Data communication using single board computers

A breif Review of the program

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The code package

- *Pcm_wave_header.h*
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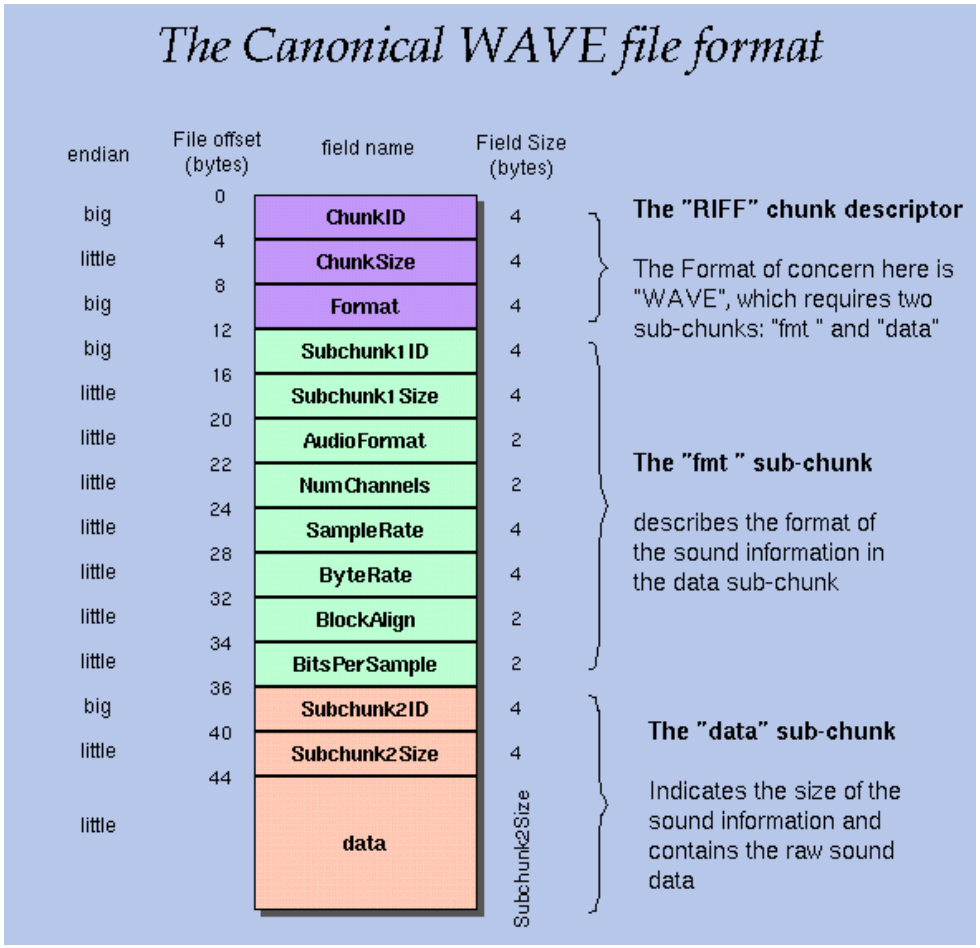
Pcm_wave_header




```
struct PCMWaveHeader
{
char chunkID[4];
unsigned chunkSize;
char format[4];
char subchunk1ID[4];
unsigned subchunk1Size;
unsigned short audioFormat;
unsigned short channels;
unsigned sampleRate;
unsigned byteRate;
unsigned short blockAlign;
unsigned short bitsPerSam-
ple;
char subchunk2ID[4];
unsigned subchunk2Size;
};
```

Audioformat.h

```
struct AudioFormat
{
    unsigned short channels;
    unsigned short bitsPerSample;
    unsigned sampleRate;
};
```

