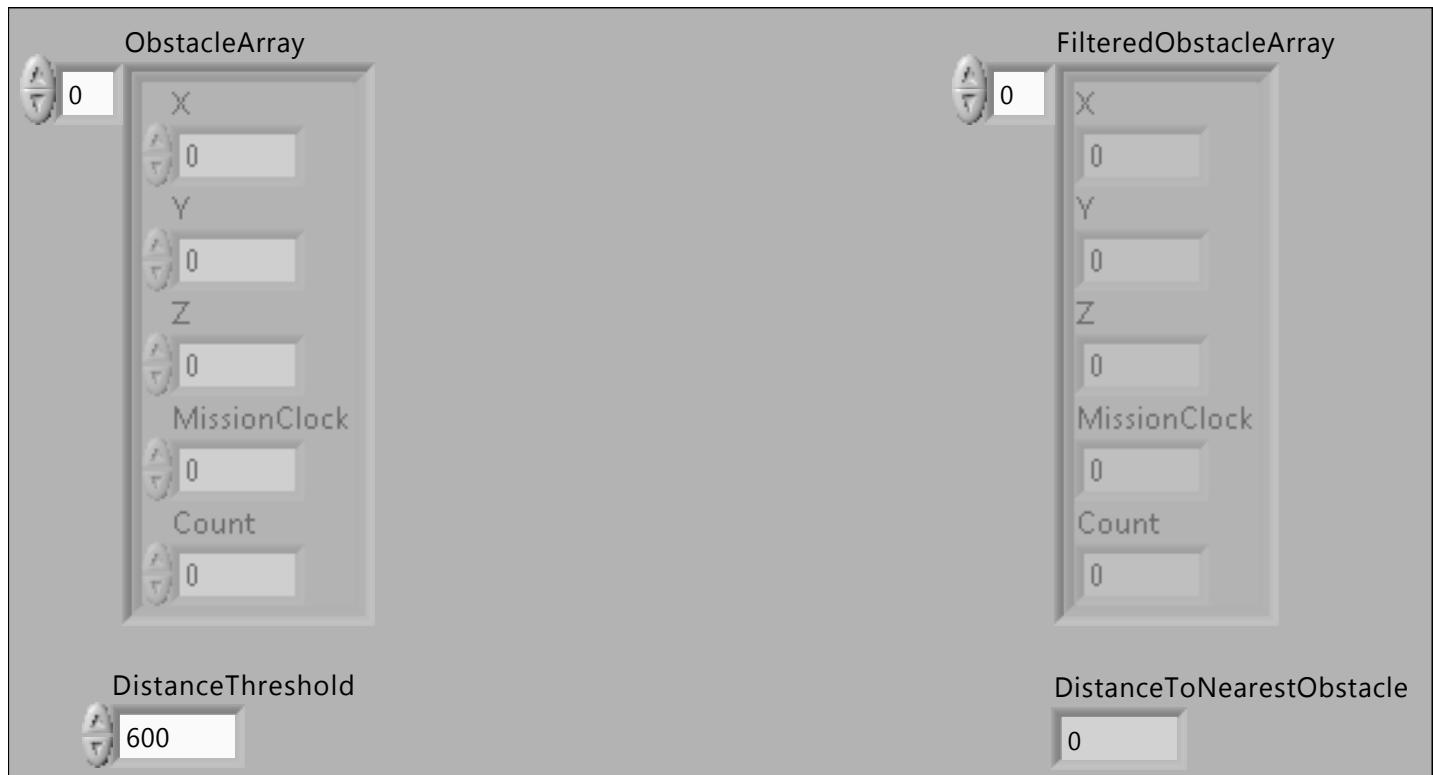
This can get more complicated

RemoveFalseReadings.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\ObstacleFilterSubVIs\RemoveFalseReadings.vi

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RemoveFalseReadings.vi

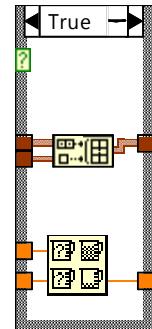
I arbitrarily chose the DistanceThreshold as the initial DistanceToNearestObstacle, since that's the largest distance we would care about.

RemoveFalseReadings.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\ObstacleFilterSubVIs\RemoveFalseReadings.vi

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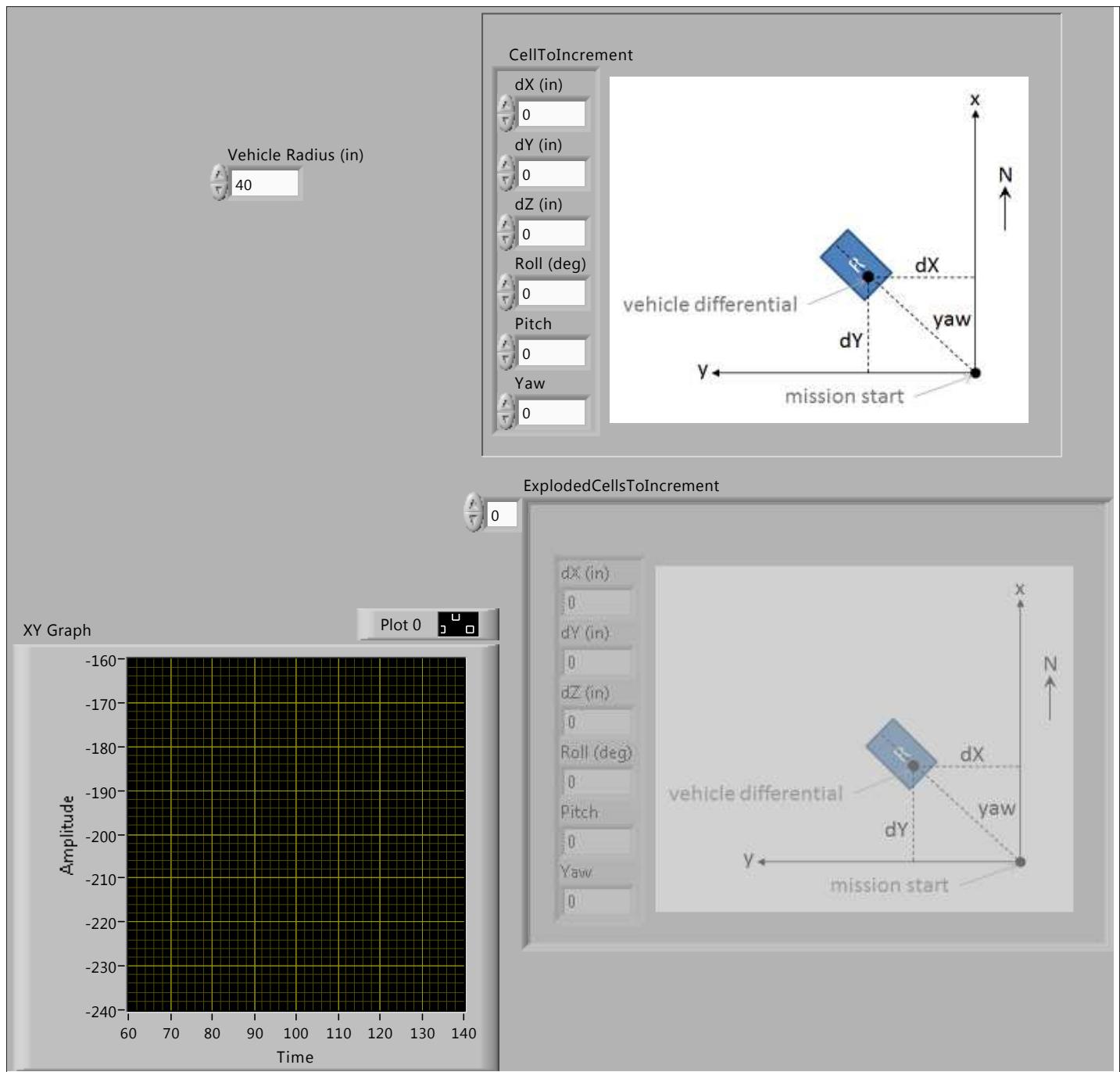
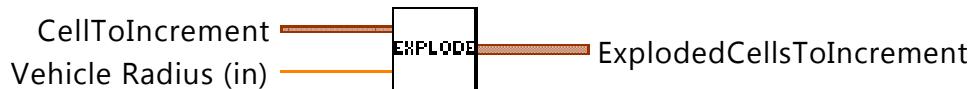


ExplodePoints.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\UpdateHistogramGridSubVIs\ExplodePoints.vi

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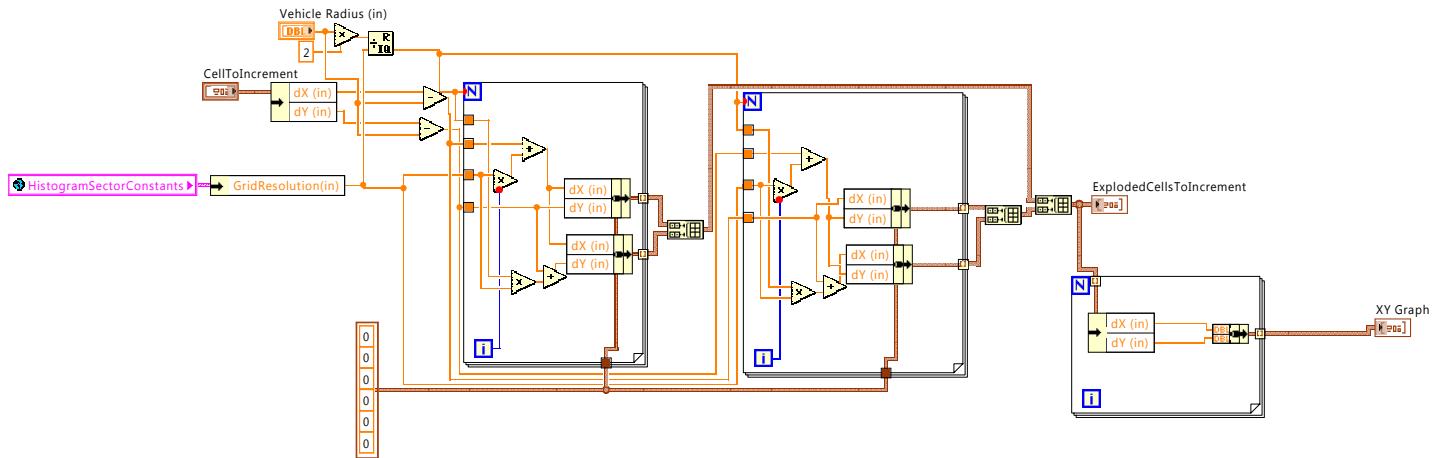
ExplodePoints.vi

ExplodePoints.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\UpdateHistogramGridSubVIs\ExplodePoints.vi

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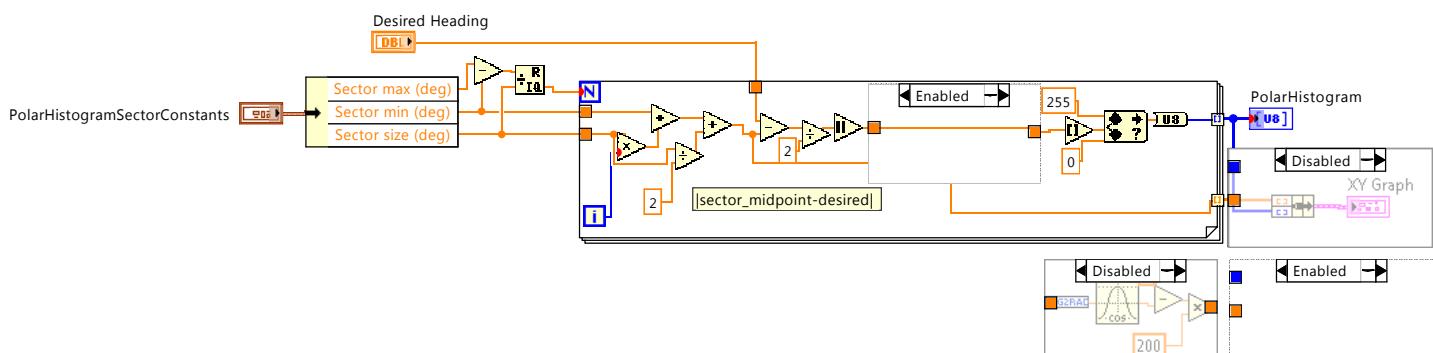
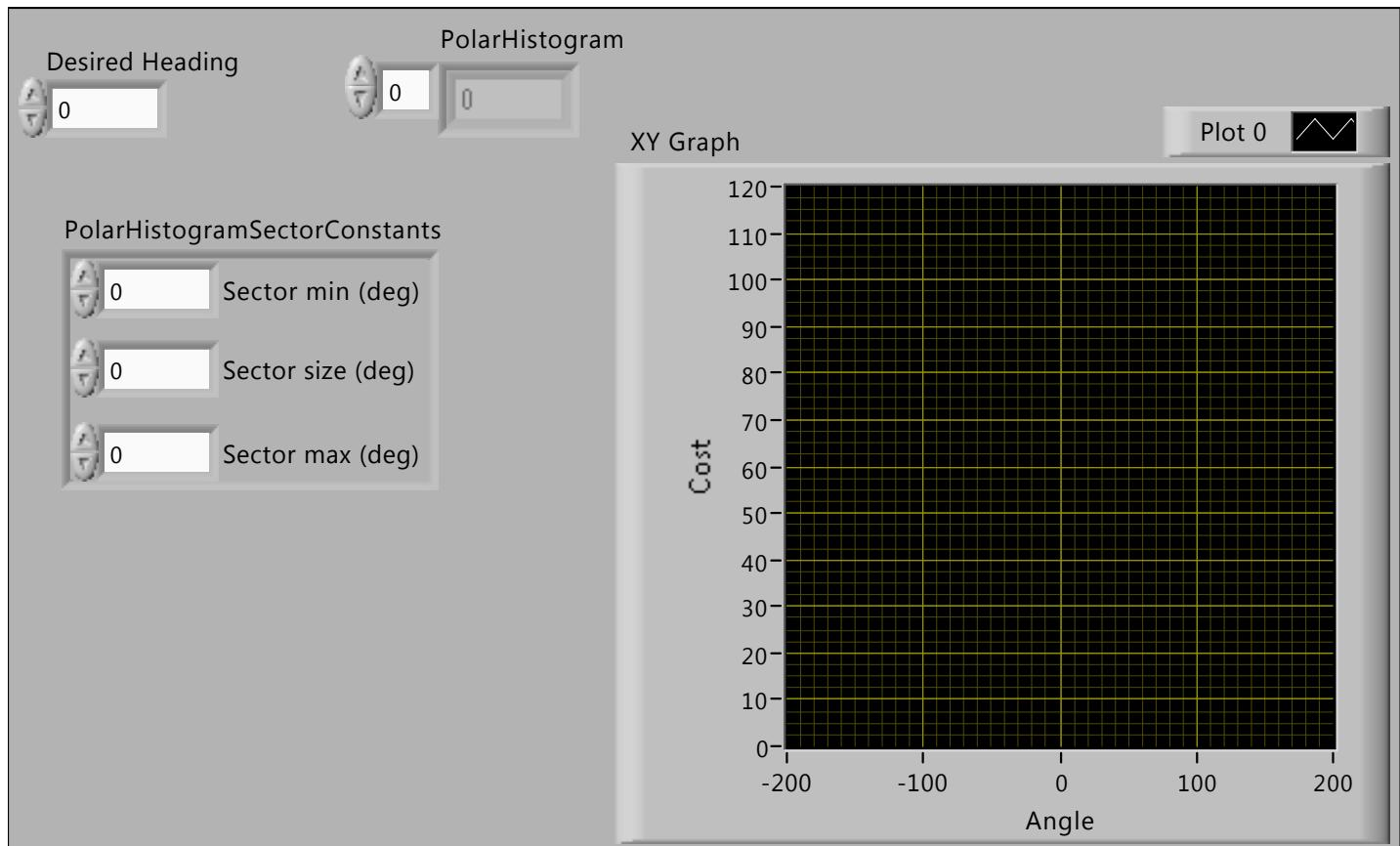
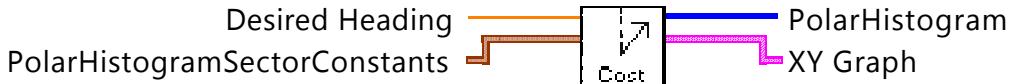
CalculateHeadingCost.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\Think\CalculateHeadingCost.vi

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CalculateHeadingCost.vi



IsObstacle.vi

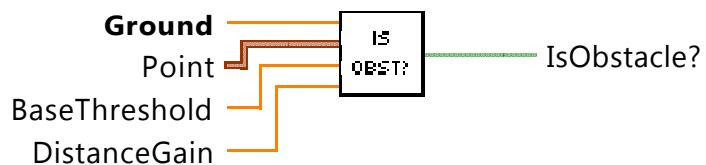
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ObstacleFilterSubVIs\IsObstacle.vi

Last modified on 3/23/2011 at 4:48 PM

Printed on 4/29/2011 at 1:51 AM

IsObstacle.vi



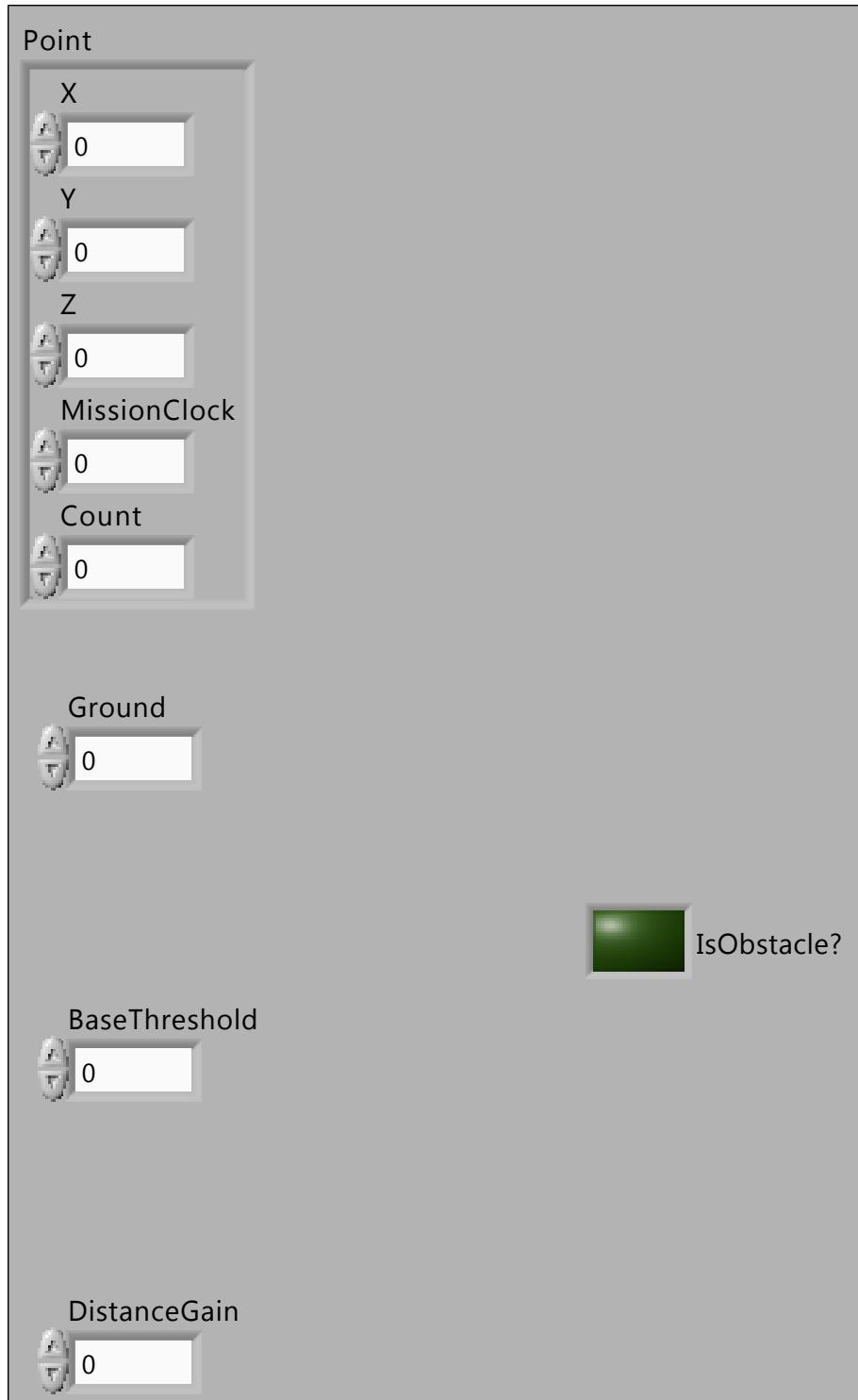
IsObstacle.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ObstacleFilterSubVIs\IsObstacle.vi

Last modified on 3/23/2011 at 4:48 PM

Printed on 4/29/2011 at 1:51 AM

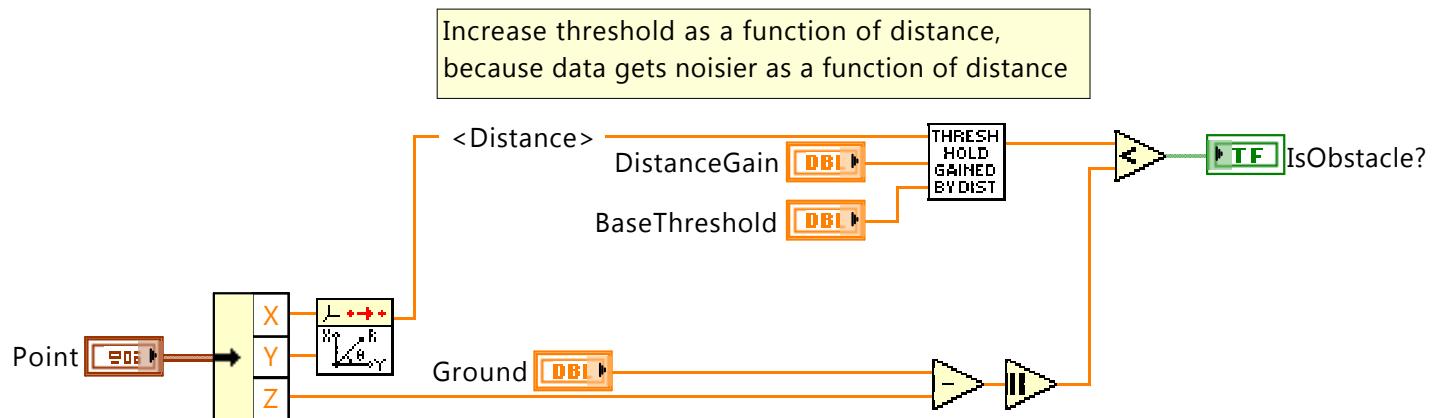


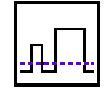
IsObstacle.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\ObstacleFilterSubVIs\IsObstacle.vi

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ThresholdFilter.vi

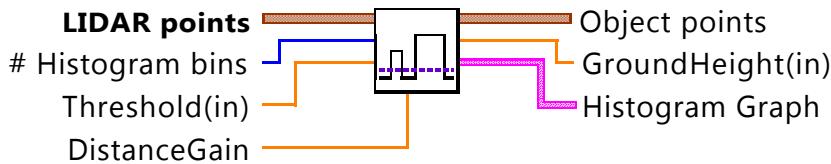
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ObstacleFilterSubVIs\ThresholdFilter.vi

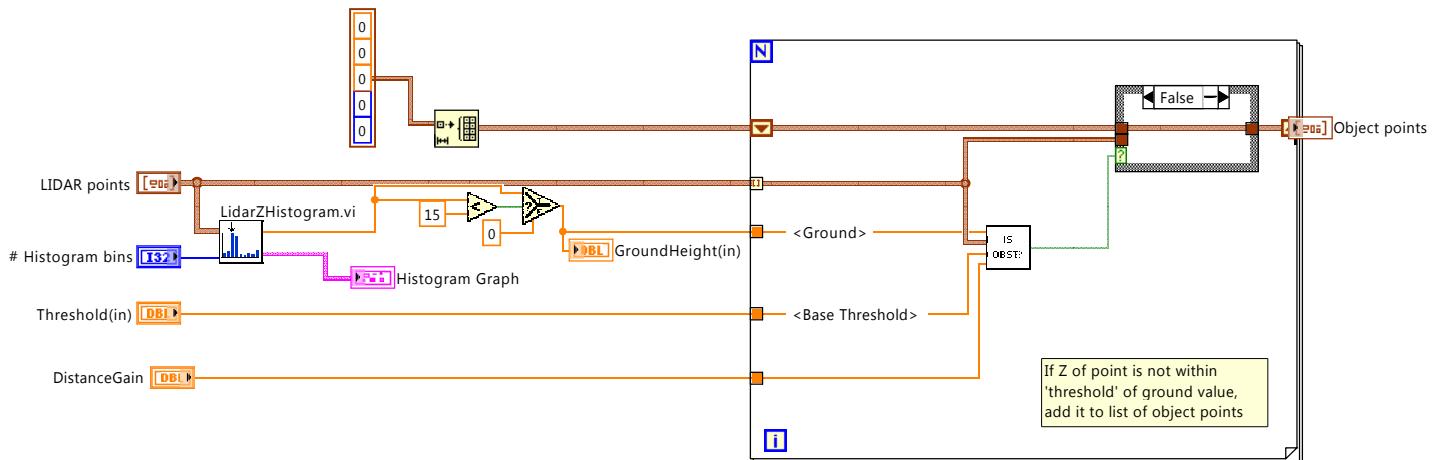
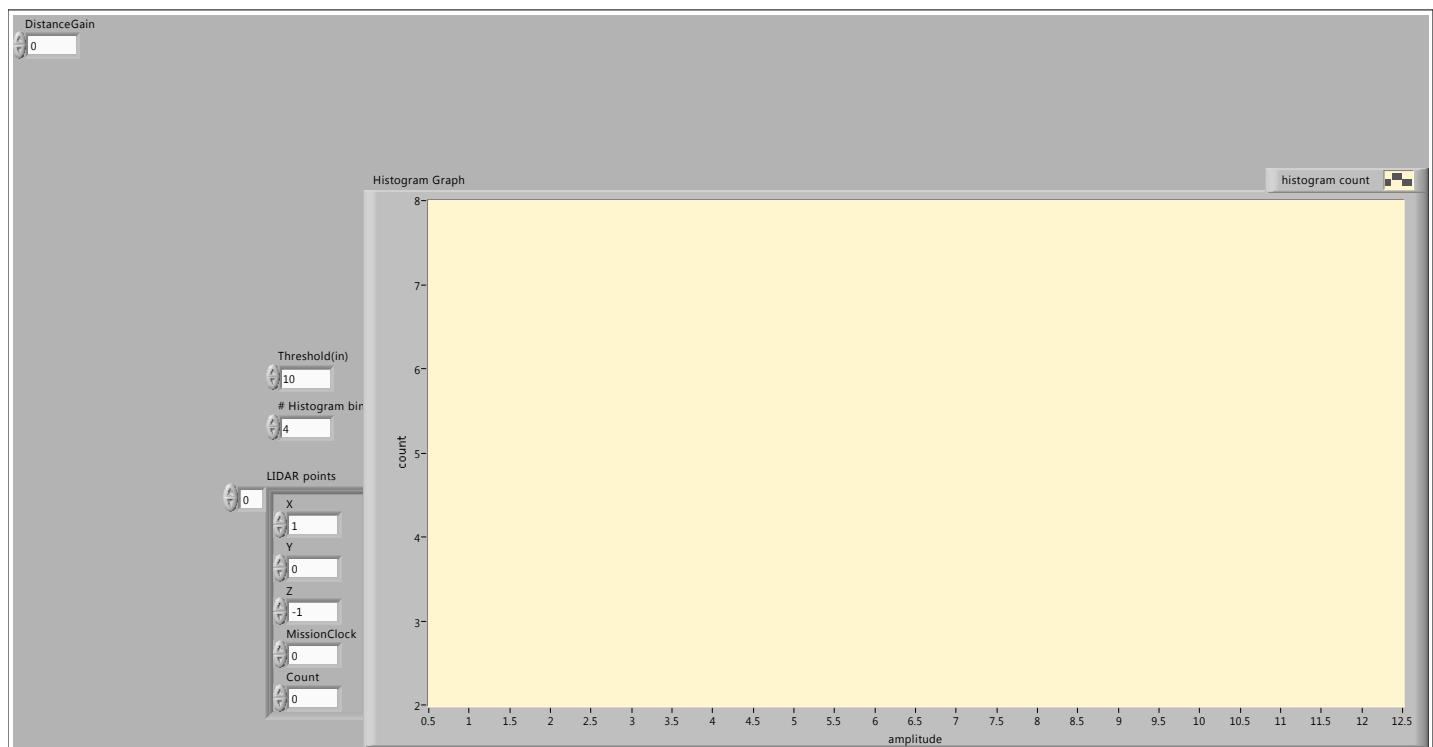
Last modified on 4/6/2011 at 9:52 AM

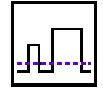
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ThresholdFilter.vi



This VI takes in an array of LIDAR (x,y,z) points and a threshold, and returns a list of "object points". It calculates the estimated z-value of the ground using LidarZHistogram. If a particular point has a z-value that is outside a threshold of the ground, it is added to the list of object points. The optional '# Histogram bins' input sets the number of bins to use in the LidarZHistogram.





