



SNS COLLEGE OF TECHNOLOGY

(An Autonomous Institution)

Coimbatore-35

sns
INSTITUTIONS

DEPARTMENT OF BIOMEDICAL ENGINEERING

19BMB303 & Fundamentals of Microprocessors and Microcontrollers

Unit IV MICROCONTROLLER BASED SYSTEM DESIGN

III Year/ VI Sem

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ASP / BME / SNSCT**



MICROCONTROLLER BASED SYSTEM DESIGN



- Introduction
- Matrix display Interface
- 16x2 LCD Interface
- High power devices
- Optical motor shaft encoder
- Stepper Motor
- DC Motor speed Control using PWM
- RTC
- EEPROM interface using I2C protocol



Microcontroller-Based System Design



Introduction:

- Microcontroller-based systems are the foundation of many embedded systems and electronic devices. These systems are designed to perform specific tasks by interacting with sensors, actuators, or other components.
- The design of a microcontroller-based system typically involves several stages, from initial planning to implementation.



Microcontroller-Based System Design



- **Microcontroller (MCU):** The heart of the system, which performs computations and controls other components. Popular microcontrollers include the **ARM Cortex, PIC, AVR, 8051**, and **ESP32**.
- **Power Supply:** Provides the required voltage and current to the MCU and other components. Often includes voltage regulators to ensure stable operation.
- **Input Devices:** These could be **sensors** (temperature, pressure, humidity), **keypads, switches, buttons**, etc., used to collect data or provide control inputs.
- **Output Devices:** Devices such as **LEDs, displays (LCD, OLED), motors, relays**, or **actuators** that respond based on the system's logic.



Microcontroller-Based System Design



- **Communication Interfaces:** These allow the MCU to communicate with other devices. Popular interfaces include **UART, SPI, I2C, CAN, Ethernet, and Wi-Fi.**
- **Memory:**
- **RAM:** Temporary data storage for running operations.
- **Flash/EEPROM:** Non-volatile memory for storing program code and configuration data.
- **Clock System:**
The clock controls the timing of operations. Typically involves an **oscillator** (crystal) to maintain system timing.