My Project

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Here is a list of all namespaces with brief descriptions:

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2.1 Class List

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3.1 File List

Here is a list of all files with brief descriptions:

Chapter 4

Namespace Documentation

4.1 vaso Namespace Reference

contains functions related to the file I/O use in this program

Enumerations

- enum Side { Side::Left, Side::Right }

Functions

- std::string CurrentDataName ()
- std::string InitialDataName (auto dir)
- std::string PatientName ()
- DataParams ReadParams (auto filename)
- std::string WriteParams (DataParams params, auto filename)
- float32 average (float32 *data, uint32 size)
- void average (float32 *data, float32 *avg, uint8 count, uint32 size)
- void diff (float32 *data, uint32 size)
- void fft (cfloat32 *data, uint32 size)
- void mag (cfloat32 *orig, float32 *newmags, uint32 size)
- void max (float32 *data, uint32 size)
- void smooth (float32 *data, uint32 size, uint16 order)
- void play (auto filename)
- void * process (void *procdata)
- void StartProcessing (ProcData procdata)
- void * processing (void *procdata)

Variables

- const std::string PATIENT_PATH = "/home/pi/patients/"

4.1.1 Detailed Description

contains functions related to the file I/O use in this program

contains functions related to the program's threaded processing of audio data

contains the function(s) relating to sound

contains the functions necessary to perform the mathematical operations required by this program

This namespace contains all code related to this project.

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Nicholas K. Nolan

4.1.2 Enumeration Type Documentation

4.1.2.1 enum vaso::Side [strong]

The side of the head to which a recording pertains.

Enumerator

Left

Right

Definition at line 58 of file definitions.hpp.

4.1.3 Function Documentation

4.1.3.1 float32 vaso::average (float32 * *data*, uint32 *size*)

Takes the average of all elements in an array

Parameters

data	the array from which to compute the average
size	the number of elements in the data array

Returns

the computed average

Definition at line 105 of file sigmath.hpp.

4.1.3.2 void vaso::average (float32 * *data*, float32 * *avg*, uint8 *count*, uint32 *size*)

Element-wise averaging along the first dimension of a two-dimensional array.

Parameters

data	the two-dimensional array containing [count] number of arrays in the first dimension and [size] number of each elements in the second dimension
avg	the array of size [size] containing the averaged values of each element
count	the number of arrays in the first dimension of data and will likely be a constant value of 3 in this program
size	the number of elements in the second dimension of data

Definition at line 109 of file sigmath.hpp.

4.1.3.3 std::string vaso::CurrentDataName ( )

Gets a data-based name to which the file(s) created in a session to be saved.

Returns

a partial (?) filename for the current session

Definition at line 26 of file fileio.hpp.

4.1.3.4 void vaso::diff (float32 * *data*, uint32 *size*)

Computes the left-handed first derivative of a discrete signal. The first element will be 0.

Parameters

data	an array containing the discrete signal data
size	the number of elements in data

Definition at line 113 of file sigmath.hpp.

4.1.3.5 void vaso::fft (cfloat32 * *data*, uint32 *size*)

Replaces the values of an array of cfloat32's with the array's DFT using a decimation-in-frequency algorithm.

This code is based on code from http://rosettacode.org/wiki/Fast_Fourier_transform#C.↩2B.2B.

Parameters

data	the array whose values should be replaced with its DFT
size	the number of elements in the data array

Definition at line 117 of file sigmath.hpp.

4.1.3.6 std::string vaso::InitialDataName (auto *dir*)

Finds the filename of the oldest (i.e., baseline) data is saved.

Parameters

dir	the directory which contains all patient data

Returns

the base (?) filename to which all baseline data was saved

Definition at line 37 of file fileio.hpp.

4.1.3.7 void vaso::mag (cfloat32 * *orig*, float32 * *newmags*, uint32 *size*)

Computes the magitude of an array of complex numbers.

Parameters

orig	the array of complex numbers
newmags	an array to which the magitudes are to be written
size	the number of elements in orig and newmags

Definition at line 165 of file sigmath.hpp.

4.1.3.8 void vaso::max (float32 * *data*, uint32 *size*)

Finds the maximum value in an array.

Parameters

data	the array whose maximum value is to be found
uint32	size the number of elements in the data array

Definition at line 169 of file sigmath.hpp.