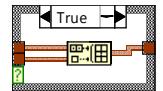
ThresholdFilter.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

ObstacleFilterSubVIs\ThresholdFilter.vi

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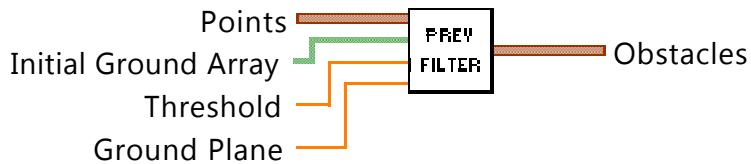
BooleanFilter.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

BooleanFilter.vi

Last modified on 3/25/2011 at 3:21 PM

Printed on 4/29/2011 at 1:51 AM

BooleanFilter.vi

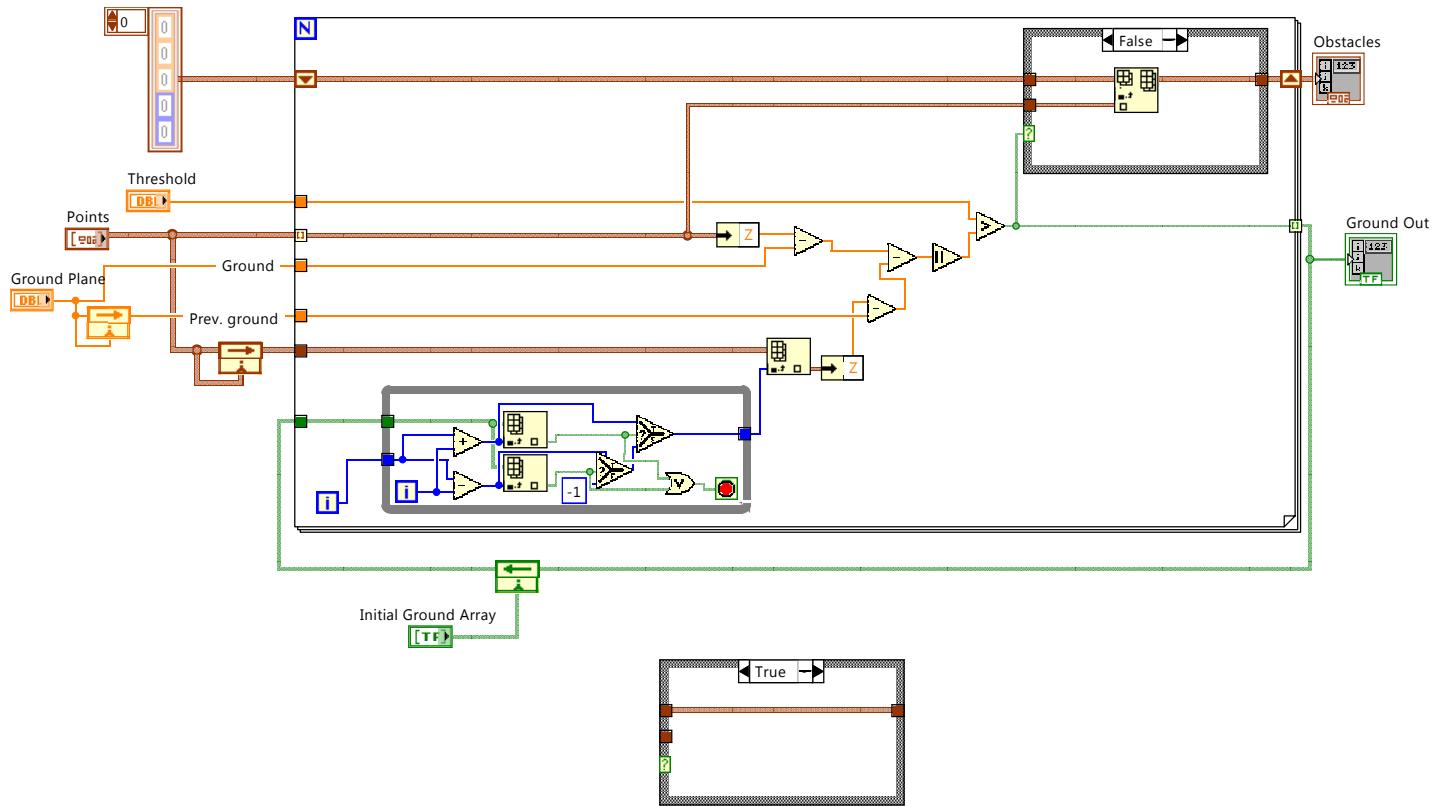
BooleanFilter.vi

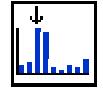
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\

BooleanFilter.vi

Last modified on 3/25/2011 at 3:21 PM

Printed on 4/29/2011 at 1:51 AM





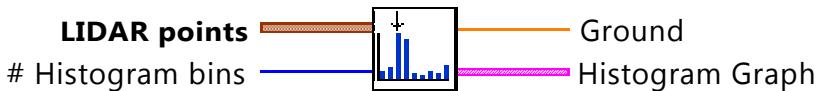
LidarZHistogram.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\What\ObstacleFilterSubVIs\LidarZHistogram.vi

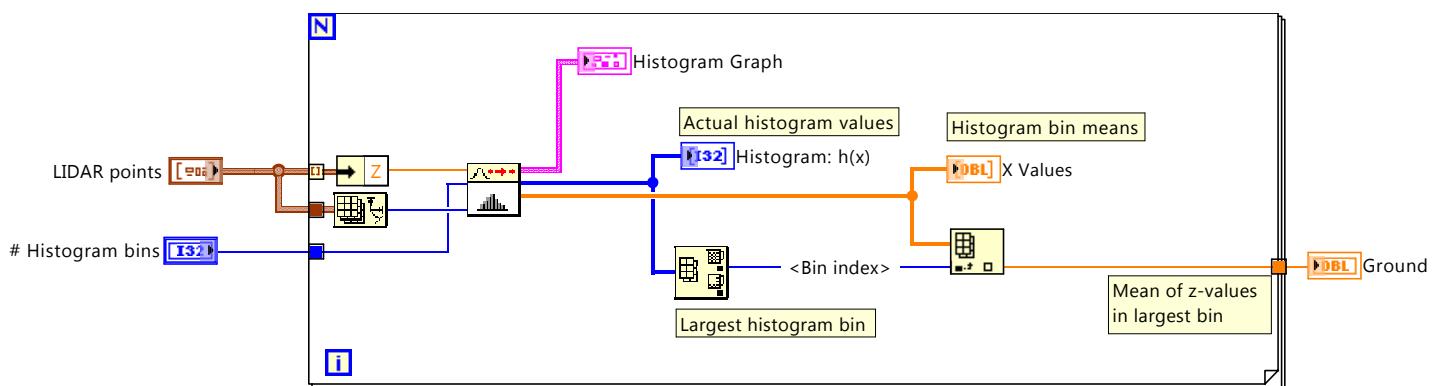
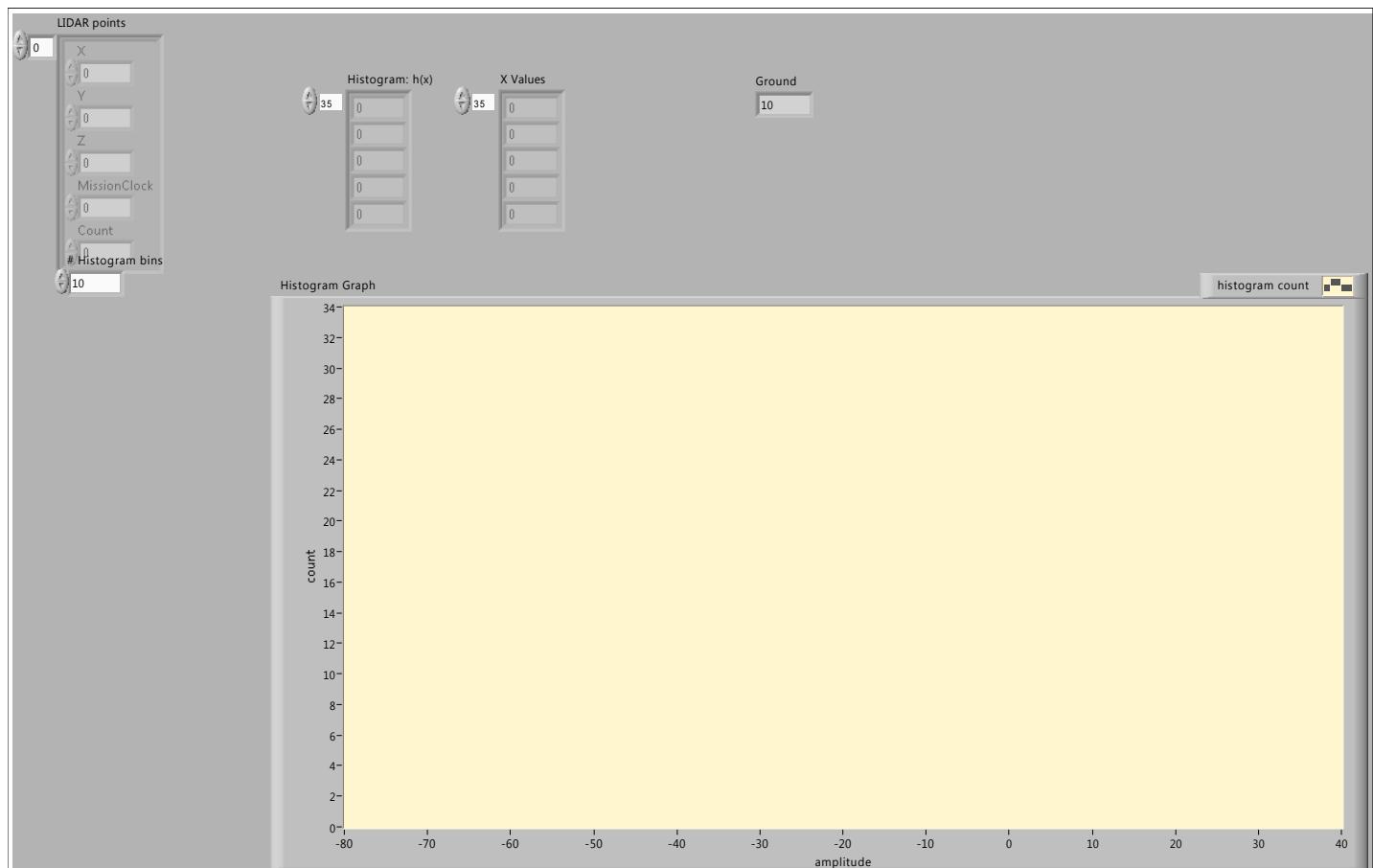
Last modified on 3/7/2011 at 11:30 AM

Printed on 4/29/2011 at 1:51 AM

LidarZHistogram.vi



This VI takes in an array of LIDAR (x,y,z) points and divides them into a histogram based on their z-values. It finds the largest histogram bin, and returns the mean of the z-values in that bin (which is assumed to be the approximate z-value of the ground).



Convert StrWheel to Wheel Angle.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Act\SteeringMotorSubVIs\

Convert StrWheel to Wheel Angle.vi

Last modified on 3/28/2011 at 6:16 PM

Printed on 4/29/2011 at 1:51 AM

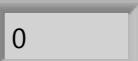
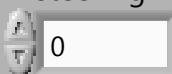
Convert StrWheel to Wheel Angle.vi



Converts steering wheel angle to physical wheel angle

Converts steering wheel angle to physical wheel angle

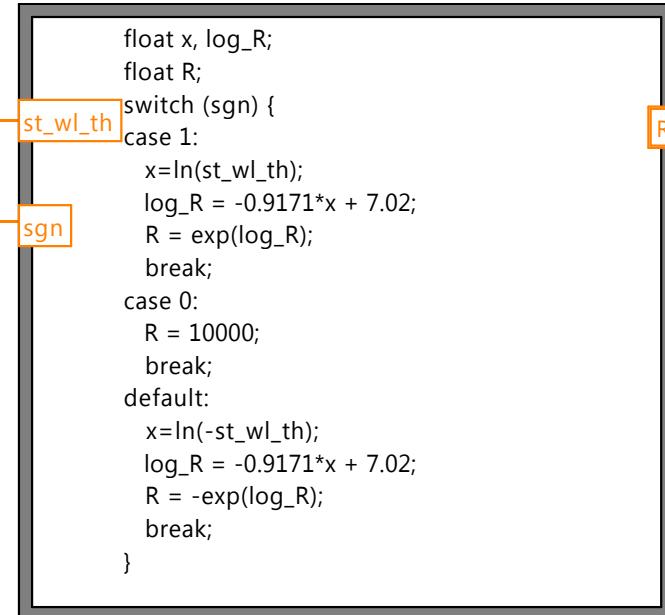
steering wheel angle radius of curvature (m)



radius of curvature (in)



steering wheel angle



radius of curvature (m)

radius of curvature (in)

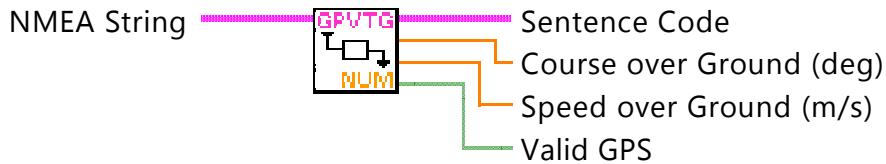
Parse GPVTG.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\GPS\Parse GPVTG.vi

Last modified on 3/8/2011 at 1:47 AM

Printed on 4/29/2011 at 1:51 AM

Parse GPVTG.vi



Pass this VI an NMEA sentence and it will parse it as if it's a GPGGA sentence.

The Valid GPS output will be false if there's no fix or if it's not a GPGGA sentence.

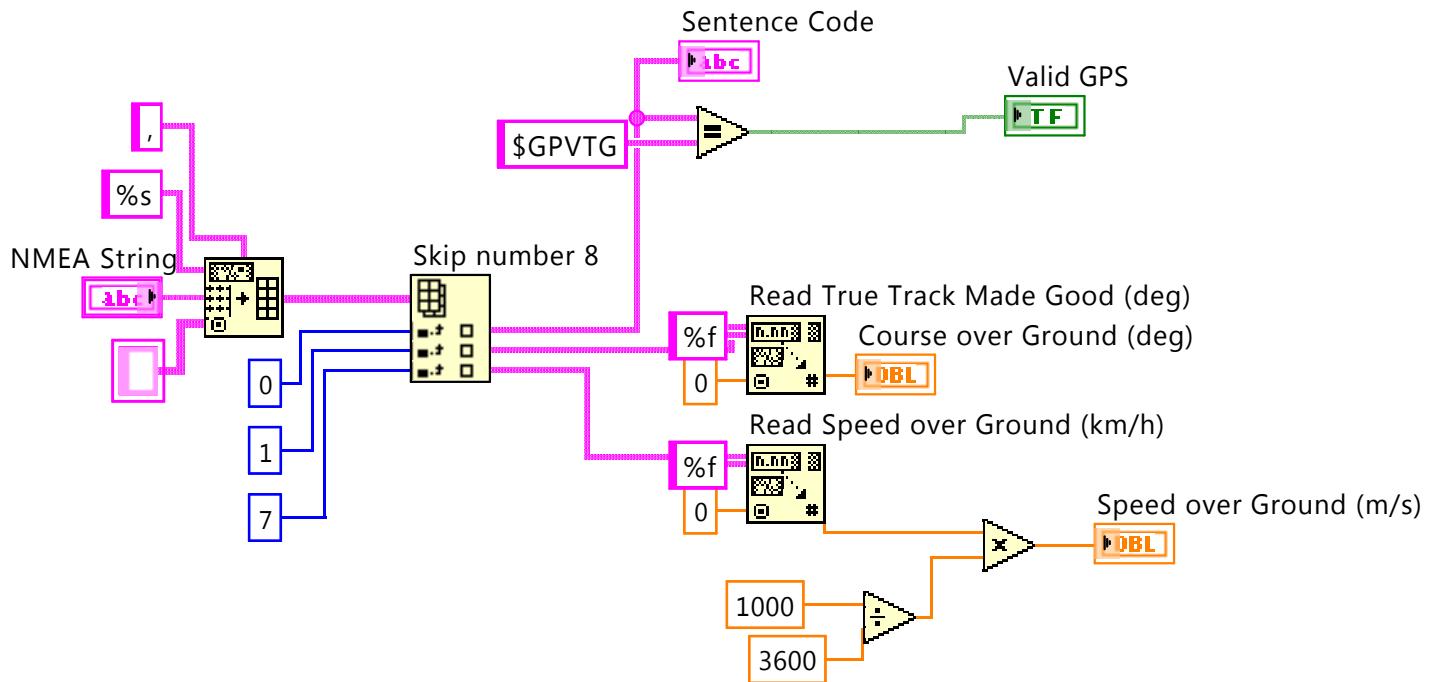


Parse GPVTG.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\GPS\Parse GPVTG.vi

Last modified on 3/8/2011 at 1:47 AM

Printed on 4/29/2011 at 1:51 AM



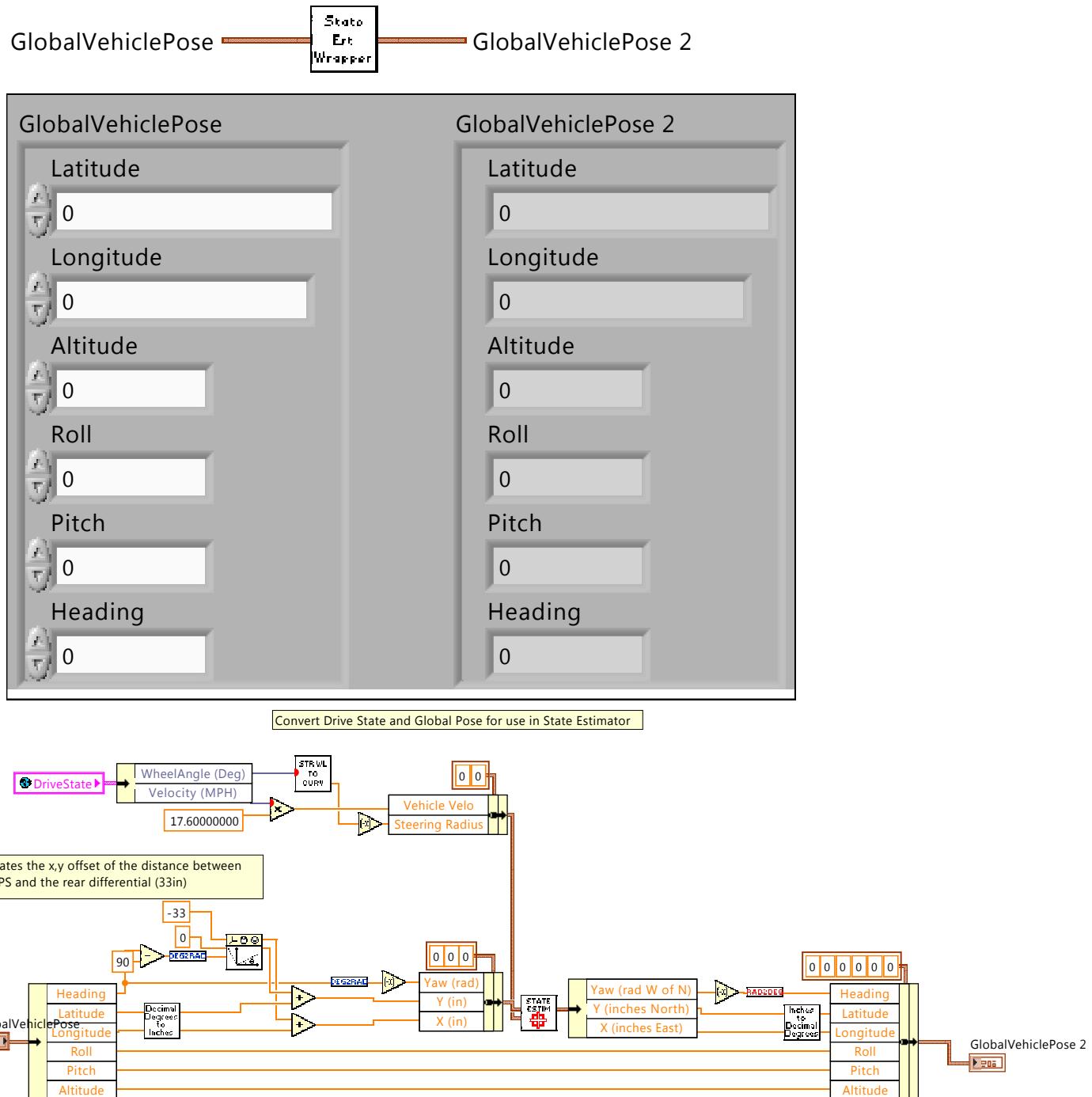
StateEstimatorWrapper.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\Where\StateEstimatorWrapper.vi

Last modified on 4/27/2011 at 5:40 PM

Printed on 4/29/2011 at 1:51 AM

StateEstimatorWrapper.vi



Parse GPGGA.vi

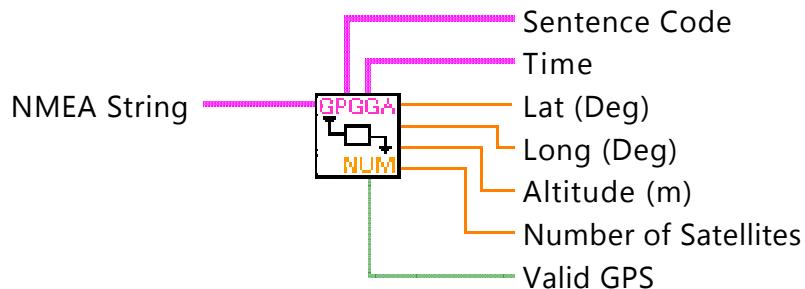
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\GPS\Parse

GPGGA.vi

Last modified on 3/8/2011 at 1:47 AM

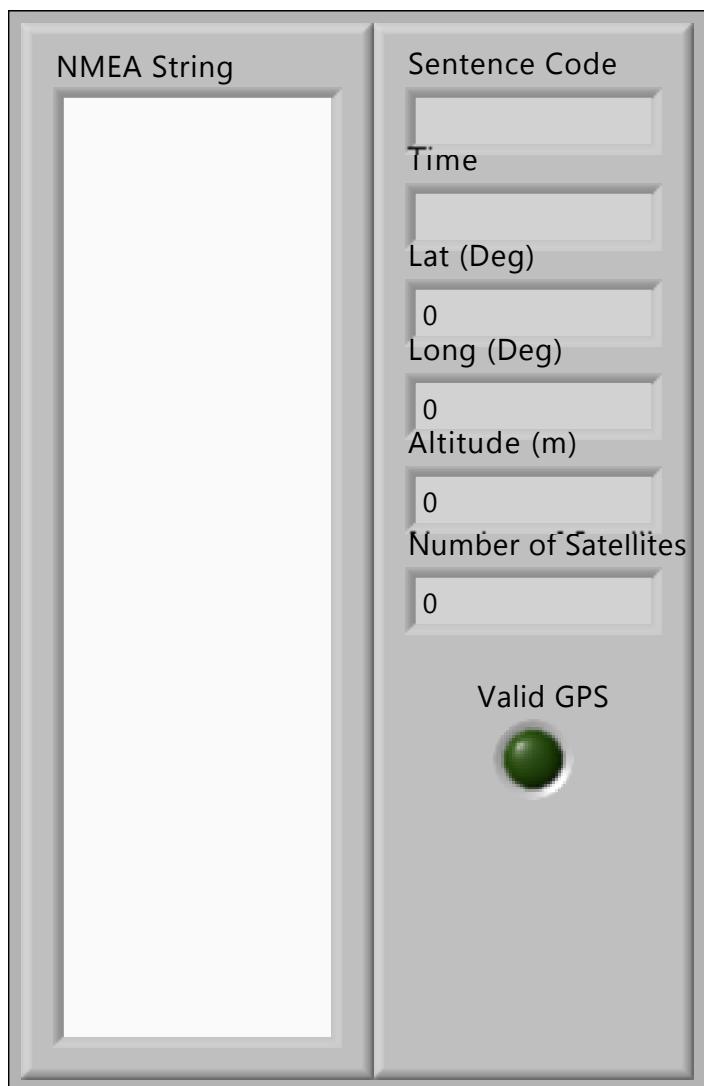
Printed on 4/29/2011 at 1:51 AM

Parse GPGGA.vi



Pass this VI an NMEA sentence and it will parse it as if it's a GPGGA sentence.

The Valid GPS output will be false if there's no fix or if it's not a GPGGA sentence.



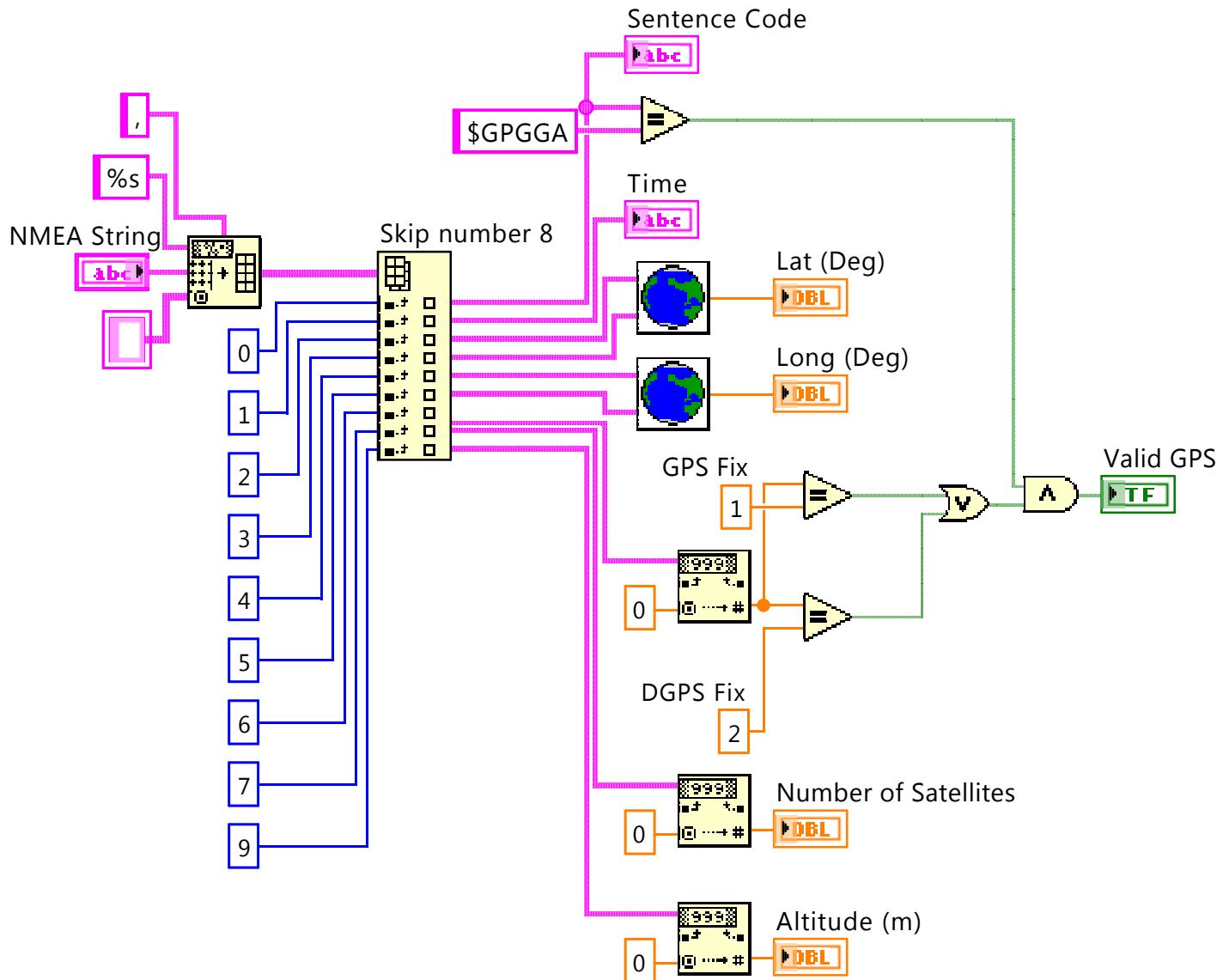


Parse GPGGA.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\GPS\Parse GPGGA.vi

Last modified on 3/8/2011 at 1:47 AM

Printed on 4/29/2011 at 1:51 AM

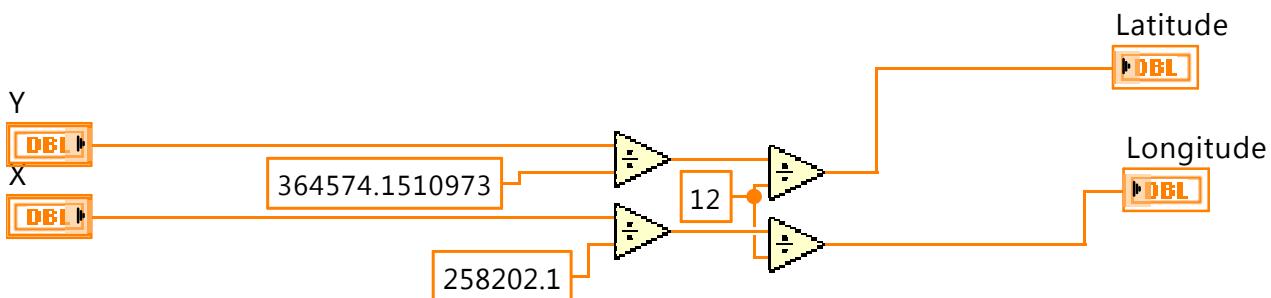
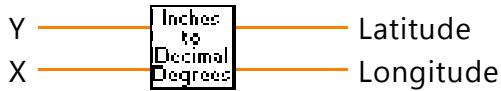


InchesToDecimalDegress.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\InchesToDecimalDegress.vi

