Stress Controller Device C++ Code

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Chapter 1

Hierarchical Index

1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

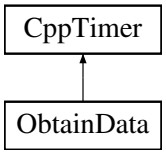
Chapter 4

Class Documentation

4.1 CppTimer Class Reference

`#include <CppTimer.h>`

Inheritance diagram for CppTimer:



Public Member Functions

- CppTimer ()
- virtual ~CppTimer ()
- void start (long nanosecs)
- virtual void timerEvent ()=0

4.1.1 Constructor & Destructor Documentation

4.1.1.1 CppTimer()

`CppTimer::CppTimer ( )  [inline]`

4.1.1.2 ~CppTimer()

`virtual CppTimer::~CppTimer ( )  [inline], [virtual]`

4.1.2 Member Function Documentation

4.1.2.1 start()

```
void CppTimer::start (
            long nanosecs )  [inline]
```

4.1.2.2 timerEvent()

```
virtual void CppTimer::timerEvent ( )  [pure virtual]
```

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

- C:/Users/Mufasa/Desktop/123/Final_V3/CppTimer.h

4.2 Fir1 Class Reference

```
#include <Fir1.h>
```

Public Member Functions

- template<unsigned nTaps>
  Fir1 (const double(&_coefficients)[nTaps])
- Fir1 (double *coefficients, unsigned number_of_taps)
- Fir1 (const char *coeffFile, unsigned number_of_taps=0)
- Fir1 (unsigned number_of_taps)
- ~Fir1 ()
- double filter (double input)
- void lms_update (double error)
- void setLearningRate (double _mu)
- double getLearningRate ()
- void reset ()
- void zeroCoeff ()
- unsigned getTaps ()
- double getTapInputPower ()

4.2.1 Detailed Description

Finite impulse response filter. The precision is double. It takes as an input a file with coefficients or an double array.

4.2.2 Constructor & Destructor Documentation

4.2.2.1 Fir1() [1/4]

```
template<unsigned nTaps>
Fir1::Fir1 (
            const double(&) _coefficients[nTaps] )  [inline]
```

Coefficients as a const double array. Because the array is const the number of taps is identical to the length of the array.

Parameters

_coefficients	A const double array with the impulse response.

4.2.2.2 Fir1() [2/4]

```
Fir1::Fir1 (
            double * coefficients,
            unsigned number_of_taps )
```

```
Coefficients as a (non-constant-) double array where the length needs to be specified.
```

Parameters

coefficients	Coefficients as double array.
number_of_taps	Number of taps (needs to match the number of coefficients

4.2.2.3 Fir1() [3/4]

```
Fir1::Fir1 (
            const char * coeffFile,
            unsigned number_of_taps = 0 )
```

Coefficients as a text file (for example from Python) The number of taps is automatically detected when the taps are kept zero.

Parameters

coeffFile	Patht to textfile where every line contains one coefficient
number_of_taps	Number of taps (0 = autodetect)

4.2.2.4 Fir1() [4/4]

```
Fir1::Fir1 (
            unsigned number_of_taps )
```

```
Inits all coefficients and the buffer to zero
```

This is useful for adaptive filters where we start with zero valued coefficients.

4.2.2.5 ∼Fir1()

```
Fir1::∼Fir1 ( )
```

Releases the coefficients and buffer.

4.2.3 Member Function Documentation

4.2.3.1 filter()

```
double Fir1::filter (
            double input )
```

The actual filter function operation: it receives one sample and returns one sample.

Parameters

input	The input sample.

4.2.3.2 getLearningRate()

```
double Fir1::getLearningRate ( )  [inline]
```

Getting the learning rate for the adaptive filter.

4.2.3.3 getTapInputPower()

```
double Fir1::getTapInputPower ( )
```

```
Returns the power of the of the buffer content:
```

sum_k buffer[k]^2 which is needed to implement a normalised LMS algorithm.

4.2.3.4 getTaps()

```
unsigned Fir1::getTaps ( )  [inline]
```

Returns the number of taps.

