**Link -** <https://www.youtube.com/playlist?list=PLmdxycs9ZImfG_tGekAYFsDdGXqmNEEIt>

✅DAY – 1 Introduction, IDE Installation, and Setting the Tone for 30 Days Challenge

✅DAY – 2 Data types and variables, Your first C Program

✅DAY – 3 Address Variables and Storage Classes

✅DAY – 4 How to Write functions

✅DAY – 5 Understanding Microcontroller programming

✅DAY – 6 Build Process and Analyzing Embedded C Code

✅DAY – 7 Floating Point data and Scanf

✅DAY – 8 Pointers and stdint.h

✅DAY – 9 Operators

✅DAY – 10 Decision-Making Loops

✅DAY – 11 Bitwise Operators

✅DAY – 12 Blinking LED

✅DAY – 13 Bitwise Shift Operators

✅DAY – 14 Looping

✅DAY – 15 Type Qualifier 'Const'

✅DAY – 16 Pinread and Optimization

✅DAY – 17 'volatile' type Qualifier

✅DAY – 18 Structures and Bit field

✅DAY – 19 Usage of Bitfiled in embedded code

✅DAY – 20 Keypad Interfacing

✅DAY – 21 Arrays

✅DAY – 22 Strings

✅DAY – 23 Pre-procesor Directives in C

✅DAY – 24 LCD Programming in C

✅DAY – 25 UART Programming in C

✅DAY – 26 SPI TFT Display in C

✅DAY – 27 IIC Memory Programming in C

✅DAY – 28 SPI ADC Programming in C

✅DAY – 29 Interview Question in C

✅DAY – 30 Graduation Day and Wrapp up

**Day - 01**

* Microprocessor(MP) and Microcontroller(MC).
* An Embedded system is a combination of **MP/MC-based hardware and software** with some mechanical parts to perform a **specific task**.
* Eg: Printer, Mouse, Refrigerator.
* Program.
* A series of instructions that cause a computer or a microcontroller to perform a particular task.
* Programming languages in embedded system.
* **C and C++ - Microcontrollers** ( most widely used)
* Rust
* Assembly
* Java
* Python - Microprocessors, Raspberry pi, Jetsen nano
* Types of processors and controllers
* Microprocessors/ Microcontroller (8 bits/16 bits/32 bits) - WEB SIDE = Digi-Key **[Dallas, Philips, Renesas, Freescale, Texas, Microchip]**
* CPLD(Complex Programmable Logic Device)/ FPGA( Field Programmable Gate Array) **[Xilinx, Altera, Lattice, Actel]**
* General purpose processors ( AMD processors, Pentium 4, GPU(Graphics processing unit), Media GPU) (Before GPU was used for gaming applications as well as for rendering applications but today GPU is used for training for deep learning applications) **[Intel, AMD, Nvidia]**
* ASIC Application (application-specific integrated circuit) **[Intel]**
* DSP Processors (Digital signal processing) ( Blackfin, Shark) **[Texas, Analog Devices, Motorolla]**
* SOC (system-on-a-chip) **[Qualcomm, Broadcomm]**
* Microprocessor
* The microprocessor must have external peripherals to interact with the outside.
* Eg: Raspberry pi chip is an example of a microprocessor 8085, 8086
* Microprocessor everything is external.
* CPU — Control

1. BOOT, ROM(Read-only memory) [Used at startup]
2. Instruction (program) ROM
3. Data, RAM (Random-access memory)
4. Transducers
5. Keyboard, Screen, UART, Parallel, Interface

* Microcontroller
* Microcontroller everything is Internal.
* Microcontroller everything is on a single chip
* The microcontroller cannot do a DSP application
* CPU (Central Processing Unit)

1. Program memory
2. Timers
3. Data memory
4. ADC (Analog-to-digital conversion)

* UART (Universal asynchronous receiver-transmitter)