Last modified on 3/18/2011 at 3:33 PM

Printed on 4/29/2011 at 1:51 AM

InchesToDecimalDegress.vi



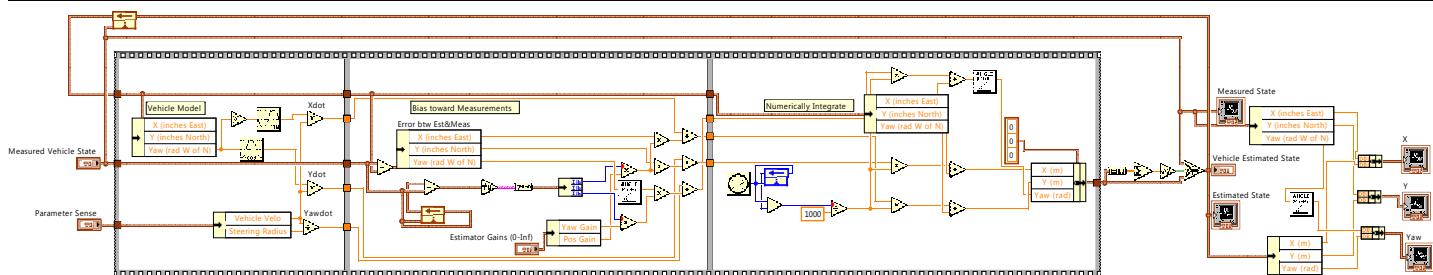
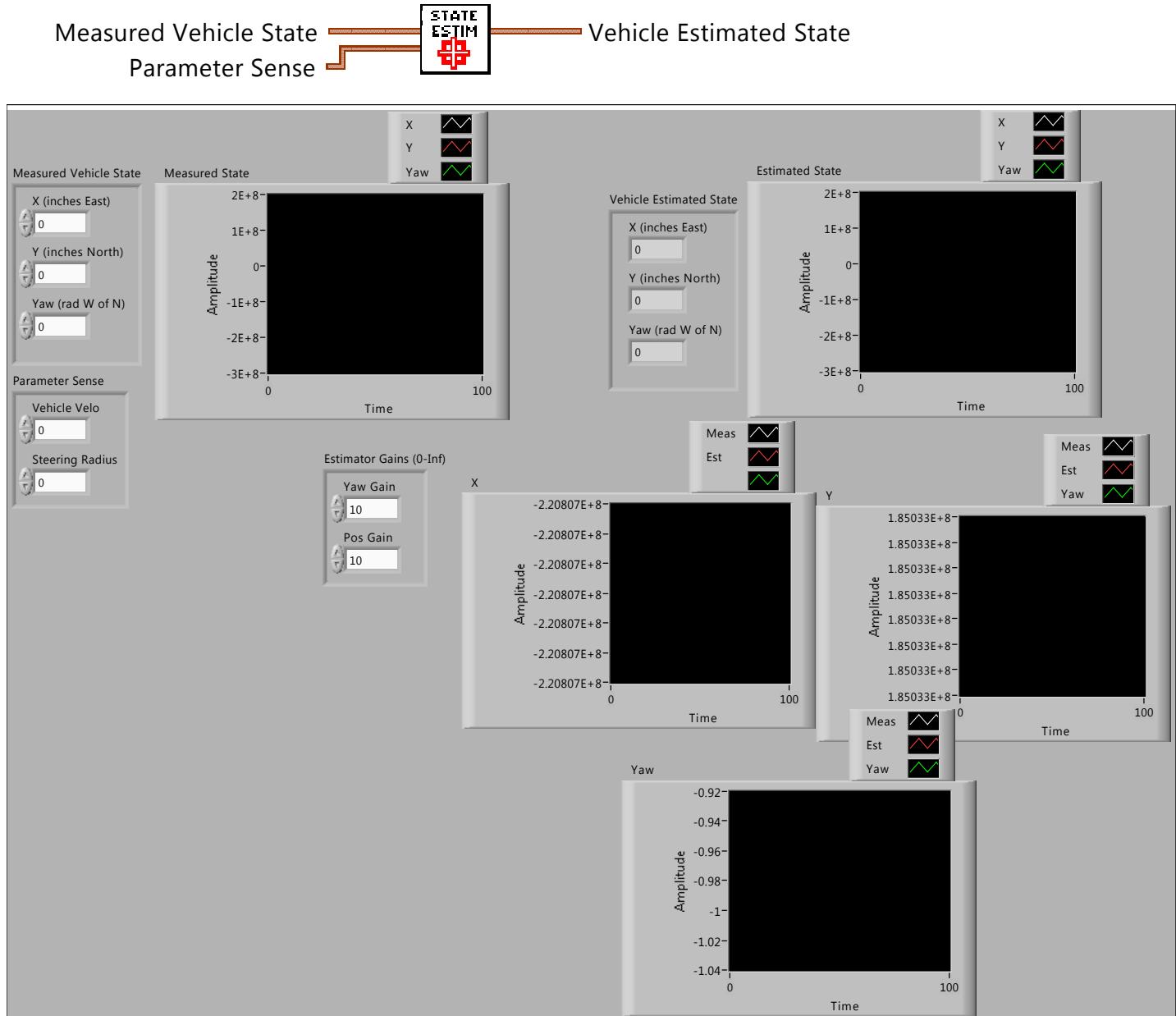
State Estimator.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\Where\State Estimator.vi

Last modified on 3/28/2011 at 11:20 PM

Printed on 4/29/2011 at 1:51 AM

State Estimator.vi



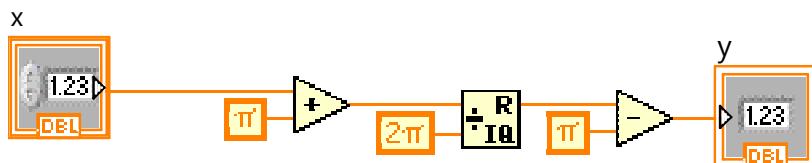
**RadianAngle To PiNegPi.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\Where\

RadianAngle To PiNegPi.vi

Last modified on 3/23/2011 at 4:50 PM

Printed on 4/29/2011 at 1:51 AM

RadianAngle To PiNegPi.vi

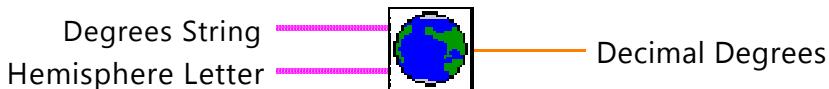
Decimal Degrees from dddmm.mmm.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\GPS\Decimal
Degrees from dddmm.mmm.vi

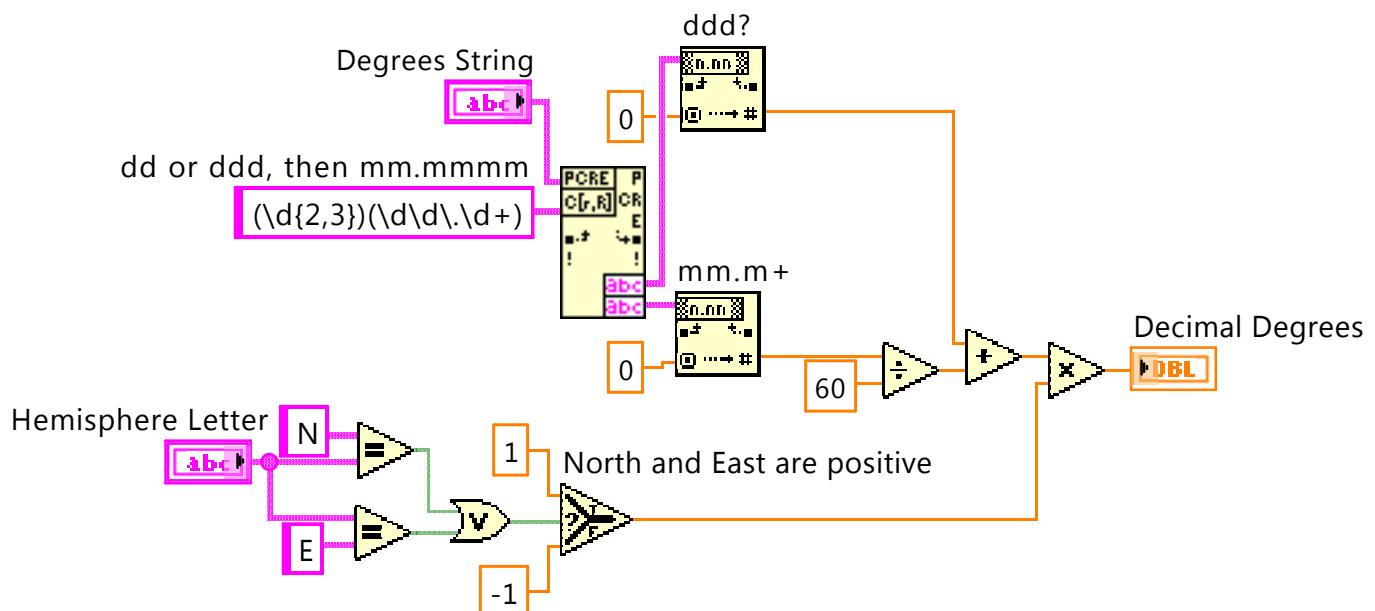
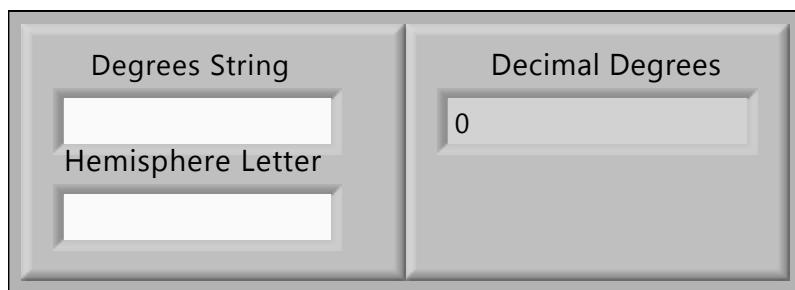
Last modified on 3/8/2011 at 1:47 AM

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Decimal Degrees from dddmm.mmm.vi



Give this VI decimal degrees in the format [d]ddmm.mmmmm and a hemisphere letter (N,E,S,W) and will return decimal degrees with the correct sign.

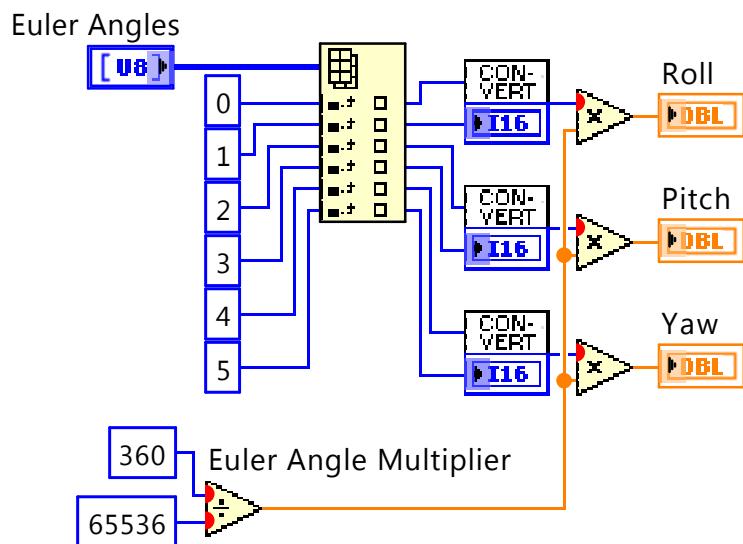
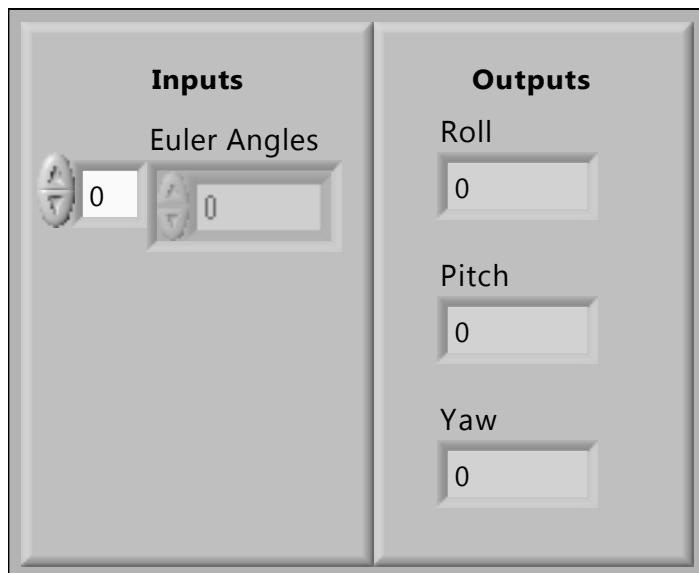
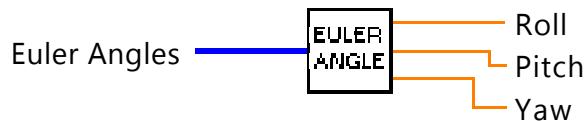


Interpret Euler Angles.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\INS\Interpret Euler Angles.vi

Last modified on 3/8/2011 at 1:37 AM

Printed on 4/29/2011 at 1:51 AM

Interpret Euler Angles.vi

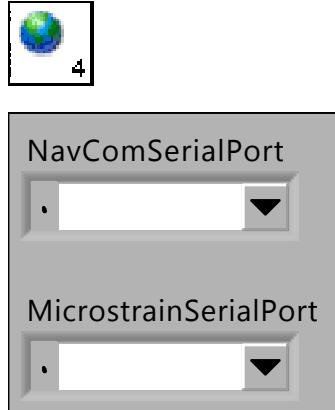
EllaPorts.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Neurons\EllaPorts.vi

Last modified on 3/2/2011 at 10:44 AM

Printed on 4/29/2011 at 1:51 AM

EllaPorts.vi

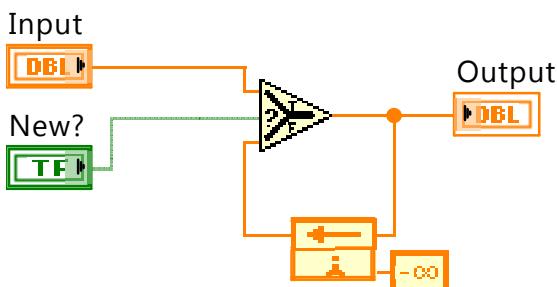
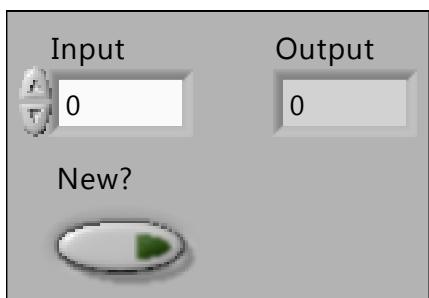


ChangeOnNew.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Midbrain\SensorThalamus\Where\
ChangeOnNew.vi

Last modified on 4/27/2011 at 12:23 PM

Printed on 4/29/2011 at 1:51 AM

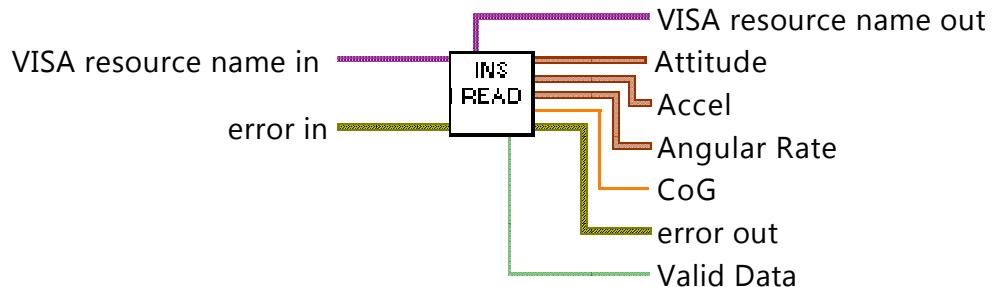
ChangeOnNew.vi

INS Read.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\INS\INS Read.vi

Last modified on 4/27/2011 at 11:37 AM

Printed on 4/29/2011 at 1:51 AM

INS Read.vi

Reads the instantaneous Euler Angles and Vectors from the INS COM port.

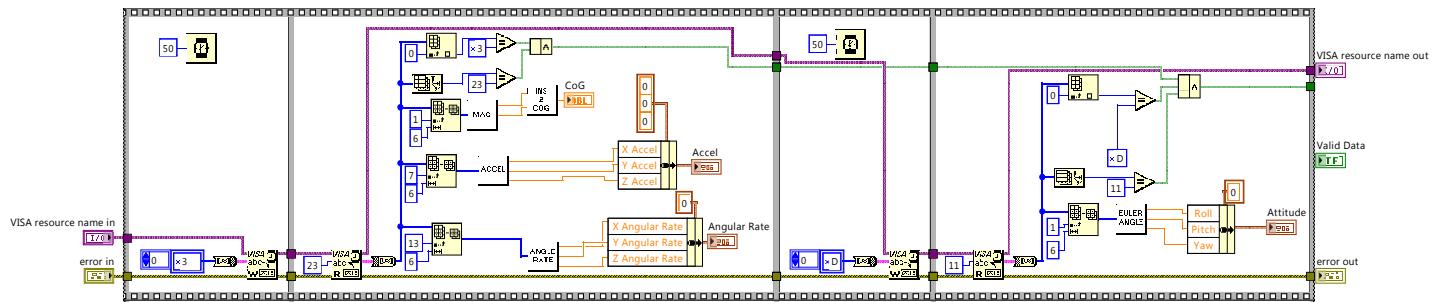
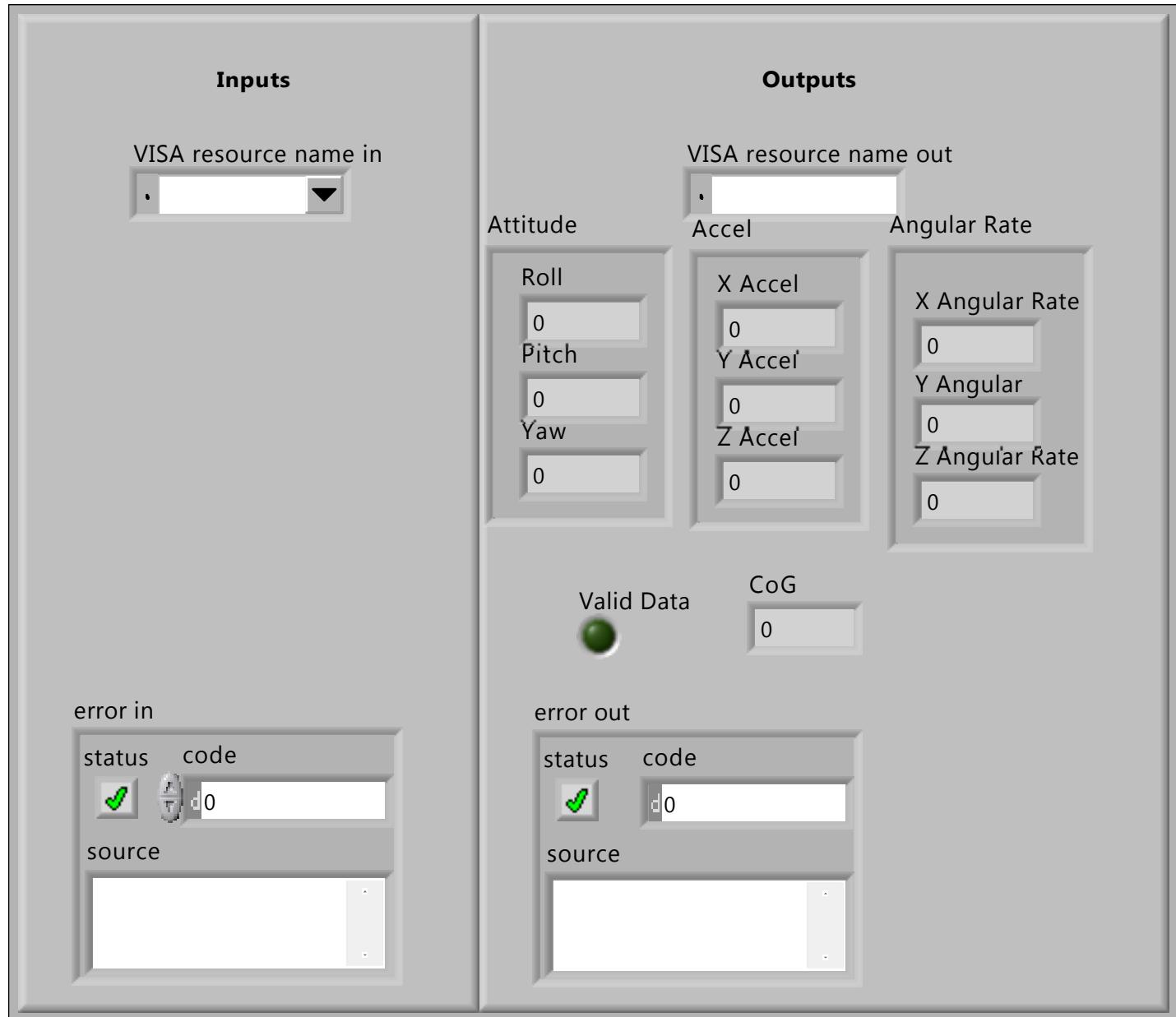
This uses polling, so there is a certain delay between the request being sent, and the INS sending back message. Therefore this VI takes a non-trivial amount of time to execute.

INS Read.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\INS\INS Read.vi

Last modified on 4/27/2011 at 11:37 AM

Printed on 4/29/2011 at 1:51 AM





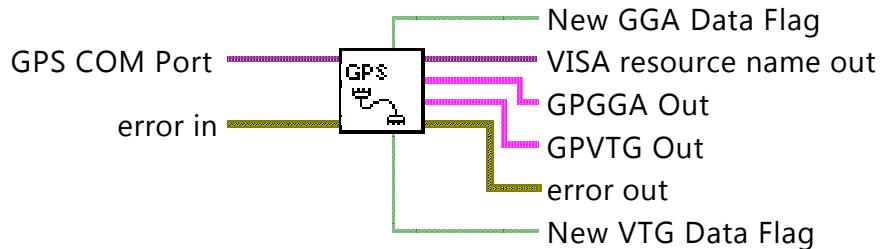
GPS Read.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\GPS\GPS Read.vi

Last modified on 3/8/2011 at 9:04 PM

Printed on 4/29/2011 at 1:51 AM

GPS Read.vi



Give this VI a COM port to listen to and it will send out all NMEA sentences it finds, with their leading dollar signs. In between new messages the old message will continue to be output, but the new data will go low.

GPS Read.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\GPS\GPS Read.vi

Last modified on 3/8/2011 at 9:04 PM

Printed on 4/29/2011 at 1:51 AM



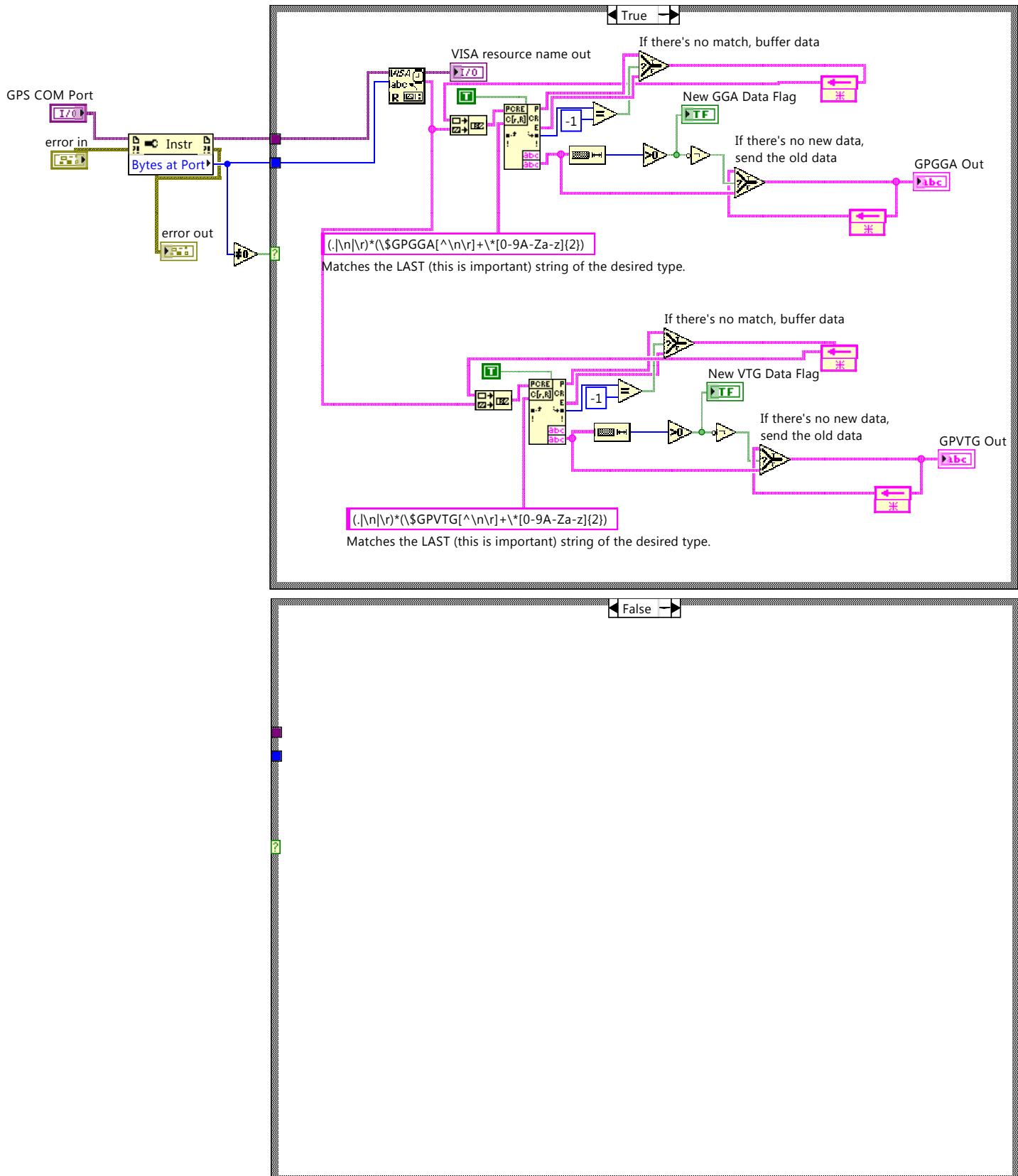


GPS Read.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\GPS\GPS Read.vi

Last modified on 3/8/2011 at 9:04 PM

Printed on 4/29/2011 at 1:51 AM

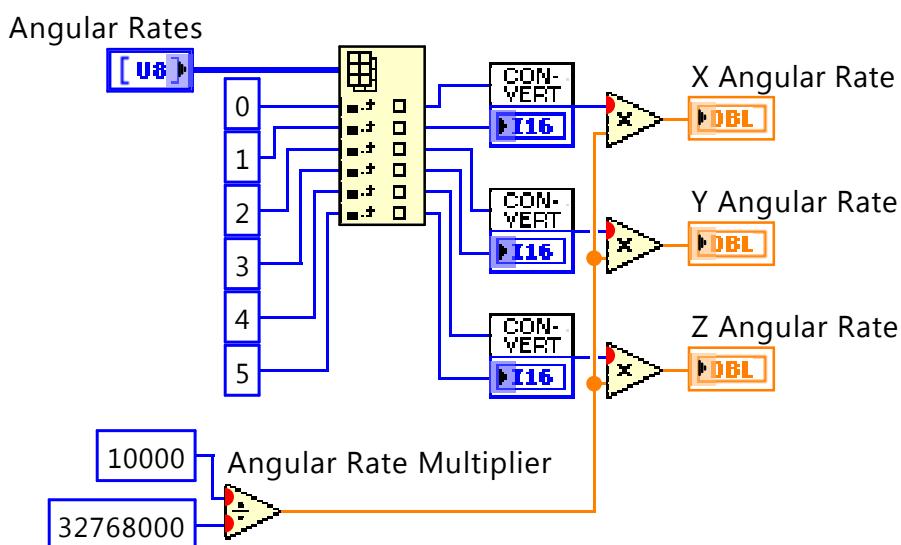
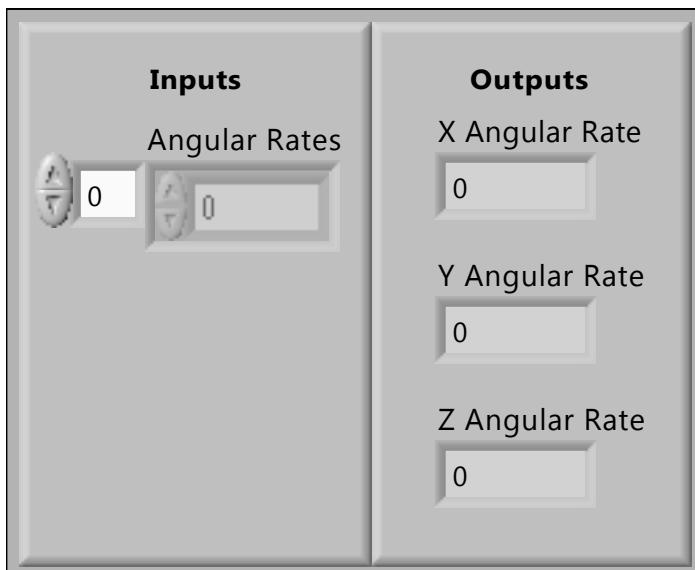
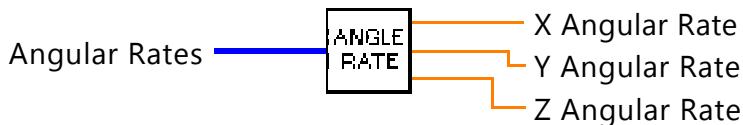


Interpret Angular Rates.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\INS\Interpret
Angular Rates.vi

Last modified on 3/8/2011 at 1:37 AM

Printed on 4/29/2011 at 1:51 AM

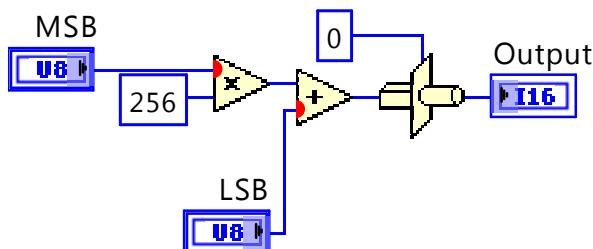
Interpret Angular Rates.vi

Convert Bytes to I16.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\INS\Convert Bytes to I16.vi

