



**UNIVERSITAS KOMPUTER  
INDONESIA**



# Pendahuluan : Teori Sistem dan Sinyal

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# Silabus

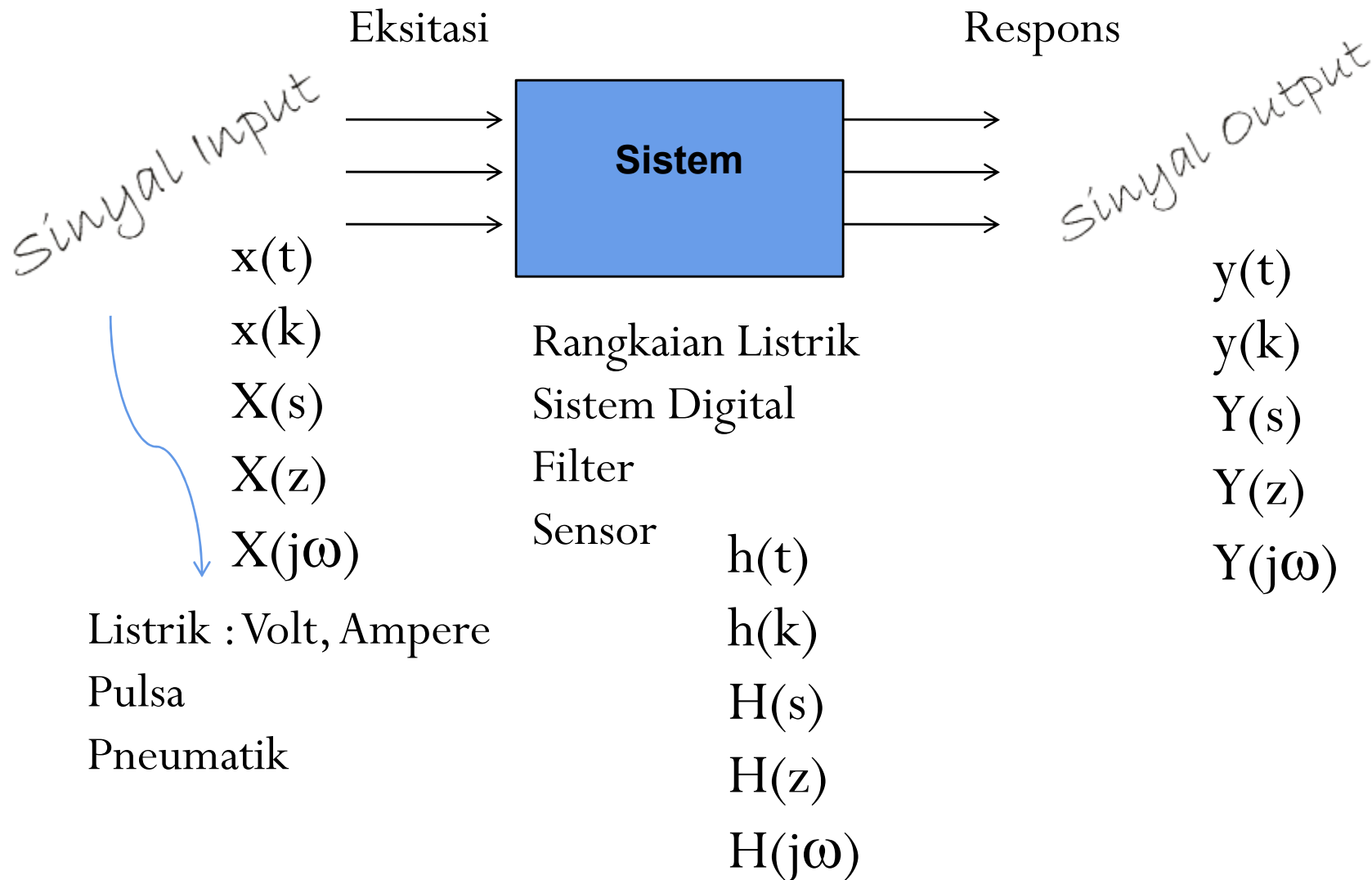


- 1. Signal Representation and Systems Response
- 2. Time-domain description and convolution
- 3. Transfer Function and System characterisation
- 4. Sampled Data systems and the z-transform

## Pustaka:

- Introduction to System Analysis, T.H. Glisson, Mc.Graw Hill
- Mulgrew, B., Grant, P., Thompson J., (2003), Digital Signal Processing 2<sup>nd</sup>, Palgrave Macmillan, New York.

