21D04120402
DASAR ELEKTRONIKA
Modul 01 SERBA-SERBI ELEKTRONIKA

(versi kuliah DARLING = semi-DARing semi-LurING)

Semester Awal 2021-2022

Selintas SEJARAH

- **1995: KONSORSIUM ILMU2 TEKNIK** menetapkan: **Teknik Elektro** (***Electrical Engineering***) = (1) Teknik Tenaga Listrik, (2) Teknik Telekomunikasi, (3) **Teknik Elektronika**, (4) Teknik Kendali dan (5) Teknik Komputer

Cover image: Frank Wing / The Image Bank

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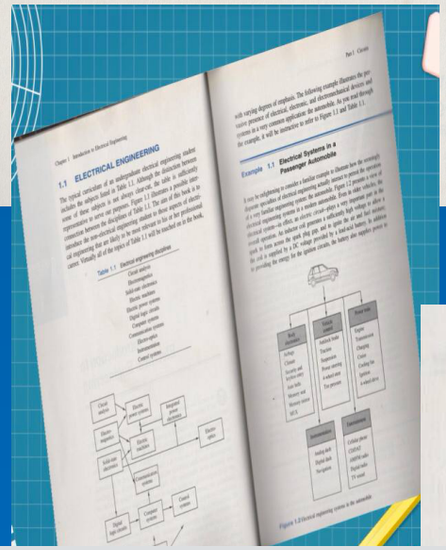
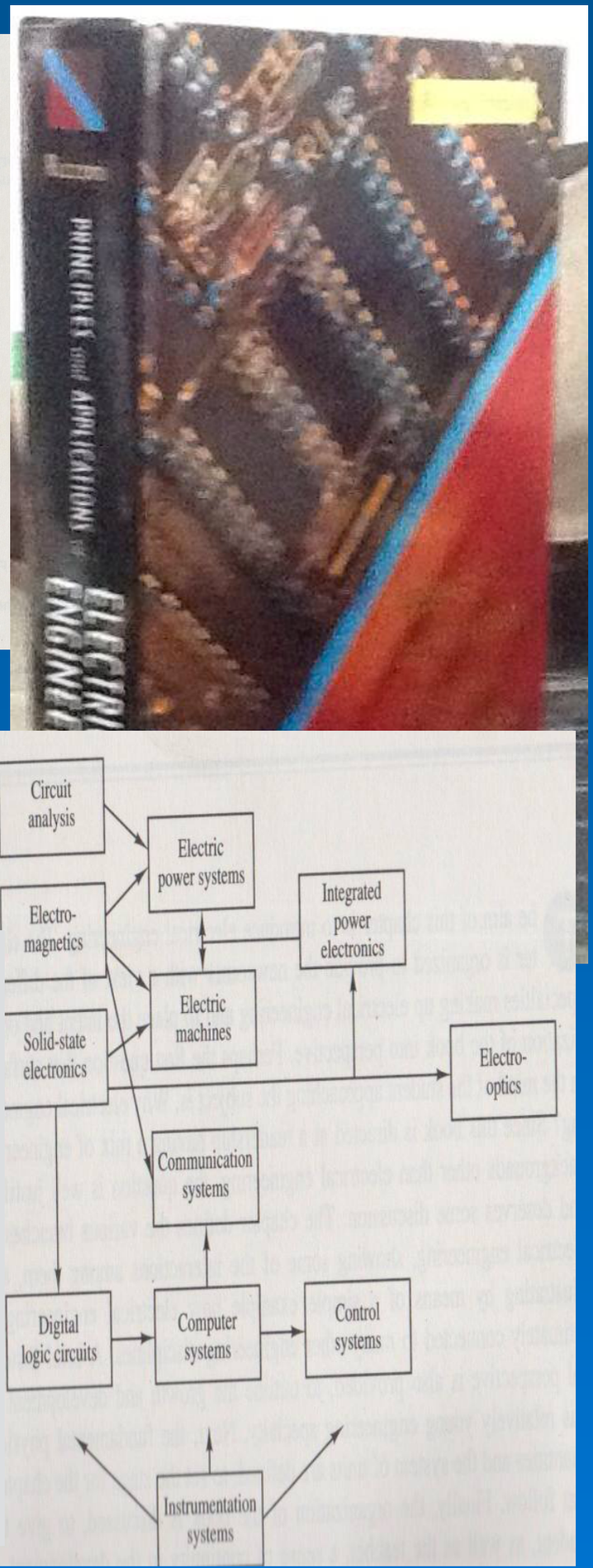
Compositor: Technique Typesetting
Typeface: 10/12 Times Roman
Printer: R. R. Donnelley & Sons Company

Library of Congress Cataloging-in-Publication Data

Rizzoni, Giorgio.
Principles and applications of electrical engineering / Giorgio Rizzoni.