Last modified on 3/8/2011 at 1:37 AM

Printed on 4/29/2011 at 1:51 AM

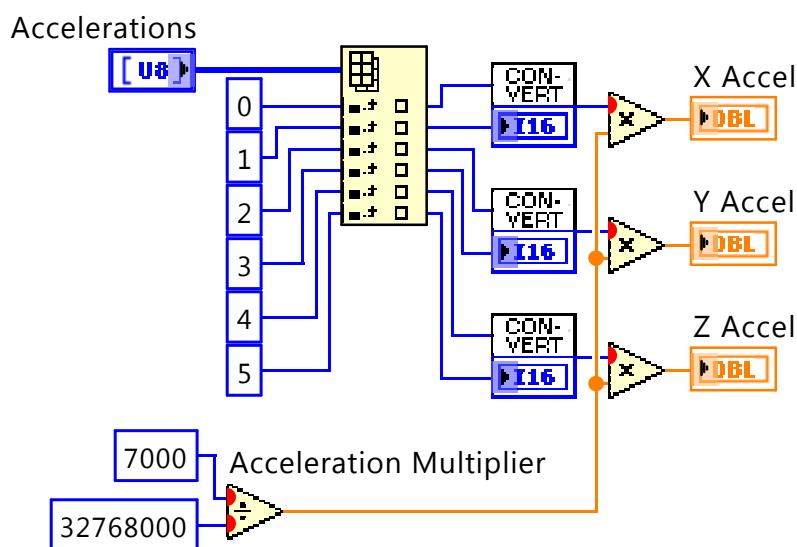
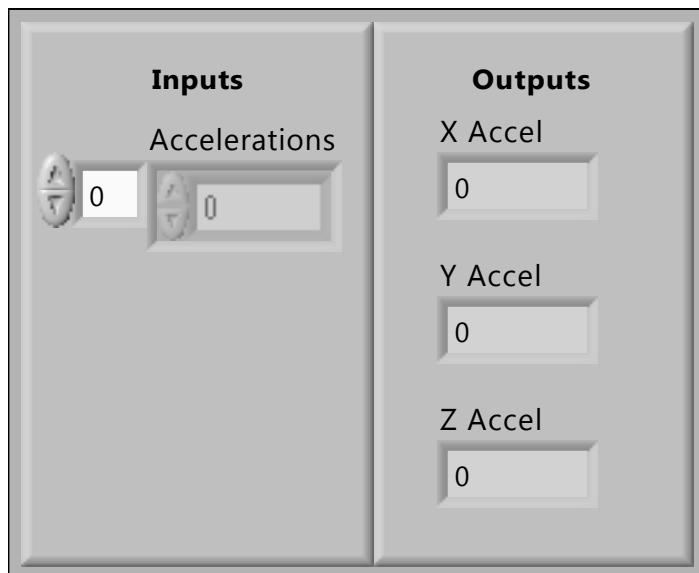
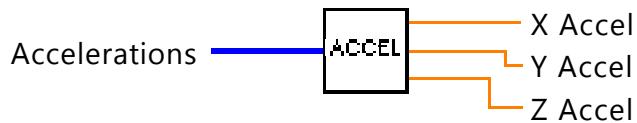
Convert Bytes to I16.vi

Interpret Accelerations.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\INS\Interpret Accelerations.vi

Last modified on 3/8/2011 at 1:37 AM

Printed on 4/29/2011 at 1:51 AM

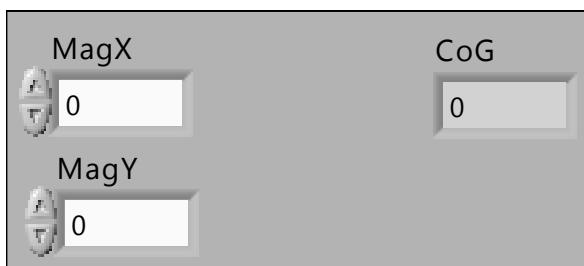
Interpret Accelerations.vi

INSMag2Cog.vi

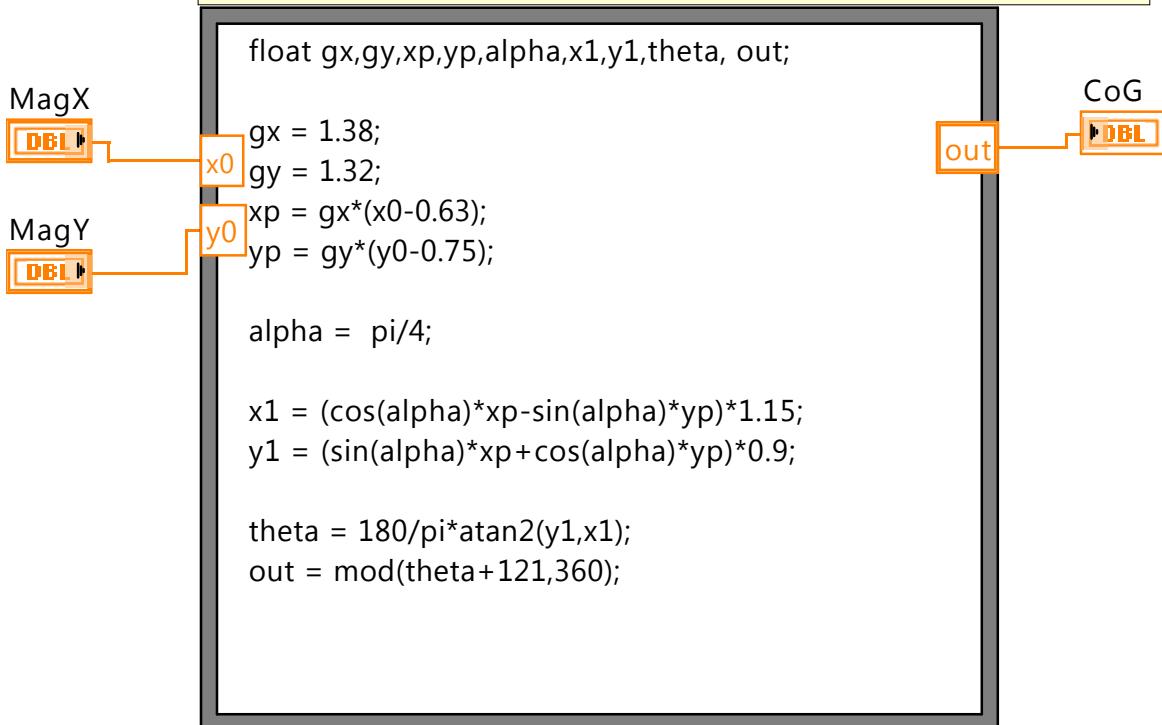
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\INS\INSMag2Cog.vi

Last modified on 4/11/2011 at 9:56 PM

Printed on 4/29/2011 at 1:51 AM

INSMag2Cog.vi

This converts the INS magnetic field vector to course over ground. It uses empirically derived constants from the data set saved in the calibration folder.

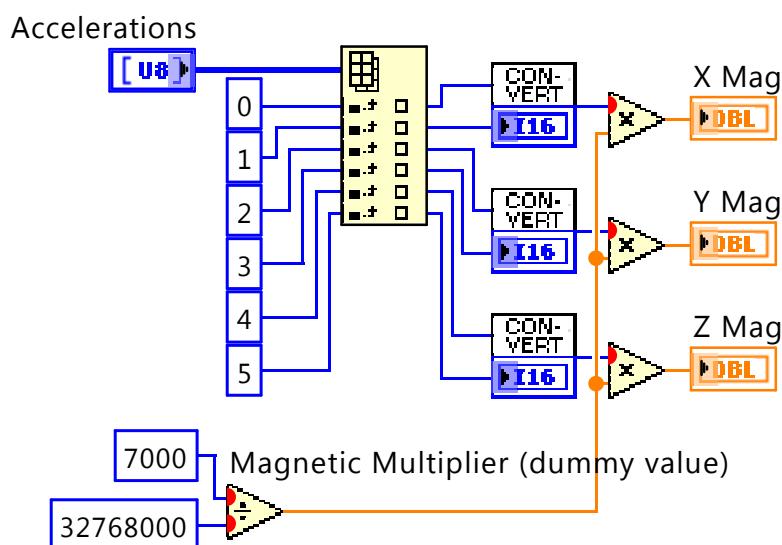
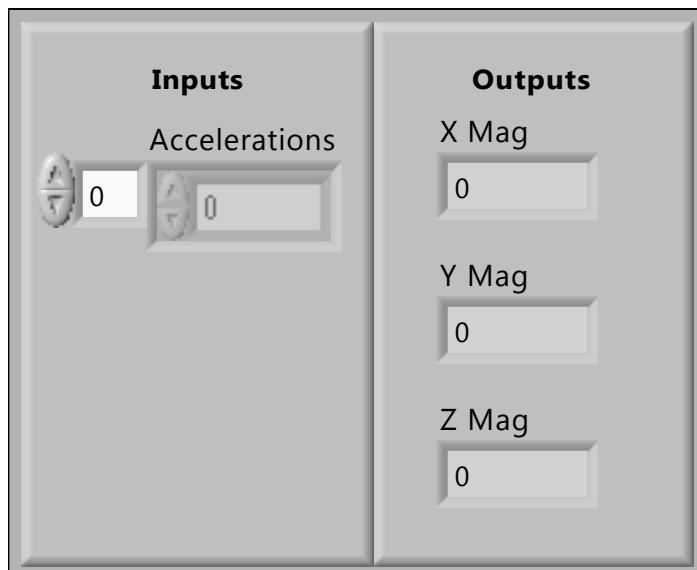
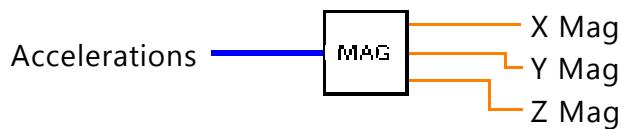


Interpret Magnetometer.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\Where\INS\Interpret Magnetometer.vi

Last modified on 4/11/2011 at 12:26 PM

Printed on 4/29/2011 at 1:51 AM

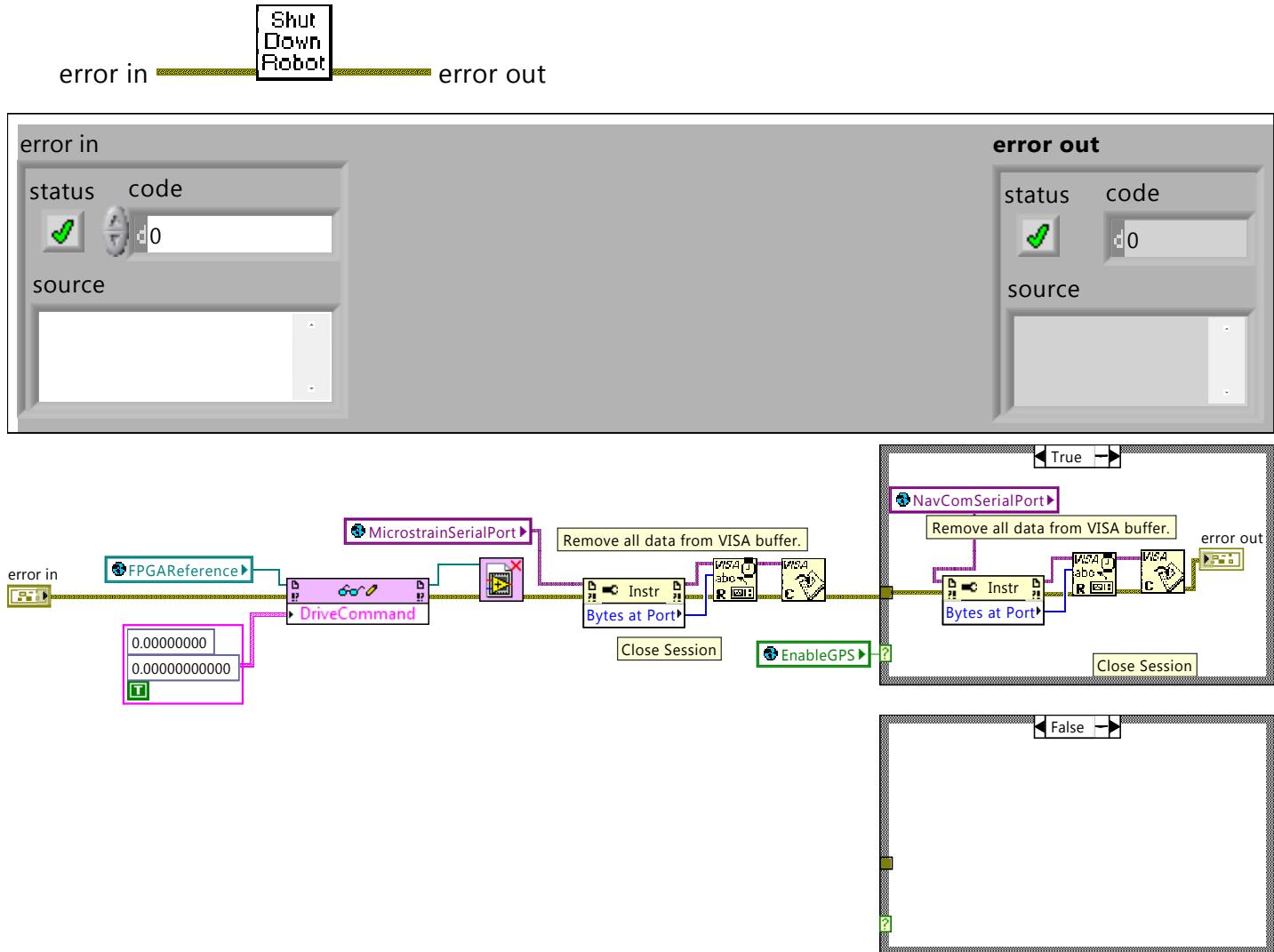
Interpret Magnetometer.vi

ShutDownRobot.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\ShutDownRobot.vi

Last modified on 4/27/2011 at 5:40 PM

Printed on 4/29/2011 at 1:51 AM

ShutDownRobot.vi

LidarOffsets.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\LidarOffsets.ctl

Last modified on 3/2/2011 at 2:30 PM

Printed on 4/29/2011 at 1:51 AM

LidarOffsets.ctl



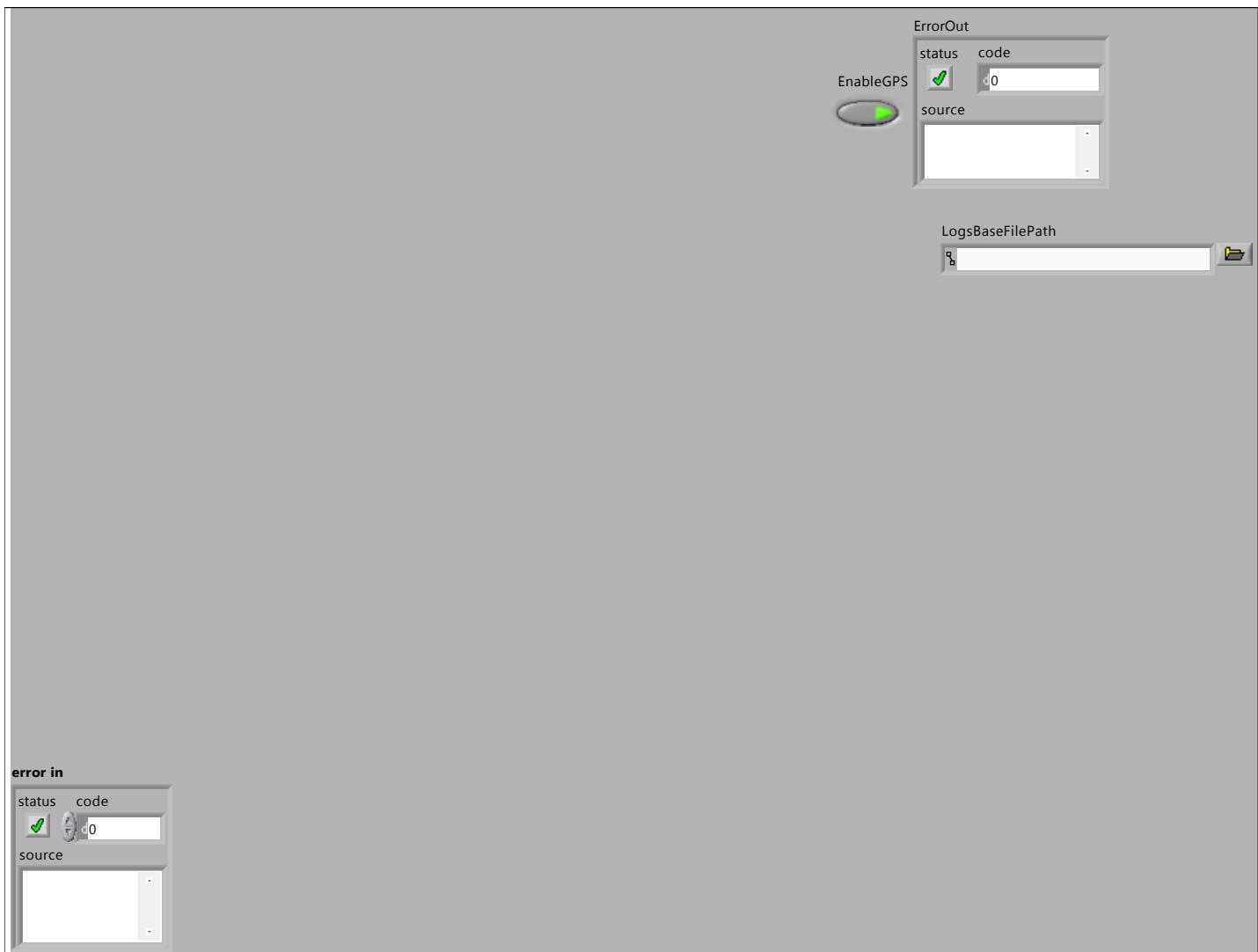
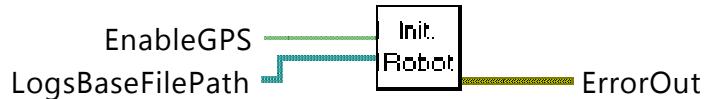
x_offset	Theta_y
<input type="text" value="2000"/>	<input type="text" value="0.000000"/>
y_offset	Theta_z
<input type="text" value="450"/>	<input type="text" value="45.000000"/>
z_offset	
<input type="text" value="1000"/>	

InitializeRobot.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\InitializeRobot.vi

Last modified on 4/28/2011 at 1:29 PM

Printed on 4/29/2011 at 1:51 AM

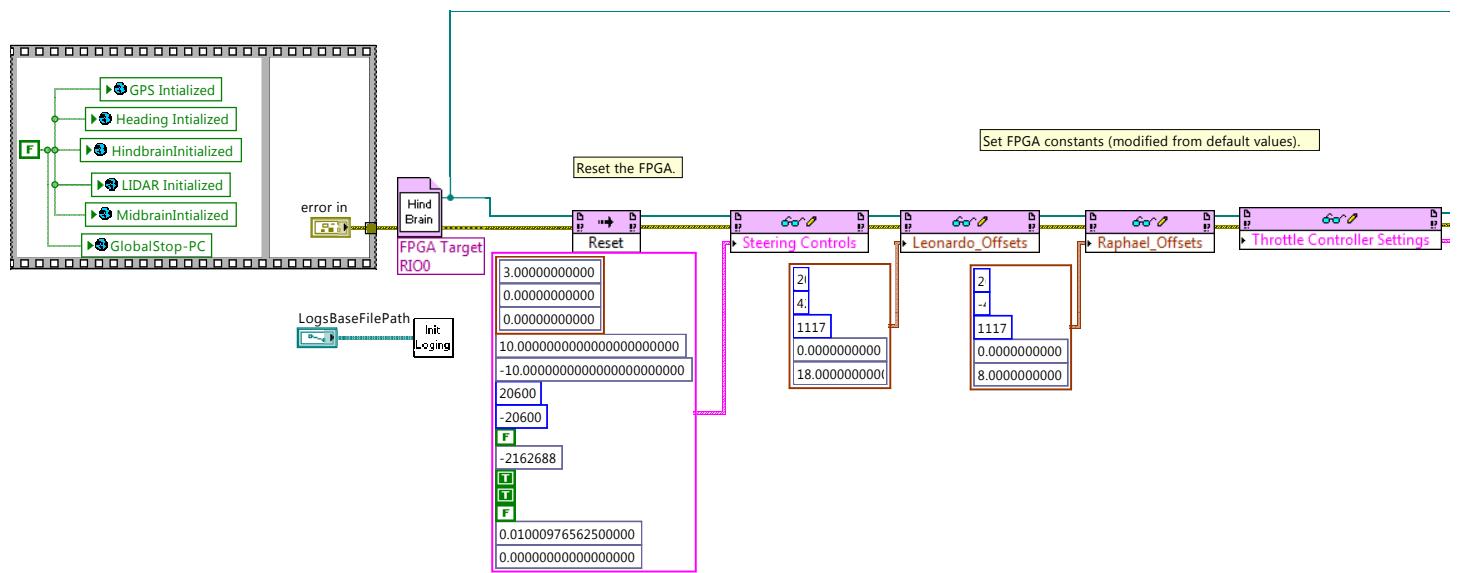
InitializeRobot.vi

InitializeRobot.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\InitializeRobot.vi

Last modified on 4/28/2011 at 1:29 PM

Printed on 4/29/2011 at 1:51 AM

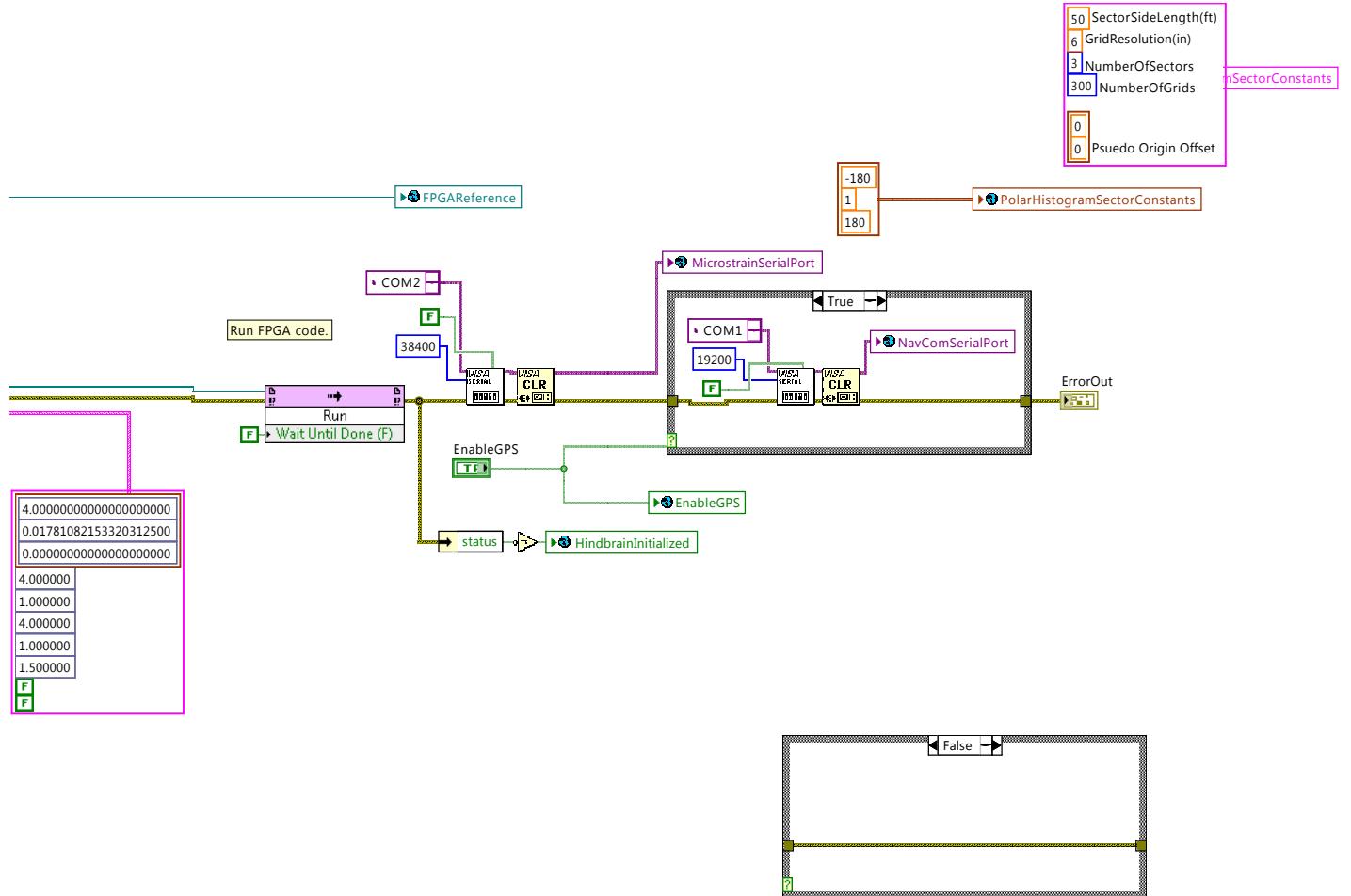


InitializeRobot.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\InitializeRobot.vi

Last modified on 4/28/2011 at 1:29 PM

Printed on 4/29/2011 at 1:51 AM

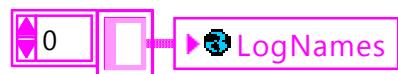


InitLogging.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Utilities\Logging\InitLogging.vi

Last modified on 3/26/2011 at 5:46 PM

Printed on 4/29/2011 at 1:51 AM

InitLogging.vi

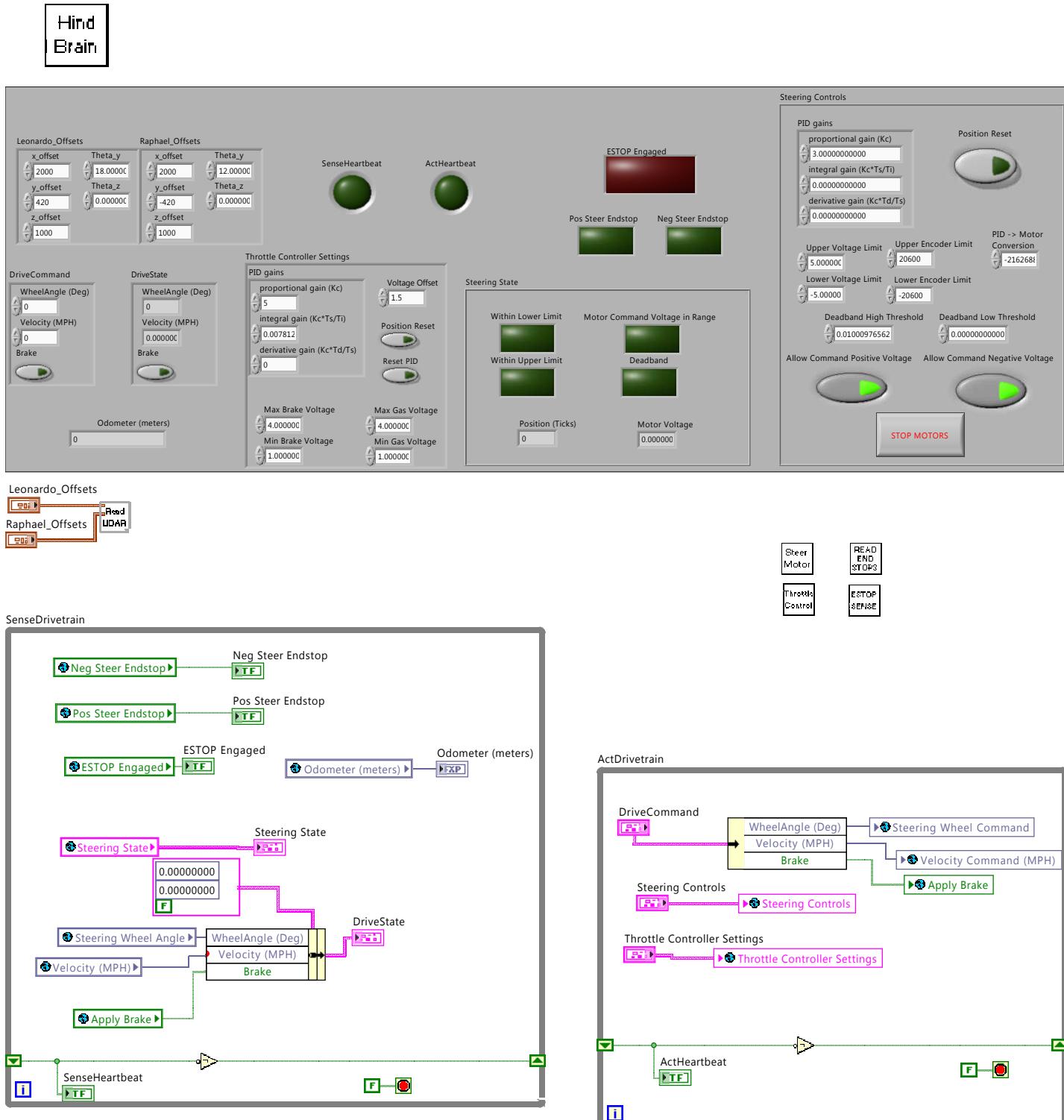
Hindbrain.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Hindbrain.vi

Last modified on 4/29/2011 at 1:17 AM

Printed on 4/29/2011 at 1:55 AM

Hindbrain.vi



LV FPGA Serial Read Write.vi

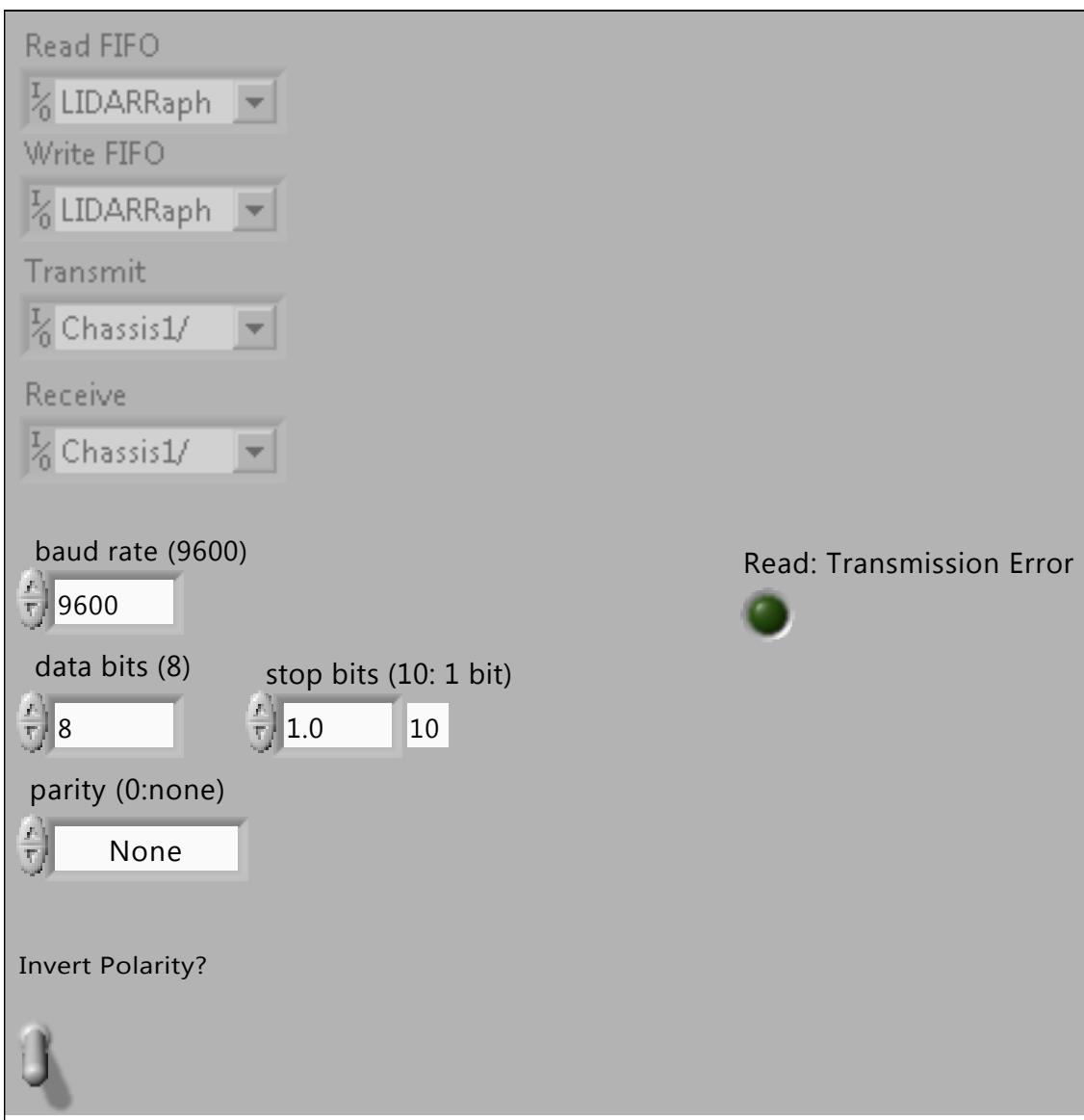
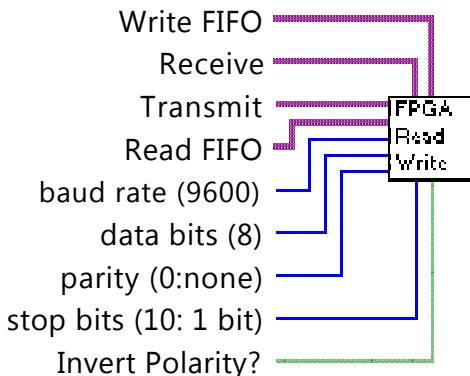
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LV FPGA Serial Read Write.vi