4.1.3.9 std::string vaso::PatientName ( )

Prompts a user to enter a first, middle, and last name for a patients and creates a directory (if necessary) in which all of a patient's data can be saved.

Must warn a user if the patient folder does not already exist in order to prevent missaving data.

Returns

the directory under which all patient data is saved

Definition at line 51 of file fileio.hpp.

4.1.3.10 void vaso::play (auto *filename*)

Plays a WAVE file in a loop in a non-blocking manner.

Parameters

filename	the absolute or relative path to the WAVE file

Definition at line 19 of file sound.hpp.

4.1.3.11 void* vaso::process (void * *procdata*)

Computes recording parameters in a separate thread in a thread-safe manner. AUtomatically waits for each recording to finish before processing it. This file is meant to be called ONLY from the StartProcessing function.

Parameters

procdata	a struct containing the values necessary to processing the audio

Returns

a (void) pointer to a DataParams struct containing the computed parameters for a patient

4.1.3.12 void* vaso::processing (void * *procdata*)

Definition at line 42 of file threadproc.hpp.

4.1.3.13 DataParams vaso::ReadParams (auto *filename*)

Reads the previously computated parameters found in the specified file.

Parameters

filename	the absolute or relative path to the file containing the patient data to read

Returns

the patient parameters read

Definition at line 64 of file fileio.hpp.

4.1.3.14 void vaso::smooth (float32 * *data*, uint32 *size*, uint16 *order*)

Applies an nth-order moving-average filter to a discrete signal.

Parameters

data	the array containing the signal to which the filter should be applied
size	the number of elements in the data array
order	the order of the filter

Definition at line 173 of file sigmath.hpp.

4.1.3.15 void vaso::StartProcessing (ProcData *procdata*)

Begins processing the recorded data. Should be called before or immediately after the first recording.

Parameters

proxdata	a struct containing the values necessary to processing the audio

Definition at line 46 of file threadproc.hpp.

4.1.3.16 std::string vaso::WriteParams (DataParams *params*, auto *filename*)

Writes the parameters to the specified file.

Parameters

params	

Definition at line 73 of file fileio.hpp.

4.1.4 Variable Documentation

4.1.4.1 const std::string vaso::PATIENT_PATH = "/home/pi/patients/"

Absolute path to the folder containing the patients' data

Definition at line 18 of file fileio.hpp.

Chapter 5

Class Documentation

5.1 DataParams Struct Reference

`#include <definitions.hpp>`

5.1.1 Detailed Description

A structure containing the calculated results from processing the audio recordings.

Definition at line 40 of file definitions.hpp.

The documentation for this struct was generated from the following file:

- src/definitions.hpp

5.2 ProcData Struct Reference

`#include <definitions.hpp>`

5.2.1 Detailed Description

A structure containing information needed in the process() thread.

Definition at line 47 of file definitions.hpp.

The documentation for this struct was generated from the following file:

- src/definitions.hpp

Chapter 6

File Documentation

6.1 bin/start File Reference

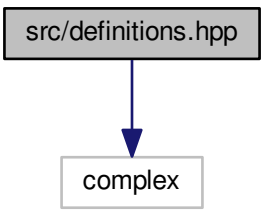
6.2 etc/doxygen.config File Reference

6.3 makefile File Reference

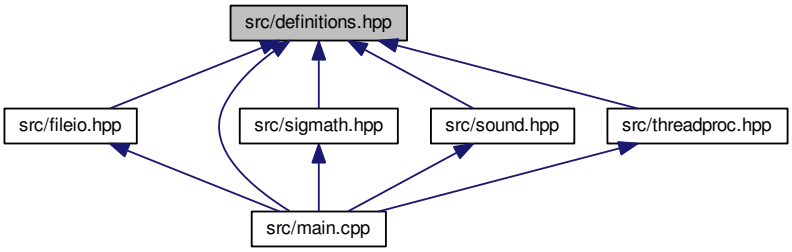
6.4 src/definitions.hpp File Reference

```
#include <complex>
```

Include dependency graph for definitions.hpp:



This graph shows which files directly or indirectly include this file:



Classes

- struct DataParams
- struct ProcData

Namespaces

- vaso

  contains functions related to the file I/O use in this program

Macros

- #define ENUM signed char

  Contains declarations of system-independant (universal size) integers and float types, shortened type names for some commonly used types, and enumerations.