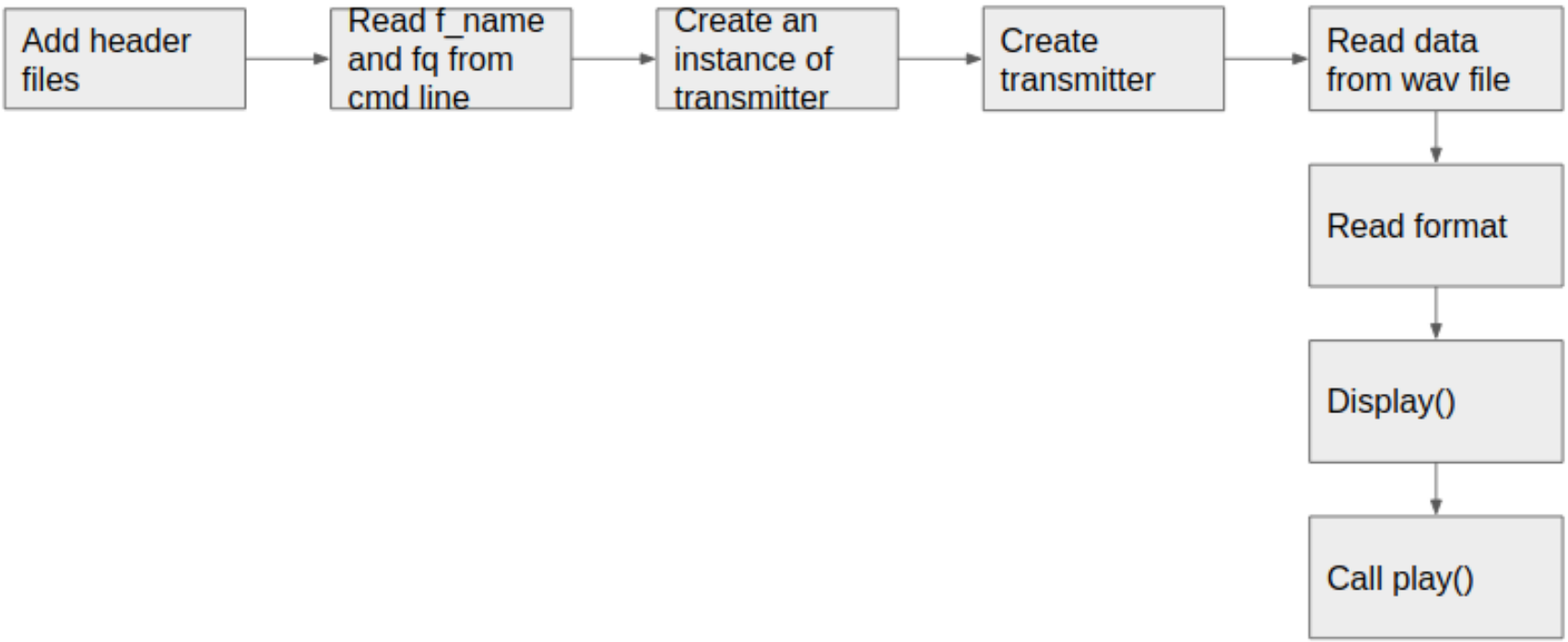
ErrorReporter.h

```
using std::exception;
using std::string;
class ErrorReporter : public exception
{
    public:
        explicit ErrorReporter(string message);
        virtual  ErrorReporter() throw();
        virtual const char* what() const throw();
    protected:
        string errorMessage;
};
```

ErrorReporter.cpp

```
#include "error_reporter.h"
ErrorReporter::ErrorReporter(string message) :
    errorMessage(message)
{
}
ErrorReporter:: ErrorReporter() throw()
{
}
const char* ErrorReporter::what() const throw()
{
    return errorMessage.c_str();
}
```

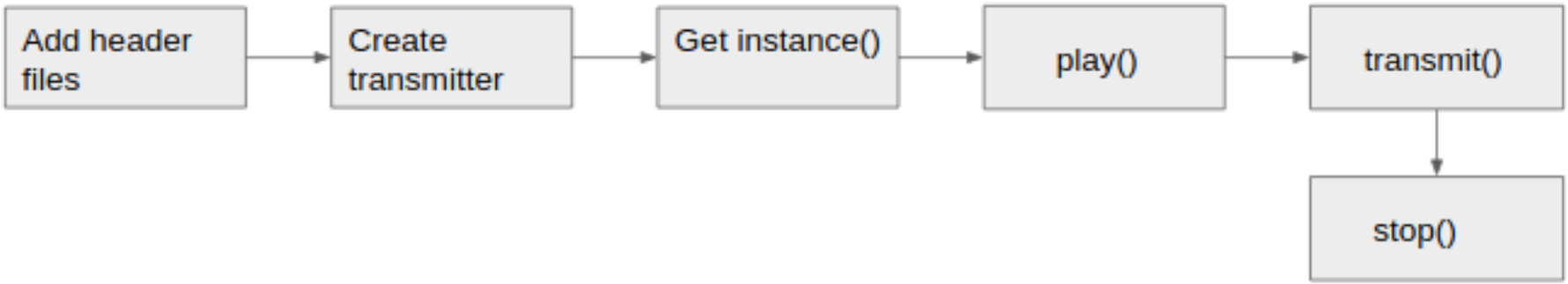
Main.cpp


Add header files
Read f_name and fq from cmd line
Create an instance of transmitter
Create transmitter
Read data from wav file
Read format
Display()
Call play()

Tranmitter.h

```
class Transmitter
{
    public:
        virtual Transmitter();
        void play(string filename, double frequency, bool loop);
        void stop();
        static Transmitter* getInstance();
    private:
        Transmitter();
        bool forceStop, eof;
        static void* peripherals;
        static vectorfloat* buffer;
        static bool transmitting, restart;
        static unsigned frameOffset, clockDivisor;
        static void* transmit(void* params);
};
```

Transmitte.cpp



- Include header files
- Assign the base addresses for gpio base clock base clockdividor base and a counter
- Assign initial values for variables to transmitter class members
- Check for the system, type and version of the host system.
- Assign memory for the GPIO pins using memFd and mmap system calls and this memory would be the base for assessing the GPIO and clock etc.