# Pemodelan Teori Sistem dan Sinyal



# Transformasi Domain

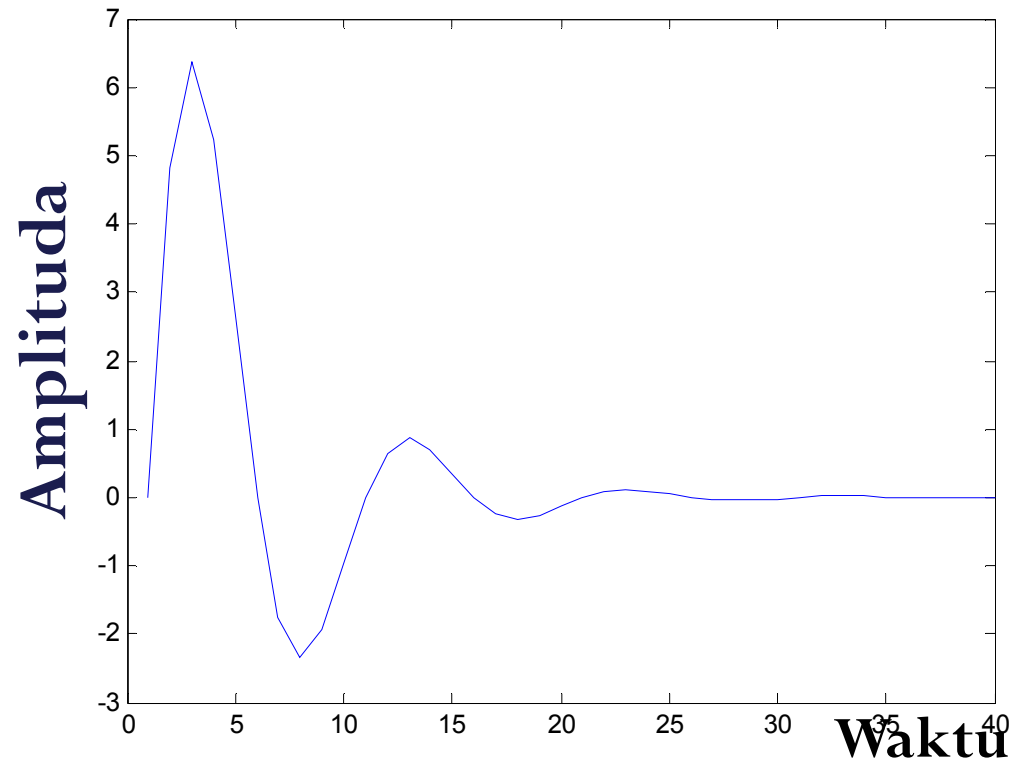
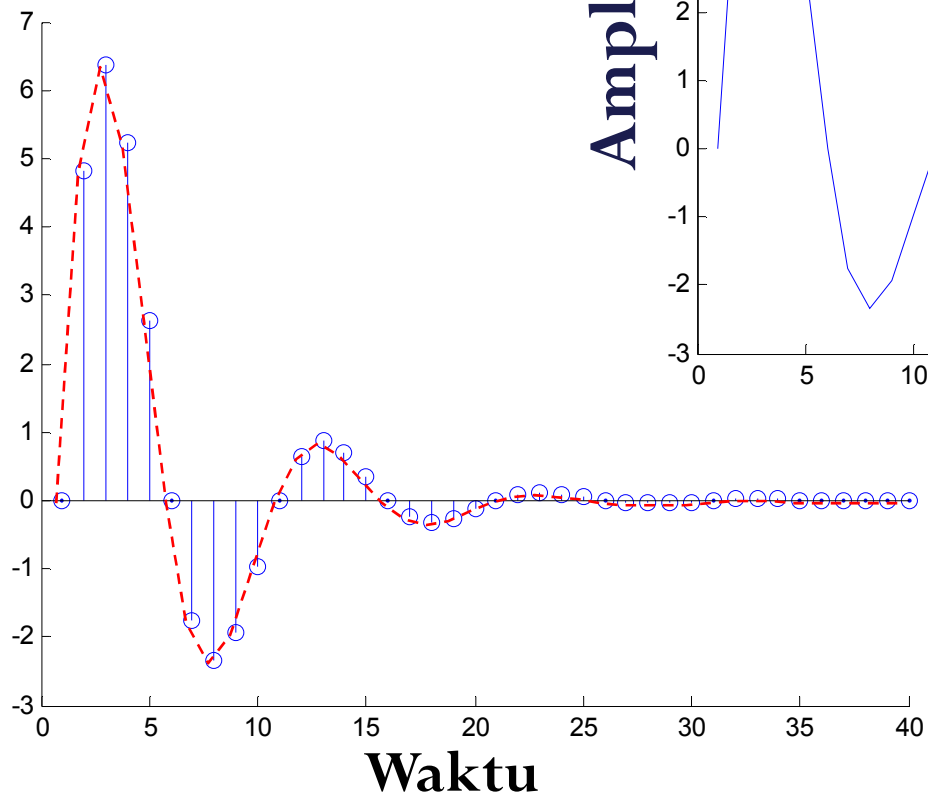