Typedefs

- typedef unsigned char byte
- typedef unsigned char uint8
- typedef signed char sint8
- typedef unsigned short uint16
- typedef signed short sint16
- typedef unsigned int uint32
- typedef signed int sint32
- typedef unsigned long long uint64
- typedef signed long long sint64
- typedef float float32
- typedef double float64
- typedef std::complex< float32 > cfloat32

Enumerations

- enum vaso::Side { vaso::Side::Left, vaso::Side::Right }

6.4.1 Macro Definition Documentation

6.4.1.1 #define ENUM signed char

Contains declarations of system-independant (universal size) integers and float types, shortened type names for some commonly used types, and enumerations.

Author

Samuel Andrew Wisner, awisner94@gmail.com

Definition at line 13 of file definitions.hpp.

6.4.2 Typedef Documentation

6.4.2.1 typedef unsigned char byte

Definition at line 15 of file definitions.hpp.

6.4.2.2 typedef std::complex<float32> cfloat32

Defines a type for complex float32's.

Definition at line 34 of file definitions.hpp.

6.4.2.3 typedef float float32

Definition at line 28 of file definitions.hpp.

6.4.2.4 typedef double float64

Definition at line 29 of file definitions.hpp.

6.4.2.5 typedef signed short sint16

Definition at line 20 of file definitions.hpp.

6.4.2.6 typedef signed int sint32

Definition at line 23 of file definitions.hpp.

6.4.2.7 typedef signed long long sint64

Definition at line 26 of file definitions.hpp.

6.4.2.8 typedef signed char sint8

Definition at line 17 of file definitions.hpp.

6.4.2.9 typedef unsigned short uint16

Definition at line 19 of file definitions.hpp.

6.4.2.10 typedef unsigned int uint32

Definition at line 22 of file definitions.hpp.

6.4.2.11 typedef unsigned long long uint64

Definition at line 25 of file definitions.hpp.

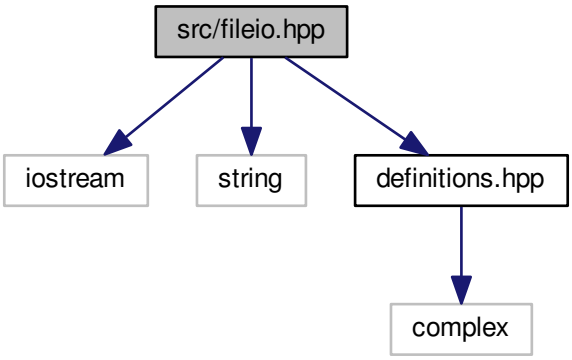
6.4.2.12 typedef unsigned char uint8

Definition at line 16 of file definitions.hpp.

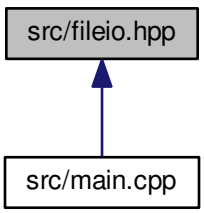
6.5 src/fileio.hpp File Reference

```
#include <iostream>
#include <string>
#include "definitions.hpp"
```

Include dependency graph for fileio.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- vaso

  contains functions related to the file I/O use in this program

Functions

- std::string vaso::CurrentDataName ()
- std::string vaso::InitialDataName (auto dir)
- std::string vaso::PatientName ()
- DataParams vaso::ReadParams (auto filename)
- std::string vaso::WriteParams (DataParams params, auto filename)

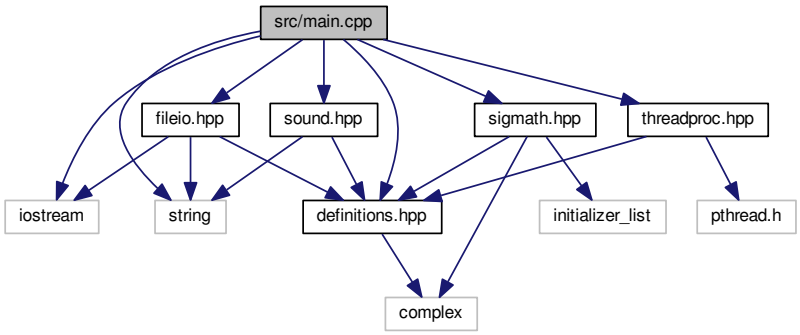
Variables

- const std::string vaso::PATIENT_PATH = "/home/pi/patients/"

