# Department of Electronics and Communication Central University of Rajasthan, Ajmer

Subject: MICROCONTROLLERS AND EMBEDDED SYSTEM LAB
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Experiment No. 1

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**Title:** Introduction to 8051 Development board.

**Material:** 8051 Development board, power adapter, programmer.

**Theory:**

**Introduction**:

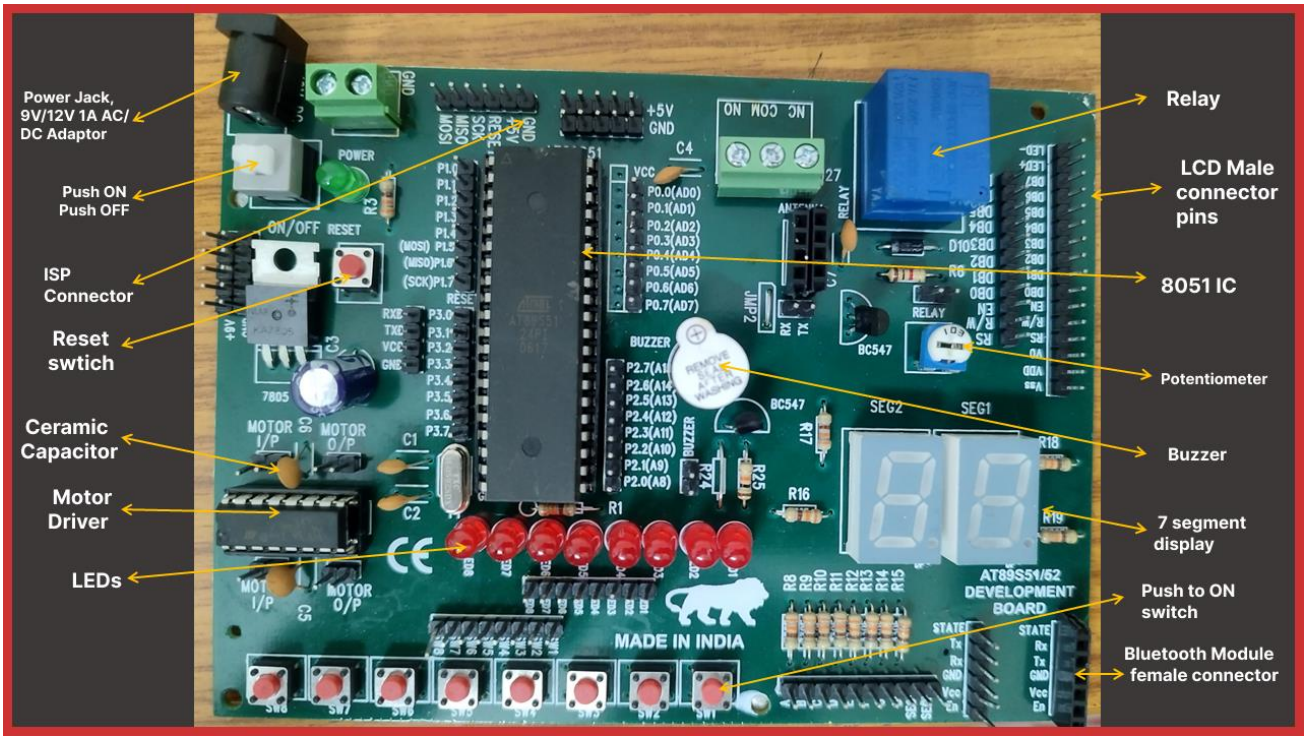
In 1981, Intel Corporation introduced an 8-bit microcontroller which was known as 8051. A development board for the 8051 microcontroller which provides essential components and features to facilitate the development and testing of applications based on the 8051 microcontrollers. The 8051-development board used in various embedded systems.

The main processing unit that executes the program instructions includes a CPU, RAM, ROM (or Flash memory), I/O ports, timers, and other peripherals. It uses to have 128 bytes of RAM, 4k bytes of on-chip RIM, two timers, one serial port, and 4 ports being 8-bits wide each, all on the chip. The 8051 microcontroller has several I/O ports that can be used to interface with external devices. LEDs, switches, and other peripherals are often connected to these ports for experimentation. These boards are useful for learning and experimenting with embedded systems programming using the 8051 microcontrollers.

The 8051 became most popular after the intel and other manufacture companies started to make 8051 . One of which was 8051, the original member of the 8051 family. Intel referred to it as MCS-51.The AT89S51/52 Development Board is a general-purpose, low-cost development board for Intel 8051-compatible family of 8-bit microcontroller AT89S51 manufactured by ATMEL.

The 8051development board is a valuable tool for both educational purposes and practical application, serving as a foundation for individuals to explore and master the intricacies of embedded systems development.