Last modified on 2/16/2011 at 9:32 AM

Printed on 4/29/2011 at 1:55 AM

LV FPGA Serial Read Write.vi



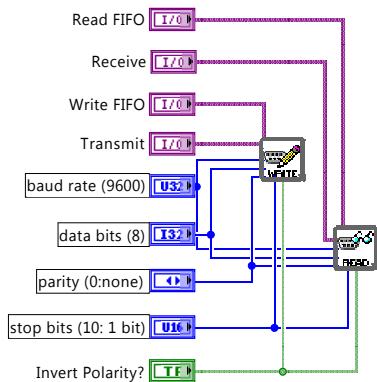
LV FPGA Serial Read Write.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LV FPGA Serial Read Write.vi

Last modified on 2/16/2011 at 9:32 AM

Printed on 4/29/2011 at 1:55 AM

Read: Transmission Error

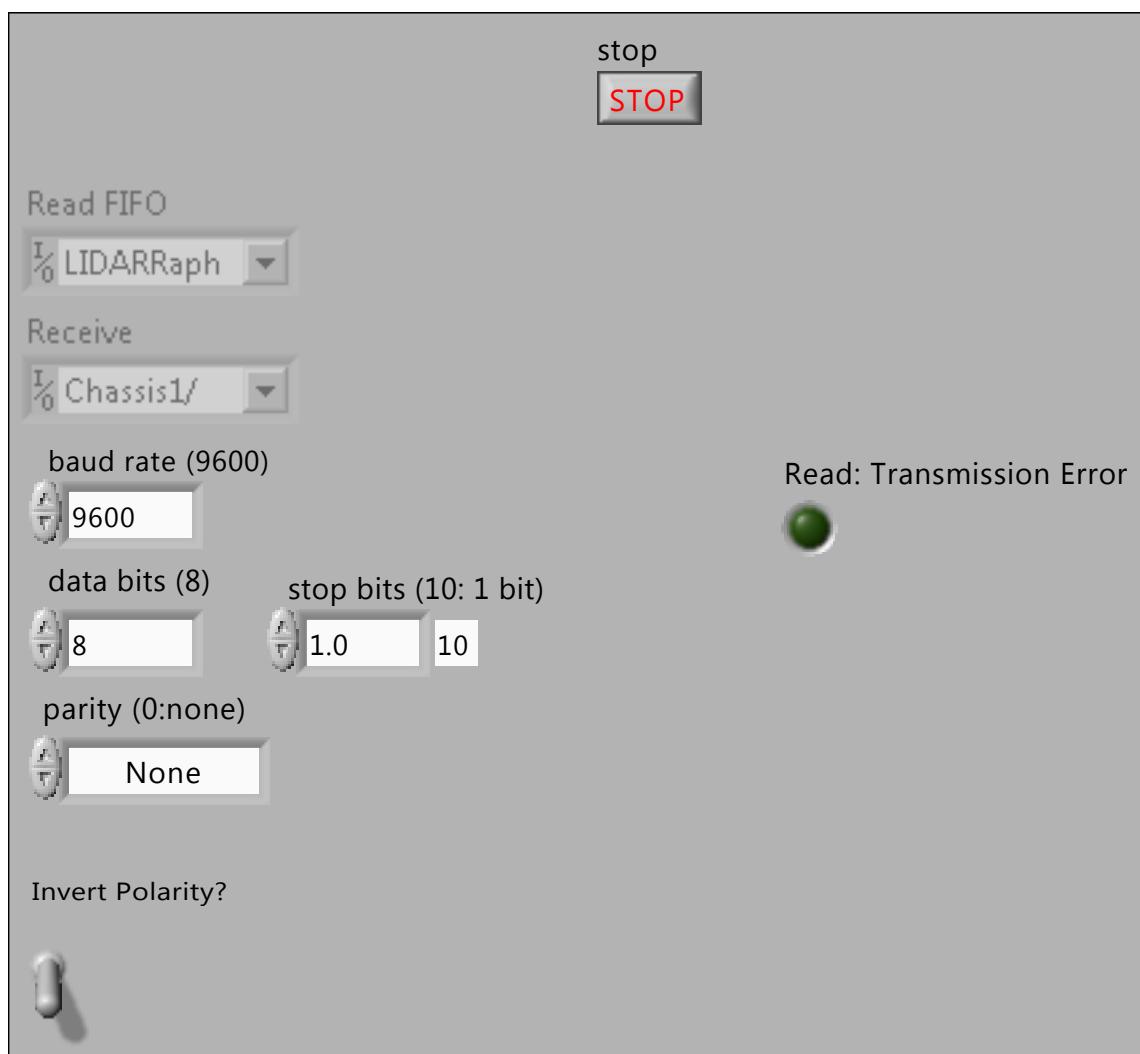
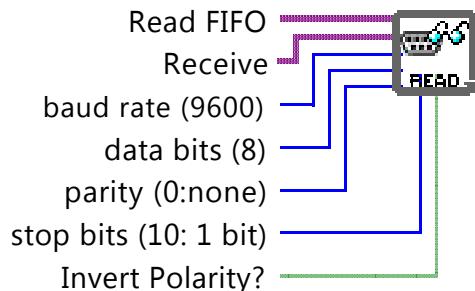
**LV FPGA Serial Read.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LV FPGA Serial Read.vi

Last modified on 2/16/2011 at 9:32 AM

Printed on 4/29/2011 at 1:55 AM

LV FPGA Serial Read.vi



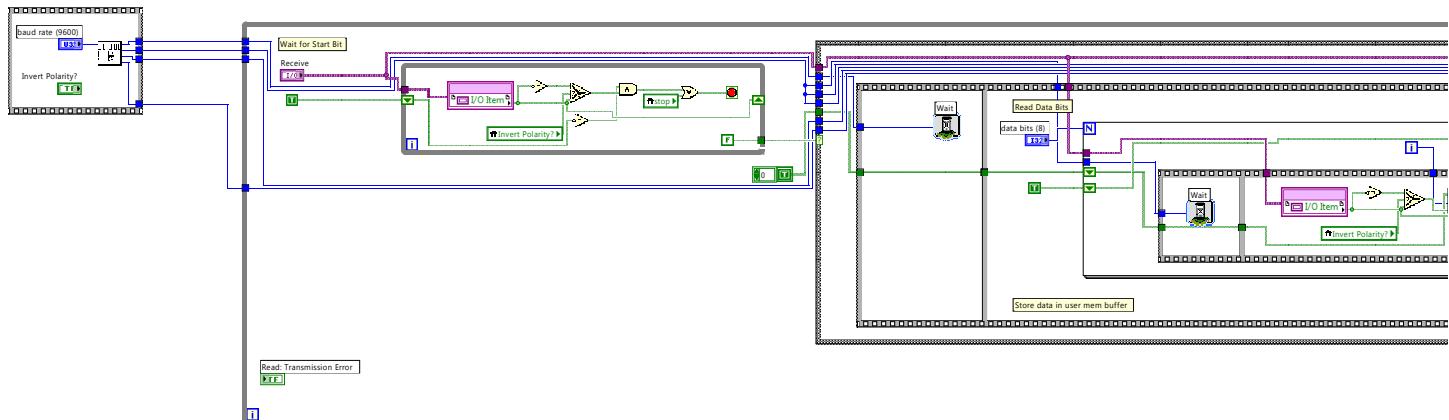
LV FPGA Serial Read.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LV FPGA Serial Read.vi

Last modified on 2/16/2011 at 9:32 AM

Printed on 4/29/2011 at 1:55 AM



Delays for a certain time interval before the output data dependence becomes valid. RT Module The Wait Express VI waits the specified count time and then returns the value of a free running counter.



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Delays for a certain time interval before the output data dependence becomes valid. RT Module The Wait Express VI waits the specified count time and then returns the value of a free running counter.



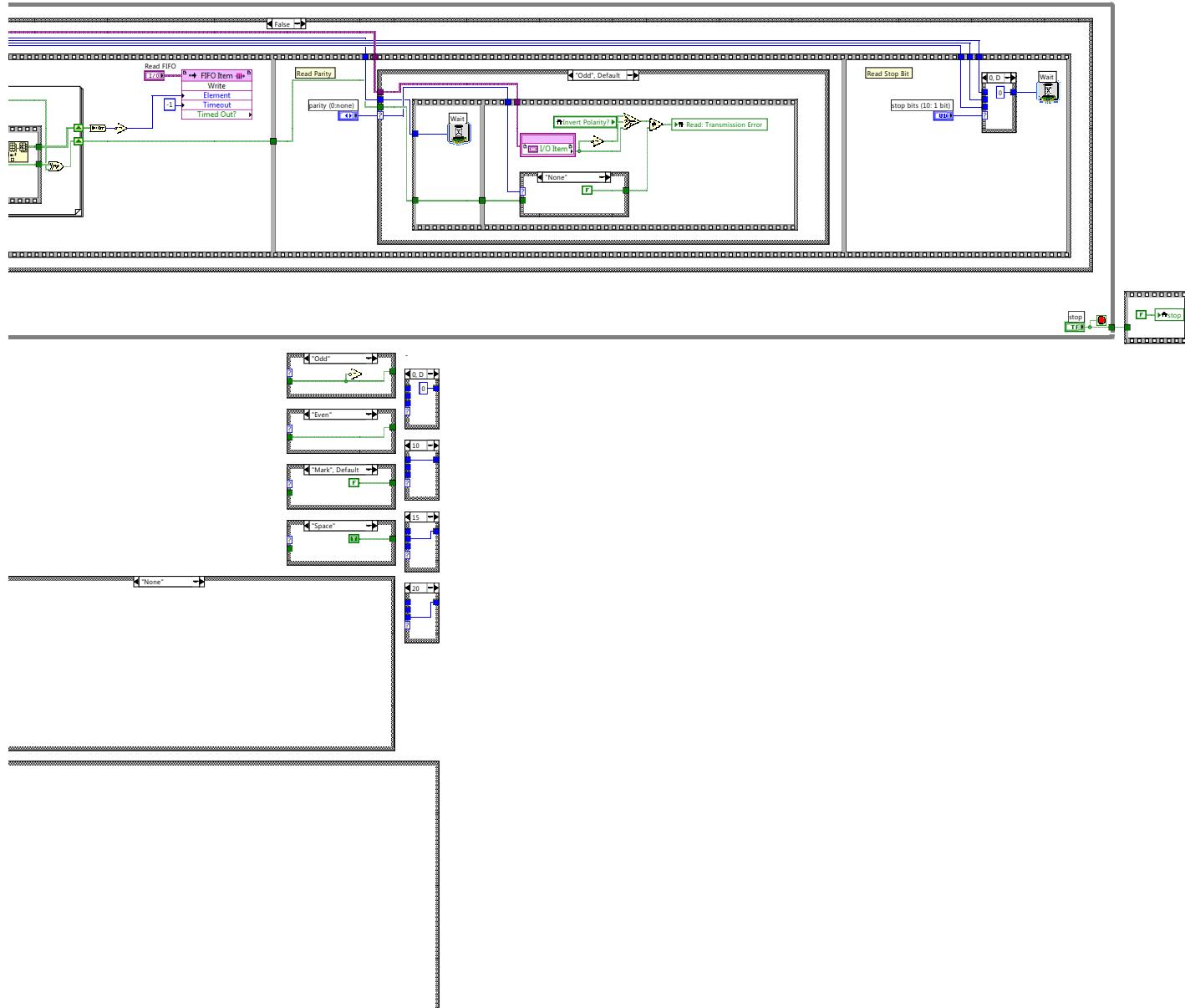
LV FPGA Serial Read.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LV FPGA Serial Read.vi

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LV FPGA Serial Read.vi

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LV FPGA Serial Read.vi

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Delays for a certain time interval before the output data dependence becomes valid. RT
Module The Wait Express VI waits the specified count time and then returns the value of a
free running counter.



LidarSerialReadWrite.vi

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LidarSerialReadWrite.vi

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LidarSerialReadWrite.vi

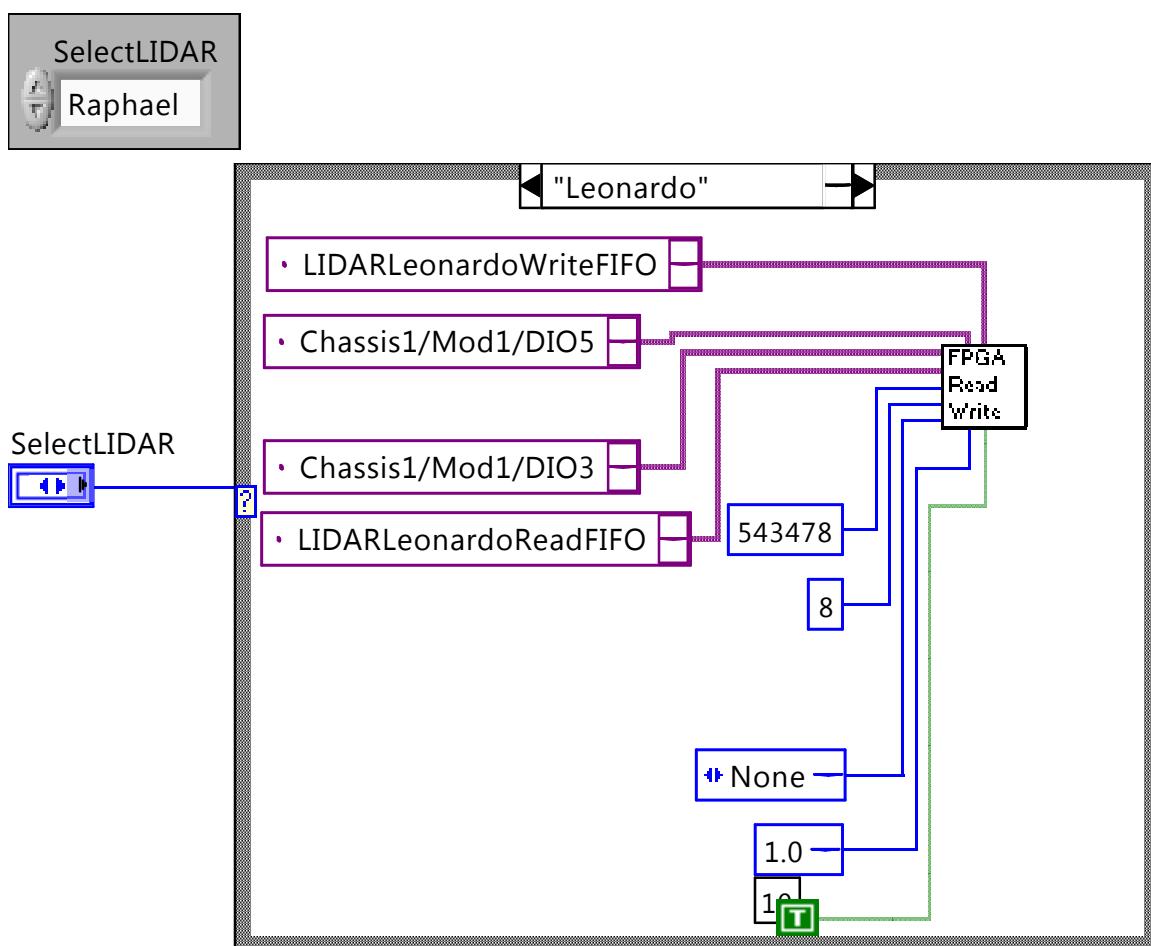
SelectLIDAR



LidarSerialReadWrite.vi uses the FPGA DIO to read and write serial data with the LIDAR. Data to send to the LIDAR is read from a FIFO, and data read from the LIDAR is written to a FIFO for later processing.

< b > Inputs

SelectLIDAR - selects which LIDAR to talk to





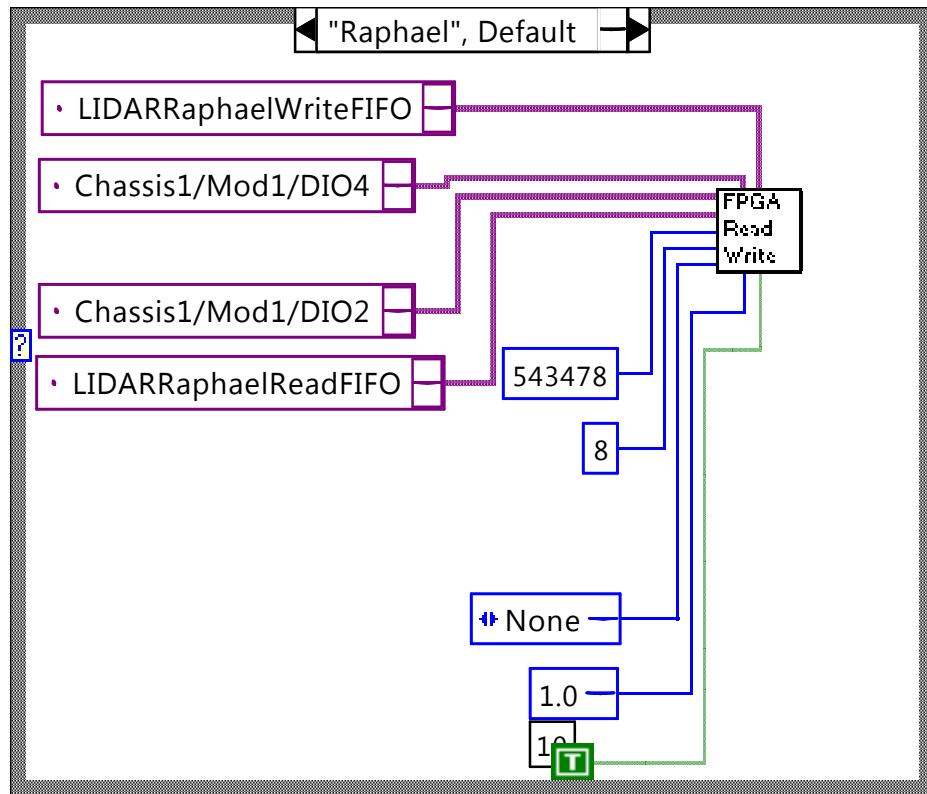
LidarSerialReadWrite.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarSerialReadWrite.vi

Last modified on 3/2/2011 at 2:54 PM

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LidarRotateYZ.vi

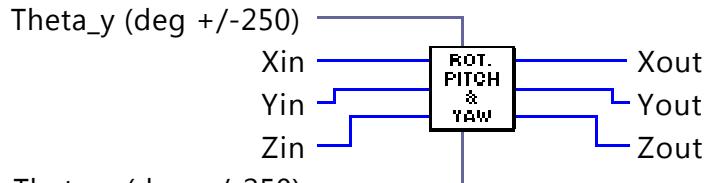
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarRotateYZ.vi

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LidarRotateYZ.vi



Theta_y (deg +/-250)

LidarRotateYZ.vi rotates a point in XYZ of LIDAR frame to XYZ in the gator's frame.

Inputs

Xin - x position of point

Yin - y position of point

Zin - z position of point

Theta_y - pitch of the LIDAR head in degrees below horizontal. Note that this only works for values in the range [-250,250].

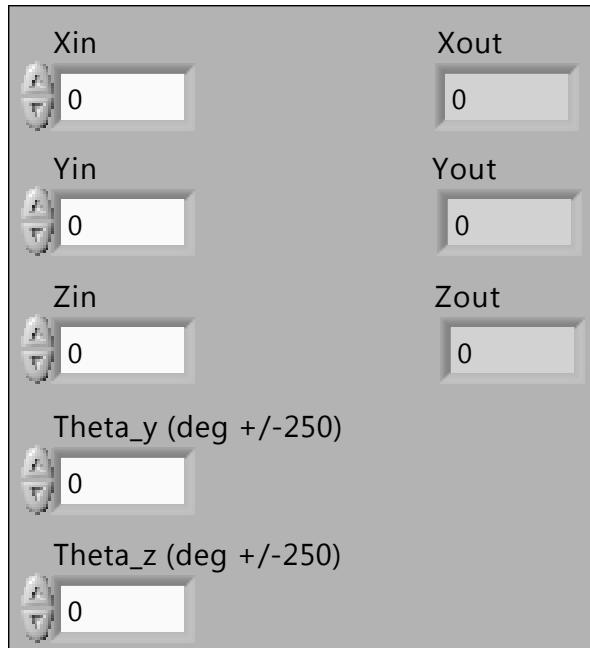
Theta_z - yaw of the LIDAR head in degrees left of forward. Note that this only works for values in the range [-250,250].

Outputs

Xout - new x position of point

Yout - new y position of point

Zout - new z position of point



LidarRotateYZ.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

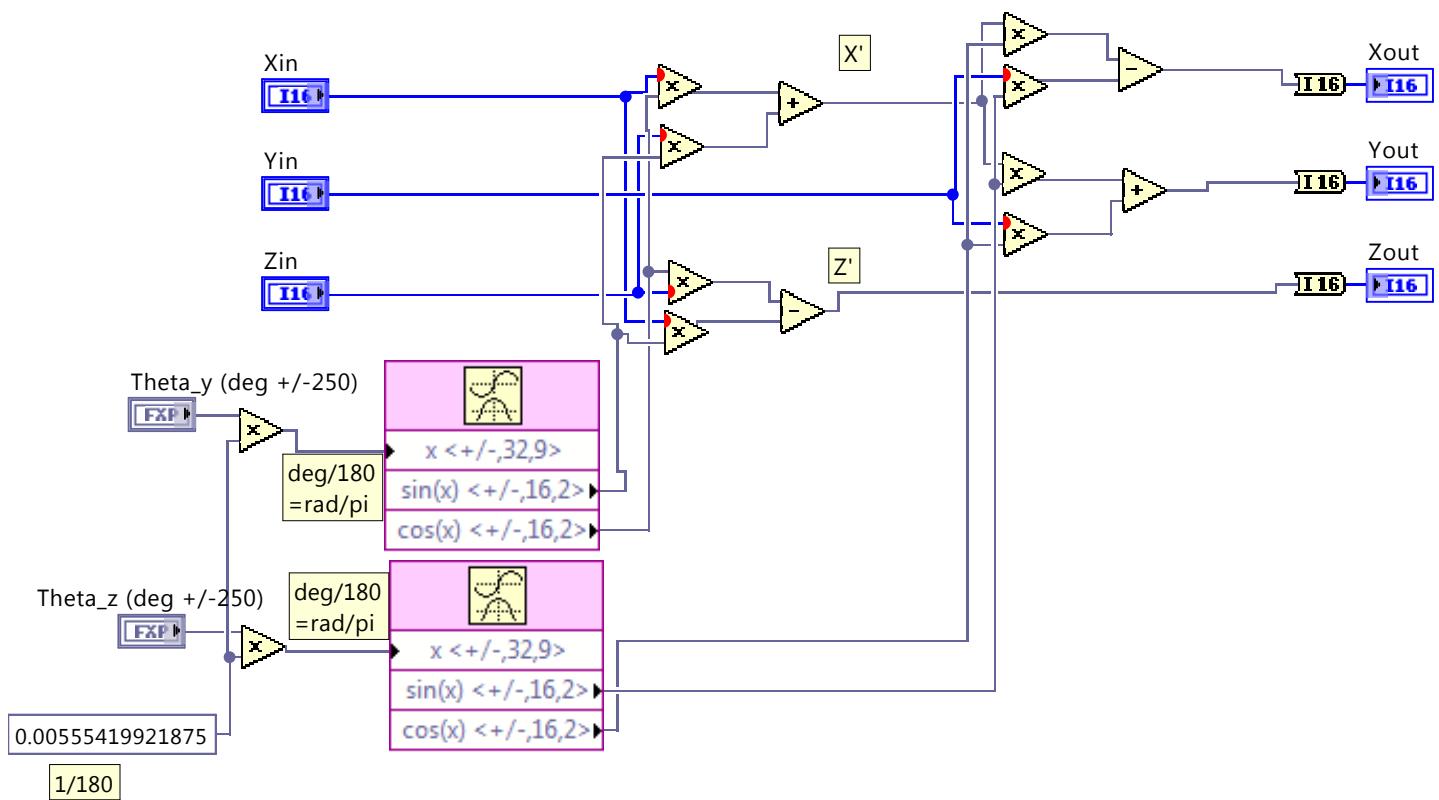
LidarRotateYZ.vi

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Rotation about Y axis:
 $X' = \cos(T_y)X + \sin(T_y)Z$
 $Y' = Y$
 $Z' = \cos(T_y)Z - \sin(T_y)X$

Rotation about Z axis:
 $X_f = \cos(T_z)X' - \sin(T_z)Y'$
 $Y_f = \sin(T_z)X' + \cos(T_z)Y'$
 $Z_f = Z'$



Lidar2RobotTransform.vi

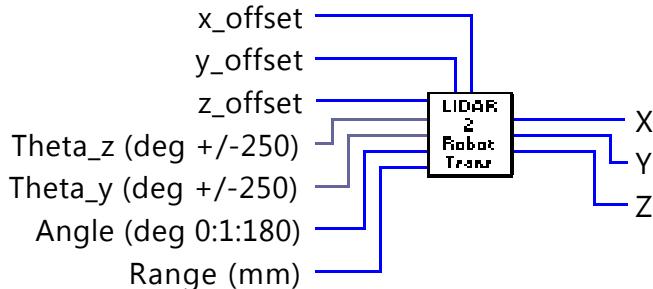
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

Lidar2RobotTransform.vi

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Lidar2RobotTransform.vi



Lidar2RobotTransform.vi takes data from the LIDAR and transforms it into cartesian coordinates in robot's frame of reference.