6.6 src/main.cpp File Reference

```
#include <iostream>
#include <string>
#include "definitions.hpp"
#include "fileio.hpp"
#include "sigmath.hpp"
#include "sound.hpp"
#include "threadproc.hpp"
```

Include dependency graph for main.cpp:



Functions

- int main (int argc, char **argv)

6.6.1 Function Documentation

6.6.1.1 int main (int *argc*, char ** *argv*)

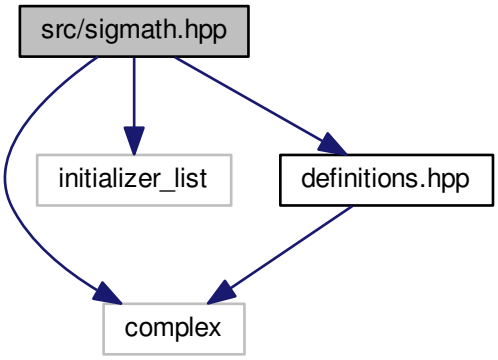
The main program for this progject. It will detect vasospasms over a period of days.

Definition at line 23 of file main.cpp.

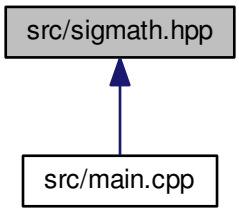
6.7 src/sigmath.hpp File Reference

```
#include <complex>
#include <initializer_list>
#include "definitions.hpp"
```

Include dependency graph for sigmath.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- vaso

  contains functions related to the file I/O use in this program

Functions

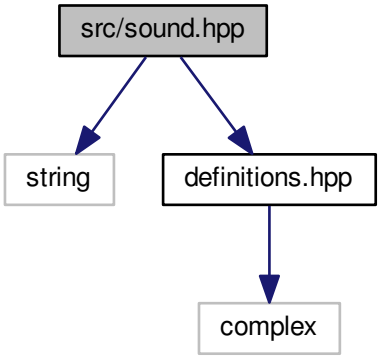
- float32 vaso::average (float32 *data, uint32 size)
- void vaso::average (float32 *data, float32 *avg, uint8 count, uint32 size)

- void vaso::diff (float32 *data, uint32 size)
- void vaso::fft (cfloat32 *data, uint32 size)
- void vaso::mag (cfloat32 *orig, float32 *newmags, uint32 size)
- void vaso::max (float32 *data, uint32 size)
- void vaso::smooth (float32 *data, uint32 size, uint16 order)

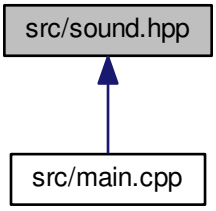
6.8 src/sound.hpp File Reference

```
#include <string>
#include "definitions.hpp"
```

Include dependency graph for sound.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- vaso

  contains functions related to the file I/O use in this program

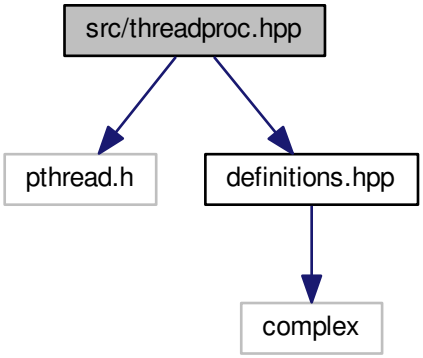
Functions

- void vaso::play (auto filename)

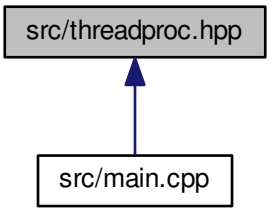
6.9 src/threadproc.hpp File Reference

```
#include <pthread.h>
#include "definitions.hpp"
```

Include dependency graph for threadproc.hpp:



This graph shows which files directly or indirectly include this file:



Namespaces

- vaso

  contains functions related to the file I/O use in this program

Functions

- void * vaso::process (void *procdata)

- void vaso::StartProcessing (ProcData procdata)
- void ∗ vaso::processing (void ∗procdata)

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