4.2.3.5 lms_update()

```
void Fir1::lms_update (
            double error )
```

```
LMS adaptive filter weight update:
```

Every filter coefficient is updated with: w_k(n+1) = w_k(n) + learning_rate ∗ buffer_k(n) ∗ error(n)

Parameters

error	Is the term error(n), the error which adjusts the FIR conefficients.

4.2.3.6 reset()

```
void Fir1::reset ( )
```

Resets the buffer (but not the coefficients)

4.2.3.7 setLearningRate()

```
void Fir1::setLearningRate (
            double _mu )  [inline]
```

Setting the learning rate for the adaptive filter.

Parameters

_mu	The learning rate (i.e. rate of the change by the error signal)

4.2.3.8 zeroCoeff()

```
void Fir1::zeroCoeff ( )
```

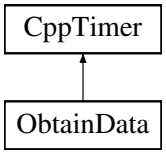
Sets all coefficients to zero

The documentation for this class was generated from the following files:

- C:/Users/Mufasa/Desktop/123/Final_V3/Fir1.h
- C:/Users/Mufasa/Desktop/123/Final_V3/Fir1.cpp

4.3 ObtainData Class Reference

Inheritance diagram for ObtainData:



Additional Inherited Members

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

- C:/Users/Mufasa/Desktop/123/Final_V3/StressController.cpp

4.4 VEML6030rpi Class Reference

`#include <VEML6030rpi.h>`

Public Member Functions

- VEML6030rpi ()
- virtual ~VEML6030rpi ()
- void init (uint8_t _ADR)
- void setALS (uint16_t cmd)
- void setALS_WH (uint16_t wh)
- void setALS_WL (uint16_t wl)
- uint8_t SetIntTime (uint16_t TimeBits)
- uint8_t SetGain (uint16_t GainVal)
- uint16_t getALS (void)
- uint16_t getWhite (void)
- uint16_t getALS_INT (void)
- unsigned int IntTime2Bits (unsigned int Time)
- uint16_t Gain2Bits (float GainVal)
- void powerSaving (uint16_t ps)
- uint8_t Shutdown (void)
- uint8_t PowerOn (void)
- void SetResolution (float Gain, float IntTime)
- void AutoSet (void)

Public Attributes

- uint16_t als
- uint16_t white
- float resolution
- float lux
- float whitelux

4.4.1 Constructor & Destructor Documentation

4.4.1.1 VEML6030rpi()

`VEML6030rpi::VEML6030rpi ( )`

4.4.1.2 ~VEML6030rpi()

```
VEML6030rpi::~VEML6030rpi ( )  [virtual]
```

4.4.2 Member Function Documentation

4.4.2.1 AutoSet()

```
void VEML6030rpi::AutoSet (
            void  )
```

4.4.2.2 Gain2Bits()

```
uint16_t VEML6030rpi::Gain2Bits (
            float GainVal )
```

4.4.2.3 getALS()

```
uint16_t VEML6030rpi::getALS (
            void  )
```

4.4.2.4 getALS_INT()

```
uint16_t VEML6030rpi::getALS_INT (
            void  )
```

4.4.2.5 getWhite()

```
uint16_t VEML6030rpi::getWhite (
            void  )
```

4.4.2.6 init()

```
void VEML6030rpi::init (
            uint8_t _ADR )
```

4.4.2.7 IntTime2Bits()

```
unsigned int VEML6030rpi::IntTime2Bits (
            unsigned int Time )
```

4.4.2.8 PowerOn()

```
uint8_t VEML6030rpi::PowerOn (
            void  )
```

4.4.2.9 powerSaving()

```
void VEML6030rpi::powerSaving (
            uint16_t ps )
```

4.4.2.10 setALS()

```
void VEML6030rpi::setALS (
            uint16_t cmd )
```

4.4.2.11 setALS_WH()

```
void VEML6030rpi::setALS_WH (
            uint16_t wh )
```