# HOW 8051 DEVELOPMENT BOARD LOOKS LIKE???




# DIFFERENT COMPONENTS OF 8051 DEVELOPMENT BOARD

1. Power Jack, 9V/12V 1A AC/DC Adaptor

2. Push ON Push OFF Switch

3. ISP Connector

4. Reset switch

5. Ceramic Capacitor

6. Motor Driver

7. LEDs

8. Relay

9. LCD Male connector pins

10. 8051 IC

11. Potentiometer

12. Buzzer

13. 7 segment display

14. Push to ON switch

15. Bluetooth Module female connector

16. BC547 Transistor

## Let us discuss each component in details.

**1. Power Jack, 9V/12V 1A AC/DC Adaptor:-** This type of connector used for the power supply .DC power can be set between 9 volts or 12 volts of direct current (DC) power which indicates the output voltage options provided by the power supply. . The power supply may absorb both alternating current (AC) input from wall outlets and convert it to direct current (DC) required by electronic devices. This power supply is designed to provide either 9V or 12V DC output with a maximum current of 1A.

**2. Push ON Push OFF Switch:-** It is a type of switch that has two stable states: one in which it is ON, and another in which it is OFF that's why it is known as "Push ON Push OFF" switch, or latching switch. These switches are frequently found in a variety of electronic devices and circuits where the user wants to control a device's power state with a single

**3. ISP Connector**:- An In-System Programming (ISP) connector also known as a programming header, is a connector used for programming and configuring microcontrollers. They are mounted on a circuit board. . A programming device, like a programmer, can be connected to the microcontroller via the ISP connector to program or debug it.

**4. Reset switch:-**It is a momentary switch used to restart or reset an electronic device. A reset switch, also known as a reset button. The reset switch is frequently used to fix unwanted faults, fix system issues, or restart a system under control. The microcontroller or other related components get a signal from the reset switch when it is pressed, starting a reset sequence.

**5. Ceramic Capacitor**:- A ceramic capacitor is a type of capacitor that uses a ceramic material as the dielectric (insulating material) between its metal plates.

**6. Motor Driver:-** An electronic device or circuit that regulates an electric motor's direction and movement is called a motor driver. It provides the electrical signals and power to the motor ,which allow it to operate in a controlled manner .It is used in different field such as automation, robotics, and electric cars.

**7. LEDs:-** Light Emitting Diode is a semiconductor device that emits light when an electric current is applied to it. An anode and a cathode are parts of the semiconductor materials that make up LEDs. Electrons in the semiconductor recombine with holes when a voltage is applied across the anode and cathode, releasing energy in the form of light**.**

**8. Relay:- -** An electromechanical device called a relay is used to regulate the amount of electrical current that flows across a circuit. It allows a low-power signal to control a high-power circuit, providing electrical isolation between the controlling and controlled circuits. Relays are widely used in various applications to control devices, automate processes, and interface between different voltage levels or types of circuits.

**9. LCD Male connector pins:-** The interface that enables you to attach an LCD (Liquid Crystal Display) module to the development board is known as the LCD connector on an 8051-development board. The connector usually consists of a set of headers or pins that fit the LCD module's pinout specifications. This connector serves as an electrical contact between the LCD for information display and the microcontroller on the 8051-development board**.**

**10. 8051 IC:-**It was originally developed by Intel in the late 1970s. One of the first and most well-known microcontrollers was the 8051, commonly referred to as the MCS-51. It is an 8-bit microcontroller, the data is also 8-bit. It can therefore process eight bits at once.

**11. Potentiometer:-** The term "pot" is often used as an abbreviation for a "potentiometer." A potentiometer is a type of variable resistor that has three terminals and a sliding or rotating contact that forms an adjustable voltage divider. It is frequently used to supply an analog input to a microcontroller so that position-based variable voltage measurements are possible.

**12. Buzzer:-** A buzzer is an electronic device that produces sound, typically a buzzing or beeping sound, when an electrical signal is applied. To control sound generation using programmed logic, a buzzer on an 8051-development board is interfaced by attaching it to one of the microcontroller's digital output pins.

**13. 7 segment display**:- A 7-segment display is a type of electronic display device used to represent decimal numerals. It consists of seven individually illuminated segments arranged in the shape of the digit "8." Each segment can be selectively turned on or off to display the numbers 0 through 9, as well as some alphabets and other characters.

**14. Push to ON switch:-** A "push-to-on" switch is a type of momentary switch that activates (or turns on) an electrical circuit only while it is physically pressed or pushed. . When you let go of the button, the switch goes back to being in the off position. These switches are used when temporary connection is required.

**15. Bluetooth Module female connector**:- A "Bluetooth Module female connector" typically refers to the physical connector on a Bluetooth module that is designed to interface with other devices or components using Bluetooth technology. Bluetooth modules normally exchange data via serial transmission (UART). The UART pins present on the 8051-development board are- STATE, Rx, Tx, GND, Vcc and En.

**16. BC547 Transistor-** A popular general-purpose NPN bipolar junction transistor (BJT) for switching and amplification in electrical circuits is the BC547. As one among several transistors, the BC547 is particularly well-known for having high gain and low noise.

## WHAT IS THE APPLICATION OF 8051 DEVELOPMENT BOARD ??

1. Embedded System Prototyping
2. To learn Microcontroller Programming.
3. For IoT based Projects.
4. Home automation
5. Alarm and Security Systems
6. Educational Purposes
7. Traffic Light Control Systems
8. Data Acquisition Systems

## CONCLUSION

In conclusion, the 8051development board serves as a valuable and versatile platform for learning, prototyping, and developing embedded systems. The 8051development board is a valuable tool for both educational purposes and practical application, serving as a foundation for individuals to explore and master the intricacies of embedded systems development.

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