# **ADVI GROUP - INTERNSHIP**

# TASK-01(13-03-2025)

# Peripherals of Embedded Systems:

Peripherals in Embedded Systems are hardware components that enable communication with the external devices and also it take care of Data processing.

Types of Peripherals:

1.Input peripheral:-These peripherals take the data from the output and provide it to the embedded system.

-keypads and Touch screens.(user unput interfaces)

-sensors(Measure the physical parameters)

-IR receivers(used for remote controls)

2.Output of peripherals:-These peripherals helps to communicate results with others systems.

-Speakers(7-segment,LCD)

-Diplay(provide audio out)

-Motors(DC mtors-enable movement)

3.Communication Peripherals:-Exchange of Data takes place here.

-wired communications(UART,I2C,USB)

-wireless communicatons(Wifi,Bluetooth)

4.Memory peripherals:-This peripheral is used for storage and data processing purpose.

-Flash memory.( Non-volatile storage)

-EPROM(Stores small amounts of non-volatile data.)

-RAM(Temporary storage for processing)

Time and control peripherals(timers and counters)

Power management(manage power distribution and efficiency)

2.GPIO(General purpose input/output)

GPIO is one of the most widely used peripheral in Embedded systems.It has flexibility to configurable as both input and output.

-GPIO works as both input and output.

-GPIO can set the direction of pin,can write the output,it can also read from input,pull up (HIGH) and pull down (LOW) resistors.

Applications:-

Controlling LEDs,motors and buzzers.

Reading input from buttons,switches and sensors.

Interfacing with external modles like LCDs and keypads.

3.SENSORS

Sensors are devices that detect changes in the environment or any physical conditions and convert them into electrical signals that can be processed by the embedded system.

Here electrical signals can be analog or digital.

How Sensors works:

1.sensor detects physical changes and generate electrical signals.

2.Signals are filtered and amplified and converted to digital using ADC.

3.Data processing by using micro processors.

4.Based on the sensor data, the embedded system may control actuators.

EXAMPLES:

Temp sensors,proximity,pressure,pressure sensors.

4.ACTUATORS:

Actuators are devices that convert input electrical signals from an embedded system into physical movement or action.

-They help in carry out the operations like moving, lifting, rotating, or actuating other mechanical systems.

- Actuators may be classified depending on the type of motion or action.

1.Electric motors(convert electrical energy into rotation and linear motion.)

2. Solenoids(Convert electrical energy into linear motion using a magnetic field.)

TIMERS

Timers are used to measure time intervals, generate delays, and produce periodic signals.

Timers are classified into:

1. Delay Timer(Used to introduce precise time delays in firmware)

2. Watchdog Timer (WST- Reset the system if software hangs)

3. Real-Time Clock (RTC- Maintains the current time even during power loss)

COUNTERS

Counters are used to count external events like pulses from a sensor or a rotary encoder.

Types of Counters:

1. Event Counters:Count external signal edges (rising or falling)

2. Up Counters(Increment on each external event)

3. Down Counters(Decrement on each external event)

4. Up-Down Counters(Can increment or decrement based on control signals)