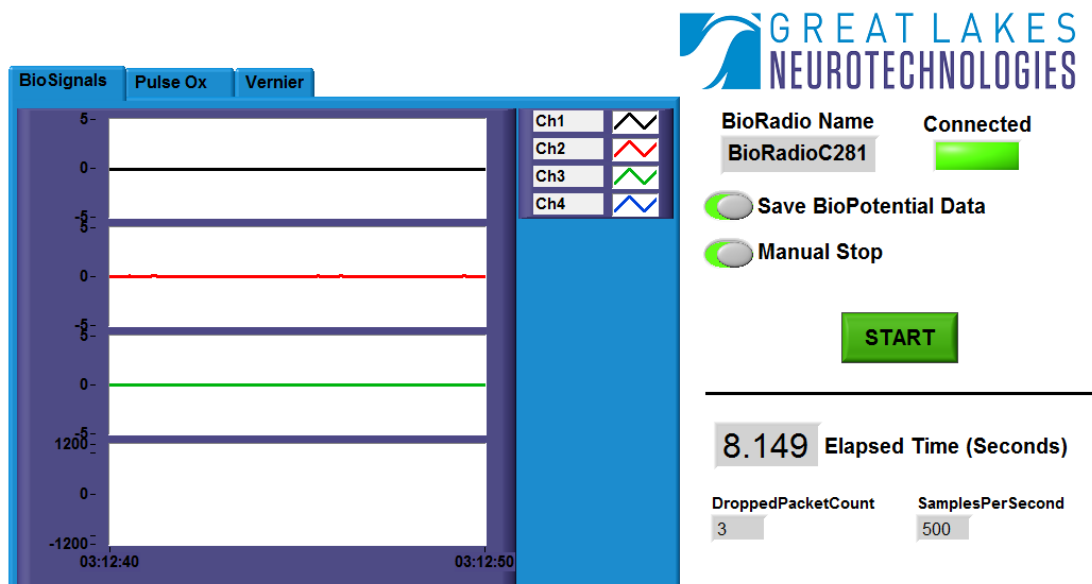


BIO RADIO SOFTWARE DEVELOPMENT KIT FOR LABVIEW™

USER'S GUIDE



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Intended Use

The LabVIEW™ software development kit is intended to provide a basic framework to collect data using the Great Lakes NeuroTechnologies BioRadio and allow for the development of customized LabVIEW software.

System Requirements

- PC with a Windows-based Operating System
- Bluetooth (v2.0 or greater) adapter
- Microsoft .NET 4.5.1 installation (available from <http://www.microsoft.com>)
- LabVIEW version 8.6 or greater

System Recommendations

- Microsoft PC with Windows 7
- 2 GB RAM
- 1024x768 or greater display resolution
- 1 GB or more available Hard Disk space
- Microsoft compatible keyboard and mouse or other pointing device
- Adobe Reader or Adobe Acrobat

Note: Macintosh and Linux operating systems are not supported.

Chapter 1: About This Software

The following document describes one LabVIEW example program and the related SubVIs. These files require a licensed copy of LabVIEW 8.6 or greater.

If you have not already, you can download the SDK software here <http://glneurotech.com/bioradio/support-page/sdk-download/>. It is recommended that you look over the BioRadio Device Guide to learn more about your BioRadio prior to use.

It is recommended that you start with the BioCapture software to insure that you are able to configure and collect data from your BioRadio. For custom applications the **GLNT_BioRadioSDK** program will provide the framework for your LabVIEW development.

A Word of Caution About LabVIEW Version

If you have version of LabVIEW that is older than 2012 you will need to change the LabVIEW.exe configuration file because the BioRadio uses the .NET 4.5 framework. This is described by National Instruments here:

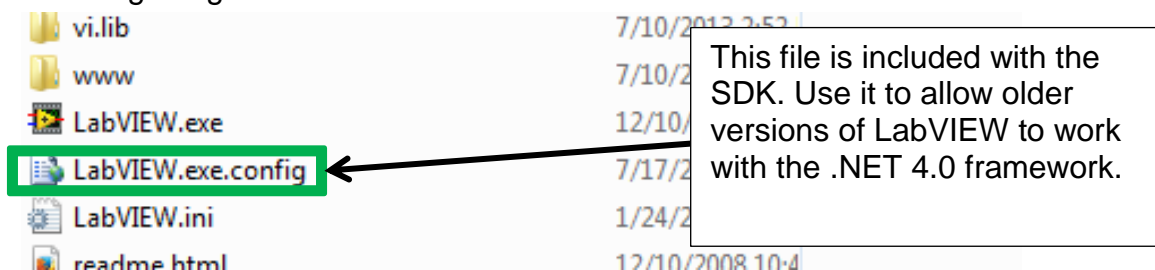
http://zone.ni.com/reference/en-XX/help/371361H-01/lvhowto/configuring_clr_version/