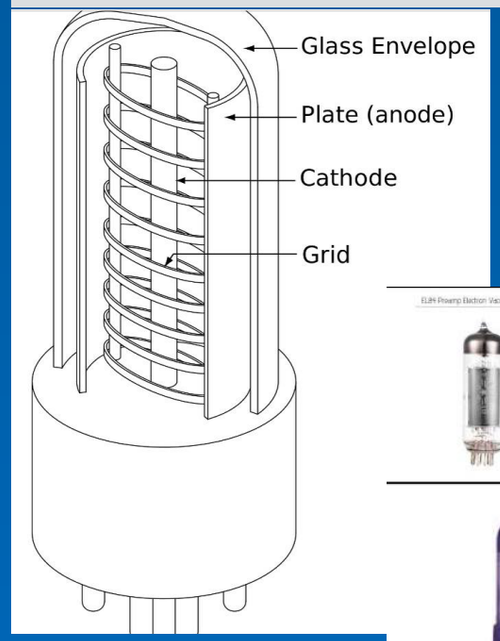


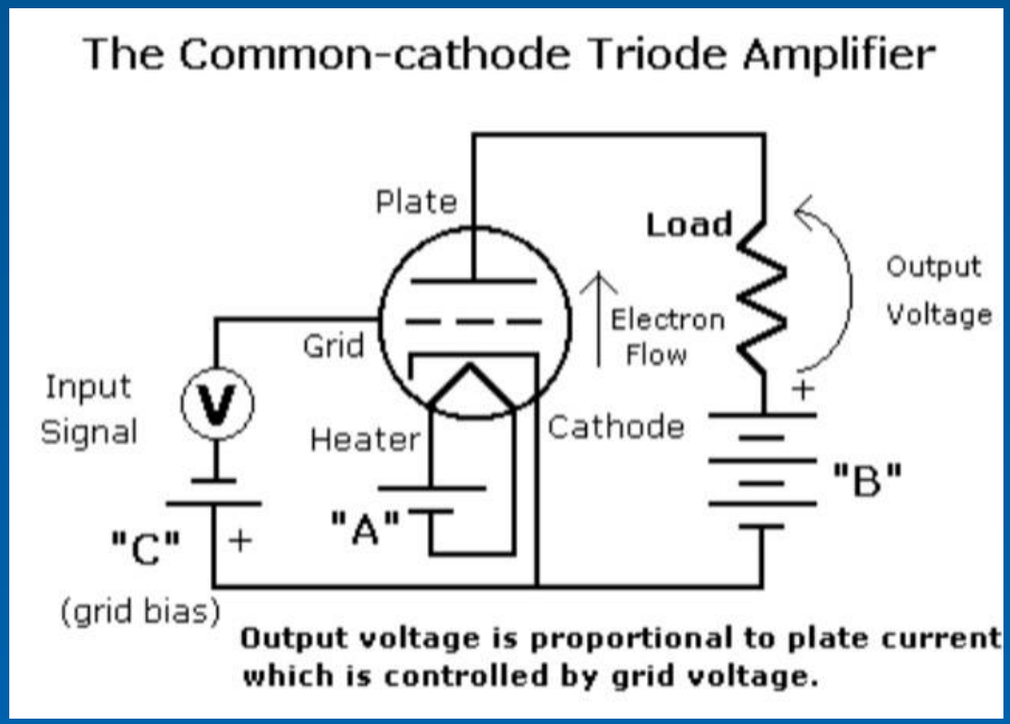


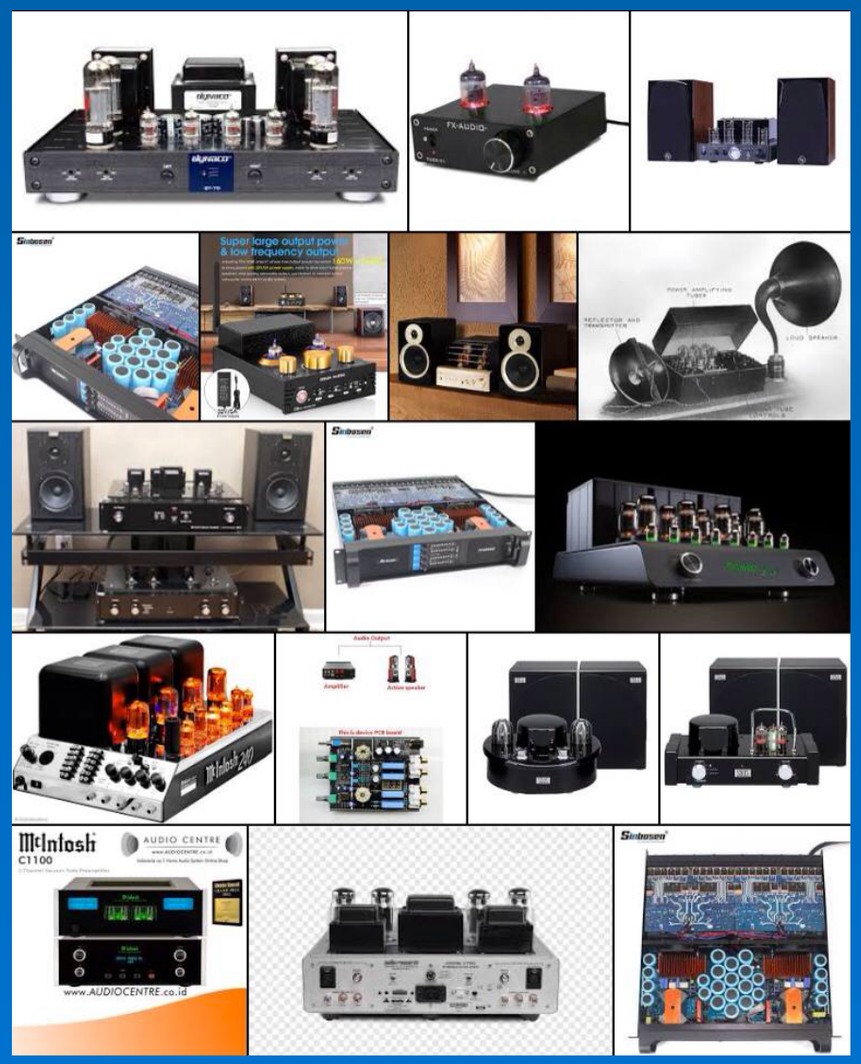
- **4(+1) DASAR KEILMUAN Teknik Elektro** (***Electrical Engineering***):
  (1) Rangkaian Listrik
  (2) Elektromagnetik
  (3) **Elektronika**
  (4) Rangkaian Logika
  dan (5) Isyarat dan Sistem