1. Parallel port
2. CAN (Controller Area Network)

* Basic features of DSP (Digital Signal Processor)
* DSP is **mathematics on chip**
* DSPs usually run applications with **hard real-time** constraints
* DSPs usually process **infinite continuous data streams**
* MAC ( Media Access Control Address) capability
* DSP processors are microprocessors designed for efficient mathematical manipulation of digital signals
* **Microcontroller**
* A microcontroller is a small computer on a single VLSI**(**Very Large Scale Integration)integrated circuit (IC) chip.
* Microcontrollers are designed for embedded applications
* **Microcontroller used for**
* A microcontroller is a compressed microcomputer manufactured to control the functions of embedded systems in office machines, robots, home appliances, motor vehicles, and a number of other gadgets. A microcontroller comprises components like - memory, peripherals, and most importantly a processor.
* **Advantages of the microcontroller**
* Low time required for performing the operation. It is easy to use, and troubleshooting and system maintenance are straightforward. At an equivalent time, many tasks are often performed therefore the human effect is often saved. The processor chip is extremely small and adaptability occurs. The cost and size of the system are less. The microcontroller is straightforward to interface additional RAM, ROM, and I/O ports. Once the microcontroller is programmed then it can’t be reprogrammed. If the digital parts were not present it will look like a microcomputer.
* **Disadvantages of the microcontroller**
* It is generally utilized in micro equipment. It has a complex structure. The microcontroller cannot interface with a better power device directly. The number of executions is limited. As every Microcontroller does not have analog I/O so there are issues real. Microcontrollers are composed of complementary metal-oxide-semiconductor (CMOS) and can be damaged by a static charge.
* **How does the microcontroller work**
* A microcontroller is embedded inside of a system to control a singular function in a device. It does this by interpreting data it receives from its I/O peripherals using its central processor. The temporary information that the microcontroller receives is stored in its data memory, where the processor accesses it and uses instructions stored in its program memory to decipher and apply the incoming data. It then uses its I/O peripherals to communicate and enact the appropriate action.
* **Microprocessors**
* A microprocessor is a computer processor where the data processing logic and control are included on a single integrated circuit or a small number of integrated circuits
* The microprocessor contains the arithmetic, logic, and control circuitry required to perform the functions of a computer's central processing unit.
* A microprocessor is any type of miniature electronic device that contains the arithmetic, logic, and control circuitry necessary to perform the functions of a digital computer's central processing unit.
* **Microprocessor used for**
* The microprocessor is the central unit of a computer system that performs arithmetic and logic operations, which generally include adding, subtracting, transferring numbers from one area to another, and comparing two numbers. It's often known simply as a processor, a central processing unit, or as a logic chip.
* **Advantages of the microprocessor**
* The microprocessor is that these are general-purpose electronics processing devices which can be programmed to execute a number of tasks. Compact size. High speed. Low power consumption. It is portable. It is very reliable. Less heat generation. The microprocessor is very versatile. The microprocessor is its speed, which is measured in basically Hertz. For instance, a microprocessor with a measured speed 3 GHz, shortly GHz is capable of performing 3 billion tasks per second. The microprocessor is that it can quickly move data between the various memory location
* **Advantages of the microprocessor**
* The main disadvantages are it's overheating physically. It is only based on machine language. The overall cost is high. The large size of the PCB is required for assembling all components. The physical size of the product is big. Overall product design requires more time. A discrete component is used, but the system is not reliable. The most microprocessor does not support floating point operations. The processor has a limitation on the size of the data. This processor should not contact the other external devices. The microprocessor does not have any internal peripheral like ROM, RAM, and other I/O devices
* **How does the microprocessor work**
* A microprocessor accepts binary data as input, processes that data, and then provides output based on the instructions stored in the memory. The data is processed using the microprocessor's ALU (arithmetical and logical unit), control unit, and register array. The register array processes the data via a number of registers that act as temporary fast access memory locations. The flow of instructions and data through the system is managed by the control unit.