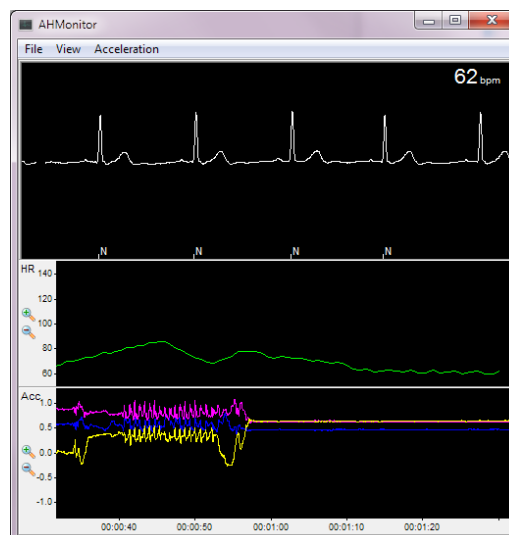# AliveX

Alive Heart Monitor sample application and source code for Microsoft Windows.
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AliveX is a sample application that connects to the Alive Heart Monitor over a Bluetooth connection to display ECG, HR, and acceleration signals. It includes all source code and a Visual Studio 2008 project for building a Microsoft Windows app. The application is written in C/C++ and should be helpful in creating your own applications.

AliveX supports the Microsoft Bluetooth stack on Windows only. It does not support Widcomm, BlueSoleil, or other Bluetooth stacks, or connections using a Bluetooth virtual serial port.

App Requirements

- Windows XP SP2 or later
- Bluetooth radio that uses the Microsoft Bluetooth stack

Build Requirements

- Microsoft Visual Studio 2008 or later.
- Windows SDK (Bluetooth libraries and header files)
- AliveECGPlug Source Code (DLL that provides ECG beat detection, classification, and filtering).

Building AliveX

Extract the contents of AliveXWinAppSource.zip to your development folder on your PC (keep the folder names). Open the AliveXWinApp.sln file in Visual Studio to build the application.

The project requires Bluetooth libraries from the Windows SDK. You may need to download and install the Microsoft Windows SDK Update for Vista, which also supports Windows XP SP2 and Windows Server 2003 SP1.

The Microsoft Bluetooth stack is built into Windows XP SP2 and later. If you have installed Bluetooth manager software such as Widcomm/Broadcom or BlueSoleil, then you may want to consider uninstalling it and your Bluetooth adapter should revert back to using the Microsoft Bluetooth stack.

The project and solution files are in Visual Studio 2008 format. If you open the project in a more recent version of Visual Studio, you will be prompted to convert the project files to the new format.

Source Files

Main source components include:

File	Description
AliveX.h AliveX.cpp	Main application window and message loop.
HMConnection.h	Manages the connection to the heart monitor and reading of data. This is done in a separate thread so that it doesn't block the UI.
HMPacket.h	Parses the data stream from the Heart Monitor into packets.
BtDeviceInfo.h	Bluetooth device discovery using the Microsoft Bluetooth winsock api.
BtRadio.h	Identifies if the Microsoft Bluetooth stack is running.
BtSocket.h BtSocket.cpp	Wrapper for creating Bluetooth SPP connections using the winsock API.
Display.h	Offscreen bitmap used for the ECG and acceleration display.
EcgGraph.h EcgGraph.cpp	Manages drawing of the ECG waveform, heart rate, beat detection and labels.
AccGraph.h AccGraph.cpp	Manages drawing of the acceleration signals.
HRGraph.h HRGraph.cpp	Manages drawing of the HR trend.
AccFilter.h AccFilter.cpp	3rd order low pass Bessel filter used for filtering acceleration signals.
ConnectionDialog.h	Dialog box used to search for Bluetooth devices and to select the heart monitor to connect to.
Plugin.h Plugin.cpp	Interface for accessing the AliveECGPlugin DLL functions for beat detection, classification and filtering.
AppProperties.h	Manages access and storage of application properties.

ECG Analysis

The AliveXWinApp project includes source code for a separate 'plugin' DLL, AliveECGPlugin, which provides beat detection, beat classification, filtering and heart rate calculations. The AliveECGPlugin.dll file must be installed into the same directory as the AliveX.exe application. When the AliveX application starts it will load and use the AliveECGPlugin.dll library. If it cannot find or load the file it will still function but will not display the heart rate, beat detection marks or annotations. The 'plugin' uses the ECG beat detector and classifier LGPL source code from EP Limited www.eplimited.com/software.htm.

Note: The AliveECG and AtsConvert applications provided with the Heart Monitor also support the same AliveECGPlugin DLL. This allows you to develop and use your own ECG beat detection and analysis algorithms in the AliveECG, AtsConvert, and AliveX applications.