

Power Efficient FFT Implementation for a Real Time Spectrum Analyser

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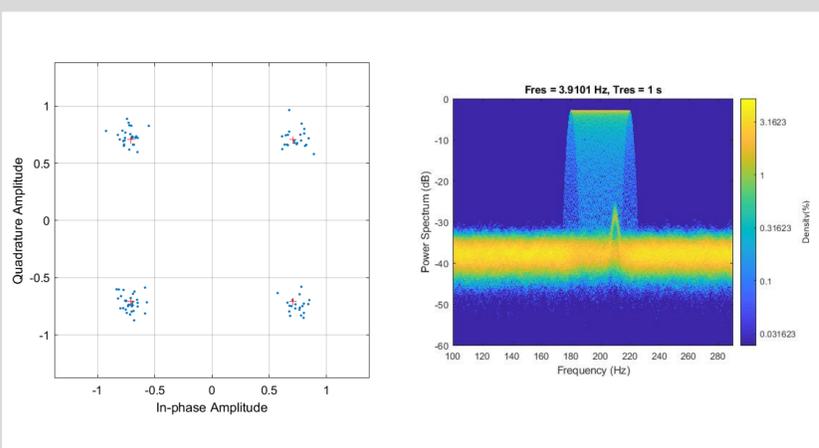
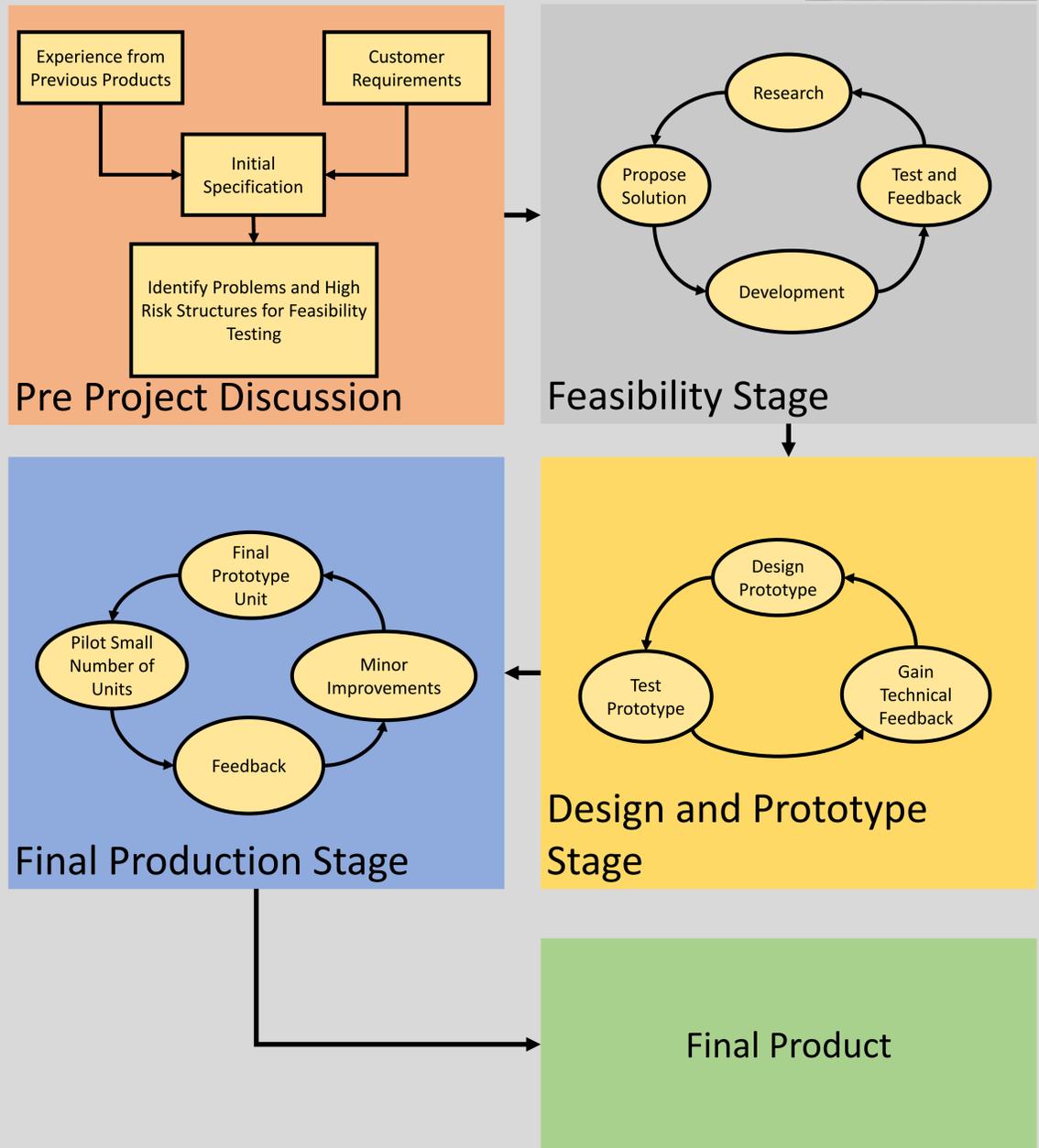