4.4.2.12 setALS_WL()

```
void VEML6030rpi::setALS_WL (
            uint16_t wl )
```

4.4.2.13 SetGain()

```
uint8_t VEML6030rpi::SetGain (
            uint16_t GainVal )
```

4.4.2.14 SetIntTime()

```
uint8_t VEML6030rpi::SetIntTime (
            uint16_t TimeBits )
```

4.4.2.15 SetResolution()

```
void VEML6030rpi::SetResolution (
            float Gain,
            float IntTime )
```

4.4.2.16 Shutdown()

```
uint8_t VEML6030rpi::Shutdown (
            void  )
```

4.4.3 Member Data Documentation

4.4.3.1 als

```
uint16_t VEML6030rpi::als
```

4.4.3.2 lux

```
float VEML6030rpi::lux
```

4.4.3.3 resolution

```
float VEML6030rpi::resolution
```

4.4.3.4 white

```
uint16_t VEML6030rpi::white
```

4.4.3.5 whitelux

```
float VEML6030rpi::whitelux
```

The documentation for this class was generated from the following files:

- C:/Users/Mufasa/Desktop/123/Final_V3/VEML6030rpi.h
- C:/Users/Mufasa/Desktop/123/Final_V3/VEML6030rpi.cpp

Chapter 5

File Documentation

5.1 C:/Users/Mufasa/Desktop/123/Final_V3/CppTimer.h File Reference

```
#include <stdlib.h>
#include <unistd.h>
#include <stdio.h>
#include <signal.h>
#include <time.h>
```

Classes

- class CppTimer

Macros

- #define CLOCKID CLOCK_MONOTONIC
- #define SIG SIGRTMIN

5.1.1 Macro Definition Documentation

5.1.1.1 CLOCKID

```
#define CLOCKID CLOCK_MONOTONIC
```

GNU GENERAL PUBLIC LICENSE Version 3, 29 June 2007

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This is inspired by the timer_create man page.

5.1.1.2 SIG

```
#define SIG SIGRTMIN
```

5.2 C:/Users/Mufasa/Desktop/123/Final_V3/Fir1.cpp File Reference

```
#include "Fir1.h"
#include <string.h>
#include <stdlib.h>
#include <assert.h>
#include <stdexcept>
```

5.3 C:/Users/Mufasa/Desktop/123/Final_V3/Fir1.h File Reference

```
#include <stdio.h>
```

Classes

- class Fir1

5.4 C:/Users/Mufasa/Desktop/123/Final_V3/StressController.cpp File Reference

```
#include "VEML6030rpi.h"
#include <wiringPiI2C.h>
#include "Fir1.h"
#include "CppTimer.h"
#include <fstream>
#include <array>
#include <time.h>
#include <string>
#include <unistd.h>
#include <bits/stdc++.h>
#include <iostream>
#include <stdio.h>
#include <errno.h>
#include <wiringPi.h>
#include <softTone.h>
```

Classes

- class ObtainData

Macros

- #define PIN 7

Functions

- void startalarm ()
- void alarm ()
- void init ()
- int main (void)

Variables

- int ipulse = 0
- int statpulse = 0
- int pd = 0
- int tempbpm = 80
- int iuserrest
- int iuserrun
- int iuserstress
- int tbpm
- int pbpm
- int configstep = 1
- int cnt = 1
- int scale [14] = {659, 659, 0, 659, 0, 523, 659, 0, 784, 0, 0, 0, 392, 0}
- int configstat = 1
- double restctr = 0
- double runctr = 0
- double runT = 0
- double restT = 0
- double ctr = 0
- double pulse [300] = {0}
- double mpulse = 0
- double duserrest
- double duserrun
- double duserstress
- VEML6030rpi veml6030
- string status
- string username
- string myexit
- string session
- string config
- int sessionbpm [20] = {0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 2000, 3000, 4000, 5000, 6000, 7000, 8000, 9000, 10000}
- Fir1 fir ("coeffnoise.dat", 801)
- bool userfound = false
- ifstream statustxt
- string statusfname = "/var/www/html/Project/status.txt"
- ifstream usernametxt
- string usernamefname = "/var/www/html/Project/username.txt"
- fstream userstxt
- string usersfname = "/var/www/html/Project/userdata.txt"
- ifstream exittxt

