

Real Time Systems Design

Lecture (5): Analog computer components

Dr. Rasha Thabit

Department of Computer Techniques Engineering

E-Lectures for Third Level
Real-Time systems design

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History of Analog Computers

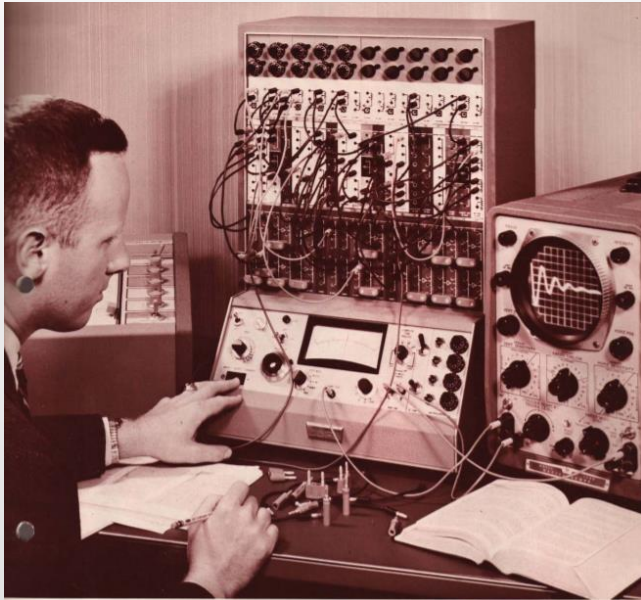
- Early analog computer was invented by William Thomson in 1873.
- The early analog computers have been used for gun fire control in World war II and the Korean war.
- Before the digital computers had developed sufficiently, analog computers were used in science and industry.



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Introduction to Analog Computers



An analog computer is a form of computer that uses the continuously changeable aspects of physical phenomena such as electrical, mechanical, or hydraulic quantities to model the problem being solved.

In contrast, digital computers represent varying quantities symbolically, as their numerical values change.

As an analog computer does not use discrete values, but rather continuous values, processes cannot be reliably repeated with exact equivalence, as they can with Turing machines. Unlike digital signal processing, analog computers do not suffer from the quantization noise, but are limited by analog noise.

Physical quantity measured by analog computer

Analog computers actually is a measuring device. An analog computer measures continues type of data and use a physical quantity, such as

- electric current,
- speed,
- weight etc.

Main electrical devices used in Analog Computers

Analog Computers are the first Computers being developed & provide the base for the development of modern digital computers. These computers are mainly made of electrical devices like

- resistors,
- amplifiers
- transistors.

Examples on analog measures

Analogue

- Analogue means continuity of quantity just like analogue clock measures time by means of distance.



- Example:

Speedometer , Thermometer e.t.c



Working



Example Amplifier

- Most electronic analog computers operate by manipulating potential difference (voltages).
- Their basic component is an operational amplifier, a device whose output current is proportional to its input potential difference.

Uses

- They are frequently used to control process such as those found in oil refinery where flow and temperature measurements are important.
- They are used for example in paper making and chemical industry.
- Analog computers are the first computers being developed and provided the basis for the development of the modern digital computers.

Disadvantages

- Digital computers can solve equations faster than analog computers.
- Readings for real time is difficult to record.
- Range of analog computers is limited and are difficult to deal with accurately.

Summary

- ✓ History of Analog Computers
- ✓ Introduction to Analog Computers
- ✓ Physical quantity measured by analog computer
- ✓ Main electrical devices used in Analog Computers
- ✓ Examples on analog measures
- ✓ Working
- ✓ Uses
- ✓ Disadvantages