If you have an existing LabVIEW configuration file (LabVIEW.exe.config) you will need to add the following text to allow it to run with the .NET 4.0 framework.

```
<?xml version="1.0"?>
<configuration>
  <startup useLegacyV2RuntimeActivationPolicy="true">
    <supportedRuntime version="v4.0.30319"/>
  </startup>
</configuration>
```

OR

You can use the file that we included. Copy this file into your LabVIEW folder as shown in the following image.



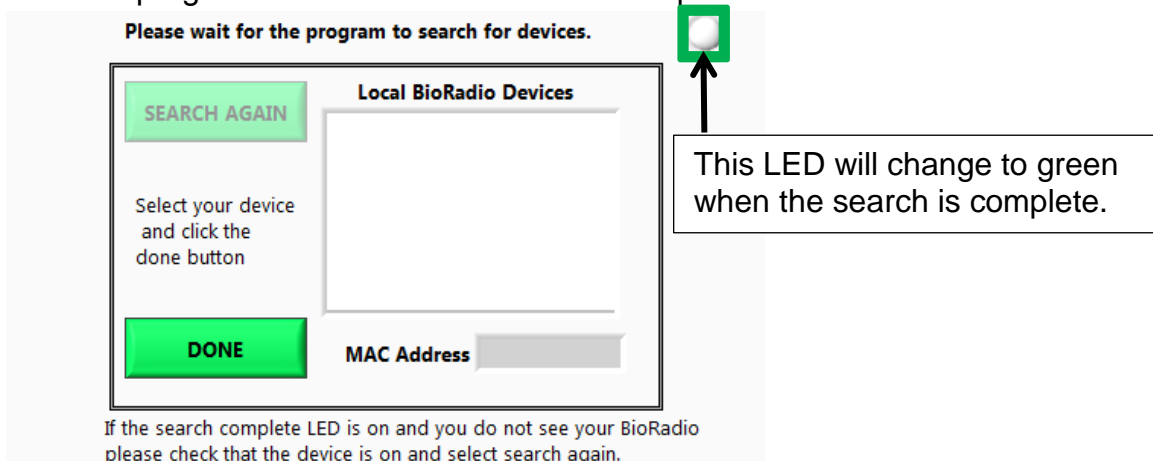
Chapter 2: Getting Started

The SDK does not currently support independent configuration of the BioRadio. Because of this, you will need to use **BioCapture** to configure the channels that you wish to use. Please see the BioCapture documentation for instructions.

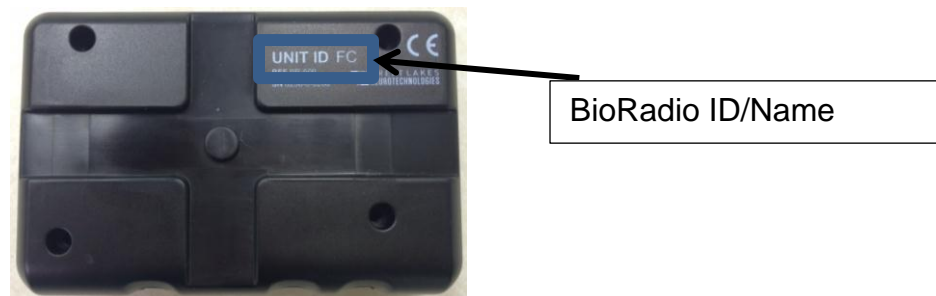
Chapter 3: Identifying Your BioRadio Using BioRadioSDKSEARCH.vi

This program will assist you in identifying your BioRadio for connection. This **BioRadioSDKSEARCH** program is embedded into the **GLNT_BioRadioSDK** program. However, if you plan to only connect to a single BioRadio, you may wish to just enter the devices MAC address. To use the **BioRadioSDKSEARCH** program use the following steps.

