Teknik Pengolahan Digital Isyarat (TEP640)

Risanuri Hidayat
Electrical Engineering, Gadjah Mada University

PERKENALAN

Tata Tertib

- Masuk Jam: .....
- Apabila Dosen masuk terlambat, mahasiswa harus masuk lebih dulu
- Tidak boleh buka laptop selama kuliah
- PPT di-download dan di-print sebelum kuliah (bukan setelah kuliah)
- Buku Teks & Catatan (PPT)harus dibawa
- PR dan Quiz setiap saat
- PR tidak boleh terlambat
- Mhs harus menjawab dengan jelas ketika ditanya
- Feed back perkuliahan (anonim)

Rencana Silabus

Review Mata Kuliah

- TEE571 – Teknik Penyandian Kanal
- Mata Kuliah Pilihan (Sem 7 & 8)
- Bersifat Lanjut
- Beberapa MK Dasar

HOW ARE SIGNALS PROCESSED

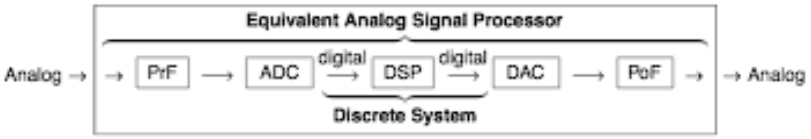
- The signals that we encounter in practice are mostly analog signals.
- These signals, which vary continuously in time and amplitude, are processed using electrical networks containing active and passive circuit elements.
- This approach is known as analog signal processing (ASP)
  - —for example, radio and television receivers.

Analog Signal Proc

Digital Signal Proc

- They can also be processed using digital hardware containing adders, multipliers, and logic elements or using special-purpose microprocessors.
- This form of the signal is called a digital signal.
- The processing of digital signals is called DSP;
- However, one needs to convert analog signals into a form suitable for digital hardware.

DSP



DSP

- PrF: This is a prefilter or an anti aliasing filter, which conditions the analog signal to prevent aliasing.
- ADC: This is an analog-to-digital converter, which produces a stream of binary numbers from analog signals.
- Digital Signal Processor: This is the heart of DSP and can represent a general- purpose computer or a special-purpose processor, or digital hardware, and so on.
- DAC: This is the inverse operation to the ADC, called a digital-to-analog converter, which produces a staircase waveform from a sequence of binary numbers, a first step toward producing an analog signal.
- PoF: This is a postfilter to smooth out staircase waveform into the desired analog signal.

ADVANTAGES OF DSP OVER ASP

- A major drawback of ASP is its limited scope for performing complicated signal-processing applications. This translates into nonflexibility in processing and complexity in system designs. Expensive product.
- On the other hand, using a DSP approach, it is possible to convert an inexpensive personal computer into a powerful signal processor.

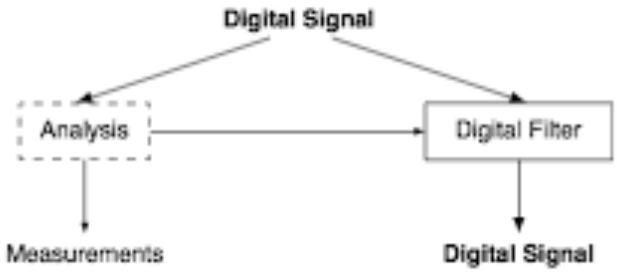
ADVANTAGES OF DSP

- Systems using the DSP approach can be developed using software running on a general-purpose computer. Therefore DSP is relatively convenient to develop and test, and the software is portable.
- 2. DSP operations are based solely on additions and multiplications, leading to extremely stable processing capability—for example, stability independent of temperature.
- 3. DSP operations can easily be modified in real time, often by simple programming changes, or by reloading of registers.
- 4. DSP has lower cost due to VLSI technology, which reduces costs of memories, gates, microprocessors, and so forth.

ADVANTAGES OF DSP

- The principal disadvantage of DSP is the limited speed of operations limited by the DSP hardware, especially at very high frequencies.

TWO IMPORTANT



- Signal analysis This task deals with the measurement of signal prop- erties. It is generally a frequency-domain operation. Some of its applications are
  - • spectrum (frequency and/or phase) analysis
  - • speech recognition
  - • speaker verification
  - • target detection

- Signal filtering This task is characterized by the signal-in signal-out situation. The systems that perform this task are generally called filters.

- It is usually (but not always) a time-domain operation. Some of the applications are
  - • removal of unwanted background noise
  - • removal of interference
  - • separation of frequency bands
  - • shaping of the signal spectrum

APPLICATIONS OF DSP

- speech/audio (speech recognition/synthesis, digital audio, equalization, etc.),
- image/video (enhancement, coding for storage and transmission, robotic vision, animation, etc.),
- military/space (radar processing, secure communication, missile guid- ance, sonar processing, etc.),
- biomedical/health care (scanners, ECG analysis, X-ray analysis, EEG brain mappers, etc.)
- consumer electronics (cellular/mobile phones, digital television, digital camera, Internet voice/music/video, interactive entertainment systems, etc) and many more.

Discussion