Introduction and Background of the Technology of the Topic

Our society has changed significantly over the last few decades, whether for the better or worse. Since then, social norms, diverse beliefs, and perhaps the influence of technology have all had an impact on how individuals behave in the society. Different types of technologies have emerged and they have significantly changed and shaped our society. It cleared the door for advancements and inventions that made life easier for us every day. One of the technologies that contributes and is often overlooked is the embedded systems.

In the 1960s, embedded systems first appeared. In order to lower the size and weight of the Apollo Guidance Computer, the digital system deployed on the Apollo Command Module and Lunar Module, Charles Stark Draper created an integrated circuit in 1961. It assisted astronauts in gathering real-time flight data as the first computer to employ ICs. The D-17B computer, which is currently a part of Boeing, was created by Autonetics in 1965 for use in the Minuteman I missile guidance system. As the first mass-produced embedded system, it is widely acknowledged. The D-17B missile guidance system was replaced by the NS-17 missile guidance system, notable for its extensive use of integrated circuits, when the Minuteman II entered into production in 1966. The Volkswagen 1600 employed a microprocessor to manage its electronic fuel injection system when it was initially produced in 1968, making it the first vehicle to use an embedded technology.

The cost of integrated circuits fell and their use increased by the late 1960s and the beginning of the 1970s. Texas Instruments created the first microcontroller in 1971. The TMS1000 series, which went on sale in 1974, featured a 4-bit CPU, read-only memory (ROM), and random-access memory (RAM), and it was priced at about $2 per unit when purchased in bulk.

The 4004, often regarded as the first commercially available CPU, was also produced by Intel in 1971. The 4-bit microprocessor was intended for use in calculators and other compact electronics, but it also needed support chips and perpetual memory. The 16 KB, 8-bit Intel 8008

was released in 1972, and the 64 KB, 8-bit Intel 8080 was released in 1974. The x86 series, which replaced the 8080 in 1978, is still mainly in use today.

Real-time VxWorks, the first embedded operating system, was published by Wind River in 1987. In 1996, Microsoft released Windows Embedded CE. The first embedded Linux products started to appear around the late 1990s. Today, Linux is used in almost all embedded devices.

Primarily, embedded systems are a type of computer system that usually forms part of a larger system, device or piece of electronic equipment. The term "embedded" refers to the fact that embedded systems always operate as a component of an entire device. The main components of an embedded system are hardware, application specific software, and real-time operating system. A basic embedded system typically include a processor, sensor, actuator, analog-to-digital (A-D) converters, digital-to-analog (D-A) converters, a power source, memory, and communication interfaces. Embedded systems employ communication ports to send data via a communication protocol between the processor and peripheral devices, which are frequently found in other embedded systems. The processor may be a microprocessor or microcontroller. The data is interpreted by the processor with the aid of simple memory-stored software. Typically, the software is very specialized for the purpose the embedded system serves. Often, embedded systems are used in real-time operating environments and use a real-time operating system (RTOS) to communicate with the hardware. Also, it plays a critical role in enabling advanced technologies such as artificial intelligence, machine learning, and the Internet of Things (IoT).

Embedded systems are present in almost every aspect of modern daily life. They have an effect on how we go about our daily lives. From the computer systems that control safety features in the automobiles, to the ATMs we use regularly to access cash, embedded systems can be found everywhere. This technology should not be ignored. Instead, we should look at how vital it is for us to have an enhanced quality of life.