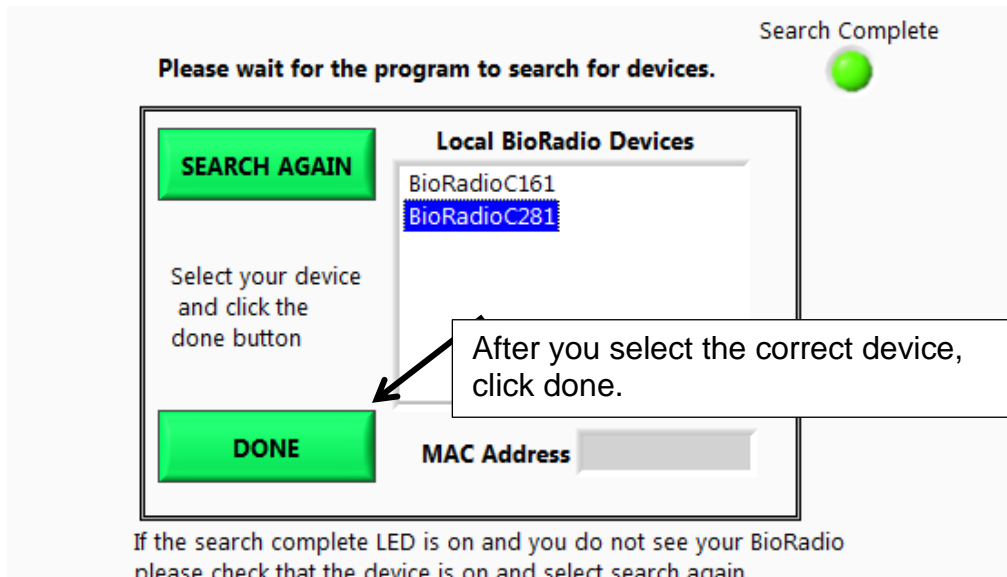
- 1) First check that your BioRadio is on.
- 2) Start the program and wait for the 'Search Complete' LED to turn on.



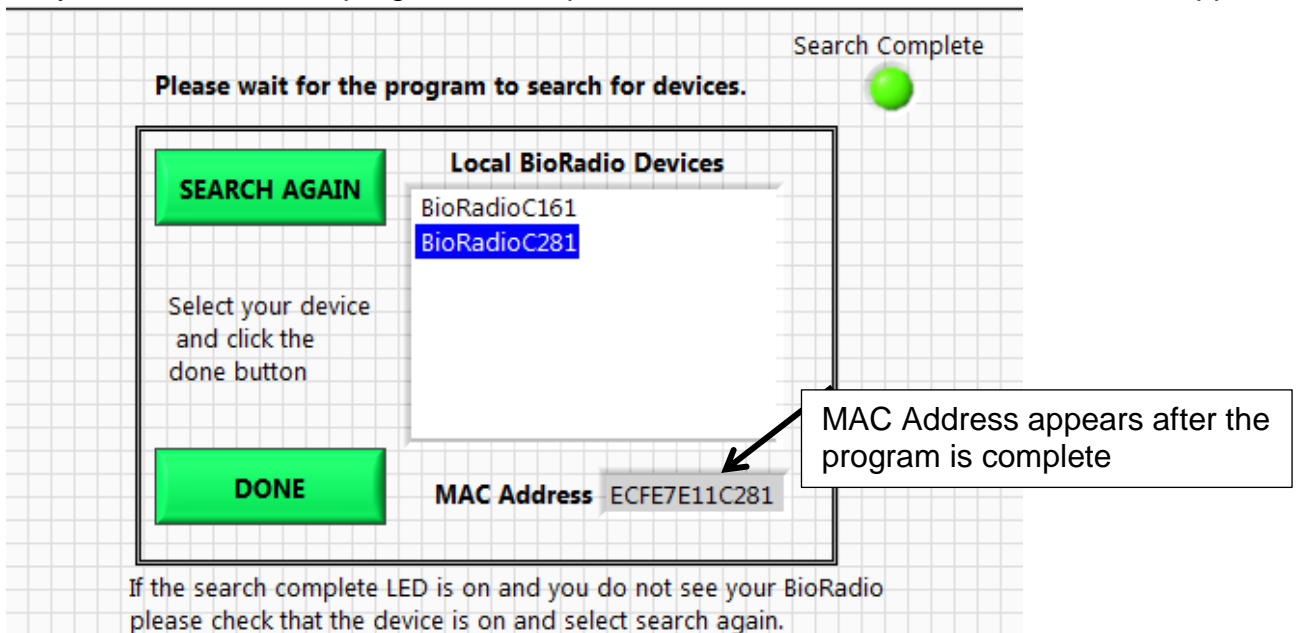
- 3) Select your BioRadio. If your device does not appear, check that your device is on, and select 'Search Again'. The device ID that will appear corresponds to the ID on the back of your device.