"NON-SOLID STATE ELECTRONICS"

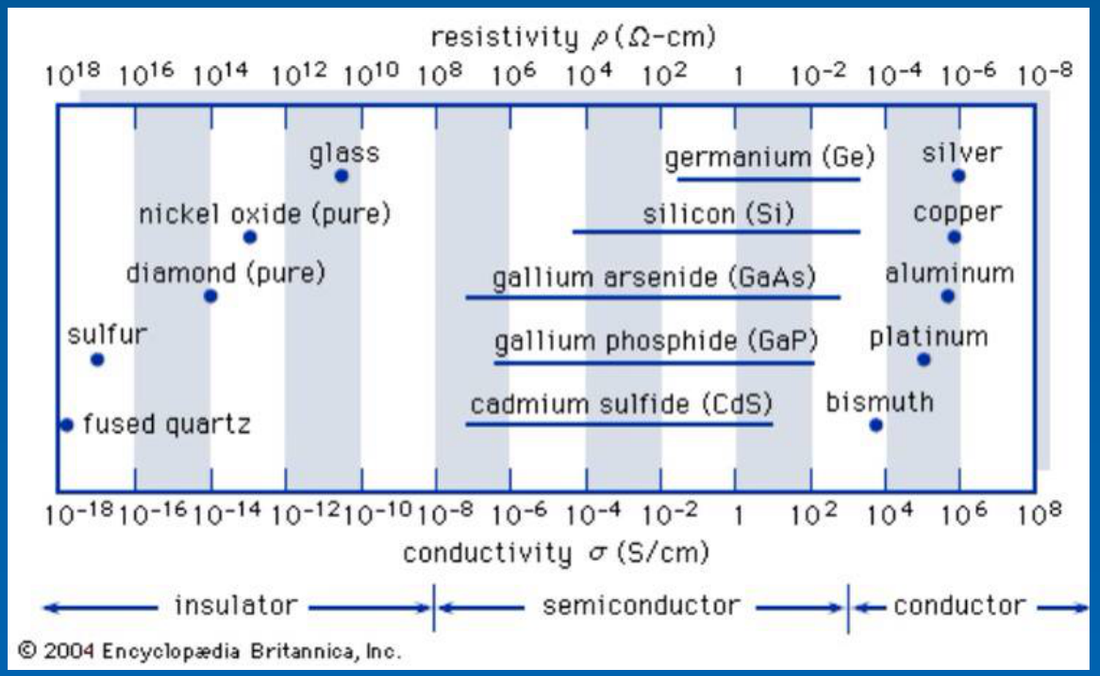
"***Solid State***" = keadaan **padat**, benda padat
Adakah Elektronika yang Bukan "***Solid State***" ???
Ada, komponen **Tabung Hampa** (**Vacuum Tube**)







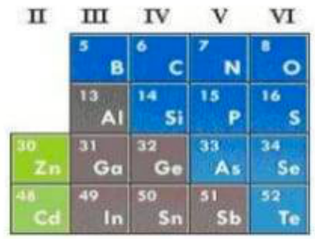
"SOLID STATE ELECTRONICS"