Introduction

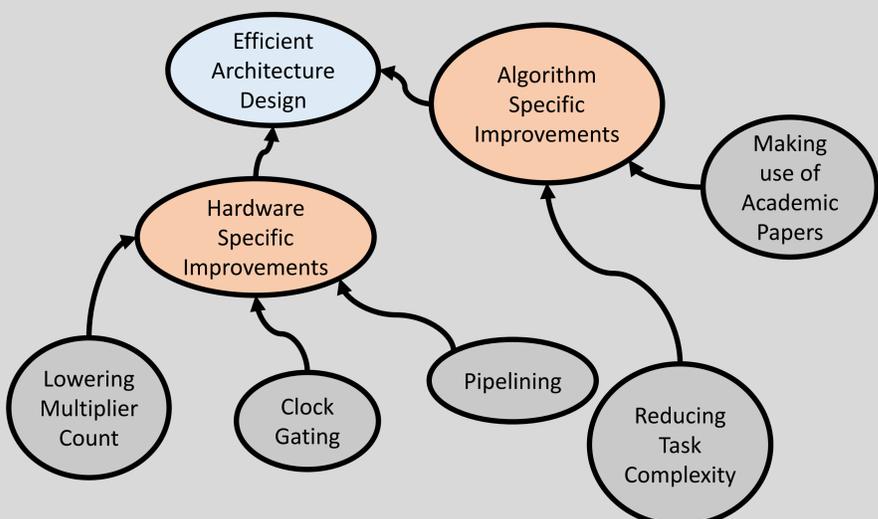
- TTI designs and manufactures Electronic Test and Measurement equipment under the Aim-TTi brand for customers with interests in Power Supplies, DVM, Signal Generators and Spectrum Analysers.
- This project aims to develop a new Spectrum Analyser based on Fast Fourier Transform (FFT) architectures, adding to their popular range of RF Spectrum Analysers.
- A variety of architectures are being explored to aid in the development of the digital signal processing section of the product.

Spectral Analysis and Demodulation Concepts

- The conversion from Time Domain data into Frequency Domain data is achieved through the computation of the Discrete Fourier Transform which is then plotted on a display with the aid of various filters that can be set up by the user as required.
- These filters in FFT based architectures take the form of a Span, Resolution Bandwidth Filters, and FFT Overlap Filter.
- Allowing the user to set the Spectrum Analyser to focus on a set frequency bandwidth with a variety of Amplitude accuracy options.
- Using FFT architectures also allows the potential for the user to demodulate OFDM signals.
- OFDM is currently a scheme used for 4G LTE communications and is planned to be used for 5G Mobile communication LTE too.
- It is also useful for Spectrum Analysers to have other demodulation options available, e.g. PSK, FSK, ASK



Designing A Low Power Algorithm



Further Work

Whilst the FFT may seem like it is a large section of the Spectrum Analyser project, there are other sections with their own complicated architectures to complete!

Resampling Filters

To achieve the users requirements for RBW, the data coming into the digital domain often has to be resampled. This requires dedicated filters, there are many different types of resampling filters, and an analysis of their suitability is underway.

Data Inspection

Customers will want to investigate their signals with different diagrams depending on the sort of job they want to do. Many of these diagrams have to be calculated at the maximum processing rate, thus steps must be taken to ensure they are designed with Low Power in mind.

FFT Windowing

This is used to make the Fourier Components more accurate and is required if the signal is not periodic with the FFT sample duration - leading to Spectral Leakage.