- 4) Once you have selected your BioRadio, select 'Done'. The BioRadio MAC address will be located in the text box below.




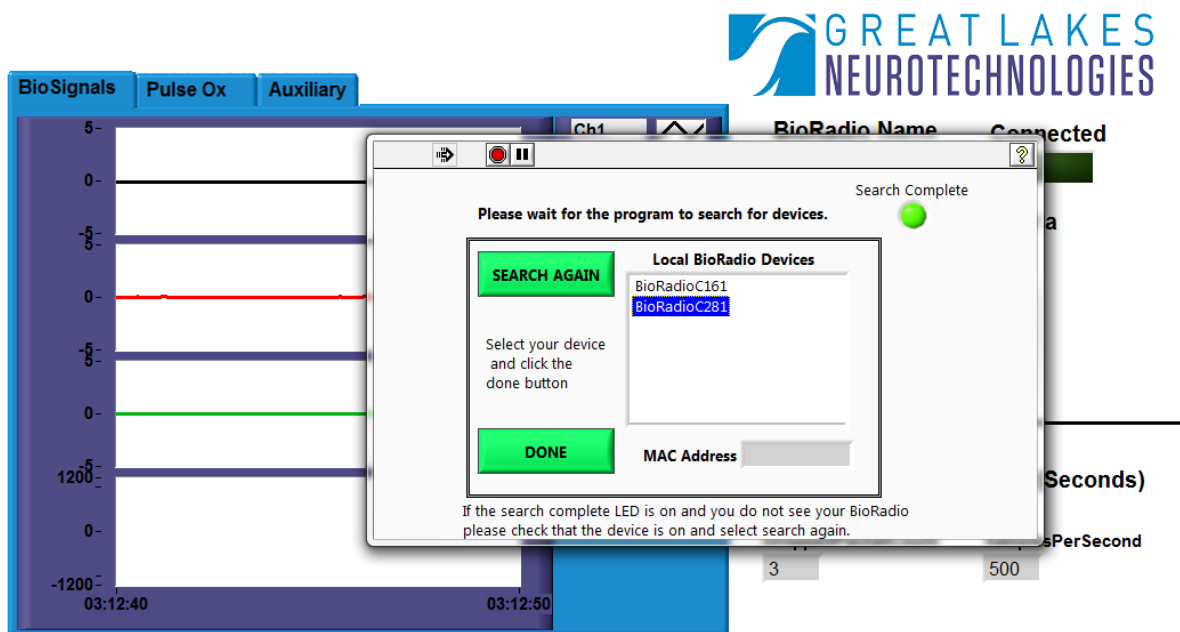
- 5) After you select done the program will stop and the MAC Address for that device will appear.



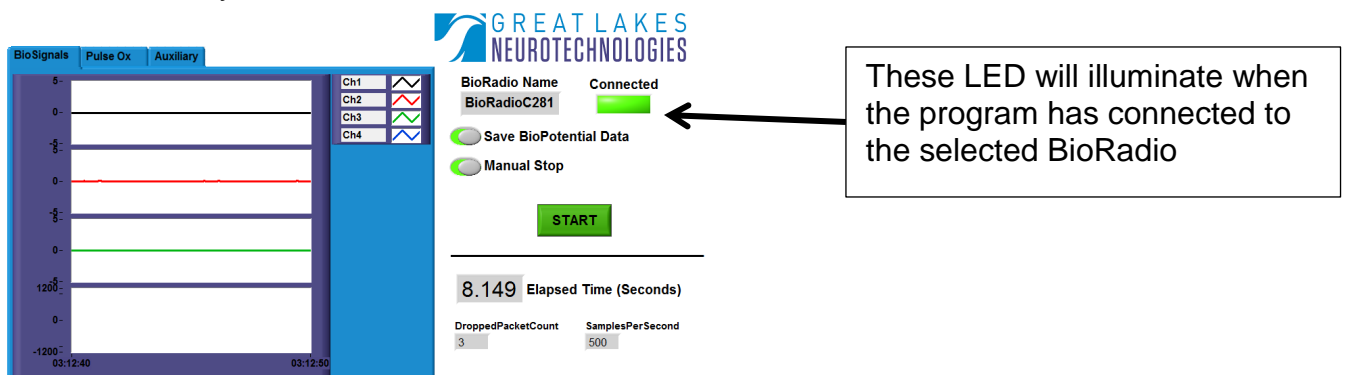
Chapter 4: Collecting Data with GLNT_BioRadioSDK.vi

This program will provide a general example of a custom application for data collection from the BioRadio.

