

**A STUDY ON THE PERFORMANCE OF BANDPASS SAMPLING
TECHNIQUE IN DEMODULATING FETAL DOPPLER
ULTRASOUND SIGNALS**

Thesis is presented in partial fulfillment for the award of the
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ABSTRACT

Doppler Ultrasound technology has been widely used in medical field. One of the applications of this signal is to get the information about heart movements to check the sign of abnormalities. Demodulation technique has to be performed to extract information from the Doppler Ultrasound signal.

There are few types of demodulation and one of them is bandpass sampling technique. A hardware set-up was arranged to send the data out from the PC. In order to create DUS signal that has the same characteristic as the real raw signal from patient, the signal from PC is mixed with Megahertz signal using a mixer. After the signal has downconverted using bandpass sampling technique, the signal is then analysed to confirm that the correct signal is obtained.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In fetal heart monitoring, fetal heart rate is used to indicate the status of the fetus. The most common signal used nowadays is Doppler Ultrasound signal (DUS). Before the heart rate can be detected from the Doppler Ultrasound signals, the fetal heart motions have to be detected first. In practice, for detecting the valve motions, Doppler Ultrasound signals are recorded simultaneously with the fetal electrocardiogram.

Ultrasound is like ordinary sound except it has a frequency higher than human beings can hear. When sent into body from a transducer resting on skin, the sound is reflected off internal structures. The returning echoes are received by the transducer and processed by an electronic instrument to extract information embedded in the signals, for example cardiac movements, blood flow, heart rate and others.

The received Doppler Ultrasound signals are in Megahertz. To detect the valve motions, the Doppler Ultrasound signals have to be downconverted to baseband signals which in Kiloherz.

Currently, conventional approach to downconvert the signal is using analog downconversion technique but the output signal will contain a lot of noise. Therefore, a few digital demodulation techniques have been implemented to downconvert the DUS signals. If the downconversion process is done digitally, accurate result may be produced that will contain less of noise.