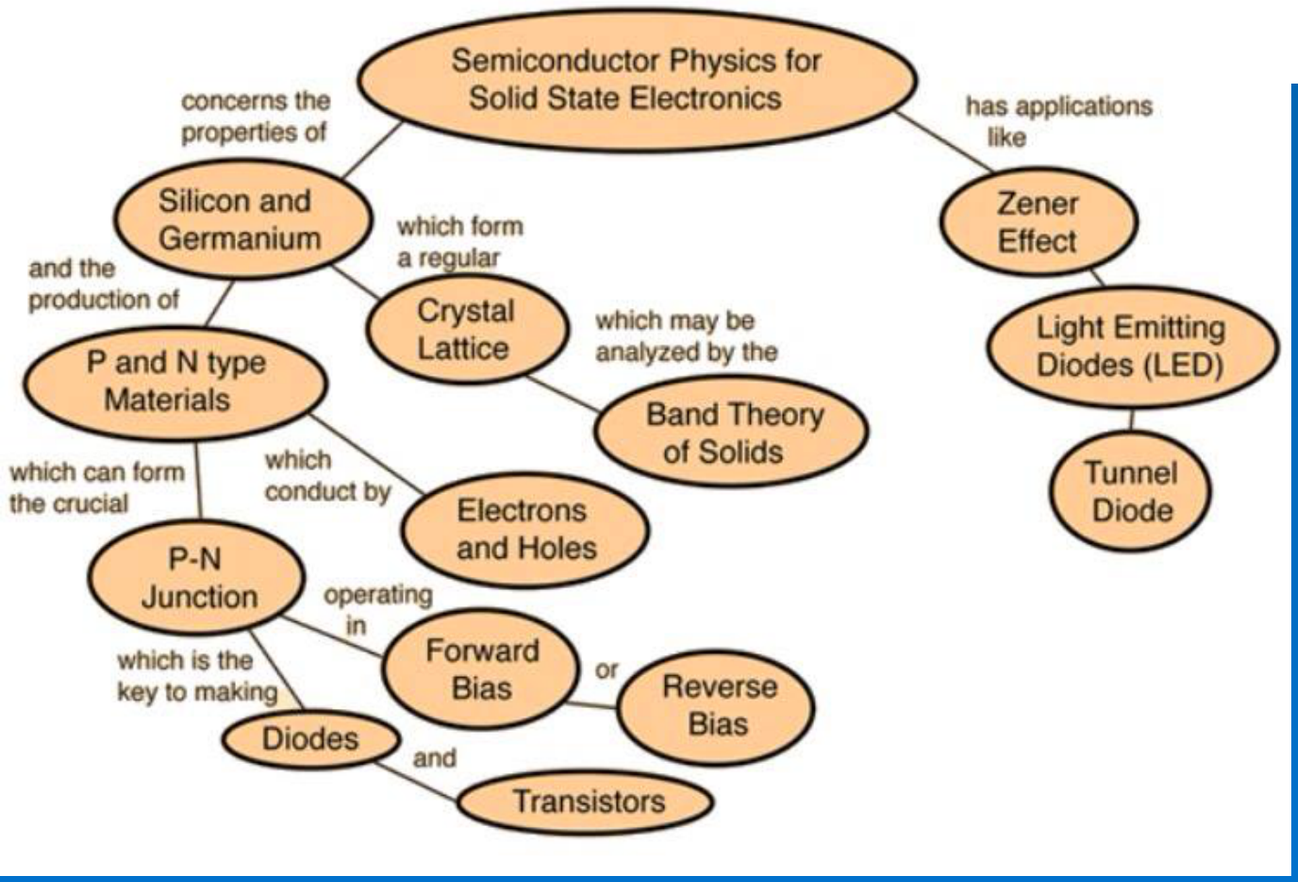


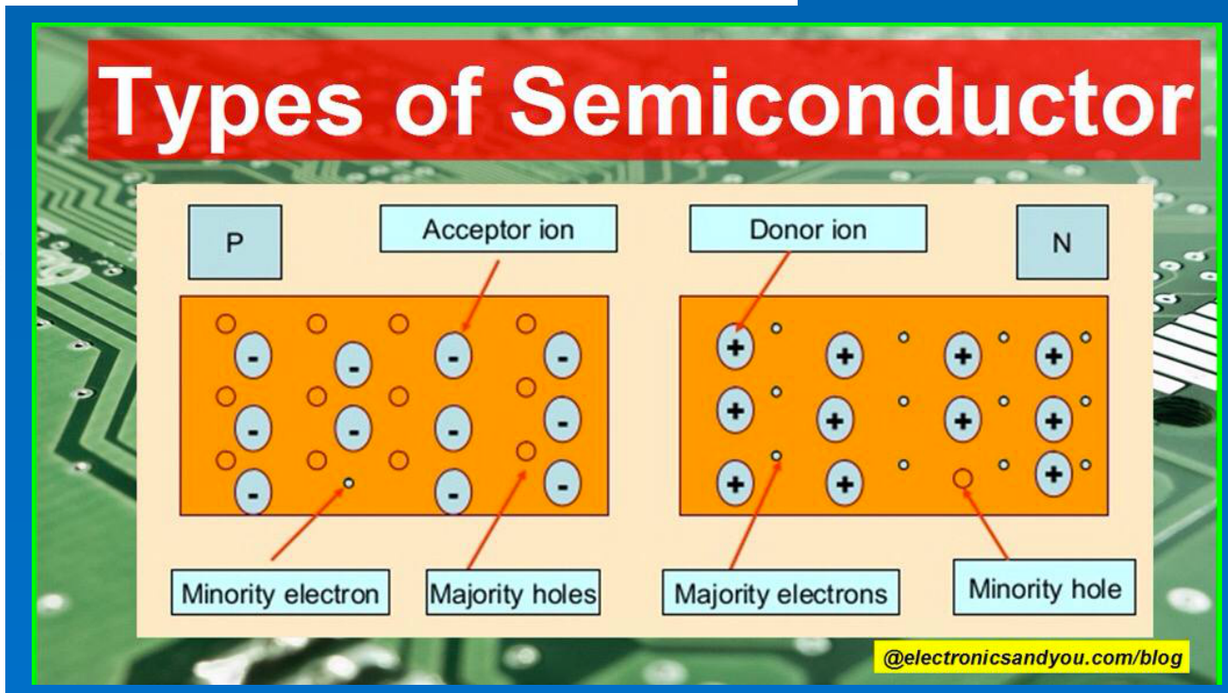
What is a Semiconductor

- A semiconductor is a material that has intermediate conductivity between a conductor and an insulator
- Also called "III-V" materials since semiconductor elements are in groups III and V of the periodic table of chemical elements.

Examples are silicon (14Si), germanium(32Ge)

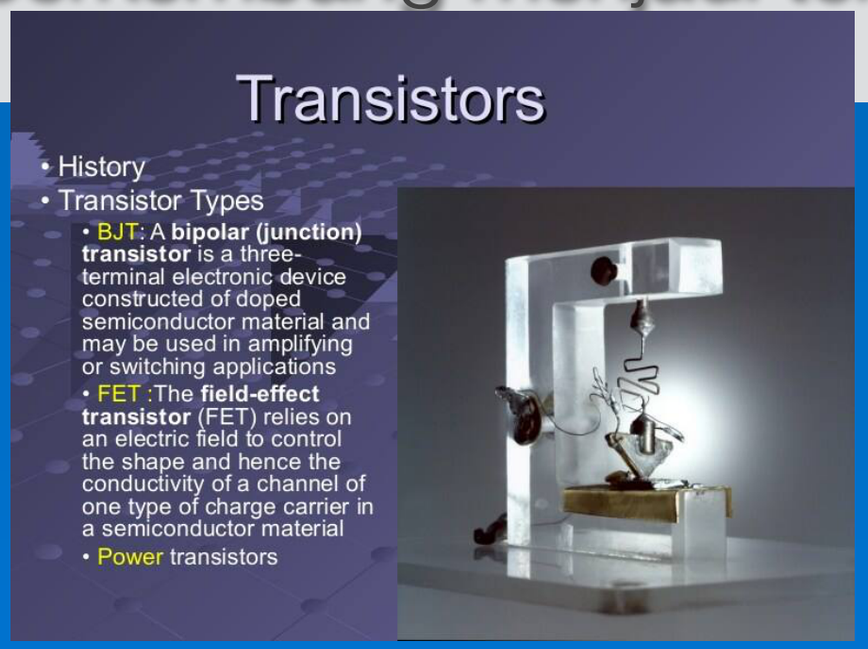






PENEMUAN TRANSISTOR

- **1925**: **Julius Edgar Lilienfeld** mengajukan konsep ***Field Effect Transistor*** (**FET**) walau pun belum bernama "transistor" dan belum terbayangkan me-realisasi-nya
- **1947**: (**Bell Labs**) **William Shockley**, **John Bardeen** dan **Walter Brattain** membuat ***Bipolar Junction Transistor*** (**BJT,** atau **transistor**).