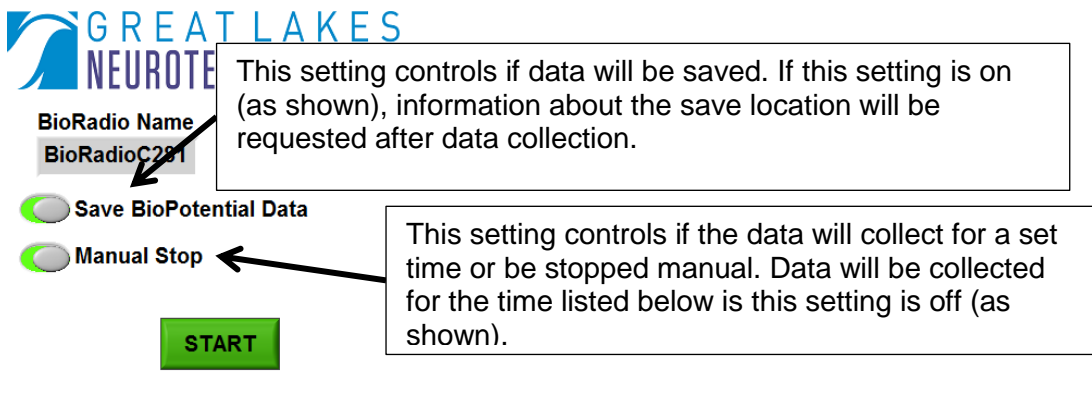
- 1) First check that your BioRadio is on
- 2) Open the program. Press the  in the upper left to start the **GLNT_BioRadioSDK** program. The **BioRadioSDKSEARCH** program is embedded into this program and will initiate a search for your device at the start as described in the previous chapter.



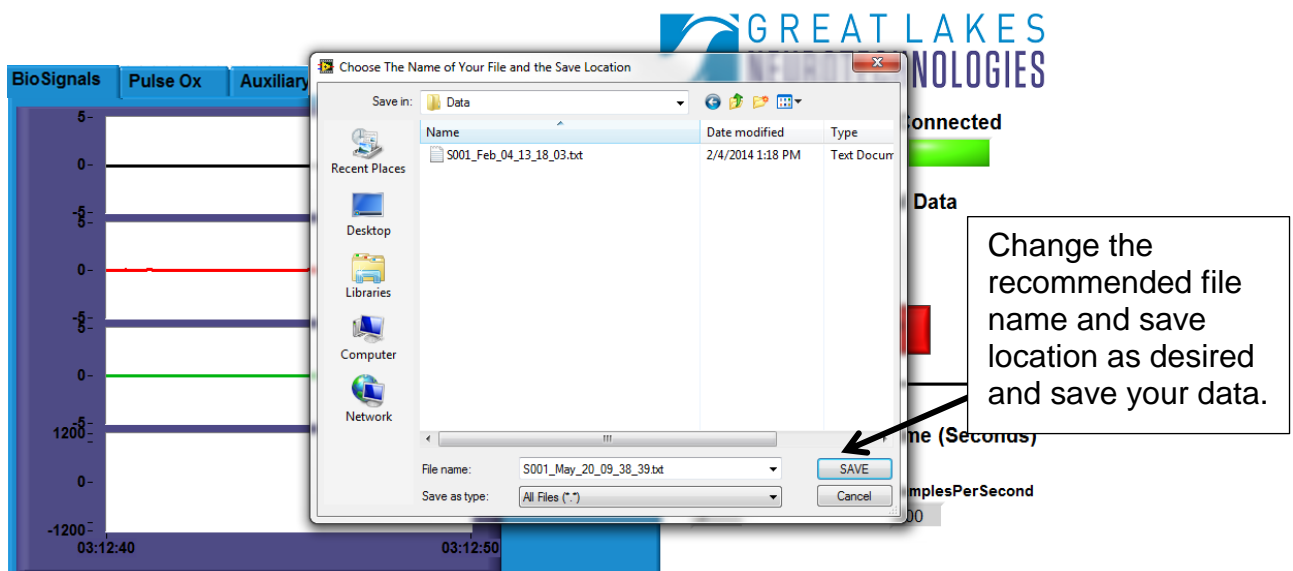
- 3) After the search is complete, select your BioRadio device and select 'Done'. The program will then connect to your device.