- Transformasi Laplace :  $t \rightarrow s = j\omega + \sigma$
- Transformasi Fourier:  $t \rightarrow \omega$  dan  $\theta$
- Transformasi Z :  $t \rightarrow kT$

# Jenis Sinyal



Kontinuitas



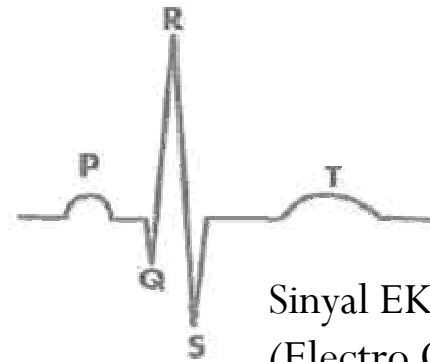
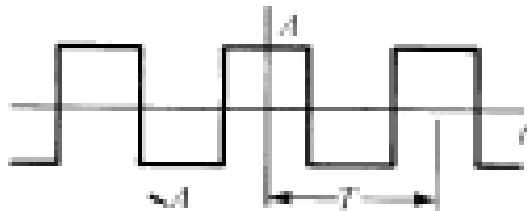
Diskrit

Analog

# Sinyal Periodik

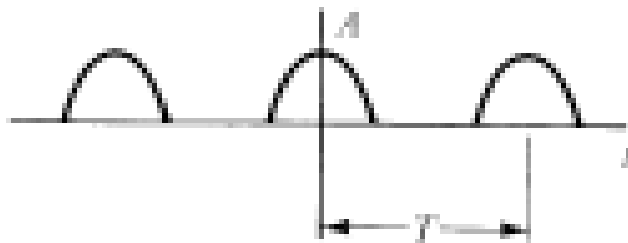


Square wave

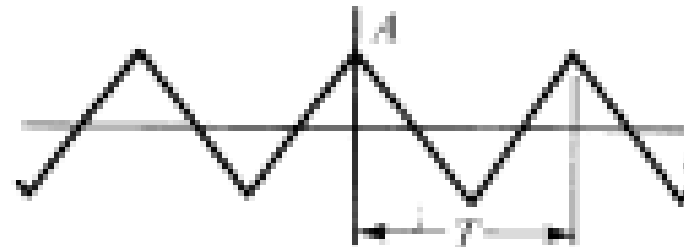


Sinyal EKG  
(Electro Cardiograph)