Inputs

Range (mm) - range value from LIDAR in mm

Angle - angle of LIDAR point in integer degrees

Theta_y - pitch angle of the LIDAR measured degrees below horizontal in range [-250,250]

Theta_z - yaw of LIDAR measured in degrees left of forwards in range [-250,250]

x_offset - x offset of LIDAR in robot frame in mm (distance from rear differential to LIDAR)

y_offset - y offset of LIDAR in robot frame in mm (distance from centerline to LIDAR)

z_offset - z offset of LIDAR in robot frame in mm (distance from ground to LIDAR)

Outputs

X - x value of point in robot frame

Y - y value of point in robot frame

Z - z value of point in robot frame

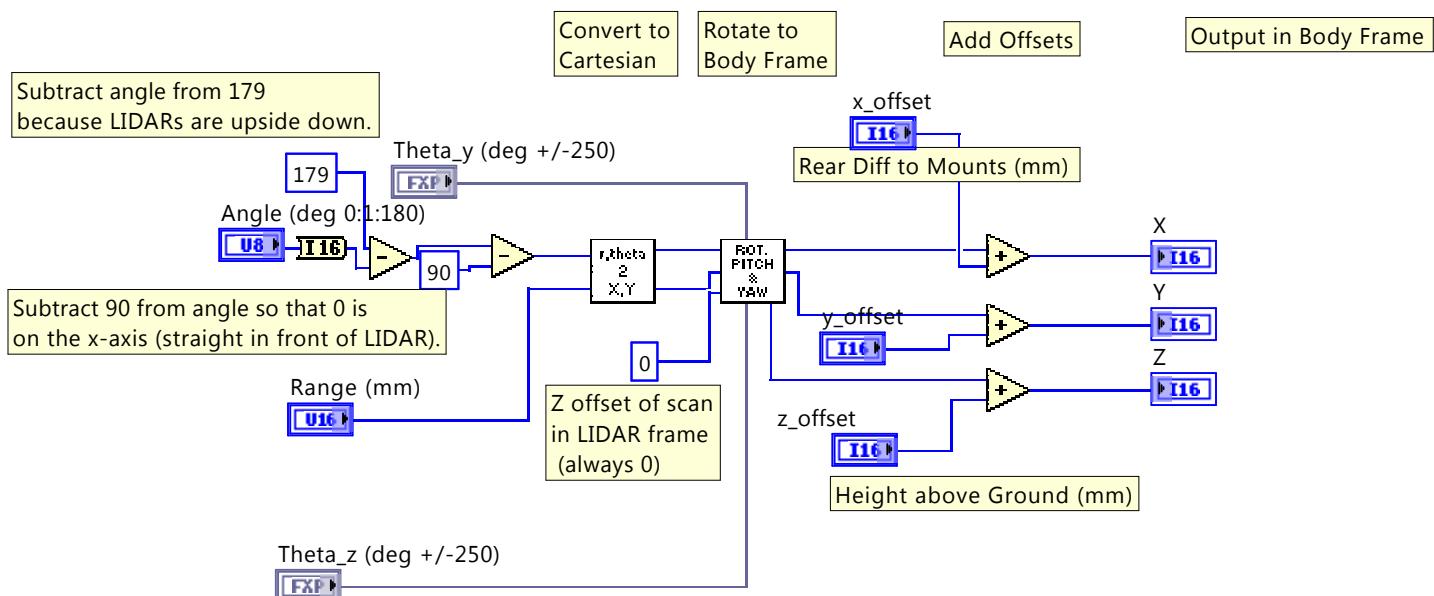
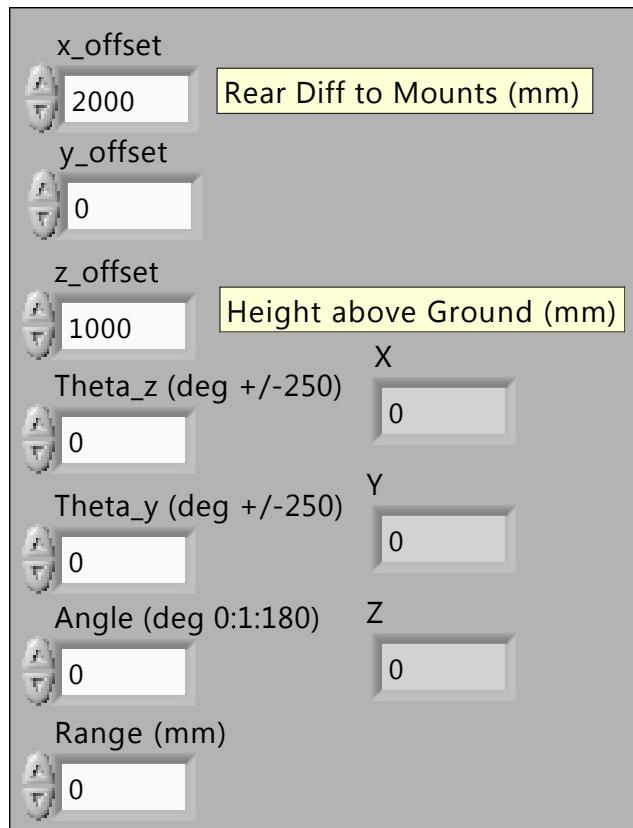
Lidar2RobotTransform.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

Lidar2RobotTransform.vi

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LV FPGA Serial Calc Timing Values.vi

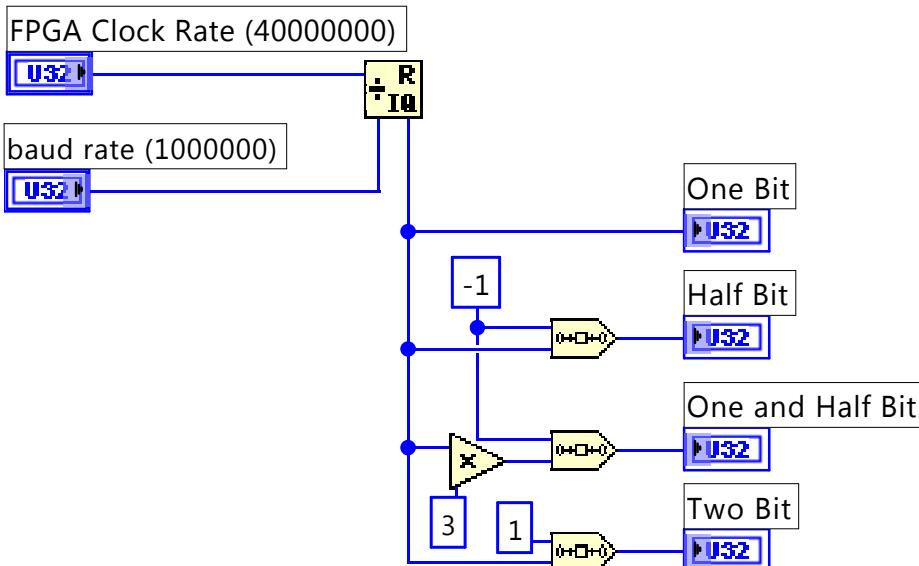
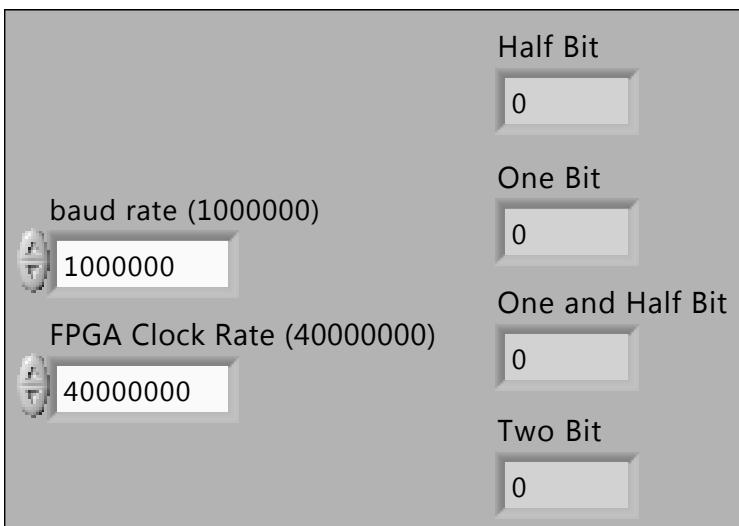
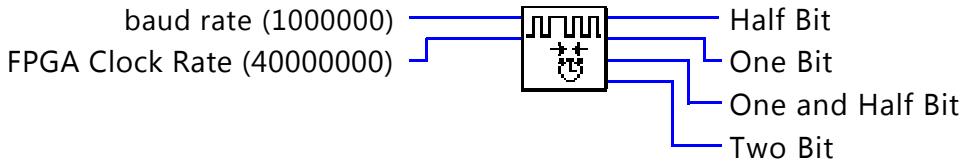
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LV FPGA Serial Calc Timing Values.vi

Last modified on 1/26/2011 at 4:28 PM

Printed on 4/29/2011 at 1:55 AM

LV FPGA Serial Calc Timing Values.vi



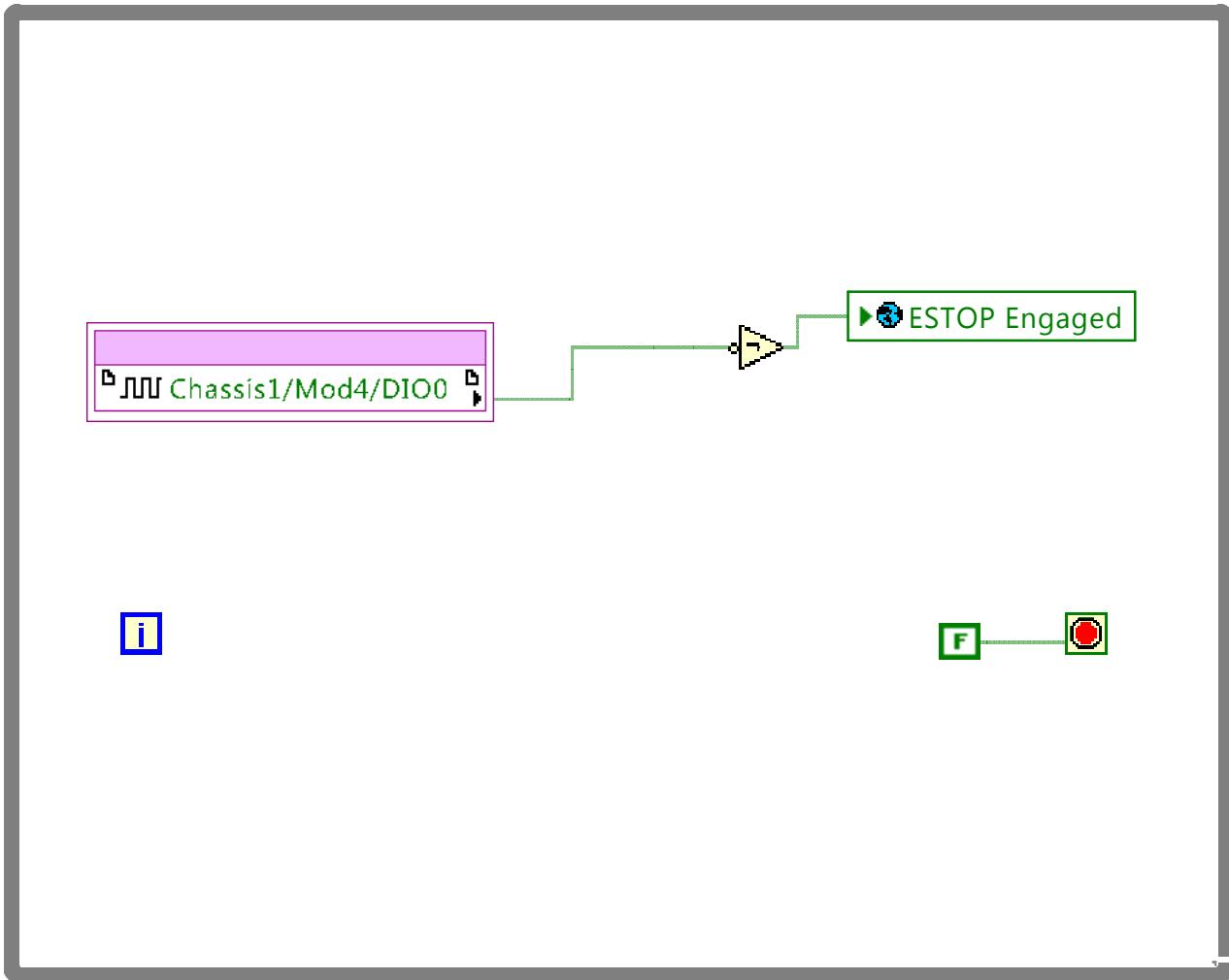
ESTOP Sense.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense>Status\ESTOP Sense.vi

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Printed on 4/29/2011 at 1:55 AM

ESTOP Sense.vi

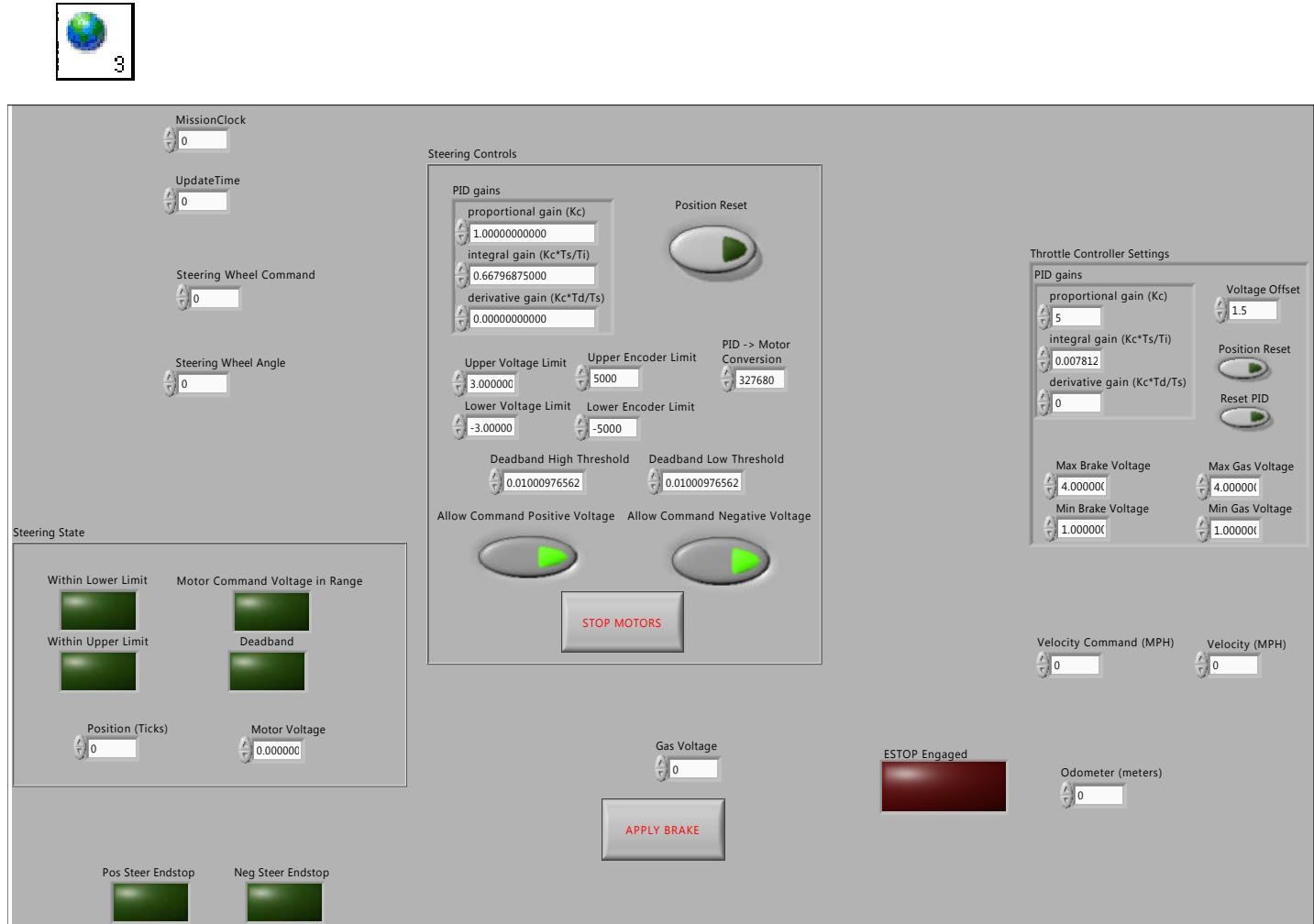


**FPGAGlobals.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\FPGAGlobals.vi

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FPGAGlobals.vi

LidarParseDFA.vi

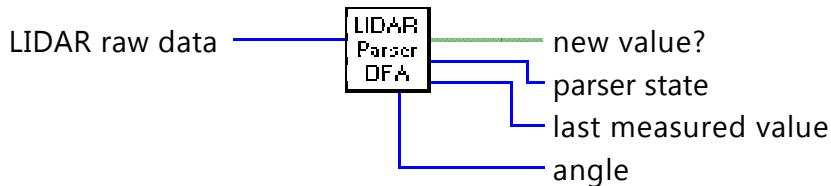
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarParseDFA.vi

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LidarParseDFA.vi



LidarParseDFA.vi parses the bytes returned by the LIDAR using a DFA to output data in range and scale angle.

Inputs

LIDAR raw data - the raw byte read in via serial from the LIDAR

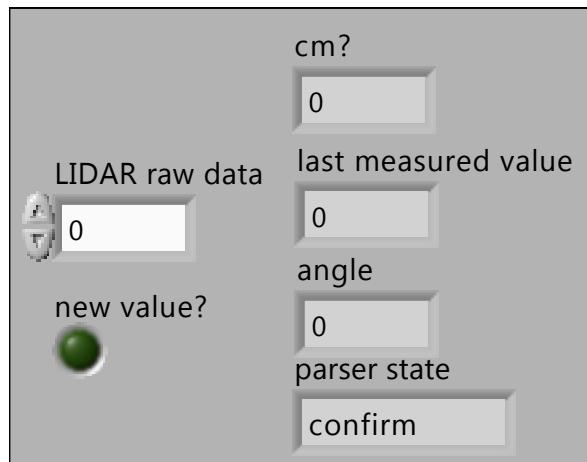
Outputs

last measured value - the last range value read in (in mm)

angle - the angle of the last measured point

parser state - the current state of the parser

cm? - flags whether the LIDAR is returning data with cm instead mm resolution



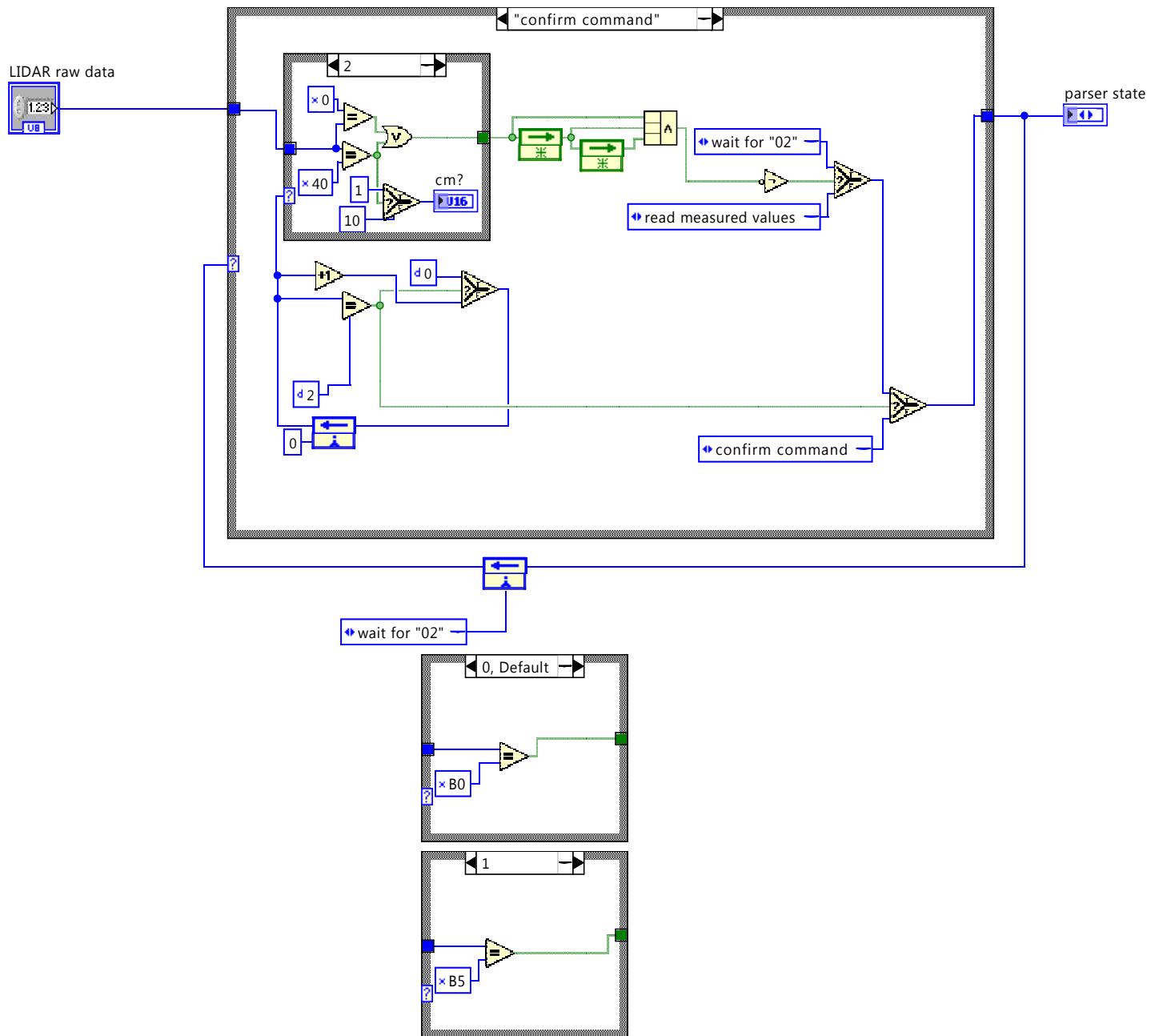
LidarParseDFA.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarParseDFA.vi

Last modified on 3/2/2011 at 12:20 PM

Printed on 4/29/2011 at 1:55 AM



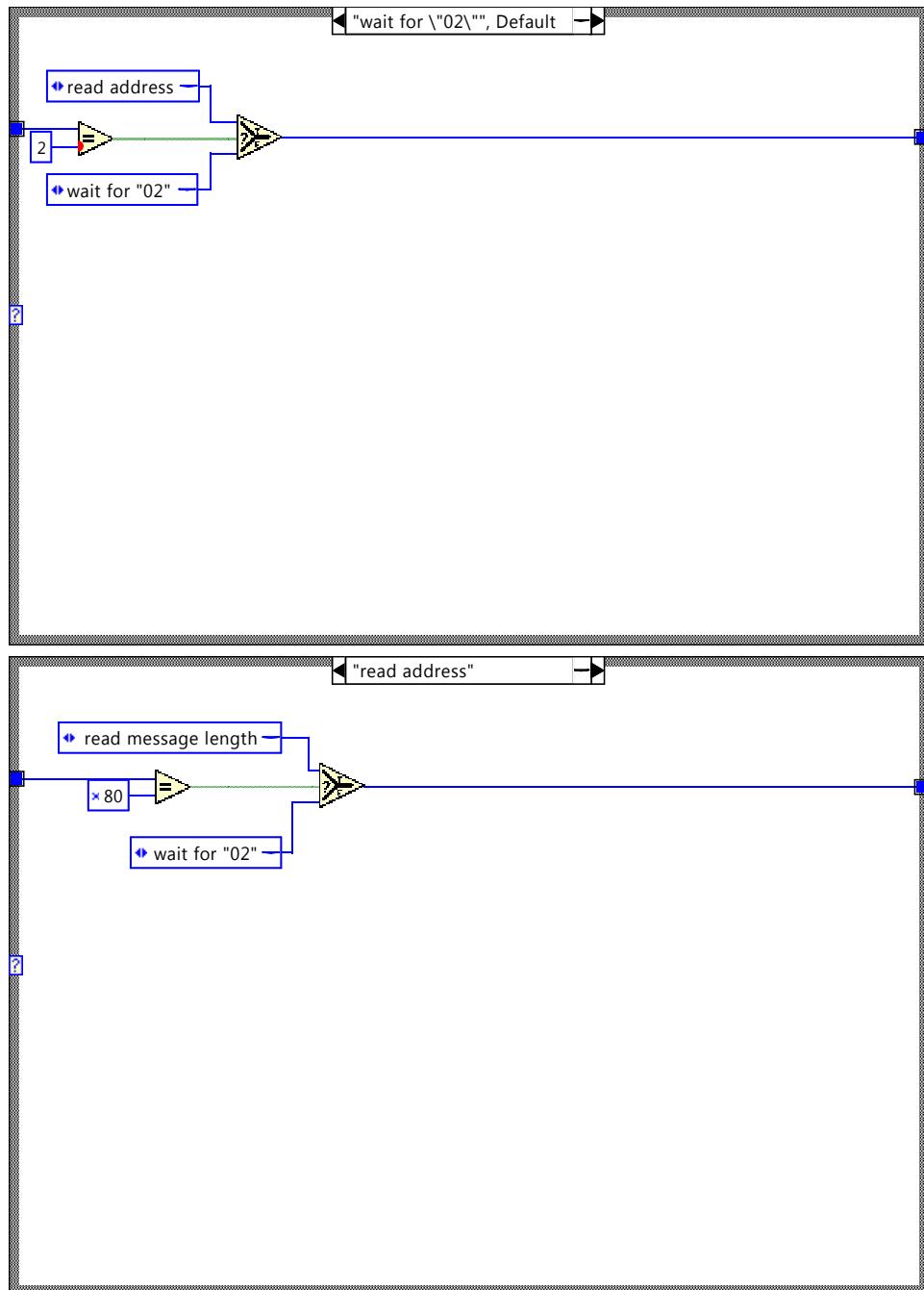
LidarParseDFA.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarParseDFA.vi

Last modified on 3/2/2011 at 12:20 PM

Printed on 4/29/2011 at 1:55 AM



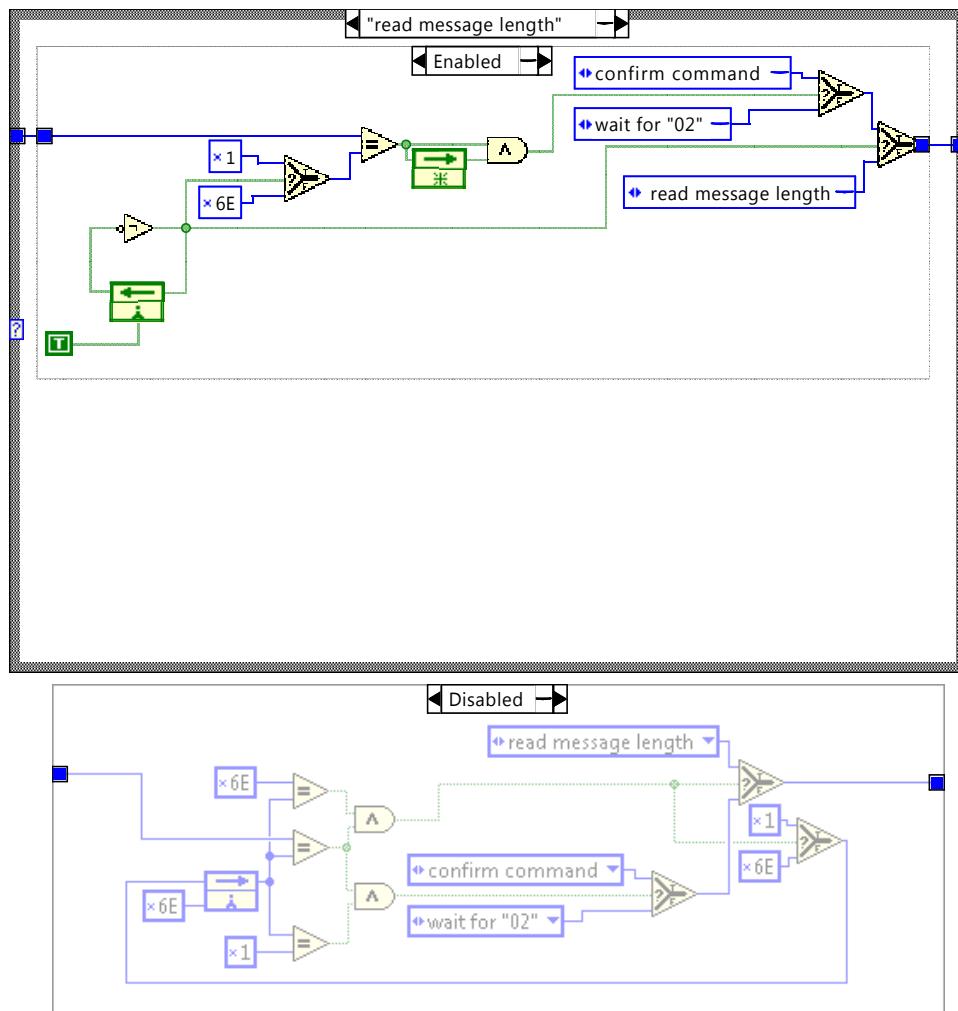
LidarParseDFA.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarParseDFA.vi

Last modified on 3/2/2011 at 12:20 PM

Printed on 4/29/2011 at 1:55 AM



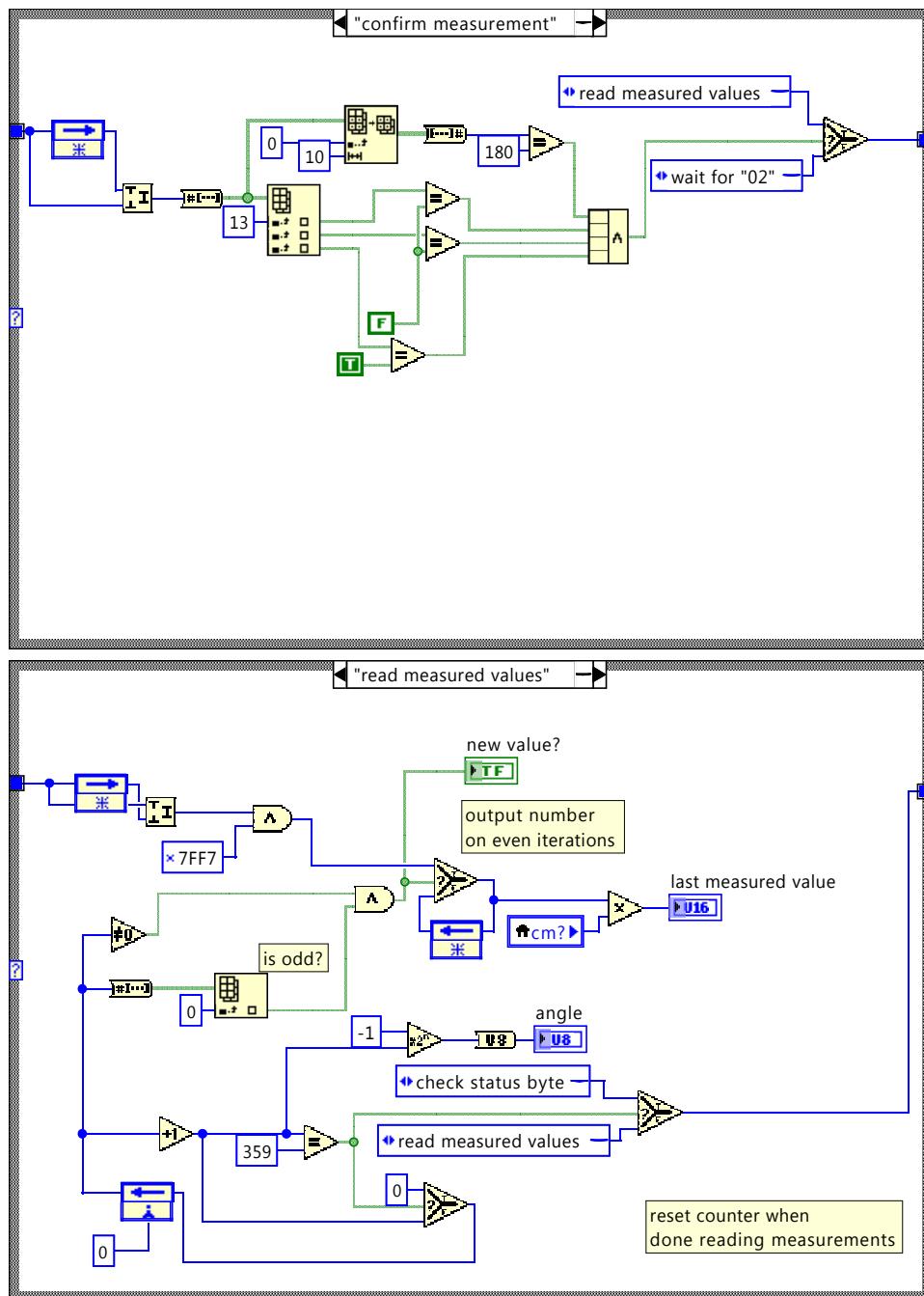
LidarParseDFA.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarParseDFA.vi