- 4) Check your settings for your data collection application.

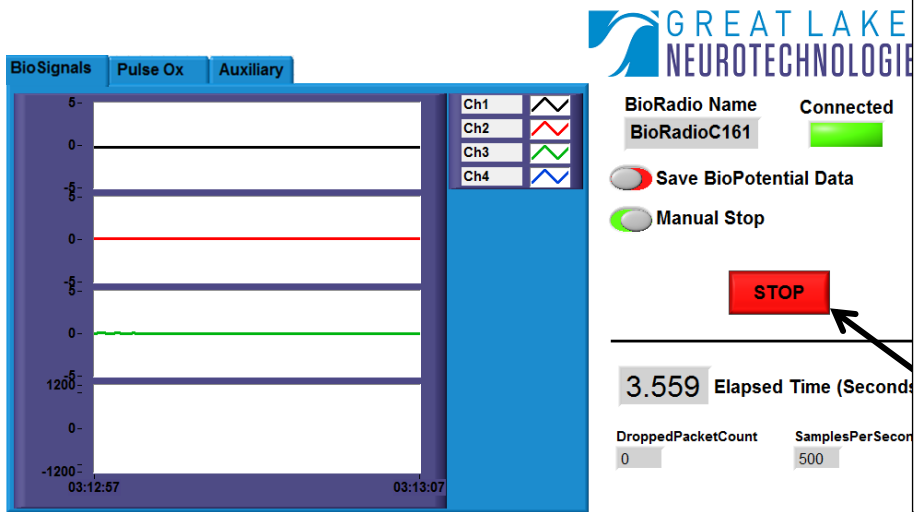


- 5) When ready click 'START' to begin data collection.
- 6) If the save data setting is on, after starting data collection a window will appear for you to choose the location to save the biopotential channel data. Please note that only biopotential data will be saved. This was done for simplicity of the SDK example because biopotential and signal blocks will most likely have different sampling frequencies.



- 7) Data will start to be collected from the BioRadio after you press 'START' and enter the saving information, if applicable.

8) Press 'Stop' to stop data collection and disconnect from the device.



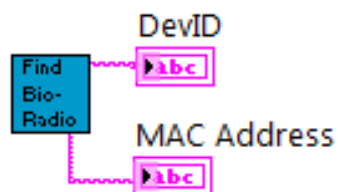
If you are not using 'Manual Stop' the program will automatically stop when the elapsed time is equal to the collection time. You can also stop the program by pressing 'STOP'. You will need to press the 'STOP' button if the 'Manual Stop' option is on (as shown).

Chapter 5: BioRadio Specific SubVIs

BioRadio specific LabVIEW VIs were created with the goal of simplicity for data collection. These VIs will provide the basic framework for data collection. Please note that these VIs do not assist with configuration of the device. Configuration needs to be completed through the BioCapture software.

BioRadioSDKSEARCH.vi

This function can be run independently to determine the BioRadio Device ID and MAC address or embedded into your application.

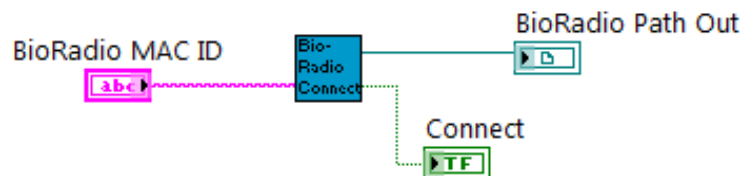


DevID– This output is the Device ID or name of your BioRadio. This will be located on the case of your device and will help you distinguish it from other nearby devices.

MAC Address– This output is the address of the selected device. This is used by the connection program to initiate the connection to the device.

BioRadioSDKCONNECT.vi

This function initiates the initial connection to the BioRadio.



BioRadio MAC ID – String with the BioRadio's MAC address. This value can be obtained using the **BioRadioSDKSEARCH** application.

BioRadio Path Out- This is the reference to the device object, which is needed for sending commands to the connected device.

