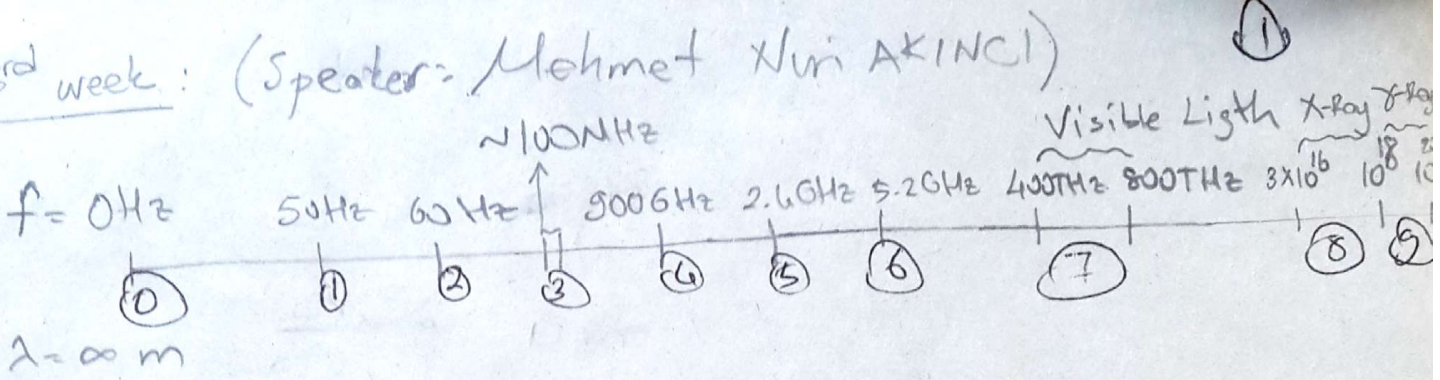
3rd week: (Speaker: Mehmet Nuri AKINCI)



$c = 3 \times 10^8 \, m/s$: Speed of the light ; $\lambda = c/f$

(0): DC, current - voltage does not vary with time.
Batteries, all electronic equipments in our dailylife utilizes from DC current - voltage.

(1), (2): Frequency for power transmission lines (50 Hz: Turkey & EU, 60 Hz: USA)

(3): Radio stations

(4): GSM

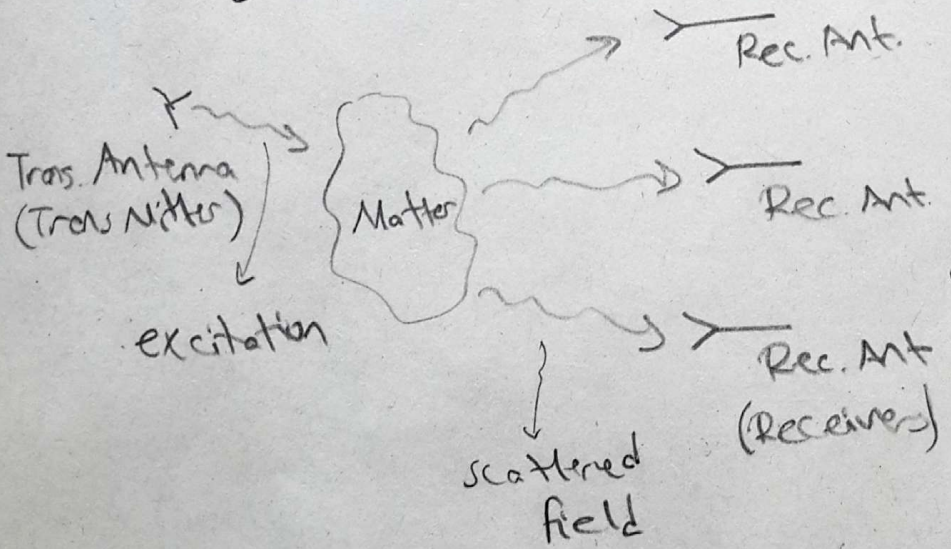
(5), (6): Wifi (2.4-5.2 GHz)
Microwave oven (2.4 GHz)

(7): Visible Light (400 THz - 800 THz)

(8): X-Ray ($3 \times 10^6 - 10^8$ Hz)

(9) γ-Rays (10^{18} Hz $- 10^{20}$ Hz

Imaging with Microwave:

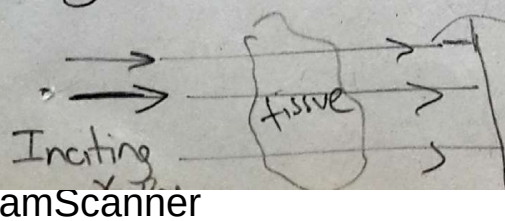


From the scattered field electric properties of matter is fund.

