CM02-220908목

2022년 9월 8일 목요일 09:43

CM 02-220908목

Announcements

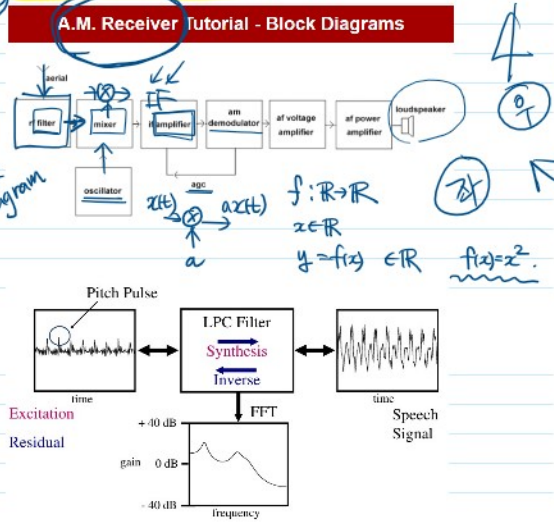
1. HW01 will be posted on the PLMS home page. Due on next Thursday.
2. For attendance check, do not forget to type in your student number and name in the chatting window at the beginning and the end of each class meeting.
3. EECE490B 전자전기공학도를 위한 기술문서 작성 및 발표 A (1-0-1) 목요일 오후 3시부터 50분간.

Overview

1. Signals and Systems
2. Linear Time-Invariant (LTI) Systems
3. Fourier Series **Representation** of Periodic Signals
4. Continuous-time Fourier Transform (CTFT)
5. Discrete-time Fourier Transform (DTFT)
6. Time and Frequency **Characterization** of Signals and Systems
9. Laplace Transform
10. Z-transform
7. Sampling ← DSP, Digital Control
8. Communication Systems

Review

1. Electrical engineering and Petronas Twin Tower
   a. 어떤 논리적 수학적 기능을 수행하면 좋은 일이 생기는가?



block diagram-level design

페트로나스 트윈 타워 (Petronas Twin Towers)

웹사이트 경로 저장 통화

4.7 ★★★★★ Google 리뷰 86,213개

말레이시아 쿠알라룸푸르의 복합 건물

페트로나스 트윈 타워는 말레이시아의 수도인 쿠알라룸푸르에 있는 건물로, 높이는 451.9m이며 1998년에 준공된 건물이다. 위키백과

주소: Concourse Level, Petronas Twin Tower, Lower Ground, Kuala Lumpur City Centre, 50088 Kuala Lumpur, 말레이시아

영업시간: 곧 영업 시작 · 오전 9:00

5주 전 다른 사용자가 업데이트함

연락처: +60 3-2331 8080

착공 날짜: 1993년 3월 1일

개장: 1999년 8월 31일

건축가/건축회사: 시저 펠리

면면적: 395,000 sq. m

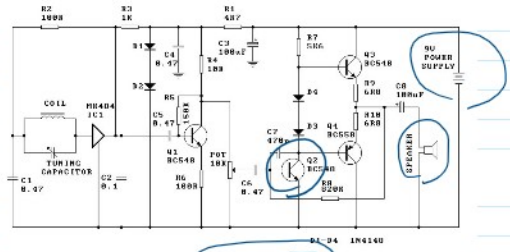
이전의 최고층 건물: 윌리스 타워

이후의 최고층 건물: 타이베이 101

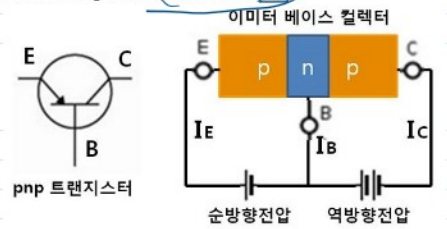
층수: 88층

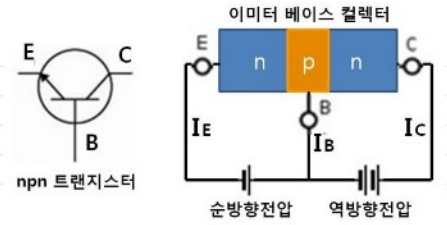
   b. 그러한 기능을 수행하기 위한 hardware를 어떻게 만들어야 하는가?

single-chip AM/FM radio receiver (RX)

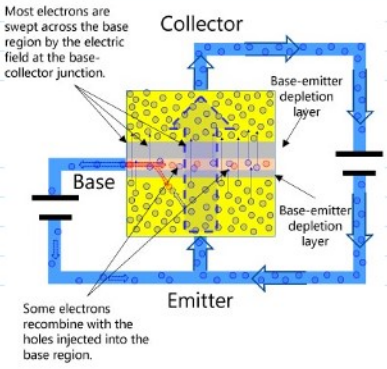


schematic diagram of AM radio RX





device



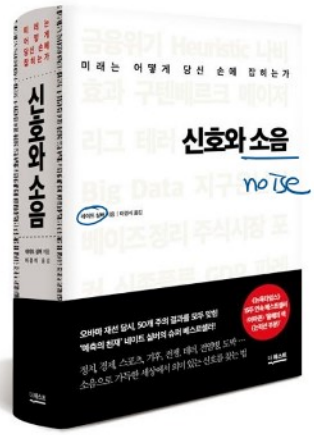
physics, chemistry, chemical engineering, material science and engineering

