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ANALYSIS OF ANALOG COMPUTER

SALONI JAIN
Lecturer in RG PG College, Meerut, U.P, India

Abstract: In this paper the attention is drawn on analog computer.For scientists attempting to prepare complex designs for simulation approach the analog computer assisted them. Extensive knowledge about the analog methods is required before preparing any analog design. The credit for the advent of analog computer goes to the invention of operational amplifier. Thus in 1950 the engineers and aircraft researchers utilized analog computers to a great extent.By the use of analog computers the problems related with processing power and timing discontinuities were reduced to a great limit.
Keywords: Analog Computer(AC), automation, simulation

1. INTRODUCTION

When talking about science and technology, the pace with which it is advancing is neither continuous nor steady. There are three types of computer based on the hardware structure:

1. Analog Computer
2. Digital Computer
3. Hybrid Computer

An analog computer is a computer that makes the use of changeable characteristics of electrical and mechanical phenomena which solves the problem. Analog computer is used to carry out the operation of analog data. It finds its application where no conversion of data is required. Analog computers were the first of its kind and provided the basis for the development of digital and then hybrid computers. The vital thing about analog computer is that it does not require any storage capability as they carry out their procedure in single step.

A digital computer plays with digits mainly 0 and 1. Digital computer works in either ON or OFF state i.e. 1 represents the ON state and 0 represents the OFF state. As digital computer works with numeric data it finds its application in all sorts of arithmetic calculations including addition, subtraction etc.

Amalgamation of analog and digital computer makes hybrid computer. It blends the striking features of each of the two i.e. it inherits the speed of analog computer and the precision of the digital computer. The hybrid computer is applicable for both discrete and continuous data. Hybrid computer are mainly used in radar systems and scientific applications. In previous study it has been mentioned that a brain can act as a hybrid computer i.e. half analog and half digital.

Analog computers don't suffer from quantization noise. The output of analog computer is in the form of voltage signals. As analog computer generates constant output i.e. it produces uninterrupted signals. There is no requirement of memory disc or drive in analog computers when compared to digital computers which require storage devices. This paper gives an insight into the working of analog computers and how it proves better than digital computers.

In the next section, elements of analog computer has been described. Section 3 and 4 discuss the automation and simulation in an analog system. Section 5 concludes the paper.

2. ELEMENTS OF ANALOG COMPUTER

The analog computers are such type of electronic devices having no state. The utilization has been automated than manual as it was difficult for users to handle the computations manually. Though, the development of analog computers is not an easy task yet they are less expensive when dealing with the storage devices as they do not require any memory devices.

Analog computers are declining to a great extent due to their unreliability and depriving in giving the accurate result. But analog computers are fast at performing its computation i.e. solving of differential equations. In terms of mathematical terms analog computers are widely used and implemented for this purpose.

The most highlighting feature of analog computer which needs a special mention is that they formed the basis for the development of digital computers. The fundamental elements of analog computer are integrators, function generators, comparators and multipliers. Some of the functional computing elements required to provide a solution for a problem are time delay devices and resolvers which can be operated too.

3. AUTOMATION IN ANALOG COMPUTER

Automation in analog computer can be done by combining different levels into one system. Previously when manually all the operations of analog computer was performed it was difficult for the users as the processing was time consuming and required huge amount of effort on their part. But nowadays everything is computerized and the processing is done within seconds. Automation in analog computers has thus gained significance. Efficient strategy for automation would be modularising the work in different modules and at the same time aligning the work in a particular hierarchy.

At the top level, priority must be deciding the blueprint of the system architecture. Next level should be focused at deciding all the parameters of the circuit or device being used. At the lowest level one should concentrate on the designing of the circuit. If at some level there is a problem then one should manipulate the parameters such that the problem is nullified. For this the input parameters can be analysed.

4. SIMULATION IN ANALOG COMPUTER

As mentioned an analog computer is continuous in giving results as is natural systems. Simulation between systems with continuous and discrete data may sound unrealistic. A natural system may not be able to function properly when sampled using digital system involving discrete data as they involve infinite number of system variables.Analog simulations are utilized both in analog and digital design.

At times, digital systems prove to be a failure when data resolution is done to a great extent. In this the analog systems produce more continuous results when simulated for different sets of system variables. Thus, analog computers generate more uninterrupted variables which is more real which is not possible when dealing with digital system.

Simulation can be advantageous when performed using basic software like excel or spreadsheets in the following ways:

- Expenditure is minimized as these packages are available widely.
- The different features available like the chart feature, graphics formulas and toolbars to name a few can enhance the overall exercise.
- It is user friendly as any user can easily learn to work with these software. They will attract a wide audience of computer users.
- For educational purposes too, these packages prove very beneficial as there flexibility upgrades them to be used in various areas such as mathematics and engineering.
- They are time saving as they produce fast results and more accurate.

In terms of speed, by using analog computer a program can be executed in a fraction of time. An analog computer proves to be stable under resistive loading. Analog computer gives high amount of precision and is regarded as versatile. Expenditure can be minimized by covering many users when an analog computer is to be purchased.

5. CONCLUSION

To overcome the problems issues related with the development, simulation and automation the researchers and scientists must be equipped with an analog computer which gives results more accurately with great precision and within the stipulated time.

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