Last modified on 3/2/2011 at 12:20 PM

Printed on 4/29/2011 at 1:55 AM



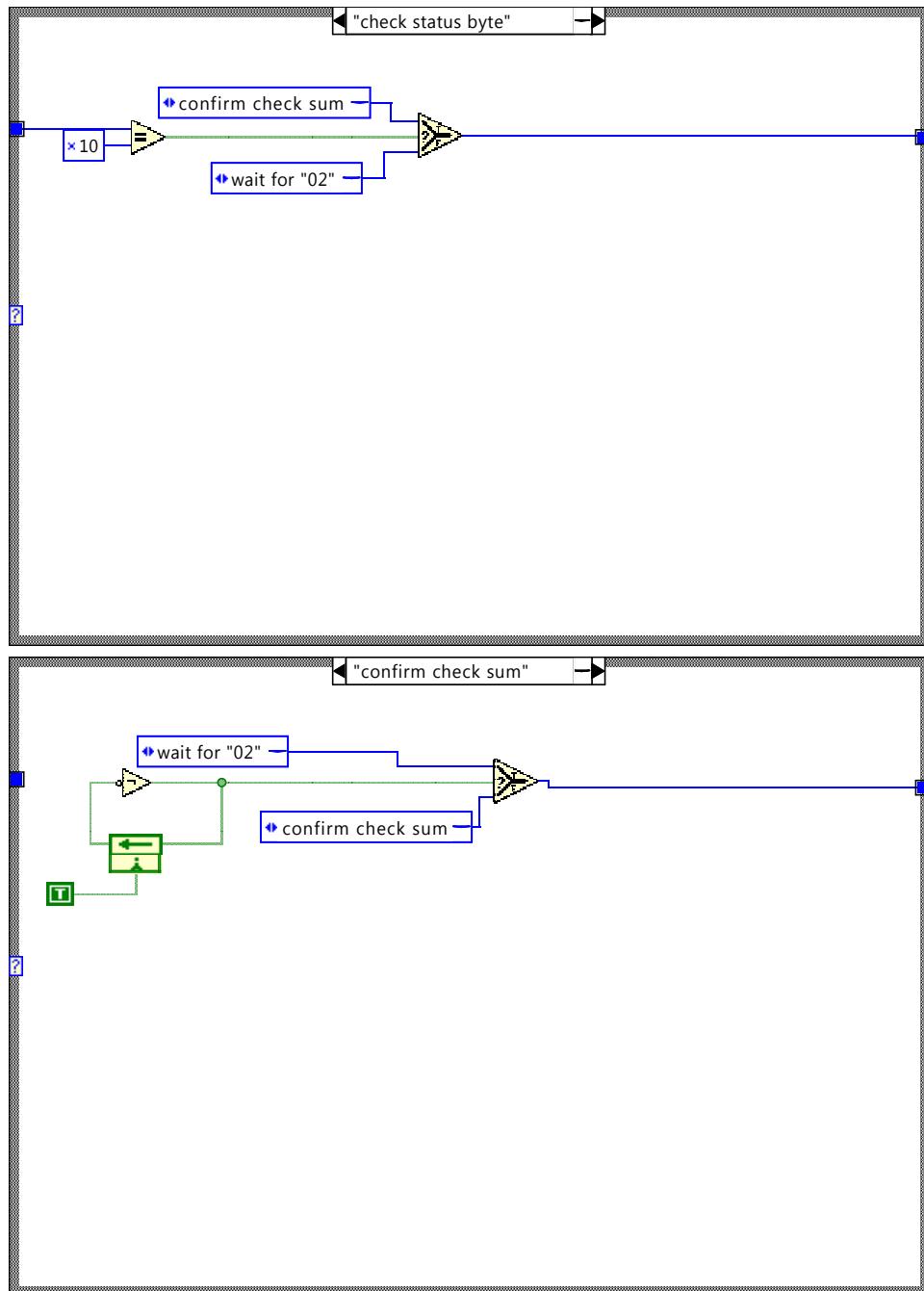
LidarParseDFA.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarParseDFA.vi

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Dan-ReadLidar.vi

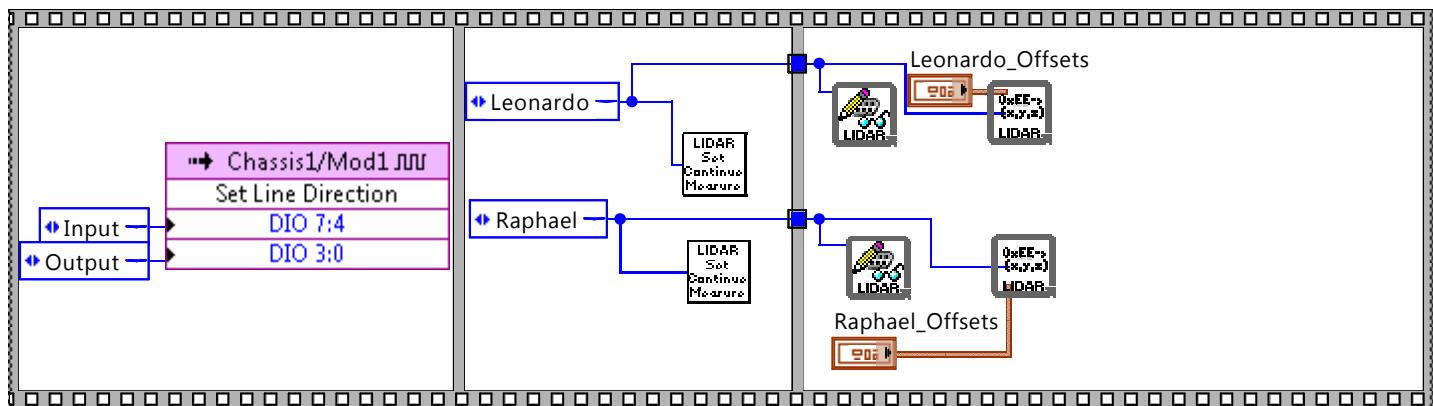
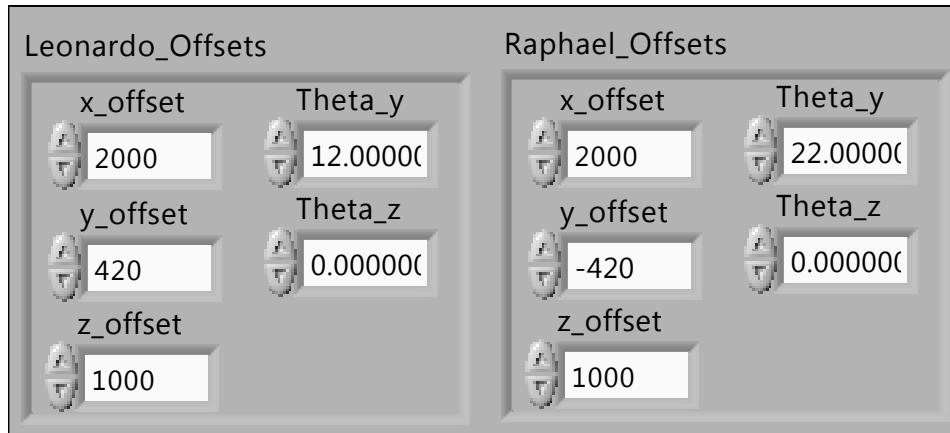
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\Dan-ReadLidar.vi

Last modified on 3/6/2011 at 11:58 AM

Printed on 4/29/2011 at 1:55 AM

Dan-ReadLidar.vi

ReadLidars.vi: sets the LIDARS to stream continuously, then reads them and sends a stream of (x,y,z) location coordinates of the last read LIDAR points to the PC.



LidarOffsets.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\LidarOffsets.ctl

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LidarOffsets.ctl



x_offset	Theta_y
<input type="text" value="2000"/>	<input type="text" value="0.000000"/>
y_offset	Theta_z
<input type="text" value="450"/>	<input type="text" value="45.000000"/>
z_offset	
<input type="text" value="1000"/>	

DriveControl.ctl

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Type Defs\DriveControl.ctl

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DriveControl.ctl



DriveControl

WheelAngle (Deg)	<input type="text" value="0"/>
Velocity (MPH)	<input type="text" value="0"/>
Brake	<input type="button" value=""/>

LidarSetToContinuousMeasurement.vi

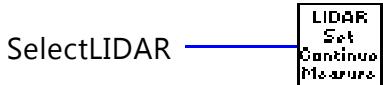
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarSetToContinuousMeasurement.vi

Last modified on 3/2/2011 at 12:31 PM

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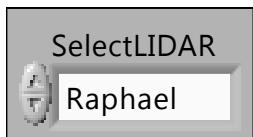
LidarSetToContinuousMeasurement.vi



LidarSetToContinuousMeasurement.vi sends a command to the selected LIDAR to set it to continuously stream data,

Inputs

SelectLIDAR - selects which LIDAR to set to continuous measurement.



LidarSetToContinuousMeasurement.vi

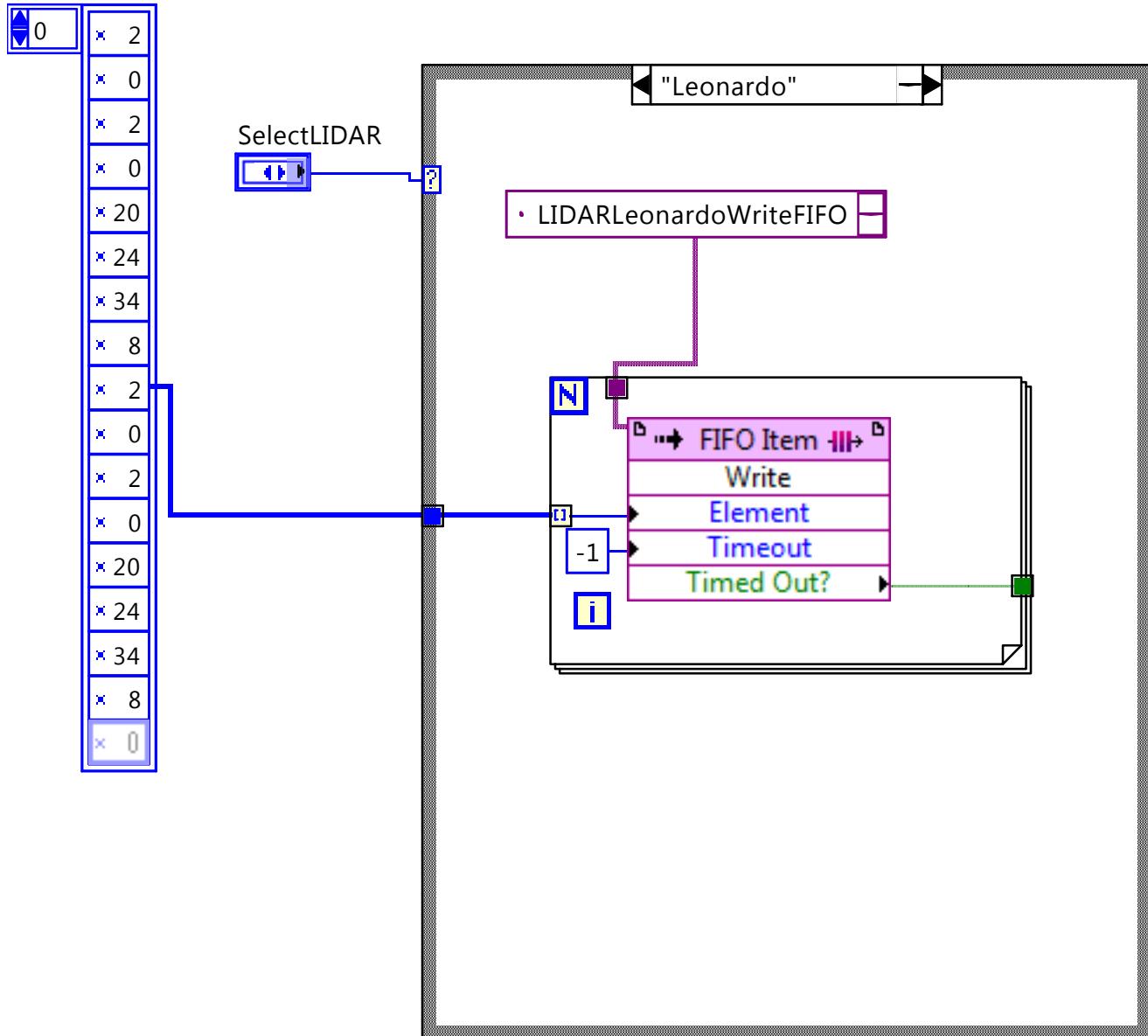
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarSetToContinuousMeasurement.vi

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start continuous measurement telegram (repeated twice)



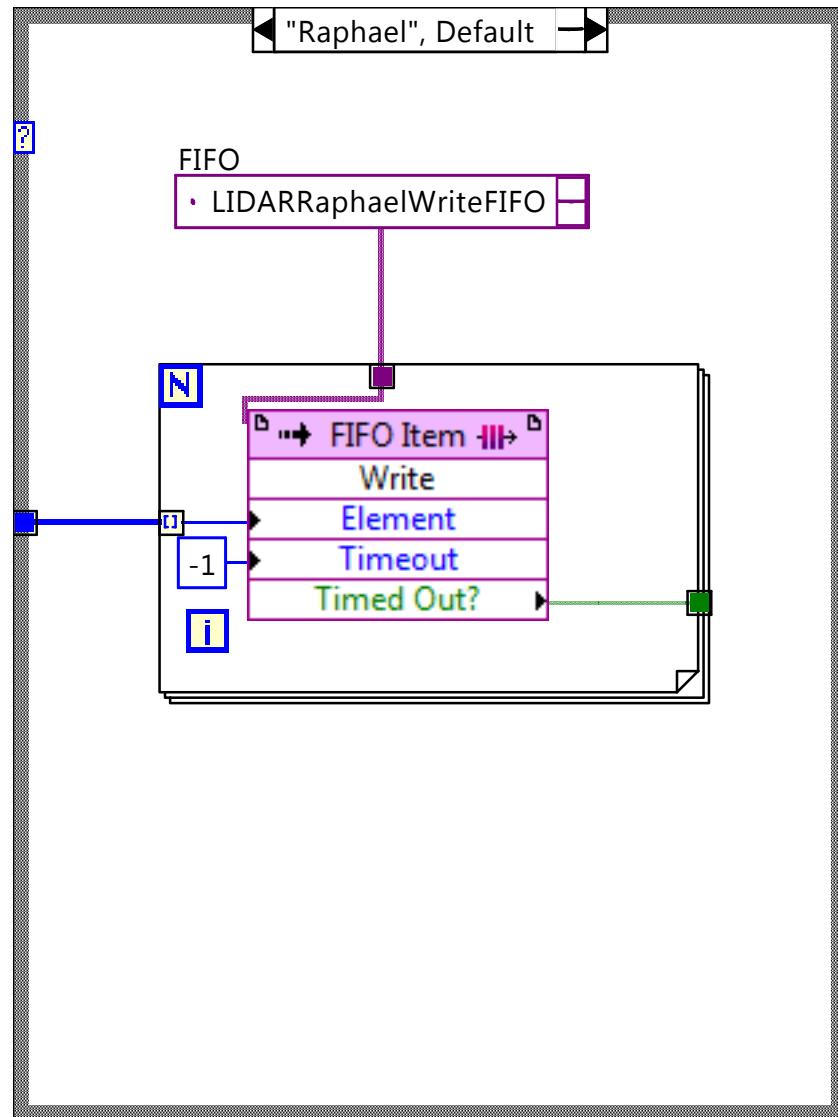
LidarSetToContinuousMeasurement.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LidarSetToContinuousMeasurement.vi

Last modified on 3/2/2011 at 12:31 PM

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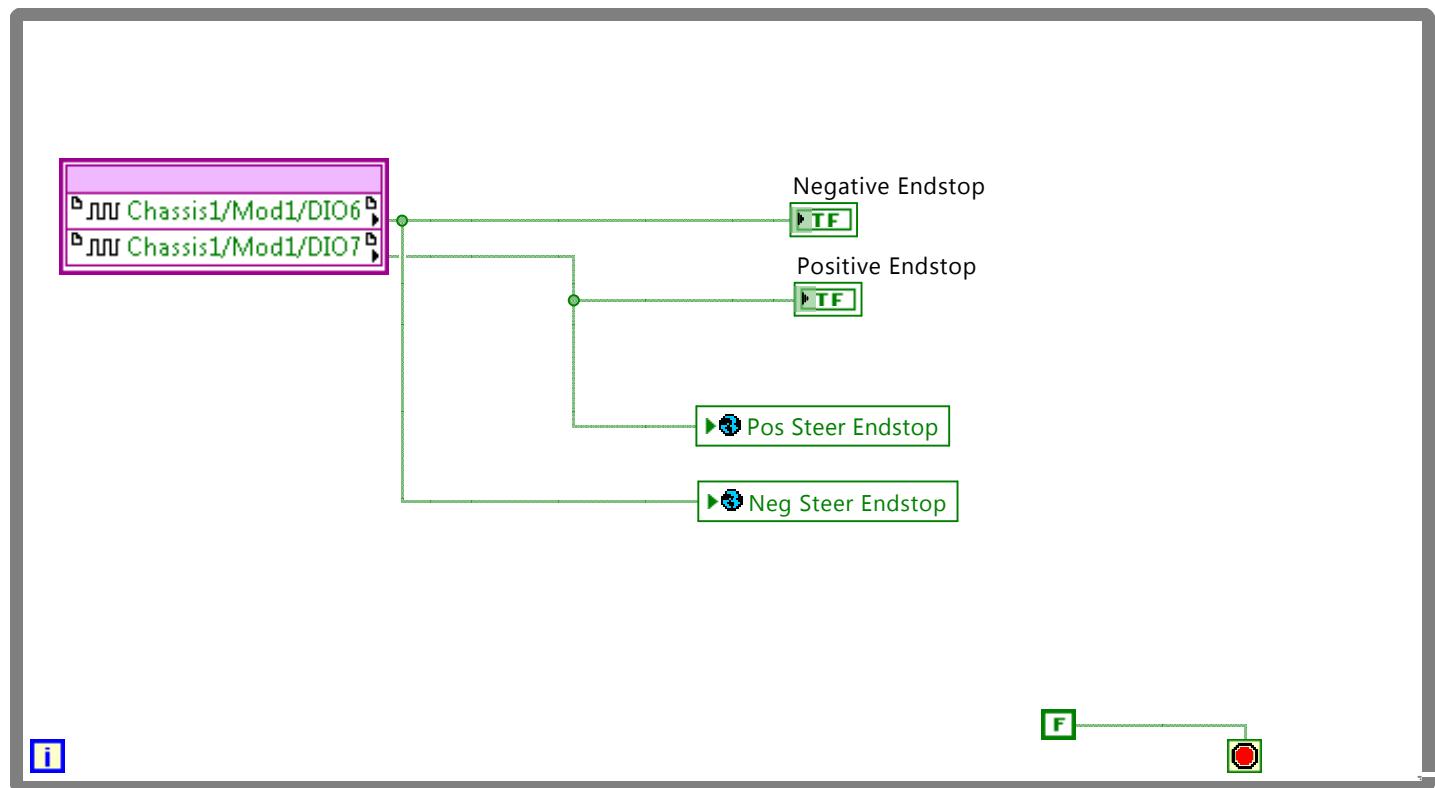


ReadEndstops.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Act\ReadEndstops.vi

Last modified on 4/27/2011 at 11:05 AM

Printed on 4/29/2011 at 1:55 AM

ReadEndstops.vi

Throttle.vi

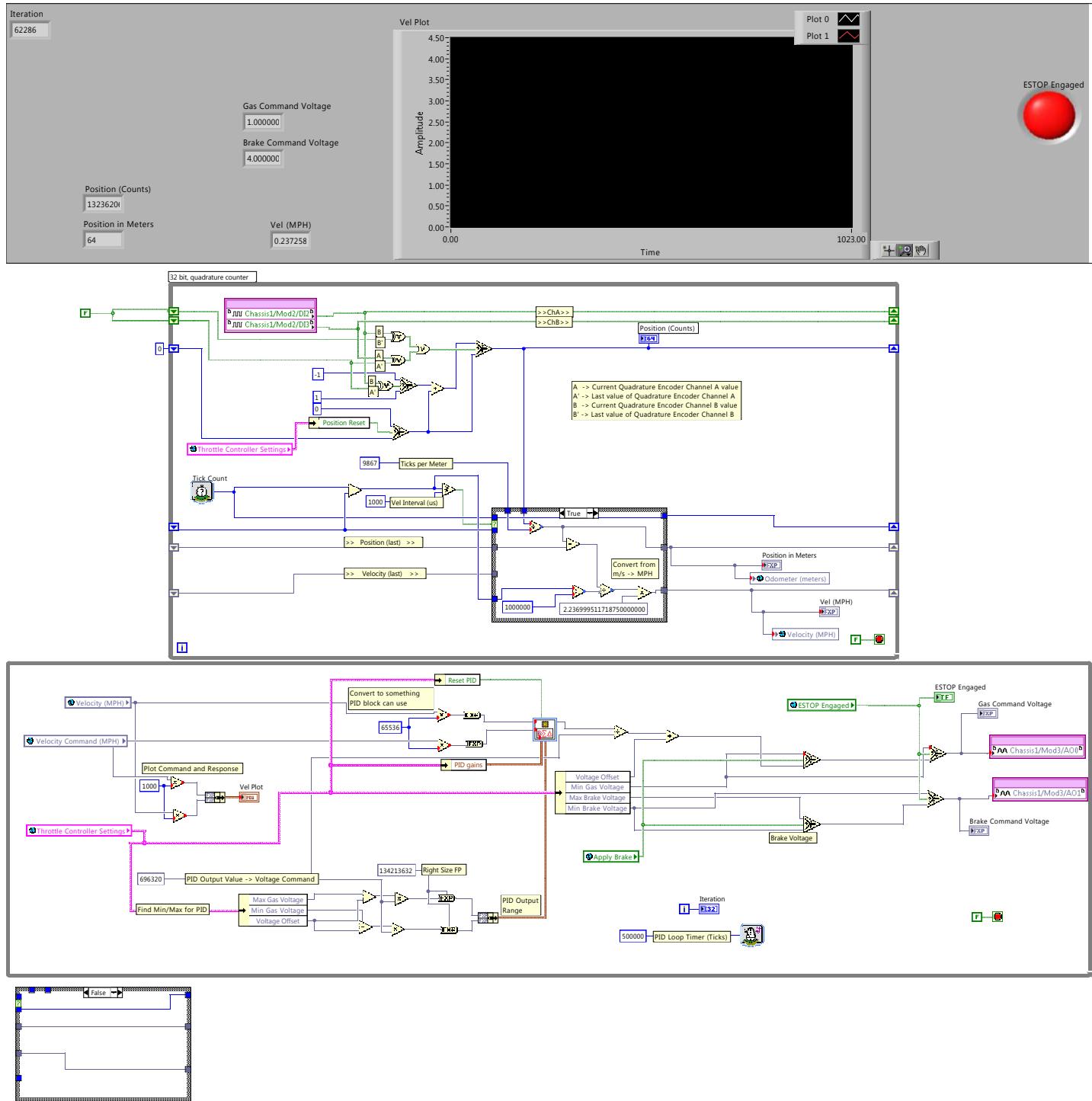
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Act\Throttle.vi

Last modified on 4/13/2011 at 4:08 PM

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Throttle.vi

Throttle
Control



Throttle.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Act\Throttle.vi

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On an FPGA target, implements an integer PID algorithm for PID applications with high-speed control and/or high channel count that require an efficient algorithm. You can use this Express VI with single-channel or multi-channel configurations. The PID algorithm features control action range and uses the integrator anti-windup calculation to limit the effect of the integral action during transients. The PID algorithm also features bumpless controller output for PID gain changes.

This Express VI is configured as follows:

Number of channels = 1

Proportional gain (Kc) = 1

Integral time (Ti) = 9.99219mmin

Derivative time (Td) = 0min

Sampling time (Ts) = 10ms

Proportional gain (scaled) ($K_c * 2^8$) = 256

Integral gain (scaled) ($[K_c * Ts] / [Ti * 60] * 2^8$) = 4

Derivative gain (scaled) ($[K_c * Td * 60] / [Ts] * 2^8$) = 0

Output range high = 32767

Output range low = -32768

Initial setpoint = 0



Waits the value you specify in Count between loop iterations. You can call this function in a loop to control the loop execution rate. If an execution instance is missed, such as when the logic in the loop takes longer to execute than the specified interval, the Loop Timer Express VI returns immediately and establishes a new reference time stamp for subsequent calls.



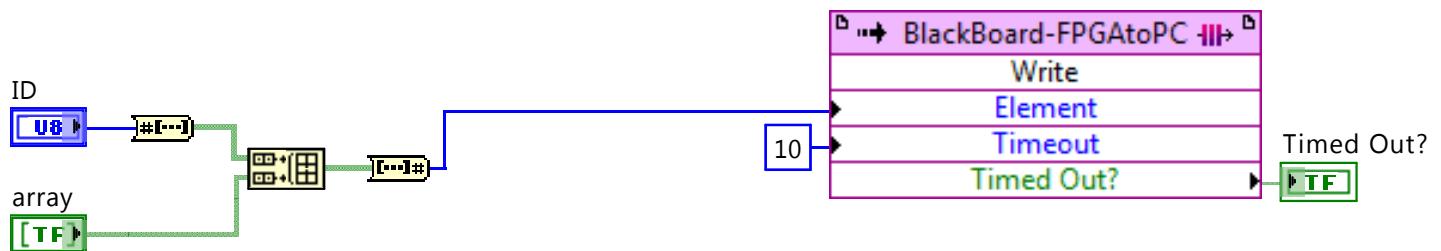
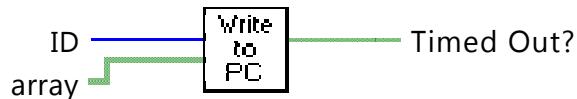
Returns the value of a free running counter in the units specified. The output and internal counter are both of the configured width.

WriteToPC.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\WriteToPC.vi

Last modified on 3/1/2011 at 10:37 AM

Printed on 4/29/2011 at 1:55 AM

WriteToPC.vi

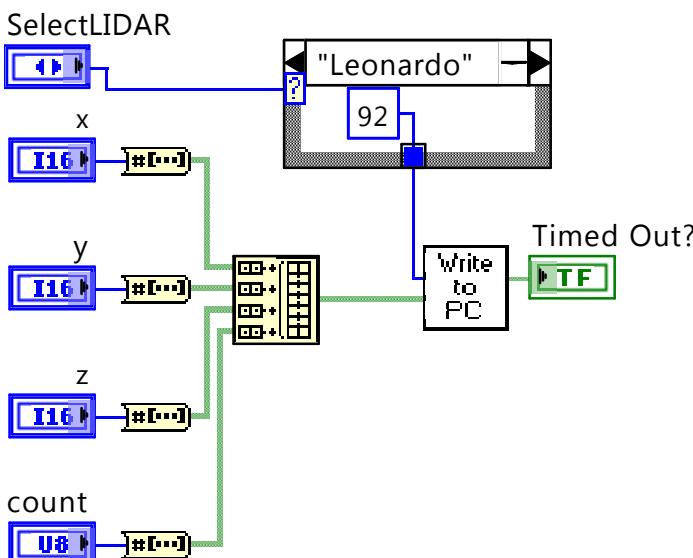
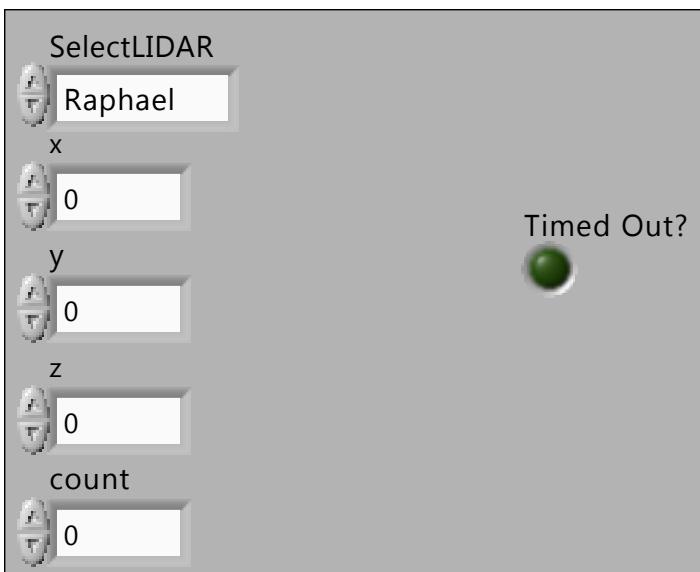
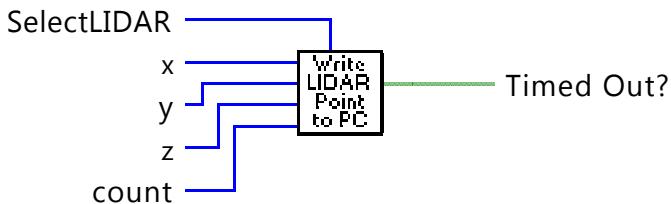
WriteLIDARPointToPC.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\

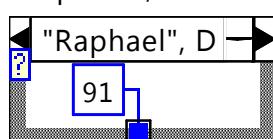
WriteLIDARPointToPC.vi

Last modified on 3/2/2011 at 10:25 AM

Printed on 4/29/2011 at 1:55 AM

WriteLIDARPointToPC.vi

"Raphael", Default



polar2cartesian.vi

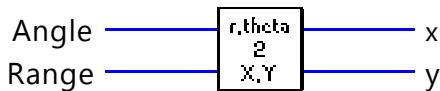
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

FPGA_Math\polar2cartesian.vi

Last modified on 3/2/2011 at 1:02 PM

Printed on 4/29/2011 at 1:55 AM

polar2cartesian.vi



polar2cartesian.vi converts polar coordinates to cartesian coordinates using a lookup table.