(8) (Electrical properties)
i) Dielectric permittivity
ii) Conductivity

Imaging with X-Ray:

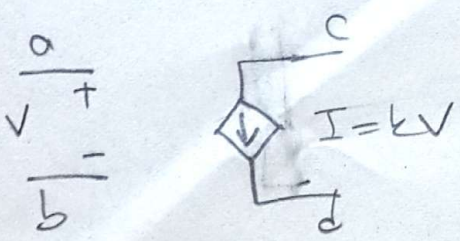
commercially available in health care.



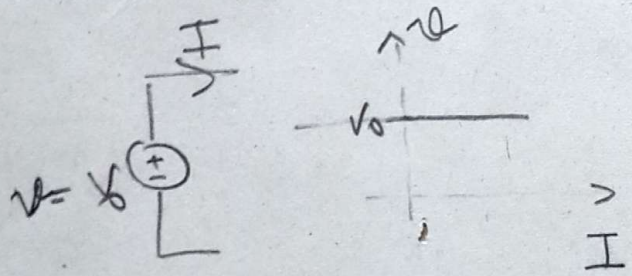
Consider we sent an X-Ray with power P_i, and we measure it after passing tissue, and its power turns out to be P_o. Then from this we want to find the attenuation profile of the object.

4th week: (Speaker: Ismail Çevik)

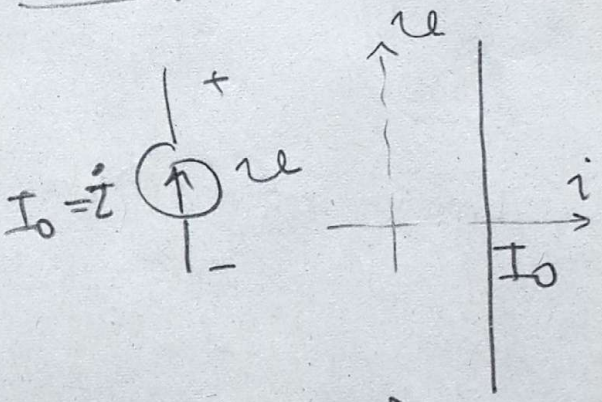
Transistor: Trans Resistor. Why? You can control the current with another voltage. (So it is a voltage controlled current source.)



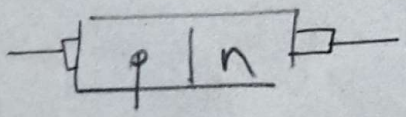
Ideal Voltage Source:



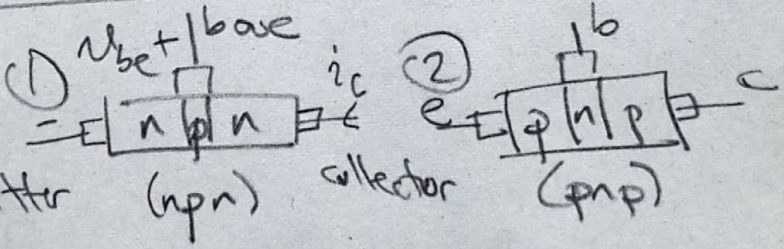
Ideal Current Source:



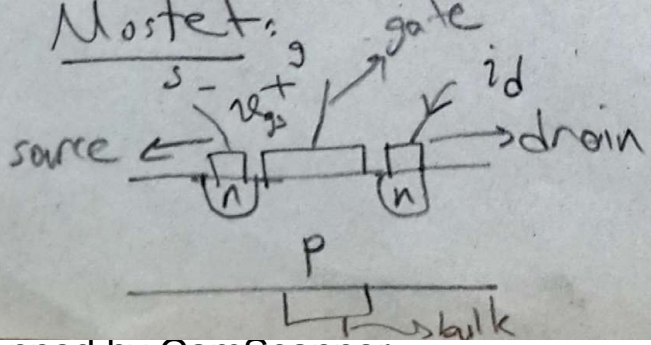
Diode:



BJT (Bipolar Junction Transistor)



Mosfet:



(A) For BJT:

$i_{collector} = f(v_{base\text{-}emitter})$ (A function)

$(i_c = f(v_{be}))$

(A) For MOSFET:

$i_d = f(v_{gs})$

5th week: (Speaker: Tuba Yilmaz)

RF Microwave — Health care industry

RF Charging

- Charging with RF power without a physical contact
- Using the ambient RF energy (like the waves radiated by base stations) to charge a battery. (This is also called as "Energy Harvesting")

Communication

- Communication of implanted devices with personalized device (telephone, PC, tablet ...)

Sensing Vital Signs With RF:

- Sensors that are designed for sensing biological signals (CO_2 production, heart rate, glucose amount in blood...)

(1) One has to choose a problem first (sensing heart rate)

(2) Then design a system for sensing heart rate:

- Correlate heart rate (x) with your measured data (y)

$y = f(x)$; → Find a mathematical relation by means of some previously measured y-x data.

(3) Let's say sensor measured $\tilde{y}$. Send $\tilde{y}$ to a personalized device.

(4) Your personal device has to produce $\tilde{x} = f^{-1}(\tilde{y})$.