Transmitter conti:.

- In the function play()

a. It checks if the transmitter is already transmitting something.

b. Creates the objects of class Wave_reader.(reader)

c. Grab the format of the reader and store it in "format" variable.

d. Set the value to the clockDivisor.

e. Create the bufferFrames that will be stored in the vector "frames"

f. Create a vector "Frames" and use the fuction getFrames from class reader to stack the bufferFrames into it.

g. Create thread to start the transmission.

h. Read the whole data frames one by one.

i. Set "transmitting" variable "false".

j. Join the thread.

k. Delete the reader and format finally while exiting.

Transmitter conti:.

- Next comes the transmit() function where in does the changes in the clock frequency for the transmission purpose.

a Declares variables to store the current, start and playbackstart positions of the data.

b Creates unsigned offset, length and temp variables.

c Creates a vectr of floats to hold the data.

d Loads the sample-rate into a variable.

e Assigns the preemp value of 0.734883 $preemp = \frac{0.75 - 2500000.0}{(float)(samplerate * 75)}$

f Sets the GPIO pin 4 on alternate function-0.

h Enables the clock-base pin.

i The playback starts

j Assigning of value and quantize it between -1, value, 1

k Set the clockdividor base register.

l Increment the counter register.

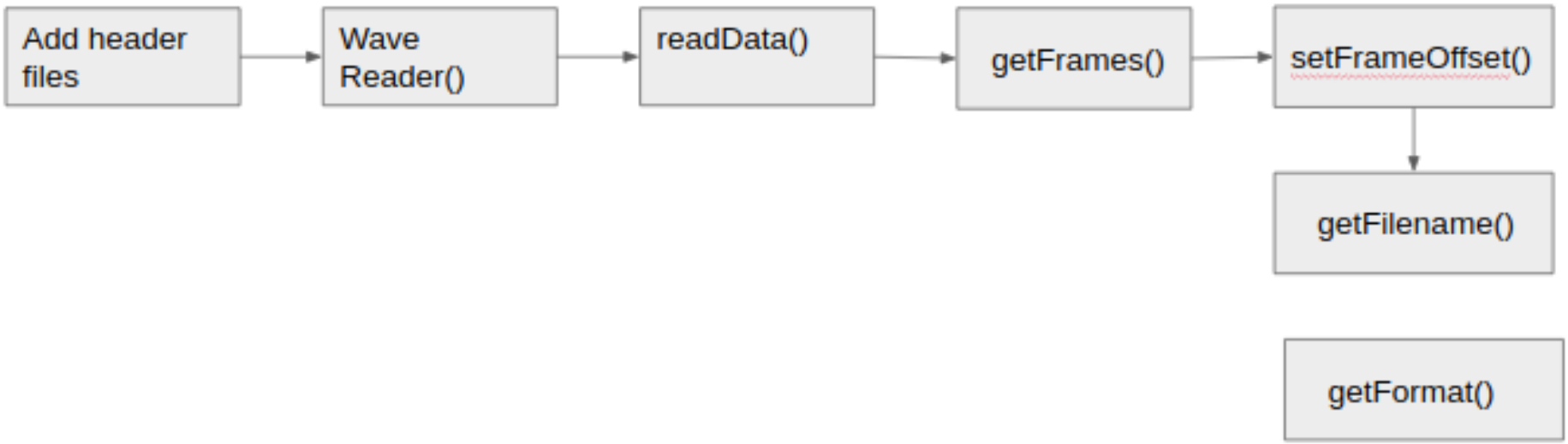
m Disable the clock base pin.

- When the interrupt is generated from the keyboard the the transmission/FM is aborted.

Wave_reader.h

```
class WaveReader
{
    public:
        WaveReader(string filename, bool forceStop);
        virtual  WaveReader();
        AudioFormat* getFormat();
        vector¡float¿* getFrames(unsigned frameCount, bool forceStop);
        bool setFrameOffset(unsigned frameOffset);
    private:
        string filename;
        PCMWaveHeader header;
        unsigned dataOffset, currentOffset;
        int fileDescriptor;
        vectorchar *readData(unsignedbytesToRead, bool
        headerBytes, bool forceStop);
        string getFilename();
};
```

Wave_reader.cpp



- Includes header files.
- It has a function for WaveReader(), which will read the entire data in the wavefile.
- It has a dataread() which will read the specified bytes from the file and returns the data vector.
- It has a getFrames() function that will read the perticular count of frames and return the vector frame.
- Setframeoffset() function will create the shift in the data frames.
- getfilename() is a function that will return the file name of the WAV

Makefile

As the name suggests it is make file which allows for the execution on this FM on particular processor