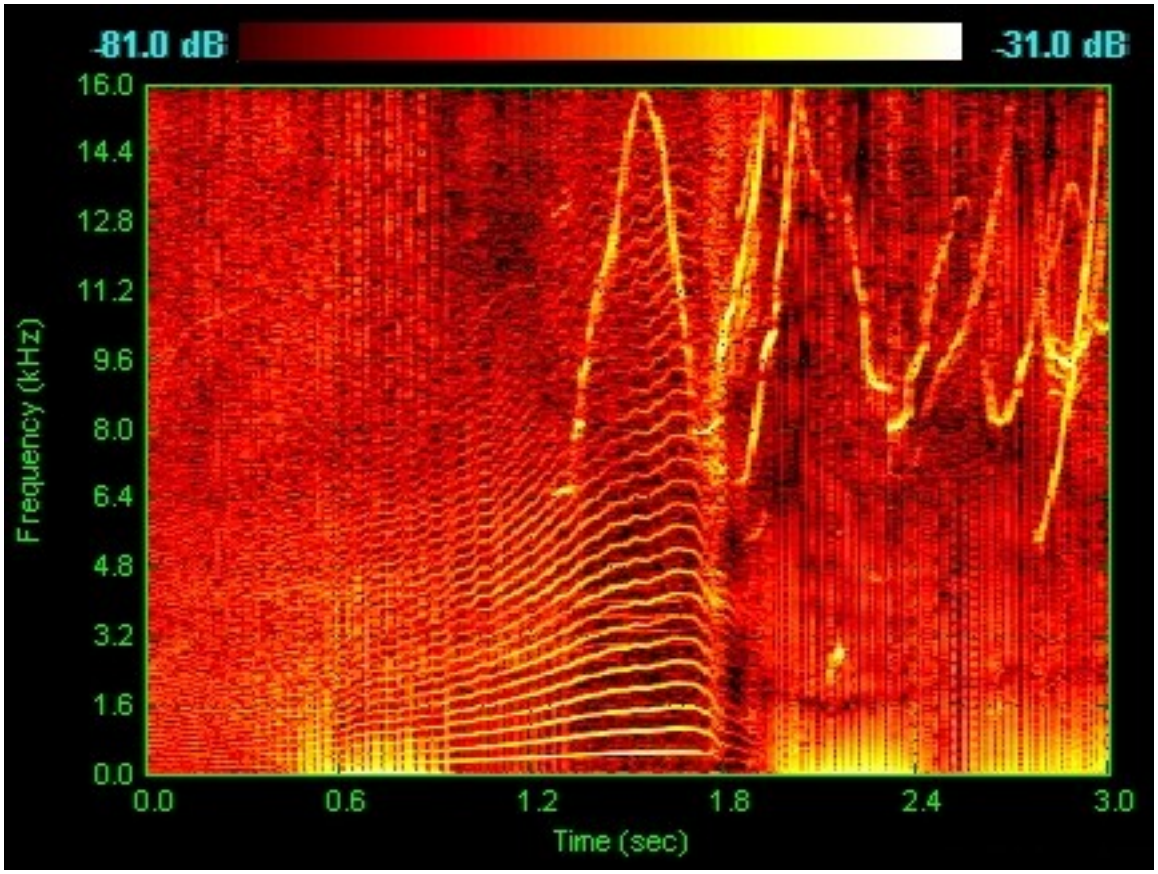
Real Time Spectrogram



Mattias Olsson
Erik Karlsson
David Winér

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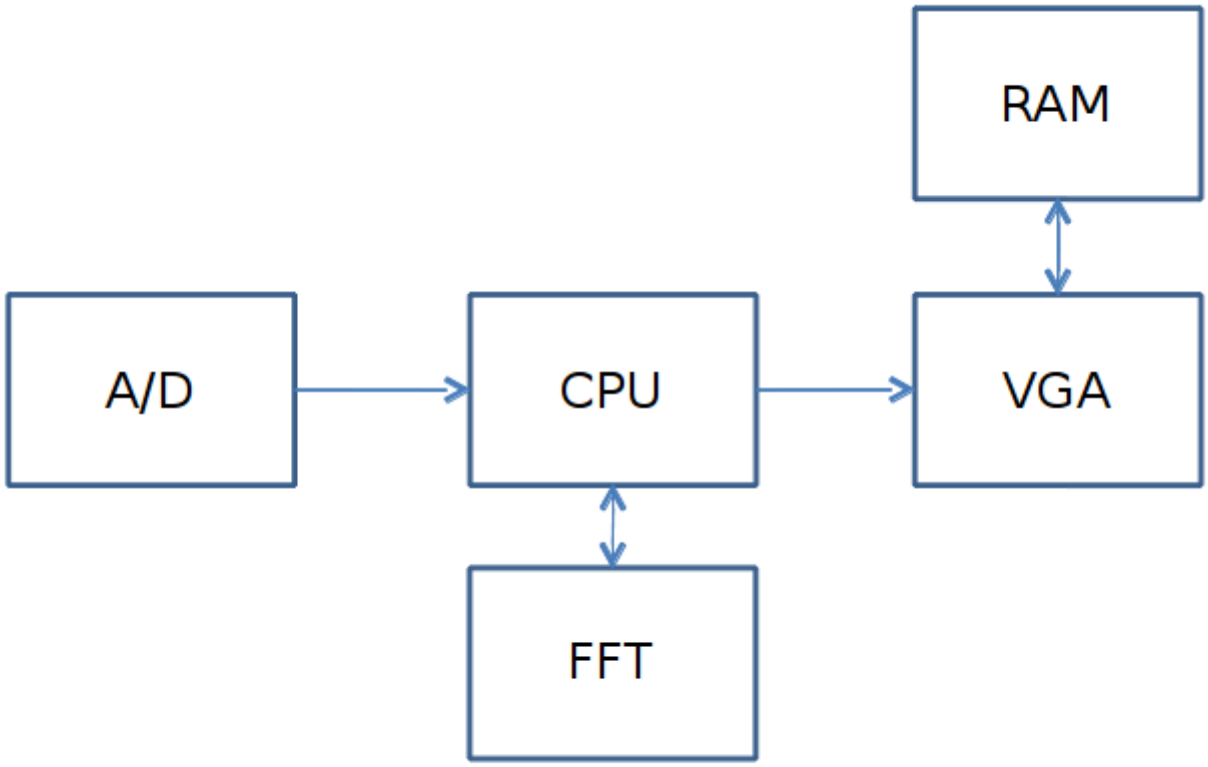
Introduction

The goal of this project is to visualize sound by producing a spectrogram on a vga monitor.
A spectrogram is a visual representation of a signal, in our case a sound signal that displays a two-dimensional graph with frequencies and time on either axis and amplitude represented by variation in colors.
The input will be a 3.5mm audio jack, where we can connect either a microphone or any other audio source and the generated spectrogram will be displayed on a monitor.

Architecture



Software
The software will handle data flow from the A/D converter through the FFT and send the visual data to the VGA controller.

A/D Converter
The A/D converter will sample at 44.1kHz at 12bit resolution.

FFT Hardware Accelerator
To transfer our signal from the time domain to the frequency domain we are using a Discrete time Fourier Transform, specifically an algorithm for it called the fast fourier transform. We repeatedly run this algorithm for short segments of the signal and they are then added together, this process is called a short time fourier transform.
We will write an FFT algorithm in hardware, starting with a 64 point fft and if possible extend it.

VGA Controller
The vga controller will use the resolution 640x480 and the spectrogram will use of 608*448 of this area, the rest of the area are used for the axis and labels of the graph.

RAM
The ram access will be handled by the vga controller and contain the previously calculated steps as well as the latest one. When a new step arrives it overwrites the oldest and a pointer is moved forward, this prevents unnecessary data movement.

Time Plan

	Erik Karlsson	Mattias Olsson	David Winér
Week 1	Planning	Planning	Planning
Week 2	FFT	VGA	A/D
Week 3	FFT/SW	VGA	VGA
Week 4	SW	Integration/Testing	SW
Week 5	Integration	Integration	Integration
Week 6	Report	Report	Report
Week 7	Presentation	Presentation	Presentation