- **1959**: (**Bell Labs**) **Muhammed Atalia** dan **Dawon Kahng** membuat ***Metal-Oxide-Semiconductor*** (**MOS**)-**FET**, selanjutnya berkembang menjadi teknologi **CMOS**.



PERKEMBANGAN SELANJUTNYA

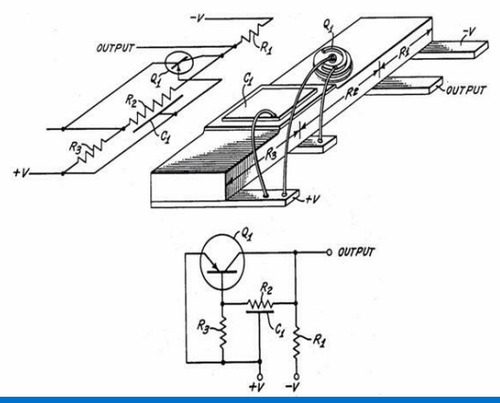
- **ELEKTRONIKA ANALOG**, transistor sebagai **penguat**
- **ELEKTRONIKA DIGITAL**, transistor sebagai **saklar**
- Teknologi ***Integrated Circuits*** (**IC**)
- **ELEKTRONIKA DAYA** (***Power Electronics***), untuk **sistem tenaga listrik**, SCR, thyristor, Power-MOSFET dll.
- **ELEKTRONIKA TELEKOMUNIKASI**, untuk **sistem telekomunikasi**, frekuensi tinggi.
- **ELEKTRONIKA KEDOKTERAN** (***Medical Electronics)***, untuk **sistem instrumentasi** kedokteran.
- …….dan lain-lain

History of Integrated Circuits

- In 1961 the first commercially available integrated circuits came from the Fairchild Semiconductor Corporation.
- The original IC had only one transistor, three resistors and one capacitor.