Inputs

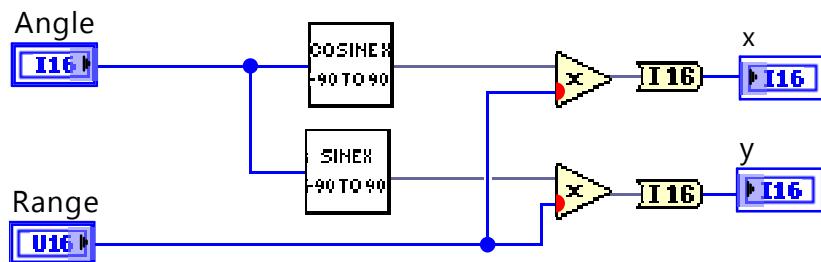
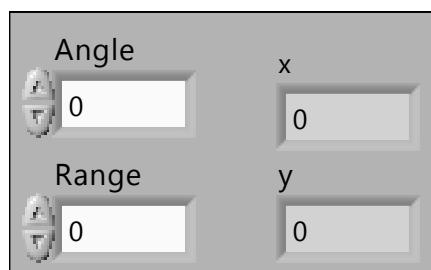
Angle - angle in integer degrees from [-90,90].

Range - range to point

Outputs

x - x position of point

y - y position of point

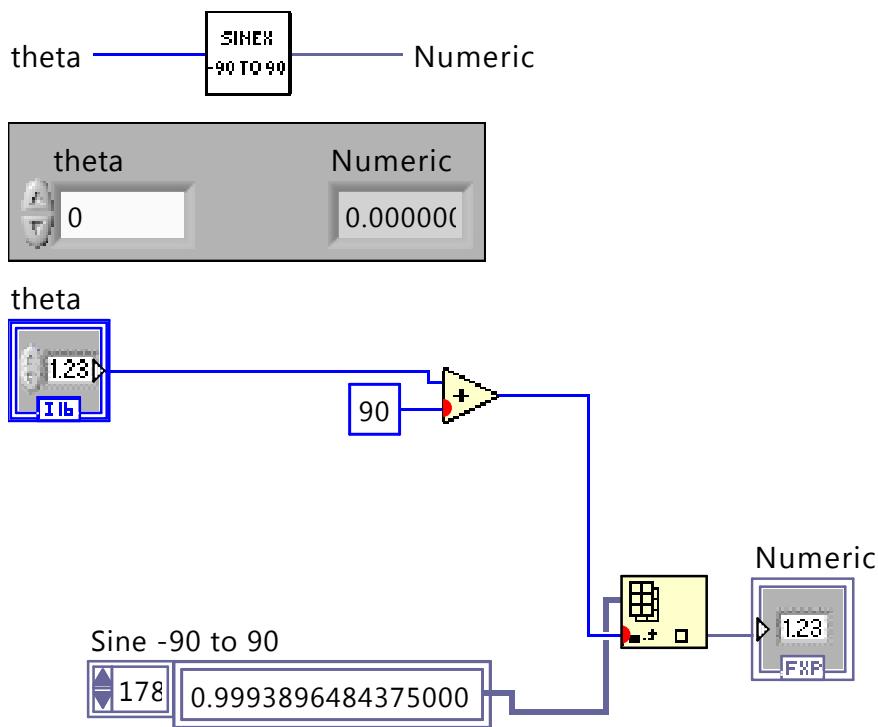


sinex_90to90.vi

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\
FPGA_Math\sinex_90to90.vi

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sinex_90to90.vi

cosinex_90to90.vi

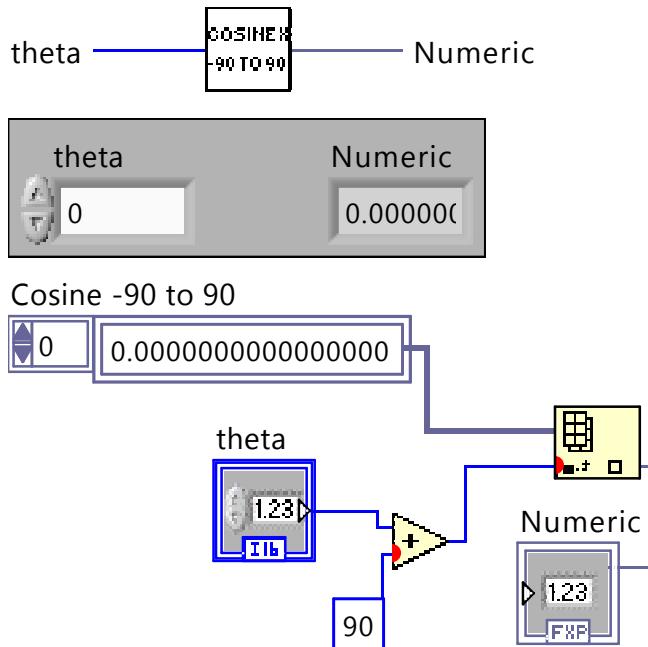
C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

FPGA_Math\cosinex_90to90.vi

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Printed on 4/29/2011 at 1:55 AM

cosinex_90to90.vi



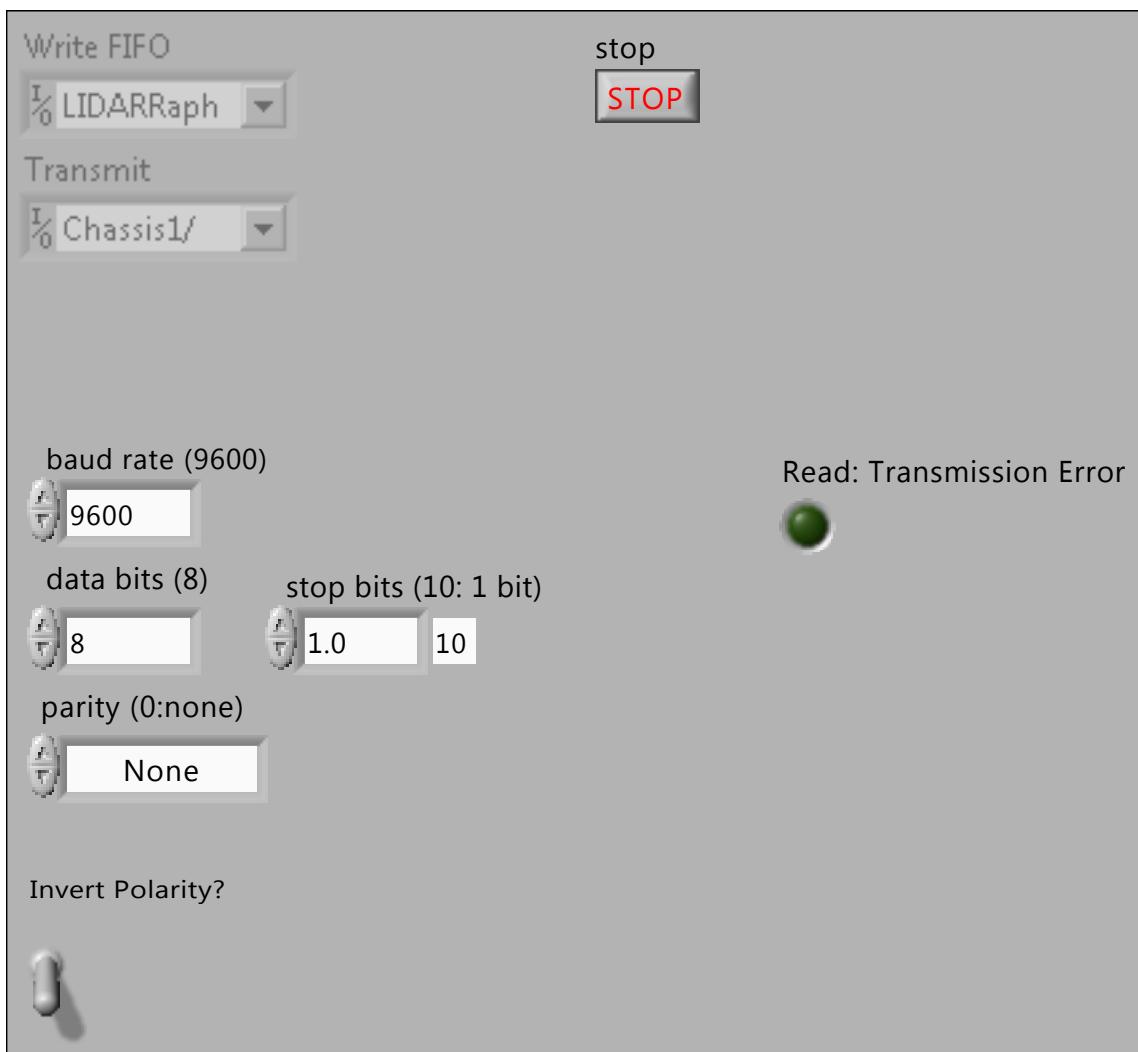
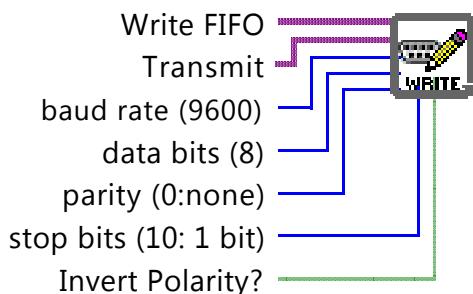
**LV FPGA Serial Write.vi**

C:\Users\dgrieneisen\Desktop\EllaProd\Code\Hindbrain\Sense\What\ReadLidarSubVIs\

LV FPGA Serial Write.vi

Last modified on 2/16/2011 at 9:32 AM

Printed on 4/29/2011 at 1:55 AM

LV FPGA Serial Write.vi



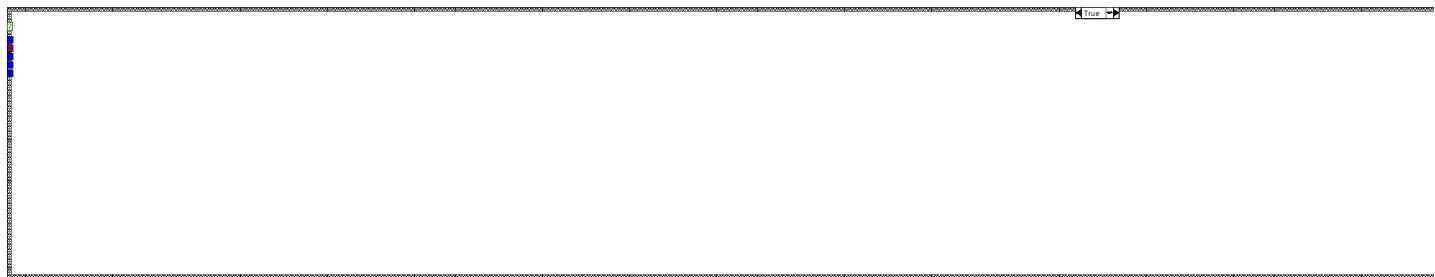
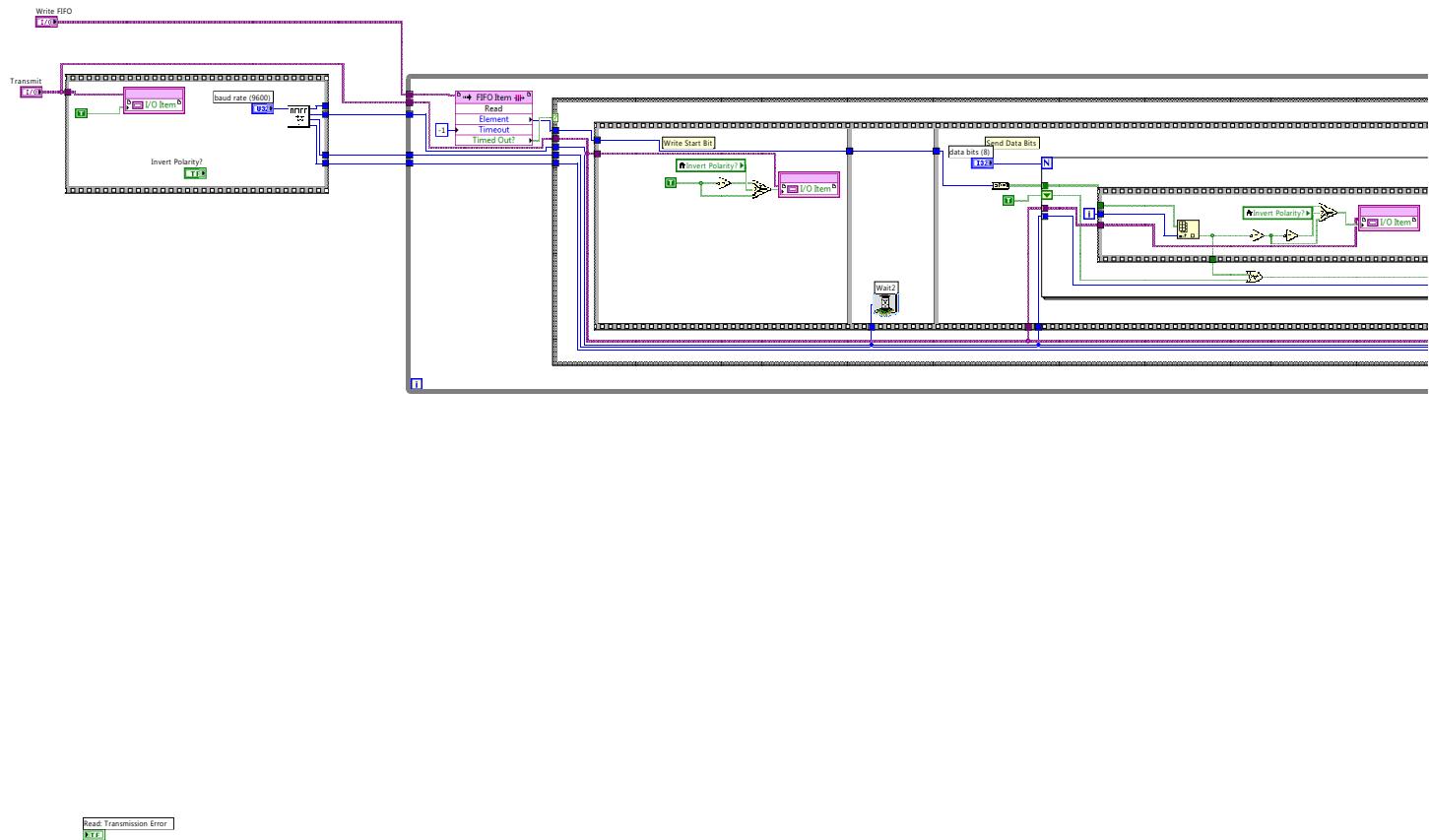
LV FPGA Serial Write.vi

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LV FPGA Serial Write.vi

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Delays for a certain time interval before the output data dependence becomes valid. RT Module The Wait Express VI waits the specified count time and then returns the value of a free running counter.



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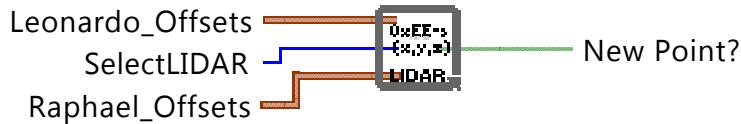
**LidarParseTransformAndSend.vi**

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LidarParseTransformAndSend.vi

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LidarParseTransformAndSend.vi

LidarParseTransformAndSend.vi parses the byte string read in from the LIDAR, transforms it into rotation coordinates, and pushes it to the PC.

*Note - currently all offsets are set to default on the front panel.

Inputs

SelectLIDAR - select LIDAR from which to read data

Leonardo_Offsets:

x_offset - x offset of Leonardo in the robot's frame in mm

y_offset - y offset of Leonardo in the robot's frame in mm

z_offset - z offset of Leonardo in the robot's frame in mm

Theta_y - pitch angle of Leonardo in degrees below horizontal

Theta_z - yaw angle of Leonardo in degrees left of forward

Raphael_Offsets:

x_offset - x offset of Raphael in the robot's frame in mm

y_offset - y offset of Raphael in the robot's frame in mm

z_offset - z offset of Raphael in the robot's frame in mm

Theta_y - pitch angle of Raphael in degrees below horizontal

Theta_z - yaw angle of Raphael in degrees left of forward

Outputs

New Point? - boolean to indicate if a new data point has been parsed

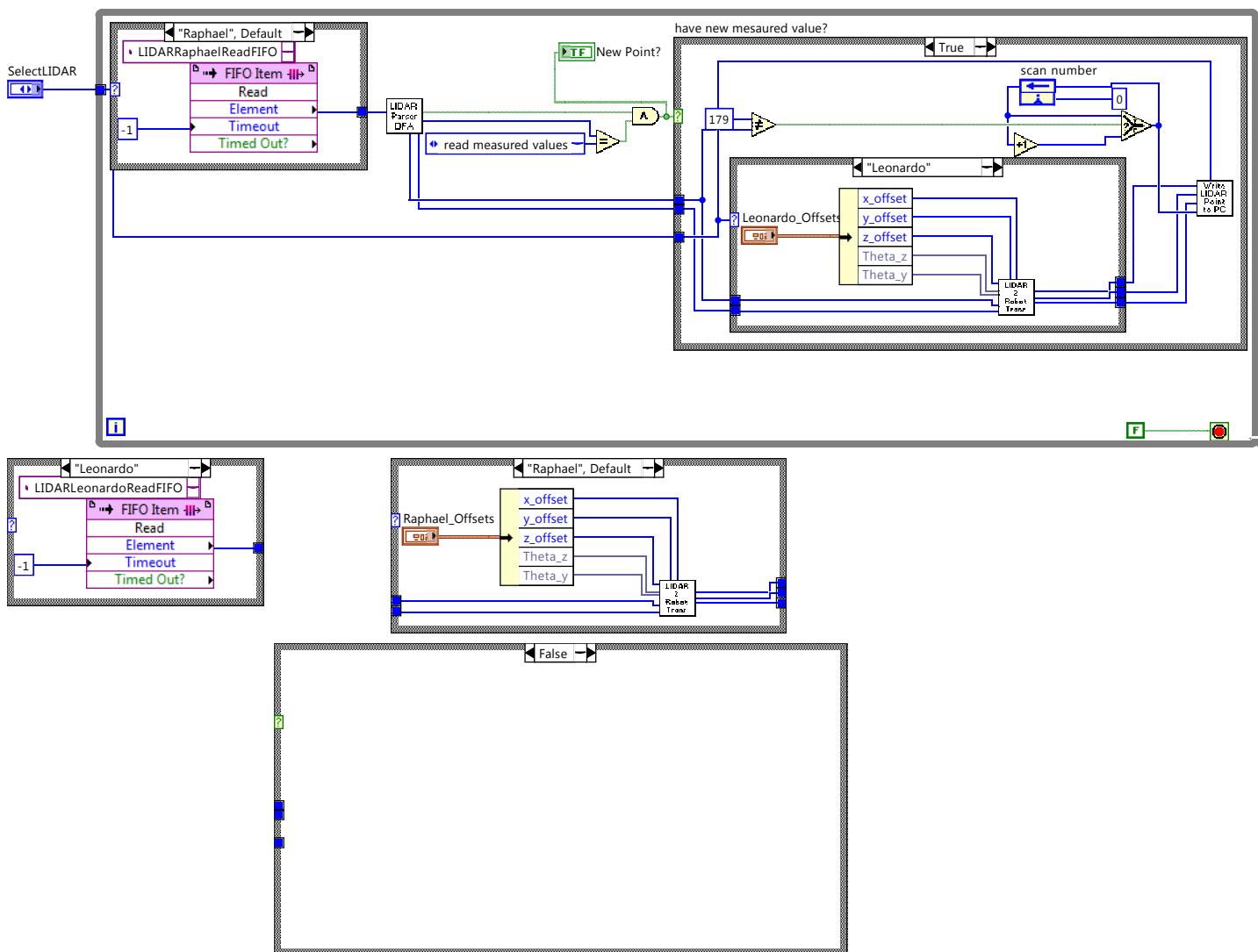
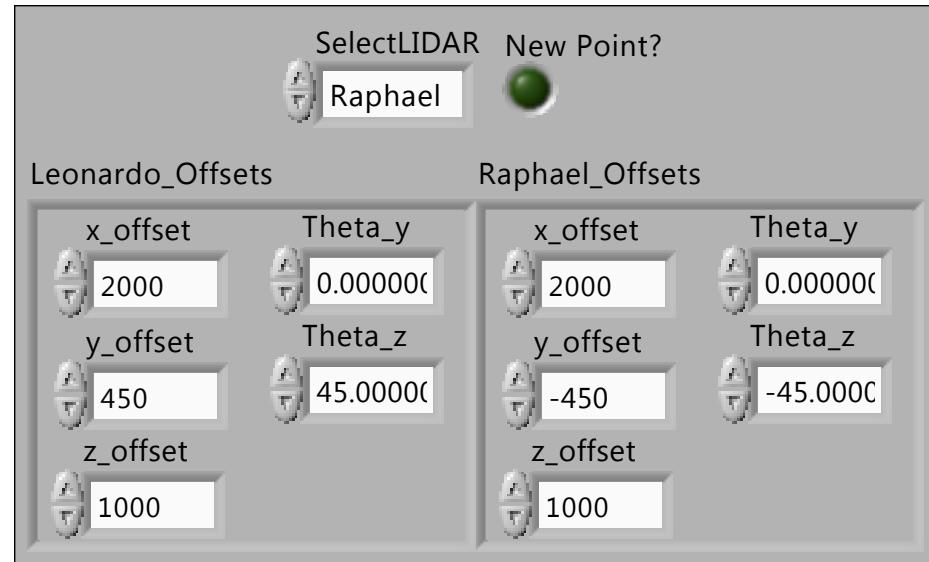
LidarParseTransformAndSend.vi

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LidarParseTransformAndSend.vi

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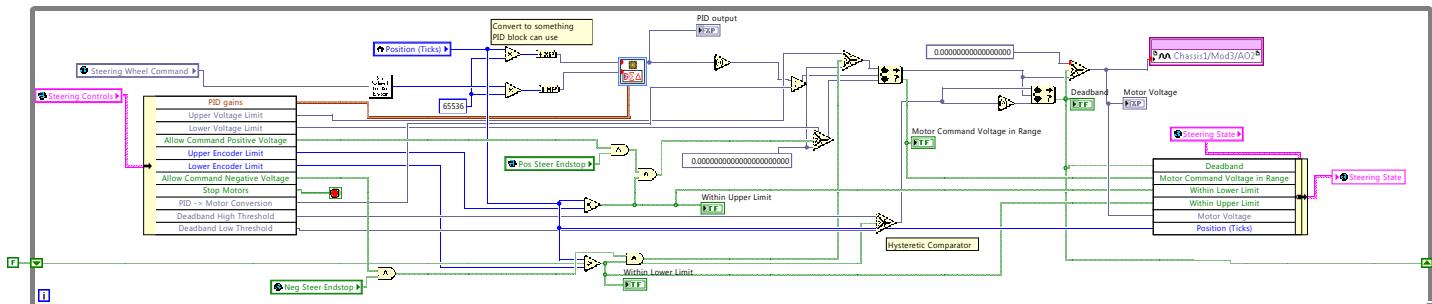
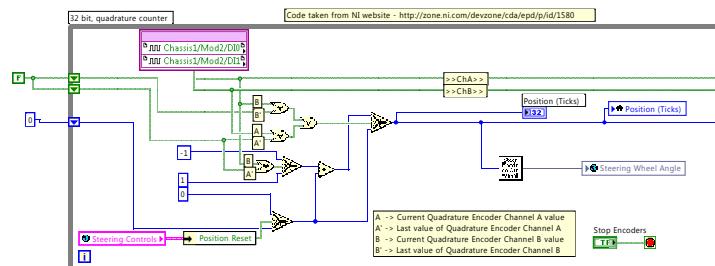
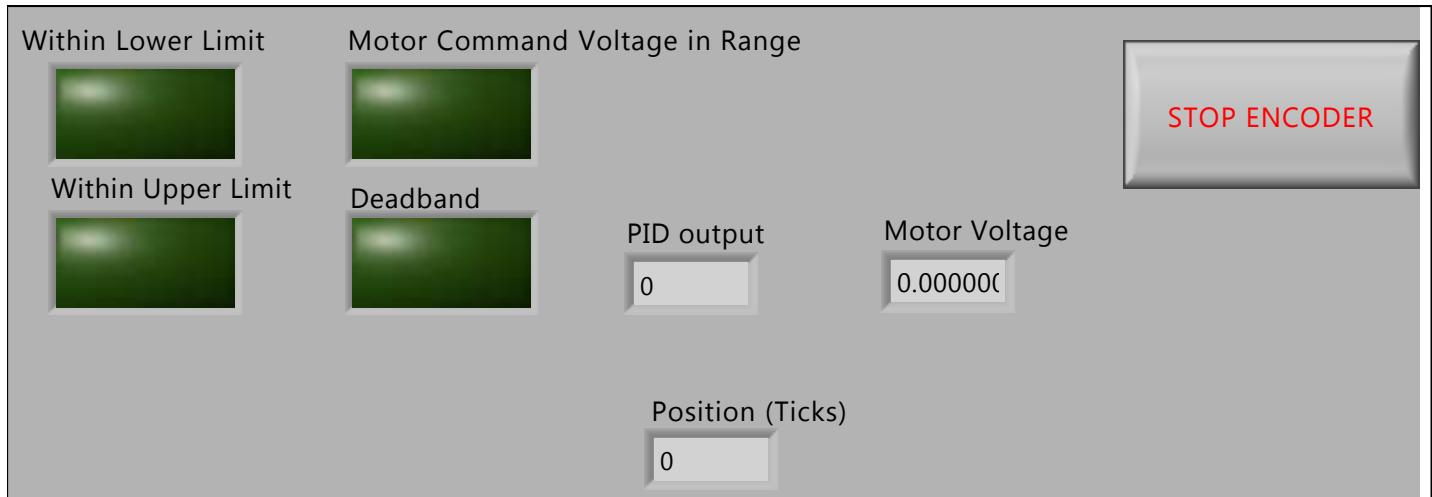
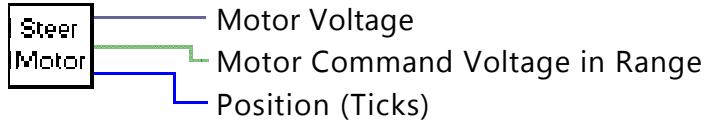
DriveSteerMotor.vi

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DriveSteerMotor.vi



DriveSteerMotor.vi

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On an FPGA target, implements an integer PID algorithm for PID applications with high-speed control and/or high channel count that require an efficient algorithm. You can use this Express VI with single-channel or multi-channel configurations. The PID algorithm features control action range and uses the integrator anti-windup calculation to limit the effect of the integral action during transients. The PID algorithm also features bumpless controller output for PID gain changes.

This Express VI is configured as follows:

Number of channels = 1

Proportional gain (Kc) = 1

Integral time (Ti) = 9.99219mmin

Derivative time (Td) = 0min

Sampling time (Ts) = 1ms

Proportional gain (scaled) ($K_c * 2^8$) = 256

Integral gain (scaled) ($[K_c * Ts] / [Ti * 60] * 2^8$) = 0

Derivative gain (scaled) ($[K_c * Td * 60] / [Ts] * 2^8$) = 0

Output range high = 50

Output range low = -50

Initial setpoint = 0

ConvertSteeringWheelToSteeringEncoder.vi

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ConvertSteeringWheelToSteeringEncoder.vi

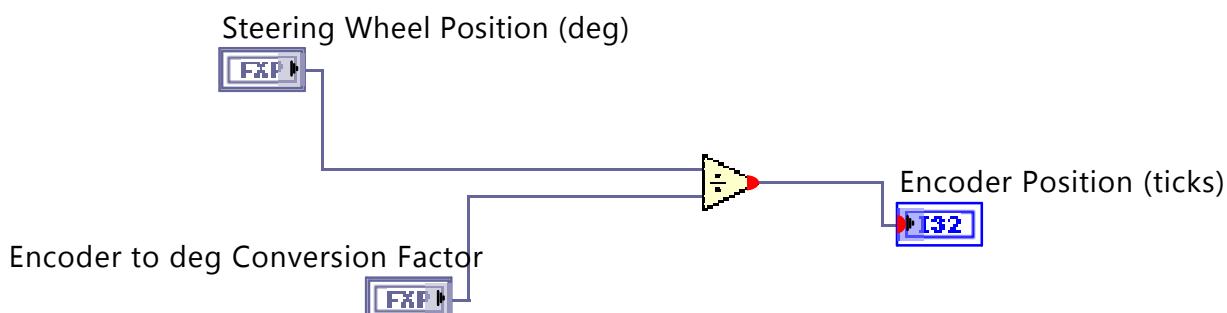
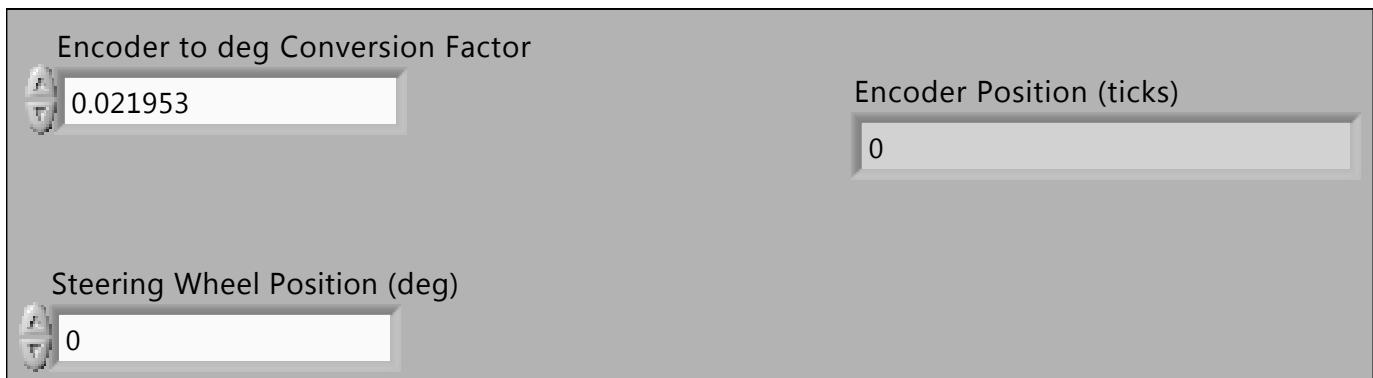
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ConvertSteeringWheelToSteeringEncoder.vi



Convert from steering wheel position to encoder ticks. One rotation of the steering wheel = 360.



ConvertSteeringEncoderToSteeringWheel.vi

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ConvertSteeringEncoderToSteeringWheel.vi

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ConvertSteeringEncoderToSteeringWheel.vi



Conver the encoder position to an angle of the steering wheel (ie one rotation of the wheel = 360 degrees).