[참고] **2018학번 전자과 전공필수과목 일람표**

구분	반도체	제어	컴퓨터	통신	회로	EM	종합설계	기타
1학년 2학기								전자공학의 현재와 미래
2학년 1학기	회로이론 (신호 및 시스템)						0-6	
2학년 2학기	[회로이론], [신호 및 시스템], 전자기파, 디지털 시스템 설계 실험 1						14.8	
3학년 1학기	반도체1	전자회로 1, 실험 2			반도체1		5	
	전자수학 B (수리물리)	전자수학 A (확률 및 랜덤프로세스)				전자수학 B (수리물리)		
		마프	마프			전자장		
3학년 2학기	물리전자	자동제어		정보통신공학개론	전자회로 2	전자회로 2	1	설계시제 1
4학년 1학기			컴설					설계과제 1
								설계과제 2
4학년 2학기							2	설계과제 2

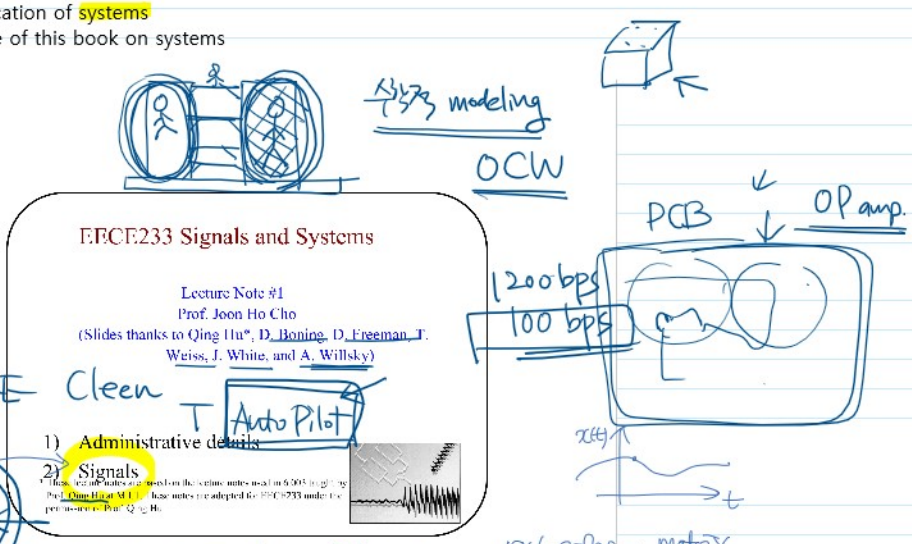
4학년 1학기			캡스톤				설계 시제 1 / 설계 시제 2
4학년 2학기						2	캡스톤 과제 2

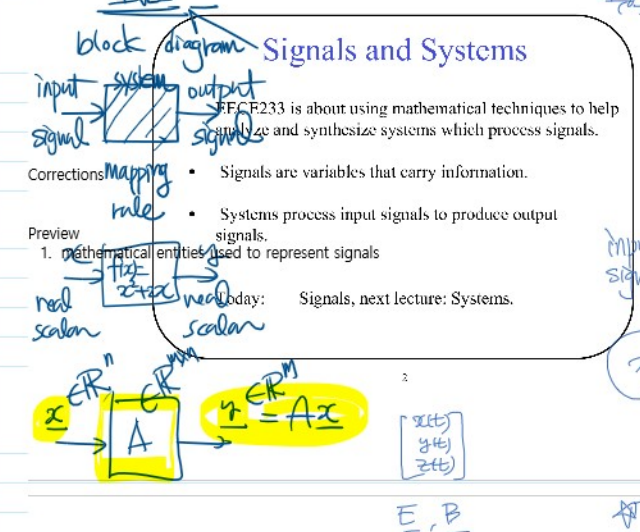
[공통필수 22: 회로 3, 신호 3, 디지털 3, 전자기학 3, 전자회로 3, 실
※ 노란색 : 전공 (공통) 필수 22 • 흰색 : 전공선택필수. 고유 전필 31.

