

# Electronic Engineering in the 21st Century - Assignment Report II -

(Unknown)

Applied Natural Science Course (Applied Physics subjects)

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## 1. Abstract

In recent years, Integrated Circuit technologies have been developed to a great extent and playing an important role in various fields. This report's purpose is to understand such IC history and future prospect in the following 2 sections: 1) giving brief explanation about the change of VLSI objectives, 2) explaining what is needed on VLSI in near future.

## 2. Transition of VLSI objectives

Integrated Circuits(IC) was invented by *Robert Noyce* and *Jack Kilby* in 1959. This technology is now general, but that was so innovative in those days and could be expected to apply to something regardless it can have few components in one chip.

After that invention between 1960 and 1990, many technical ideas enabled IC chips to integrate many components such as transistors. The number of elements in one chip has been increasing exponentially, and that could bring about digital products such as computing machineries and etc. In those days, the number of elements is most crucial tasks, so precision of fabricating chips had been sophisticated years by years.

However, in early 1990, much higher performance which took consideration into logical layout and clock settings had started to be requested. This property was originated so that electrical appliances had been developed and they needed improved in aspect of speeding up. Also, bulk production of IC was flourished, because marketing products which consist of ICs was so intensive.

Between late 1990 and now, the tendency has been hasten by fabricating chips more accurate and mass production. Today, much faster IC devices are produced in aspects of feature area, speed and so on. But speeding up can have room for improvement and now the method is studied. Moreover, other property has been needed in VLSI such as more reliable IC's performance in process and prevention of noise.

Being summarized as follows, after *Noyce* and *Kilby's* work, chip area improvement was implemented in physical feature, and as time passed speed was also crucial problem. Today, not only speed but other varied properties are important depending on the products. In next section, the prospect in near future is discussed and today explain what is crucial in obvious.

## 3. Prospect of VLSI in Near Future

Today, IC technology is faced with varied demands and problems which should be cleaned up. Such problems are different and depend on that application. This section shows how IC technology should be improved about main topics.

At first, which was touched in previous section, speeding up is one of the most important requisitions. Current IC chips are faster than previous ones, but it is not enough in some fields such as calculation, high quality network and comfortable use for digital products.

Also, process and system reliability is important because of some reasons. In aspect of process of chips, even now errors by dusts are yet left and prevent effective bulk production. At the point of system, right-operated and long-life IC is crucial to achieve complicated system. In addition to that, cost down should also be regarded in order to enforce the position of products and do mass production. , To deal with problems, many studies are implemented to improve it.

Besides, recently electric power reduction is also important topic because portable products are flourished or the global environment problem is taken into account. Certainly smaller area element can reduce electric power, but it is discussed how IC can get better power reduction. Other problems for example are noise signal, and many ways to be sorted out are devised.