

Introduction to the Signal Processing Bachelor

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Agenda



Project Proposals

Project: Noise Suppression

Project: Wind Turbine Analysis

Project: AAUSAT Radio Receiver

Hardware

Sampling

Signal Processing

Søren and Jacob

Project Proposals

Project: Noise Suppression

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Proposals

- ▶ Guitar effect (audio in, audio out)
- ▶ Automatic music transcriber (audio in, sheet music out)
- ▶ Differential PCM (signal in, compressed signal out)

Signal Processing

Søren and Jacob

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Project Proposals

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Proposals

- ▶ Guitar effect (audio in, audio out)
- ▶ Automatic music transcriber (audio in, sheet music out)
- ▶ Differential PCM (signal in, compressed signal out)

Our Semester

- ▶ Noise suppression (noisy speech in, clean speech out)
- ▶ Frequency analyzer (music/vibrations in, frequency spectrum/messages out)
- ▶ AAUSAT radio receiver (radio signal in, bits out)

Signal Processing

Søren and Jacob

2 Project Proposals

Project: Noise Suppression

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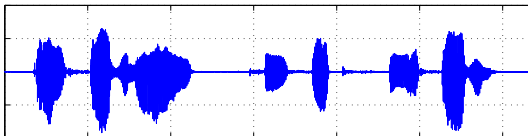
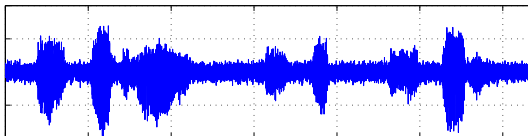
Project: AAUSAT Radio Receiver

Hardware

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Project: Noise Suppression

Remove noise from speech in real time.



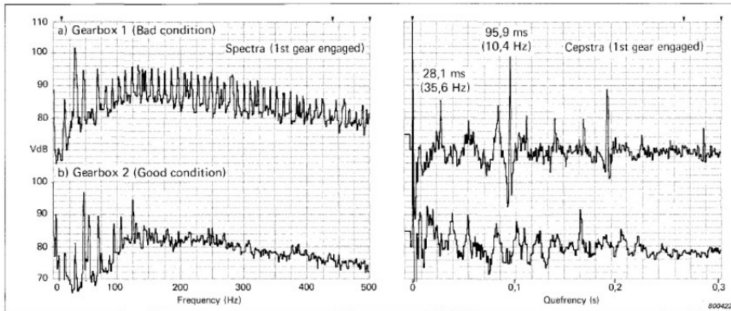
Speech: 300 Hz–3 kHz.

Project: Wind Turbine Analysis



Siemens wind turbine

- Is something broken in the turbine?



Accelerometer input, vibrations analysis.

Signal Processing

Søren and Jacob

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Project: AAUSAT Radio Receiver



Signal Processing

Søren and Jacob

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Project: Wind Turbine Analysis

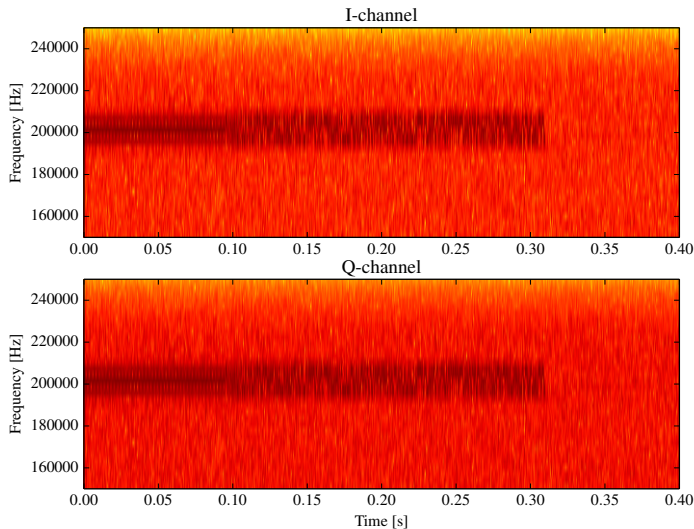
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Project: AAUSAT Radio Receiver

Hardware

Sampling

Receive databits from AAUSAT3/4.





Hardware

- ▶ Analog Devices Blackfin DSP
- ▶ (Texas Instruments DSP)
- ▶ 16 bit – only integers!

Signal Processing

Søren and Jacob

Project Proposals

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Hardware

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Hardware

- ▶ Analog Devices Blackfin DSP
- ▶ (Texas Instruments DSP)
- ▶ 16 bit – only integers!

Software

- ▶ Software for hardware people!
- ▶ MATLAB for simulation
- ▶ C + Assembly for implementation
- ▶ `float` → `int`

Signal Processing

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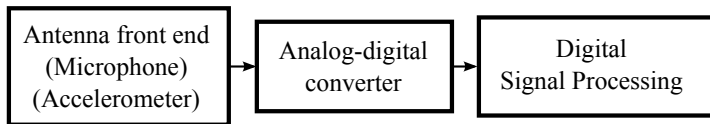
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Hardware

Sampling

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Sampling



Signal Processing

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Sampling