- string exitfname = "/var/www/html/Project/exit.txt"
- ifstream sessiontxt
- string sessionfname = "/var/www/html/Project/session.txt"
- ifstream configtxt
- string configfname = "/var/www/html/Project/config.txt"
- ofstream whitetxt
- string whitefname = "/var/www/html/Project/white.txt"
- ofstream eventlogtxt
- string eventlogfname = "/var/www/html/Project/eventlog.txt"

5.4.1 Macro Definition Documentation

5.4.1.1 PIN

```
#define PIN 7
```

"Monitoring of stress level" University of Glasgow Supervised by: Bernd Porr By Ahmed Elmogamer, Daewon Jung and Gabriel Galeote Checa

Official project location: https://github.com/GGChe/Stress_Controller_Device

Open Readme for details about the project

5.4.2 Function Documentation

5.4.2.1 alarm()

```
void alarm ( )
```

5.4.2.2 init()

```
void init ( )
```

5.4.2.3 main()

```
int main (
             void  )
```

Firstly, we need to check whether status is 0, 1 or 2. Then, if status is equals to 0, we are in the main webpage. if status is equals to 1, we are logged but the user already exists to we don't need to calibrate if status is equals to 2, we need to signup and calibrate.

5.4.2.4 startalarm()

```
void startalarm ( )
```

5.4.3 Variable Documentation

5.4.3.1 cnt

```
int cnt = 1
```

5.4.3.2 config

```
string config
```

5.4.3.3 configfname

```
string configfname = "/var/www/html/Project/config.txt"
```

5.4.3.4 configstat

```
int configstat = 1
```

5.4.3.5 configstep

```
int configstep = 1
```

5.4.3.6 configtxt

```
ifstream configtxt
```

5.4.3.7 ctr

```
double ctr = 0
```

5.4.3.8 duserrest

```
double duserrest
```

5.4.3.9 duserrun

```
double duserrun
```

5.4.3.10 duserstress

```
double duserstress
```

5.4.3.11 eventlogfname

```
string eventlogfname = "/var/www/html/Project/eventlog.txt"
```

5.4.3.12 eventlogtxt

```
ofstream eventlogtxt
```

5.4.3.13 exitfname

```
string exitfname = "/var/www/html/Project/exit.txt"
```

5.4.3.14 exittxt

```
ifstream exittxt
```

5.4.3.15 fir

```
Fir1 fir("coeffnoise.dat", 801)
```

5.4.3.16 ipulse

```
int ipulse = 0
```

5.4.3.17 iuserrest

```
int iuserrest
```

5.4.3.18 iuserrun

```
int iuserrun
```

5.4.3.19 iuserstress

```
int iuserstress
```

5.4.3.20 mpulse

```
double mpulse = 0
```

5.4.3.21 myexit

```
string myexit
```

5.4.3.22 pbpm

```
int pbpm
```

5.4.3.23 pd

```
int pd = 0
```

5.4.3.24 pulse

```
double pulse[300] = {0}
```

5.4.3.25 restctr

```
double restctr = 0
```

5.4.3.26 restT

```
double restT = 0
```

5.4.3.27 runctr

```
double runctr = 0
```

5.4.3.28 runT

```
double runT = 0
```

5.4.3.29 scale

```
int scale[14] = {659, 659, 0, 659, 0, 523, 659, 0, 784, 0, 0, 0, 392, 0}
```

5.4.3.30 session

```
string session
```

5.4.3.31 sessionbpm

```
int sessionbpm[20] = {0, 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 2000, 3000, 4000,
5000, 6000, 7000, 8000, 9000, 10000}
```

