

Quadrant II - Transcript

Hi! I am Manjunath Nayak and I am going to brief you today about the history of electronics in this first module.

Electronics comprises the physics, engineering, technology and applications that deal with the emission, flow and control of electrons in vacuum and matter. It uses active devices to control electron flow by amplification and rectification, which distinguishes it from classical electrical engineering which uses passive effects such as resistance, capacitance and inductance to control current flow. Since the discovery of electrons in 1897, along with the subsequent invention of the vacuum tube which could amplify and rectify small electrical signals, Electronics has had a major effect on the development of modern society.

So let's quickly see the history of electronics from its beginning to modern day science and technology.

Electronics/ Electronic engineering as a profession got major attention from technological improvements in the telegraph industry during the late 19th century and in the radio and telephone industries during the early 20th century. People found radio, highly fascinating the way it received and transmitted signals wirelessly. Even though many went into broadcasting in the 1920s before the period of World War I still most of them were amateurs in this field.

However, within next 20 years during World War II the technology had progressed to making of radar, sonar, communication systems, and advanced armaments and weapon systems.

In this interwar years, the subject was known as radio engineering. The word electronics began to be used in the 1940s. In the late 1950s the term electronic engineering started to emerge.

Electronic laboratories (Bell Labs, for instance) created and subsidized by large corporations in the industries of radio, television, and telephone equipment, which led to series of electronic advances.

The electronics industry was revolutionized by the inventions of the first transistor in 1948, the integrated circuit chip in 1959, and the silicon MOSFET (metal-oxide-semiconductor field-effect transistor) in 1959.

Electronic engineering (even before it acquired the name) facilitated the development of many technologies including wireless telegraphy, radio, television, radar, computers and microprocessors.

Let us quickly have a look at each of these in terms of its history and the scientists involved

Some of the devices which would enable wireless telegraphy were invented before 1900. These include the spark-gap transmitter and the coherer with early demonstrations and published findings by David

Edward Hughes (1880) and Heinrich Rudolf Hertz (1887 to 1890) and further additions to the field were by many research scientists including Jagadish Chandra Bose from India. In 1896, Guglielmo Marconi went on to develop the first practical and widely used radio wave based communication system. Which even fetched him a title of being the father of wireless communication.

In 1904, John Ambrose Fleming, the first professor of electrical Engineering at University College London, invented the first radio tube, the diode. Then, in 1906, Robert von Lieben and Lee De Forest independently developed the amplifier tube, called the triode. Electronics is often considered to have begun with the invention of the triode. Within 10 years, the device was used in radio transmitters and receivers as well as systems for long distance telephone calls.

The invention of the triode amplifier, generator, and detector made audio communication by radio practical.

The discovery of, amplifying vacuum tubes revolutionized both radio receivers and transmitters. Vacuum tubes remained the preferred amplifying device for almost 40 years, until researchers working for William Shockley at Bell Labs invented the transistor in 1947.

In the following years, transistors made small portable radios, or transistor radios, possible as well as allowing more powerful mainframe computers to be built. Transistors were smaller and required lower voltages than vacuum tubes to work.

In 1927 Philo Farnsworth made the first public demonstration of a purely electronic television. During the 1930s several countries began broadcasting, and after World War II it spread to millions of receivers, eventually worldwide. Ever since then, electronics have been fully present in television devices.

Modern televisions and video displays have evolved from bulky electron tube technology to use more compact devices, such as plasma and Liquid-crystal displays. The trend is for even lower power devices such as the organic light-emitting diode displays, and it is most likely to replace the LCD and plasma technologies.

During World War II many efforts were expended in the electronic location of enemy targets and aircraft. These included radio beam guidance of bombers, electronic counter measures, early radar systems etc. During this time very little if any effort was expended on consumer electronics developments.

The first working transistor was a point-contact transistor invented by John Bardeen and Walter Houser Brattain at the Bell Telephone Laboratories (BTL) in 1947. William Shockley then invented the bipolar junction transistor at BTL in 1948. While early junction transistors were relatively bulky devices that were difficult to manufacture on a mass-production basis, they opened the door for more compact devices.

The technique developed by Mohamed M. Atalla at BTL in 1957 led to the development of the monolithic integrated circuit chip. The first integrated circuits were the hybrid integrated circuit invented by Jack Kilby at Texas Instruments in 1958 and the monolithic integrated circuit chip invented by Robert Noyce at Fairchild Semiconductor in 1959.

The MOSFET (metal-oxide-semiconductor field-effect transistor, or MOS transistor) was invented by Mohamed Atalla and Dawon Kahng at BTL in 1959 was the first truly compact transistor that could be miniaturised and mass-produced for a wide range of uses. The MOSFET is the basic element in most modern electronic equipment and is credited for birth of modern electronics, and possibly the most important invention in electronics.

And lastly we have the microprocessors.

A microprocessor is a computer processor that incorporates the functions of a central processing unit on a single (or more) integrated circuit (IC) of MOSFET. A computer is a programmable machine that receives input, stores and manipulates data, and provides output in a useful format.

The first electronic computers were developed in the mid-20th century (1940–1945). These were the size of a large room, consuming as much power as several hundred modern personal computers (PCs). Modern computers based on integrated circuits are millions to billions of times more capable than the early machines, and occupy a fraction of the space. Simple computers are small enough to fit into small pocket devices, and can be powered by a small battery. The ability to store and execute lists of instructions called programs makes computers extremely versatile, distinguishing them from calculators.

Many electronics engineers today specialize in the development of programs for microprocessor-based electronic systems, known as embedded systems. Result of which is that it began from 8 bit then to 16 followed by 32 bit and today we have the 64 bit computers.

So, as you see the world of electronics is not just the most fascinating one but also the most fast moving one.

I hope this introductory session will make you curious to know more about these course in details.

Here is a reference which you can refer to and understand more about the history of electronics.

Thank You