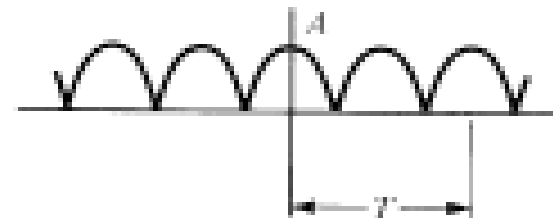
Half-wave rectified cosine



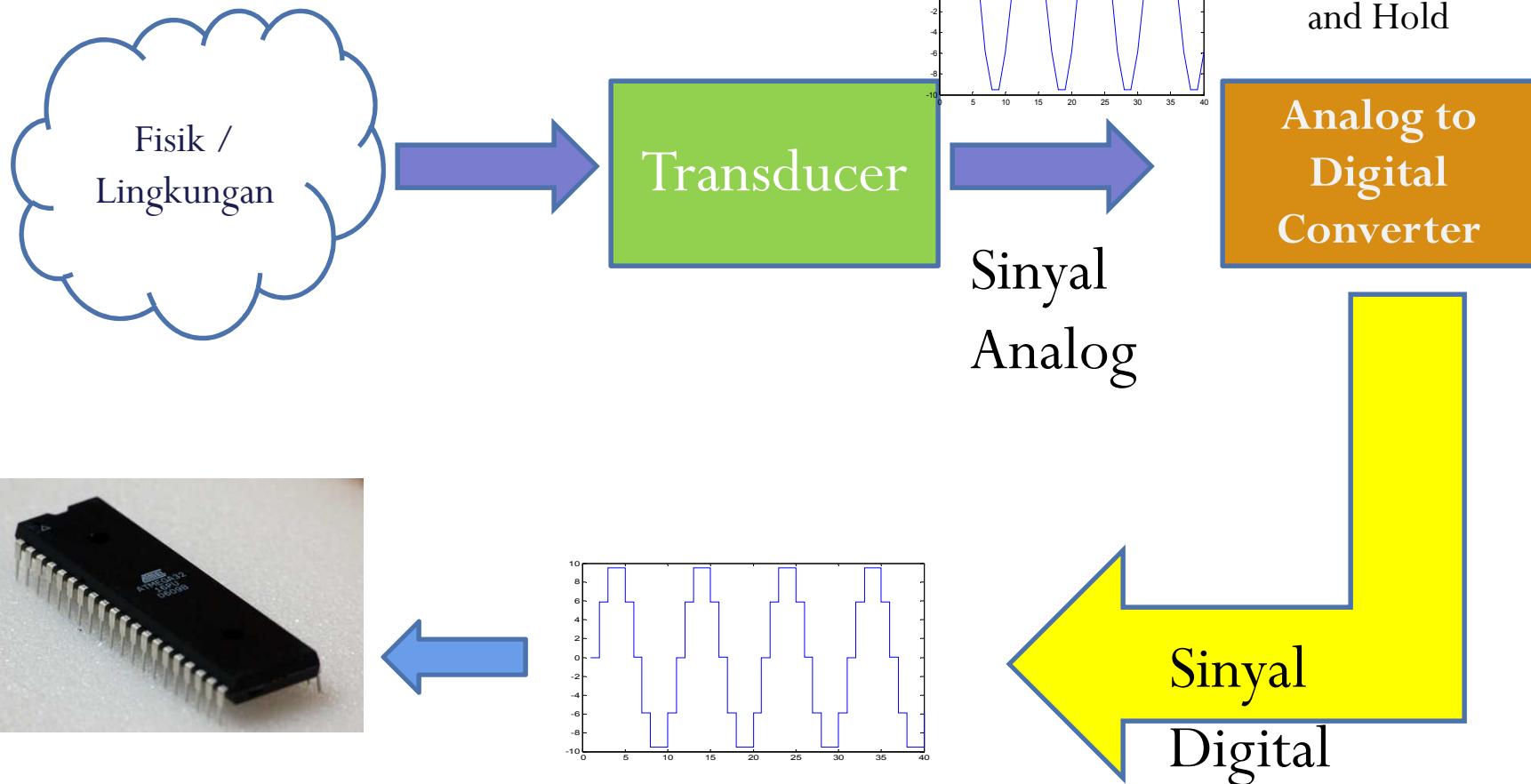
Triangular wave



Full-wave rectified cosine

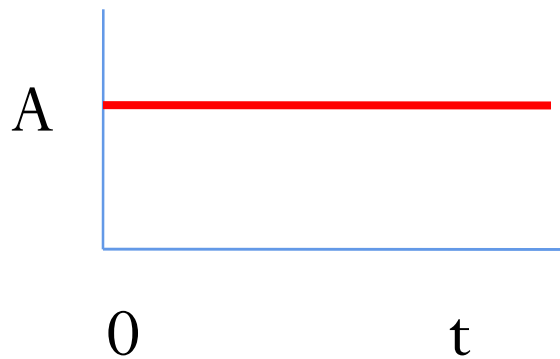


# Analog dan Digital

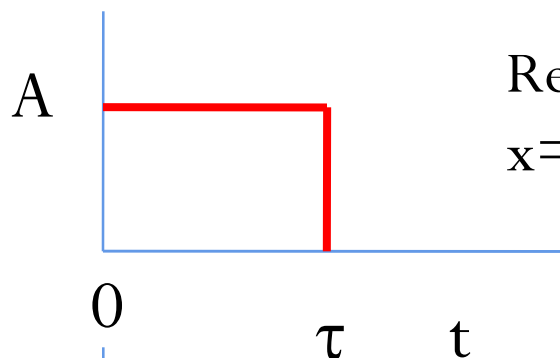


Microprocessor/  
microcontroller