The First (2D) Integrated Circuit
Jack Kilby, Texas Instruments, 1958

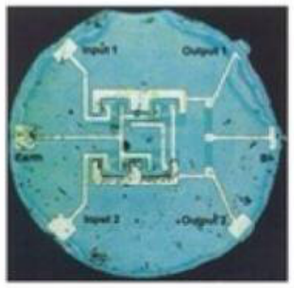
- Transistor, Resistors and Capacitors on the same piece of semiconductor
- Interconnects between components not integrated
  → Low connectivity between components

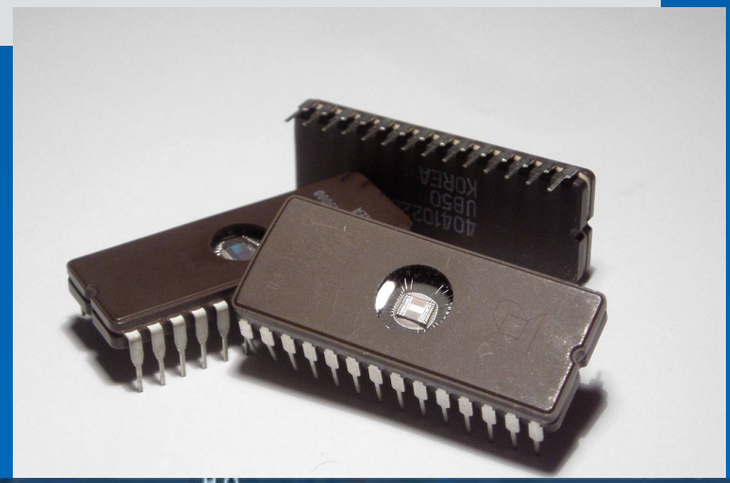


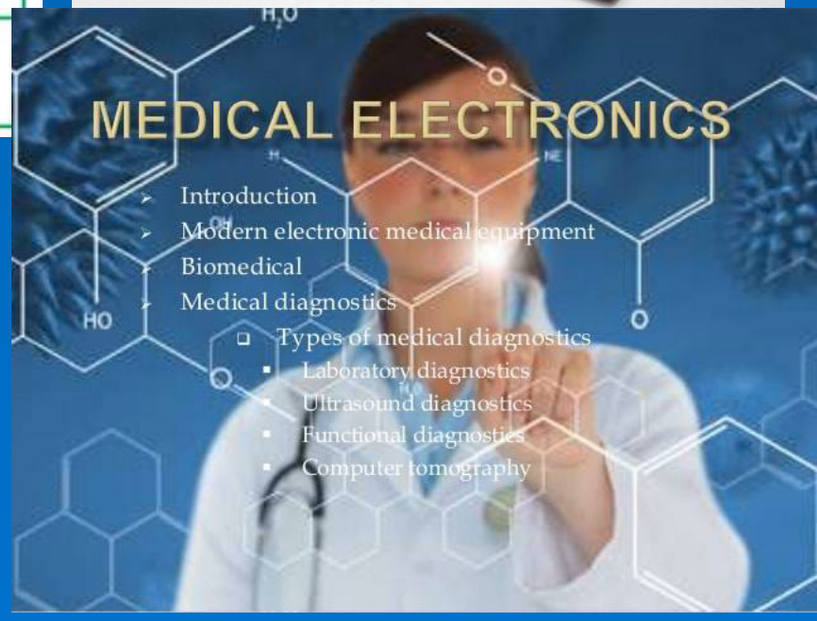
Date	Type of component integration	Level of component integration
1964	Small scale integration	Up to 10 components or gates
1968–1969	Medium scale integration (MSI)	Up to 100 components or gates
1970	Large scale integration (LSI)	Up to 1000 components or gates
Early 1980s	Very large scale integration (VLSI)	1000 or more components or gates
Late 1980s	Mega integration	1 million or more components per chip

The First *Monolithic* (2D) Integrated Circuit
Robert Noyce, Fairchild Semiconductor, 1961

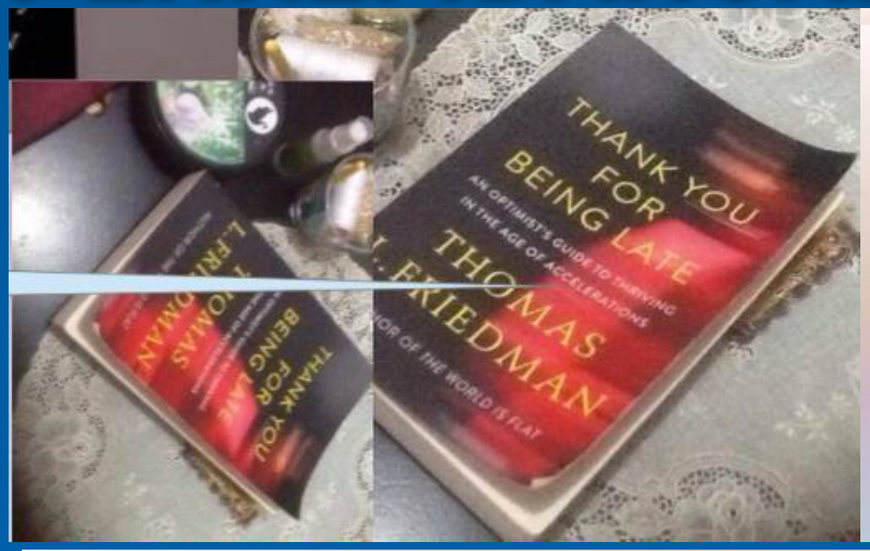
- Transistor, Resistors and Capacitors on the same piece of semiconductor
- Interconnects between components integrated
  → High connectivity between components