Connect – This tells if the device has successfully connected.

BioRadioSDKSTART.vi

This function initiates the data collection process for the device.

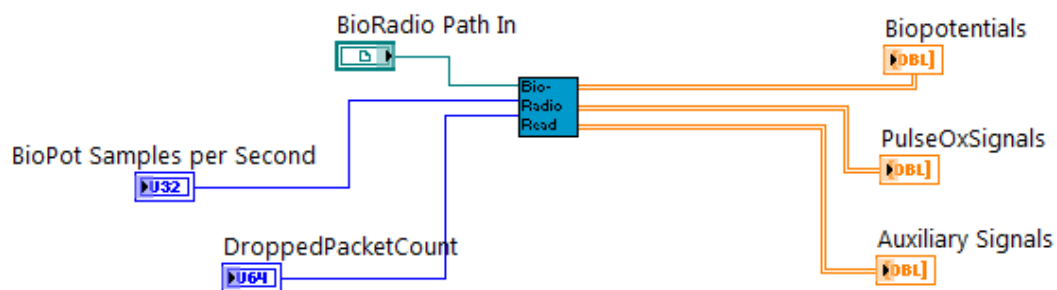


BioRadio In- This is the reference to the device object that is obtained from the BioRadioCONNECT.vi.

BioRadio Out- This is the reference to the device object that continues the path to the next object.

BioRadioSDKREAD.vi

This function reads the available data from the BioRadio. This outputs all available signals including from the sensor block (PulseOxSignals or AuxiliarySignals).



BioRadio Path In- This is the reference to the BioRadio object that is obtained from the BioRadioSTART.vi.

BioPot SamplesPerSecond- This is the biopotential data sample rate.

DroppedPacketCount- This is the cumulative number of dropped packets.

Biopotentials- Is the Biopotential data array from the device.

PulseOxSignals- Is the sensor block PulseOxSignal input data array from the device.

AuxiliarySignals- Is the sensor block Auxiliary input data array from the sensor.

BioRadioSDKSTOP.vi

This function stops the data acquisition.

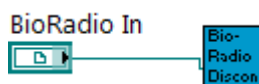


BioRadio In- This is the reference to the device.

BioRadio Out- This is the reference to the device object that continues the path to the next object.

BioRadioSDKDISCONNECT.vi

This function disconnects the BioRadio device.



BioRadio In- This is the reference to the device.

Chapter 6: Other SubVIs

The example code also includes a few VIs, which are not needed for general BioRadio function but could be useful in your applications.

DataSavingInfo.vi

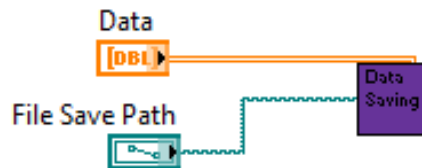
This function collects an interactive the information from the user about where to save the data that was collected and what name should be used.



Path for Saving- This is the output path for the data that will be saved. For example the output could be: 'C:\GLNT\Subject Data\S001.xls'

DataSaving.vi

This function actually completes the saving process. Having this separated from the information gathering section will allow you flexibility to not use the DataSavingInfo.vi and set the information to constants if you do not wish to change the file name or saving location.



Data- This is the data from the BioRadio.

File Save Path- This is the path where the data will be saved.

Frequently Asked Questions (FAQs)

Q. LabVIEW cannot find 'BioRadioSDK.dll' or another sub .VI.

A. When you first open LabVIEW it may have trouble finding these files. The files will be located in SubVIs folder included with the programs. Navigate LabVIEW to that folder and file. You should only need to do this once.

NOTE: If you receive an error after you have selected the "BioRadioSDK.dll" file it is most likely because your LabVIEW version does not automatically support the .NET 4.0 framework. See page 4 of this guide for instructions.

Q. My computer cannot find/connect to my BioRadio.

A. There are several potential causes for this. Please note that you will only be able to connect to a maximum of seven Bluetooth devices at one time.

1. Check that your computer's Bluetooth is on and that your BioRadio is on and charged.

- Restart the program and repeat the search for your device

2. If this does not work, check that you have the latest version of your computer's Bluetooth driver and that you are using Bluetooth hardware version 2.1 or greater.

Please Contact Us With Any Questions or Comments Related to This Software

Phone: 1-885-456-3876

Email: support@GLNeuroTech.com

Please include your LabVIEW version in any correspondence.