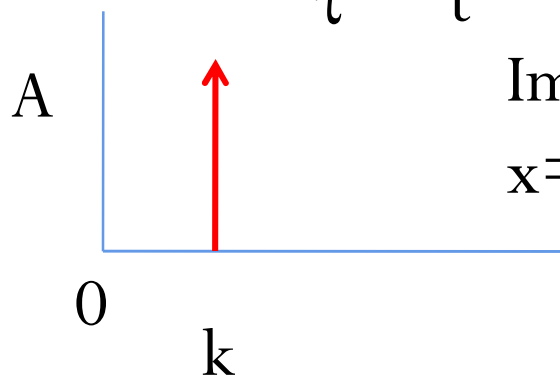
# Sinyal-sinyal elementer



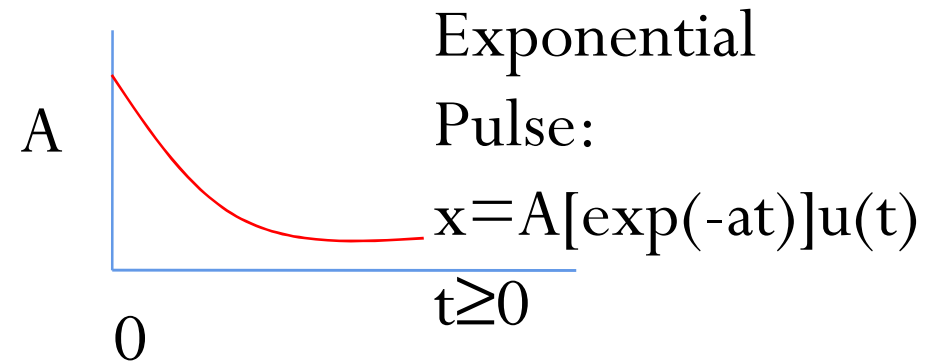
Step :  
 $x = Au(t)$   
 $t \geq 0$



Rectangular Pulse:  
 $x = Ar(t/\tau)$

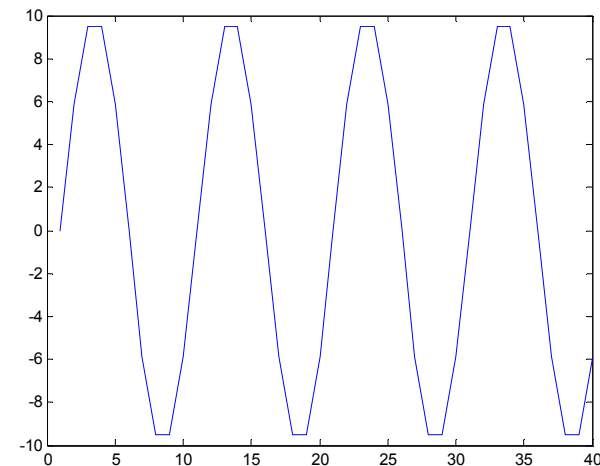


Impulse/dirac:  
 $x = A\delta(t-k)$



Exponential  
 Pulse:

