**Task 1: Setting Up Development Environment, Study Datasheet and Schematics of The Development Board.**

The following questions about STC89C52 microcontroller

1. **What is the size of the RAM and flash.**

**ANSWER:**

**RAM (Random Access Memory):** The STC89C52 typically has 256 bytes of RAM.

**ROM (Read Only Memory):** The ROM size of the STC89C52 is 8 kilobytes (KB).

**Flash Memory:** The STC89C52 often comes with 8 kilobytes (KB) of Flash memory. The Flash memory is programmable and used for storing user code.

1. **How many IO pins are available**

**ANSWER:**

The STC89C52 microcontroller has a total of 32 I/O pins.

* P0 Port: - (P0.0 to P0.7)
* P1 Port: - (P1.0 to P1.7)
* P2 Port: - (P2.0 to P2.7)
* P3 Port: - (P3.0 to P3.7)
* **General Purpose Input (GPIO):** GPIO pins read external signals, essential for interfacing with sensors.
* **General-Purpose Output (GPIO):** Output pins transmit signals, controlling devices like LEDs.
* **Configurability:** Dynamic pin settings enable adaptability in response to application needs.
* **Example Scenario:** Configurability illustrated through button and LED interaction.

1. **What peripherals are available e.g. serial, ADC etc.**

**ANSWER:**

**1. GPIO (General Purpose Input/Output**): Configurable pins for interfacing with external devices, allowing the microcontroller to handle both input and output tasks.

**2. UART (Universal Asynchronous Receiver/Transmitter):** Facilitates serial communication, enabling the microcontroller to exchange data with other devices or systems.

**3. Timer/Counters:** Multiple timers/counters (Timer 0, Timer 1, Timer 2) for tasks such as generating delays, pulse width modulation (PWM), and interval timing.

**4. ADC (Analog-to-Digital Converter):** An 8-channel, 10-bit ADC for converting analog signals into digital values, essential for interfacing with analog sensors.

**5. SPI (Serial Peripheral Interface**): Supports the SPI communication protocol, allowing synchronous serial communication with other devices.

**6. I2C (Inter-Integrated Circuit):** Supports the I2C protocol, enabling two-wire serial communication with other devices.

**7. External Interrupts**: External interrupt pins enable the microcontroller to respond to external events, enhancing its responsiveness to triggers.

**8. On-Chip Flash Memory:** Non-volatile flash memory for storing program code, ensuring program persistence even when the power is turned off.

**9. On-Chip RAM (Random Access Memory):** On-chip RAM for temporary data storage during program execution, facilitating efficient data handling.

**10. Watchdog Timer:** A timer that resets the system in case of software or hardware failures, improving the overall reliability of the microcontroller.

1. **What is meant by IAP**

**ANSWER:**

1. **Architecture:** STC89C52 is based on the 8051 architectures, which is a widely used and versatile microcontroller architecture.
2. **CPU:** It operates at a maximum frequency of 11.0592 MHz and has a powerful 8-bit CPU.
3. **Memory:** It typically comes with 8KB of Flash memory for program storage, 256 bytes of RAM for data storage, and 64 bytes of EEPROM (Electrically Erasable Programmable Read-Only Memory).
4. **Peripherals:** STC89C52 includes various peripherals such as timers, counters, UART (Universal Asynchronous Receiver/Transmitter), GPIO (General Purpose Input/Output) ports, and more.
5. **I/O Ports:** The microcontroller has four I/O ports (P0, P1, P2, P3), each of which can be configured as input or output.
6. **Interrupts:** It supports both external and internal interrupts, which can be programmed to respond to specific events.
7. **Clock Circuit:** STC89C52 includes an on-chip oscillator and supports an external crystal for accurate clock generation.

**Regarding IAP (In-Application Programming):**

IAP refers to the capability of a microcontroller to reprogram its own Flash memory while the application program is running. In other words, it allows the microcontroller to update its firmware without requiring external programming tools. The process typically involves special programming commands or routines that are executed by the microcontroller itself.

**Advantages Of IAP Include:**

1. **Flexibility:** Allows for firmware updates without the need for external programming equipment.
2. **Cost-Effective:** Eliminates the need for a separate programming interface, reducing overall system cost.
3. **Convenience:** Simplifies the firmware update process, especially in systems that may be difficult to access physically.

1. **How many timers are available**

**ANSWER: -**

The STC89C52 microcontroller typically features three timers: Timer 0, Timer 1, and Timer 2

1. Timer 0: 16-bit timer with two 8-bit auto-reload registers.
2. Timer 1: 16-bit timer with two 8-bit auto-reload registers.
3. Timer 2: 8-bit timer with a single 8-bit auto-reload register.

That can be used for tasks like generating delays and measuring time intervals in embedded systems. Refer to the datasheet for precise specifications.

1. **How many sources of interrupt are there**

**ANSWER:**

The STC89C52 microcontroller has two external interrupt sources: INT0 and INT1.

* **INT0 (External Interrupt 0):**
* This is associated with pin INT0 (P3.2) on the microcontroller.
* It can be configured to trigger an interrupt when a falling edge, rising edge, or both occur on the external pin.
* **INT1 (External Interrupt 1):**
* This is associated with pin INT1 (P3.3) on the microcontroller.
* Similar to INT0, INT1 can be configured to trigger an interrupt on falling edges, rising edges, or both on the external pin.

1. **Maximum clock frequency supported**

**ANSWER:**

**STC89C52:** 8-bit microcontroller by STC, with 33 MHz max clock frequency. Ideal for embedded systems**.**

1. **Architecture:** The STC89C52 is based on the MCS-51 architecture, which is an 8-bit microcontroller architecture developed by Intel in the 1980s.
2. **Clock Frequency:** The maximum clock frequency supported by the STC89C52 is typically 33 MHz This means that the microcontroller can execute up to 33 million machine cycles per second. However, it is essential to refer to the specific datasheet for accurate and detailed information.
3. **Memory:** The STC89C52 comes with on-chip flash memory for program storage, typically ranging from 2 KB to 64 KB. It also has on-chip RAM (Random Access Memory) for temporary data storage.
4. **I/O Ports:** The microcontroller features a number of I/O (Input/Output) pins, which can be configured to interact with external devices and sensors.
5. **Peripherals:** The STC89C52 supports various peripherals such as timers/counters, UART (Universal Asynchronous Receiver-Transmitter), and interrupt controllers, enhancing its capabilities for diverse applications.
6. **Operating Voltage:** The operating voltage of the STC89C52 is commonly in the range of 4.0V to 5.5V.
7. **Development Tools:** STC provides a variety of development tools, including an integrated development environment (IDE) for programming and debugging, allowing developers to write code and interface with the microcontroller efficiently.
8. **Programming Language:** The STC89C52 microcontroller can be programmed using assembly language or higher-level languages such as C.
9. **Applications:** Due to its features and versatility, the STC89C52 is employed in a range of applications, including industrial control systems, home automation, robotics, and various embedded systems.