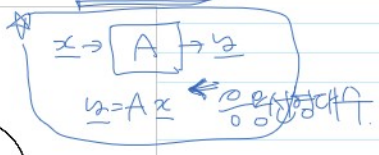


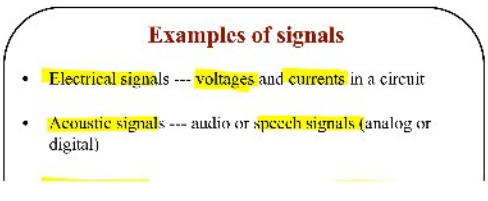
2. What is a system and a signal?
   a. "A system"? A mapping rule!
      i. function
      ii. matrix-vector multiplication
   b. "A signal"? An input or an output of a system!
      i. electrical signal
      ii. electrical system
   cf) noise ? A signal with uncertainty. Take EECE302 전자수학 A

Preview
1. mathematical entities to model electrical signals
   - Scope of this book on signals
2. A classification of systems
   - Scope of this book on systems







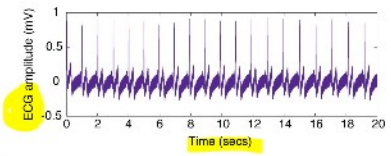


- Acoustic signals --- audio or speech signals (analog or digital)
- Video signals --- intensity variations in an image (e.g. a CAT scan)
- Biological signals --- sequence of bases in a gene
- In EECE233, we will treat noise as unwanted signals

Signal Classification

Type of Independent Variable

Time is often the independent variable. Example: the electrical activity of the heart recorded with chest electrodes the electrocardiogram (ECG or EKG).



DT signal
Digital Signal = DT signal & finite resolution
$x[n] \in \mathbb{R}$
$x[n] \in \{-5, -4, -3, \cdots, 5\}$

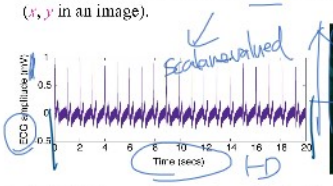
The variables can also be spatial

Eg. Cervical MRI

In this example, the signal is the intensity as a function of the spatial variables x and y.

Independent Variable Dimensionality

An independent variable can be 1-D (t in the EKG) or 2-D (x, y in an image).



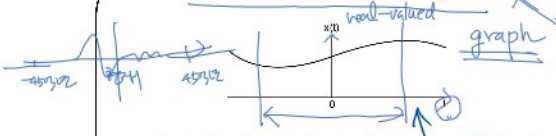
scalar-valued
1-D
2-D
vector-valued

In EECE233, focus on 1-D for mathematical simplicity but the results can be extended to 2-D or even higher dimensions. Also, we will use a generic time t for the independent variable, whether it is time or space.

scalar
vector
matrix
waveform
mixing
diff

Continuous-time (CT) Signals

Continuous-time (CT) Signals

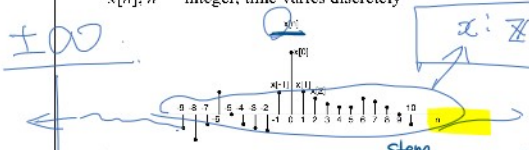


- Most of the signals in the physical world are CT signals, since the time scale is infinitesimally fine, so are the spatial scales. E.g. voltage & current, pressure, temperature, velocity, etc.

7

Discrete-time (DT) Signals

- $x[n]$, n — integer, time varies discretely



- Examples of DT signals in nature:
  - DNA base sequence
  - Population of the nth generation of certain species
  - ⋮
- Notation in ELCE233: $x(t)$ — CT, $x[n]$ — DT

8

Many human-made Signals are DT

Ex.#1 Weekly Dow-Jones industrial average

Ex.#2 digital image

Ex#3. ticking clock

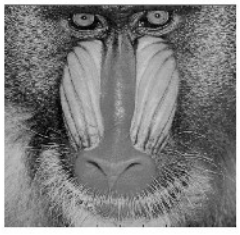
⋮

Why DT? — Can be processed by modern digital computers and digital signal processors (DSPs).

9

Mandrill Example

Unblurred Image & No Noise



10

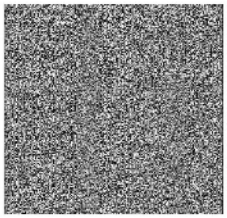
Mandrill Example

Blurred Image (bad focus)

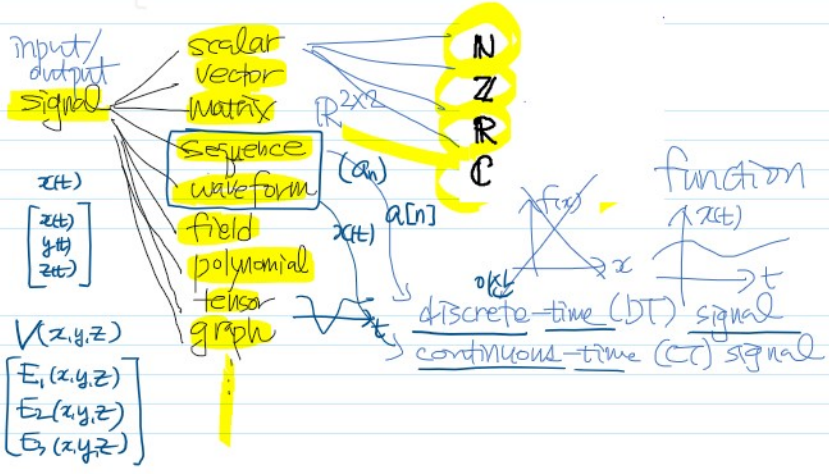
11

Mandrill Example

Unblurred Image – 0.1% Noise (too dark)



12

CM#1
CM#2

Review