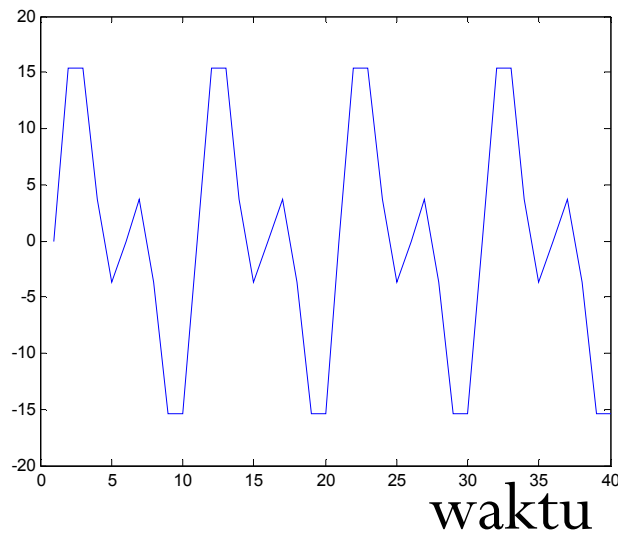
$x = A[\exp(-at)]u(t)$   
 $t \geq 0$



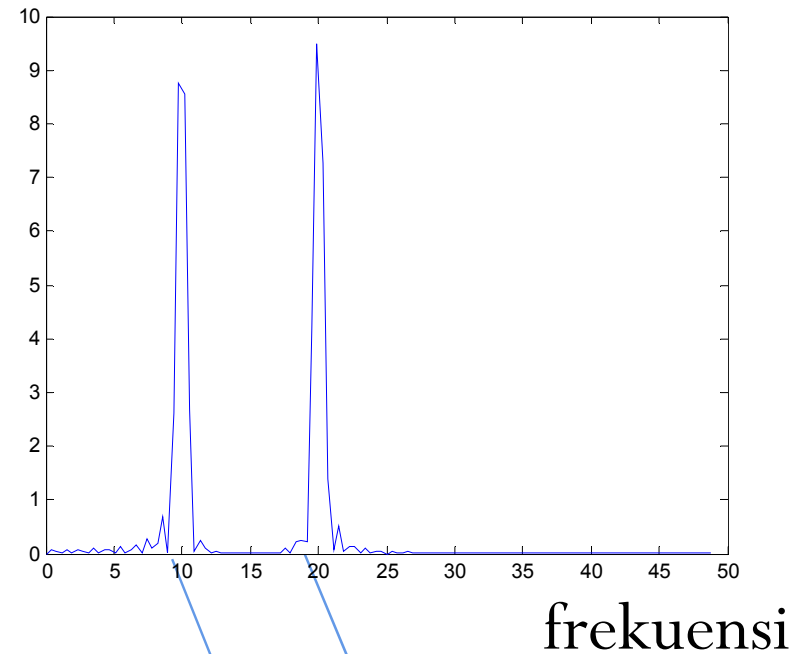
$X = A \sin(2\pi ft) = A \sin(\omega t)$



