EG Courses

Pulse Oximeter

SPECIFICATION

Revision 1.1

GPL2 </> Graphical Programming in LabVIEW 2

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General Information

The Pulse Oximeter application allows to acquire heart rate and blood oxygen level using a POX sensor and an Arduino device. The measured data can be saved to TDMS files and then displayed using the internal results viewer (additional window in the Pulse Oximeter application).

Hardware Components

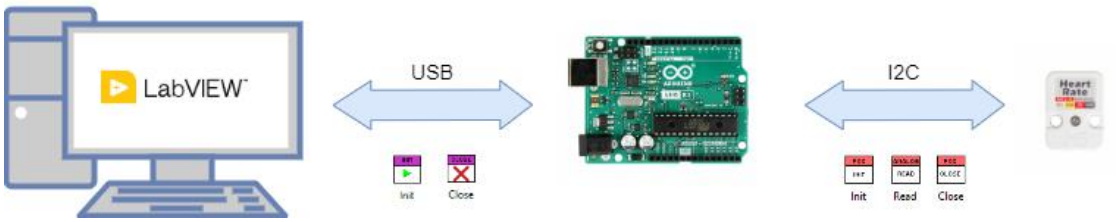
Specific hardware configuration is required for proper operation of the Pulse Oximeter application. The two main hardware components of the system are: Arduino Uno (used as a controller responsible for collecting sensor data and sending it to the application) and the POX MAX30100 device (heart rate and blood oxygen sensor connected to Arduino Uno via the I2C bus).

1. Arduino Uno.
2. Base Shield for Arduino Uno containing various connectors and pinouts (including I2C bus).
3. Pulse oximeter sensor MAX30100.
4. USB A-B cable.

Arduino Uno is connected to the computer via a USB cable, and communication with the Pulse Oximeter application is via the serial port.

Communication and Drivers

Communication with Arduino Uno from the LabVIEW environment is possible using the Magic Box palette. The application user cannot control data acquisition parameters such as sampling frequency or communication timeout. These settings should be adjusted and then coded by the developer into the application's source code. The sampling rate should be set exactly at 1 Hz.



Use the *POX* class *Read* method to obtain pulse rate and oxygen level values. This data is returned as a string formatted as follows:

Heart rate: 70.56bpm / SpO2:95%

If the POX sensor is unable to measure the biometric values, the *Read* function returns the appropriate information, formatted as follows:

Invalid sample

Configuration File

The Pulse Oximeter application uses a configuration file named *Configuration.ini* that is located in the application directory in a *\data* directory.

```
[Application Settings]
Measurements Directory = "C:\ProgramData\POX\Measurements"
```

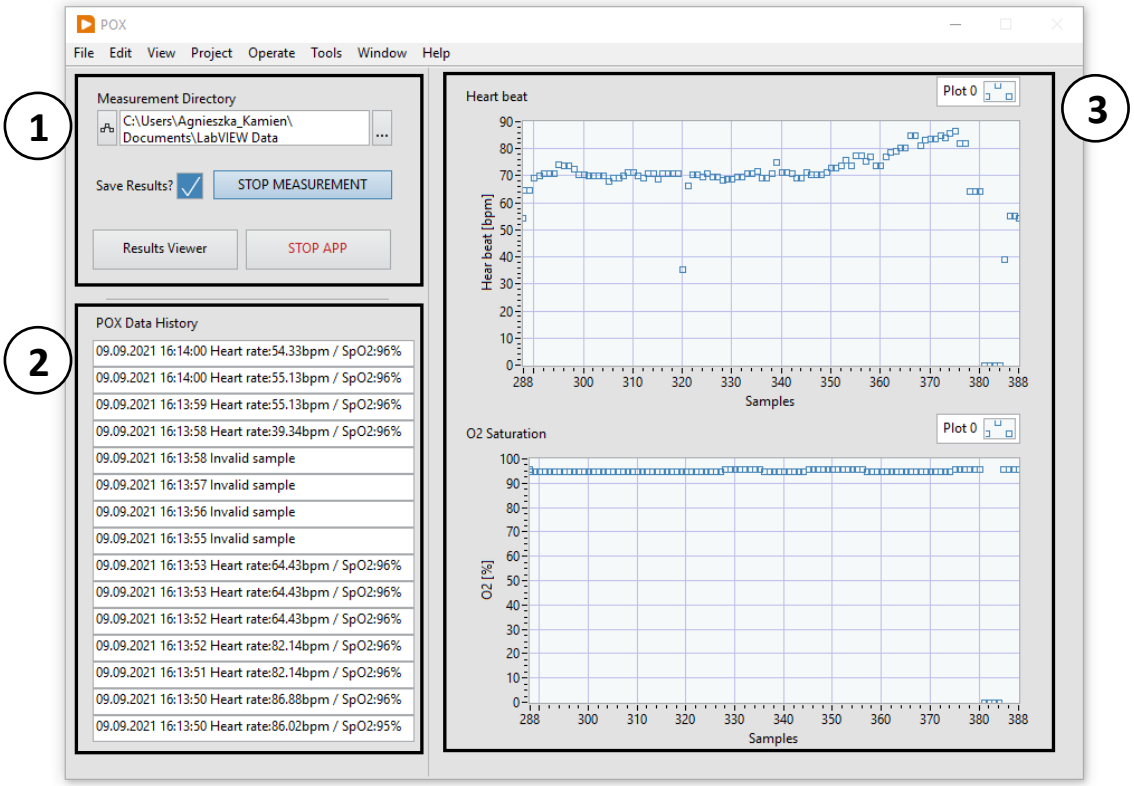
Section/key name	Description
[Application Settings]	This section contains general application settings.
Measurements Directory	This key allows to define the directory in which the measurement data is saved. If this key is empty or does not exist, the application saves the measurements on the user's desktop.

User Interface

MAIN APPLICATION WINDOW

There are three main sections in the main window of the Pulse Oximeter application:

1. Section for application and measurement control.
2. Section for displaying the history of raw data acquired from the POX device.
3. Data visualization section.



The *Measurement Directory* control allows you to change the location of the disk on which the measurement data is saved. When the application starts, this path is read from the *Configuration.ini* file. Each time the user changes the path, the *Configuration.ini* file is updated accordingly.

The *START/STOP MEASUREMENT* button starts or stops data acquisition from the POX device. If the *Save Results?* option is enabled before starting the measurement, the data is saved to the TDMS file.

The *Result Viewer* button launches additional application window described below. The *POX Data History* table shows the raw data obtained from the POX device along with the timestamp of a specific sample. The new measurements are added to the top of the table.

The *Heart Beat* and *O2 Saturation* graphs visualize the data acquired during the measurement.

RESULT VIEWER WINDOW

The second application window is the *Results Viewer*. This window allows you to load POX measurements saved in a TDMS file and visualize them on heartbeat and O2 saturation graphs. This window does not block the functionality of the main application window. Additionally, multiple *Results Viewer* windows can be opened simultaneously and do not close when the main application is closed – each *Results Viewer* window must be closed separately.