PERKEMBANGAN KE DEPAN



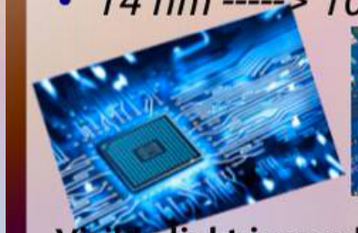
5 (LIMA) FAKTOR PENENTU

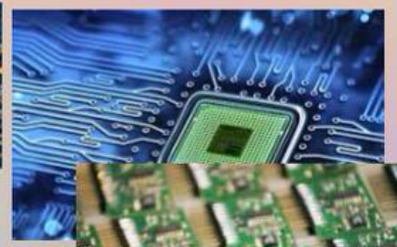
Menurut **Friedman** [**2016**, *page 37*]:

- **Teknologi *Integrated Circuits***
- ***Memory units***
- **Teknologi Jaringan**
- **Rekayasa Perangkat Lunak**
- **Teknologi Sensor**

Teknologi *Integrated Circuits*

- *Micro-chips ----> Processor ----> Multicore*
- *Dual-core ------> 16 Core -----> 256 Core ------> ?*
- *14 nm -----> 10 nm -----> ..... ------> 1 nm -----> ?*



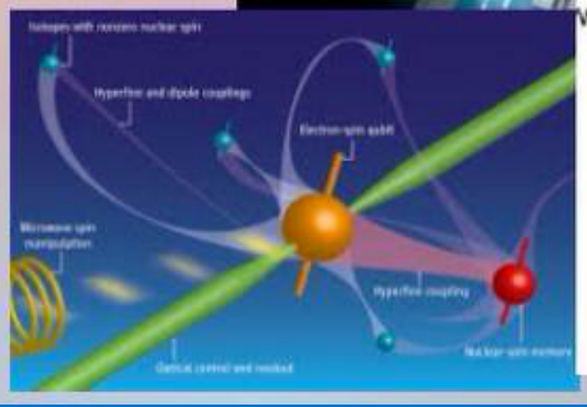


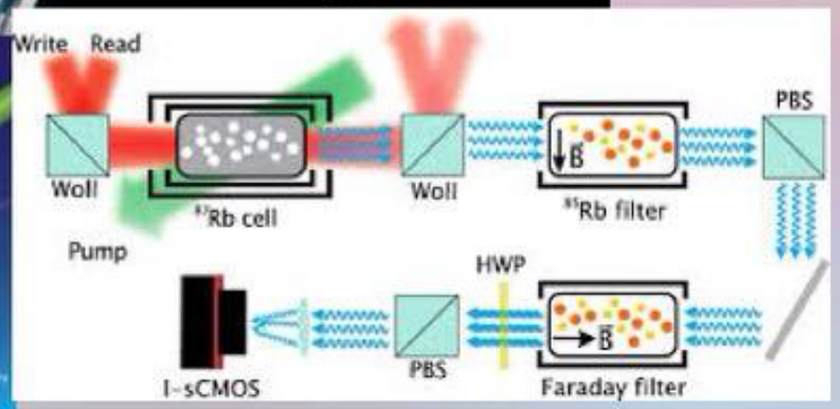

Visible light is usually defined as having wavelengths in the range of 400–700 nanometres (nm)

Memory units

- **1 bit memory, “0” atau “1” -----> slot**
- ***Quantum Memory* ------> 1 qbit**

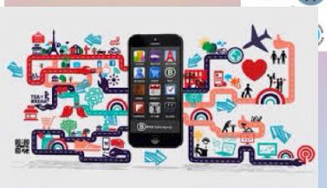
First On-chip Nanoscale Optical Quantum Memory Developed





Teknologi Jaringan

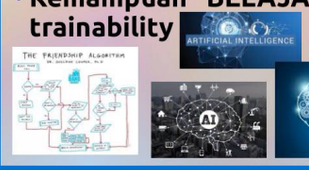
- Kecepatan (speed)
- Akses (accessibility)
- Penyebaran (obiquity)