5.4.3.32 sessionfname

```
string sessionfname = "/var/www/html/Project/session.txt"
```

5.4.3.33 sessiontxt

```
ifstream sessiontxt
```

5.4.3.34 statpulse

```
int statpulse = 0
```

5.4.3.35 status

```
string status
```

5.4.3.36 statusfname

```
string statusfname = "/var/www/html/Project/status.txt"
```

5.4.3.37 statustxt

```
ifstream statustxt
```

5.4.3.38 tbpm

```
int tbpm
```

5.4.3.39 tempbpm

```
int tempbpm = 80
```

5.4.3.40 userfound

```
bool userfound = false
```

5.4.3.41 username

```
string username
```

5.4.3.42 usernamefname

```
string usernamefname = "/var/www/html/Project/username.txt"
```

5.4.3.43 usernametxt

```
ifstream usernametxt
```

5.4.3.44 usersfname

```
string usersfname = "/var/www/html/Project/userdata.txt"
```

5.4.3.45 userstxt

```
fstream userstxt
```

5.4.3.46 veml6030

```
VEML6030rpi veml6030
```

5.4.3.47 whitefname

```
string whitefname = "/var/www/html/Project/white.txt"
```

5.4.3.48 whitetxt

```
ofstream whitetxt
```

5.5 C:/Users/Mufasa/Desktop/123/Final_V3/VEML6030rpi.cpp File Reference

```
#include "VEML6030rpi.h"
#include <wiringPiI2C.h>
#include <fstream>
#include <math.h>
#include <iostream>
```

Macros

- #define _ADR 0x48
- #define ALS_CONF 0x00
- #define ALS_WH 0x01
- #define ALS_WL 0x02
- #define PWR_SVG 0x03
- #define ALS_CMD 0x04
- #define WHITE_CMD 0x05
- #define ALS_INT 0x06
- #define IT25 0x300
- #define IT50 0x200
- #define IT100 0x000
- #define IT200 0x040
- #define IT400 0x080
- #define IT800 0x0C0
- #define GAIN_1 0x0000
- #define GAIN_2 0x0800
- #define GAIN_1_8 0x1000
- #define GAIN_1_4 0x1800

5.5.1 Macro Definition Documentation

5.5.1.1 _ADR

```
#define _ADR 0x48
```

5.5.1.2 ALS_CMD

```
#define ALS_CMD 0x04
```

5.5.1.3 ALS_CONF

```
#define ALS_CONF 0x00
```

5.5.1.4 ALS_INT

```
#define ALS_INT 0x06
```

5.5.1.5 ALS_WH

```
#define ALS_WH 0x01
```

5.5.1.6 ALS_WL

```
#define ALS_WL 0x02
```

5.5.1.7 GAIN_1

```
#define GAIN_1 0x0000
```

5.5.1.8 GAIN_1_4

```
#define GAIN_1_4 0x1800
```

5.5.1.9 GAIN_1_8

```
#define GAIN_1_8 0x1000
```

5.5.1.10 GAIN_2

```
#define GAIN_2 0x0800
```

5.5.1.11 IT100

```
#define IT100 0x000
```

5.5.1.12 IT200

```
#define IT200 0x040
```

5.5.1.13 IT25

```
#define IT25 0x300
```

5.5.1.14 IT400

```
#define IT400 0x080
```

5.5.1.15 IT50

```
#define IT50 0x200
```

5.5.1.16 IT800

```
#define IT800 0x0C0
```

5.5.1.17 PWR_SVG

```
#define PWR_SVG 0x03
```

5.5.1.18 WHITE_CMD

```
#define WHITE_CMD 0x05
```

5.6 C:/Users/Mufasa/Desktop/123/Final_V3/VEML6030rpi.h File Reference

```
#include <unistd.h>
#include <fcntl.h>
#include <string>
#include <fstream>
#include <sys/ioctl.h>
#include <linux/i2c-dev.h>
#include <stdio.h>
#include <iostream>
```

Classes

- class VEML6030rpi

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