# Domain waktu dan Frekuensi



Fourier Transform



$$y = 10\sin(2\pi f_0 t) + 10\sin(4\pi f_0 t); f_0 = 10\text{Hz}$$

$$1\text{ms} = 10^{-3}\text{s}$$

$$1\mu\text{s} = 10^{-6}\text{s}$$

waktu

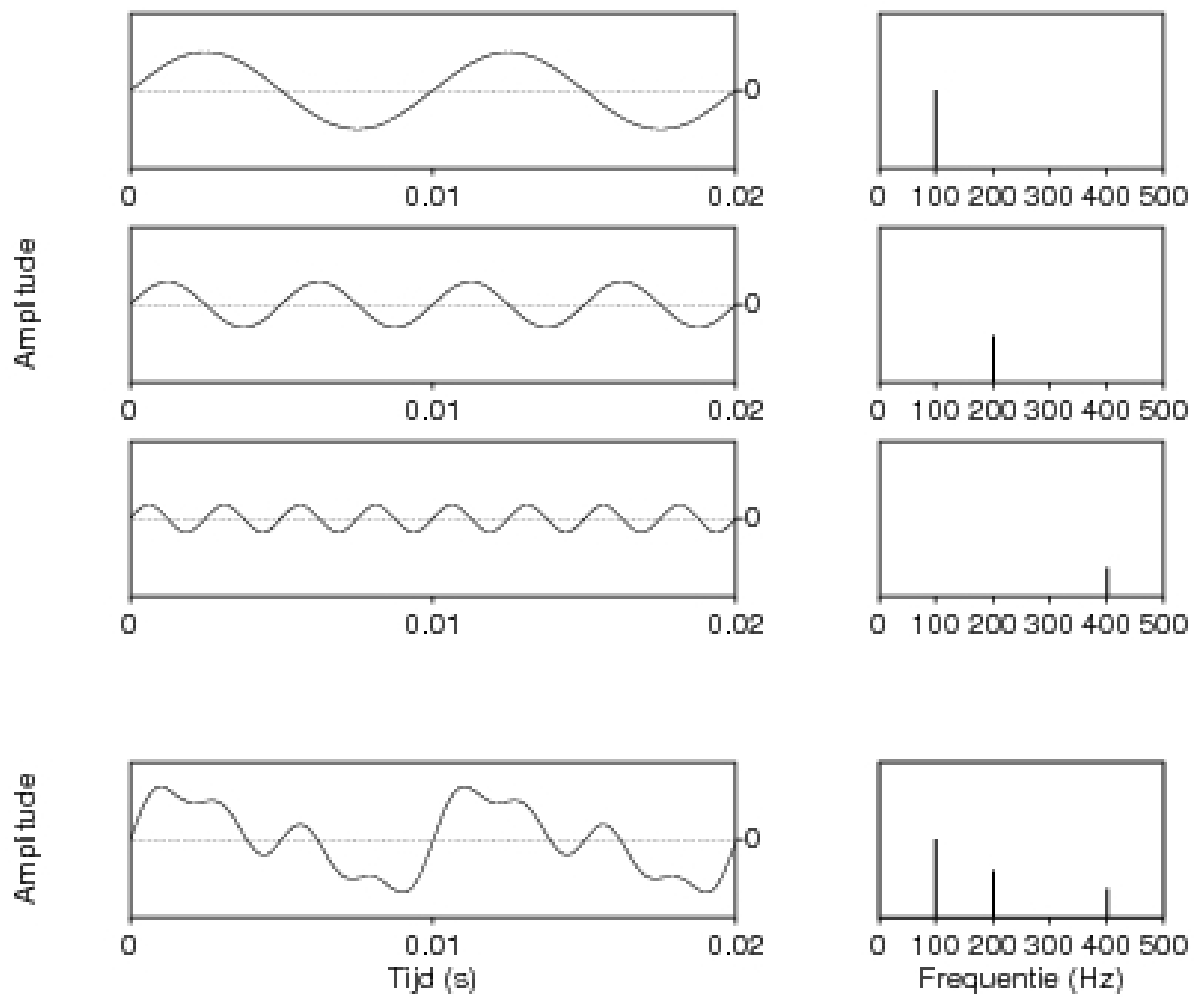
$$1\text{kHz} = 10^3\text{Hz}$$

$$1\text{MHz} = 10^6\text{Hz}$$

$$1\text{GHz} = 10^9\text{Hz}$$

Frekuensi

# Sinyal Harmonik



# Aplikasi Sinyal



Fig. 6. The upper body of the humanoid robot ARMAR III.



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