SENSOR

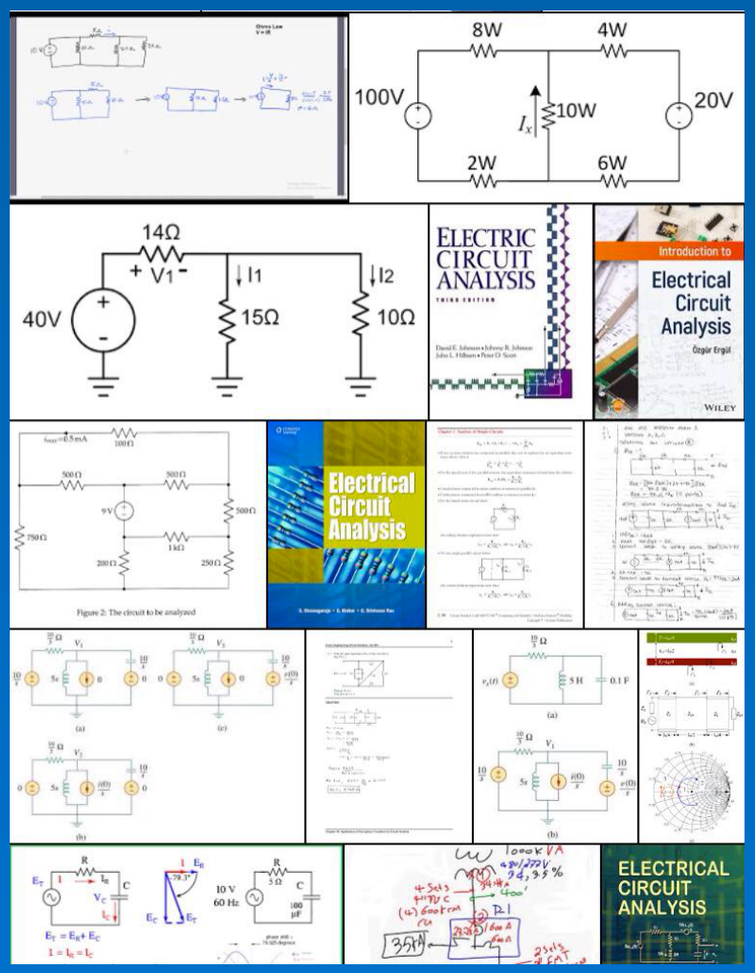
Rekayasa Perangkat Lunak

- **ALGORITMA**
- **Kecerdasan Buatan (AI)**
- **Kemampuan “BELAJAR”, trainability**

KOMPONEN ELEKTRONIKA

- **PASIF**: Resistor (**R**), Induktor (**L**), Kapasitor (**C**), atau yang dapat di-model-kan/di-substitusi oleh **R**, **L**, dan/atau **C**
- **AKTIF**: Tidak dapat di-model-kan hanya dengan **R**, **L**, dan/atau **C** saja.



6 (enam) KOMPONEN DASAR Rangkaian Listrik:

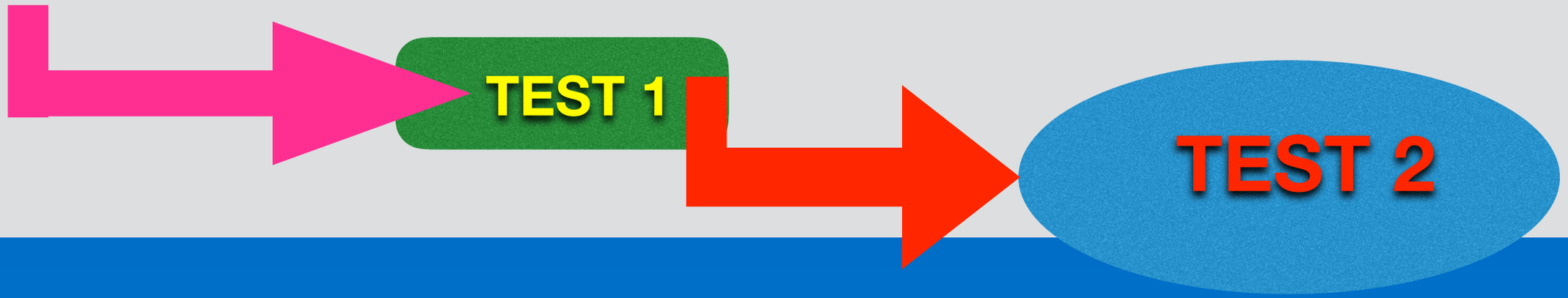
1. Resistor (**R**),
2. Induktor (**L**),
3. Kapasitor (**C**),
4. Sumber Tegangan
5. Sumber Arus
6. Saklar

- **RANGKAIAN LISTRIK**:

  Alat **ANALISIS** dan **DESAIN** Rangkaian/Komponen **ELEKTRONIKA**

MODUL PEMBELAJARAN

(tentatif, sewaktu-waktu berubah)

- **MODUL 0: PENGANTAR KULIAH**
- **MODUL 1: SERBA-SERBI ELEKTRONIKA**
- **MODUL 2: KOMPONEN-2 ELEKTRONIKA**
  - Sub-MODUL 2A: **Komponen PASIF**
  - Sub-MODUL 2B: **Komponen AKTIF**
- 

SELAMAT BELAJAR

Semoga SUKSES meraih PRESTASI!