INTERVIEW QUESTIONNAIRE

Embedded Systems (10 Questions)

1. What is the primary function of the main() function in an STM32 program?

- a) Initialize the hardware
- b) Serve as the entry point of the program
- c) Control the GPIO pins
- d) Perform interrupt handling
- *Explanation:* The main() function is the program's entry point in embedded C, where the application logic and hardware initialization typically begin.

2. Which communication protocol is typically used for connecting sensors to STM32 microcontrollers?

- a) UART
- b) SPI
- c) I2C
- d) All of the above
- *Explanation:* UART, SPI, and I2C are all communication protocols used to interface STM32 with sensors, each suited to different use cases.

3. What does an IDE (Integrated Development Environment) provide for embedded development?

- a) Debugging tools
- b) Code editor
- c) Compiler
- d) All of the above
- *Explanation:* IDEs like STM32CubeIDE provide all these tools to streamline embedded software development.

4. Which peripheral on the STM32 is responsible for real-time clock functionality?

- a) Timer
- b) GPIO
- c) ADC
- d) RTC
- *Explanation:* The RTC (Real-Time Clock) is dedicated to keeping time, even when the main processor is powered down.

5. In a Cortex-M4 processor, what is the purpose of the NVIC?

- a) Manage interrupts
- b) Handle memory allocation

- c) Process floating-point operations
- d) Control power consumption
- *Explanation:* The NVIC (Nested Vector Interrupt Controller) manages interrupts in ARM Cortex-M processors.

6. What is the default clock speed of most STM32 microcontrollers?

- a) 16 MHz
- b) 32 MHz
- c) 72 MHz
- d) Depends on the STM32 variant
- *Explanation:* The clock speed varies by model. For example, the STM32F1 series runs at 72 MHz.

7. What is the purpose of a GPIO pin in microcontrollers?

- a) Communicate with sensors
- b) Serve as input/output for digital signals
- c) Trigger interrupts
- d) All of the above
- *Explanation:* GPIO pins are versatile and used for multiple functions in embedded systems.

8. What does DMA (Direct Memory Access) in STM32 microcontrollers enable?

- a) Faster ADC conversions
- b) Direct data transfer without CPU involvement
- c) Enhanced GPIO control
- d) Real-time debugging
- *Explanation:* DMA enables peripherals to directly access memory, reducing CPU load.

9. What is the primary use of an ADC in embedded systems?

- a) Convert analog signals to digital
- b) Generate analog waveforms
- c) Measure frequency
- d) Control PWM signals
- *Explanation:* ADC (Analog-to-Digital Converter) converts physical signals like voltage into digital data.

10. Which STM32 tool assists in configuring microcontroller peripherals?

- a) STM32CubeMX
- b) Keil uVision
- c) TouchGFX
- d) Atollic TrueSTUDIO
- *Explanation:* STM32CubeMX is a graphical tool for configuring peripherals and generating initialization code.

GUI Development (8 Questions)

11. Which library is commonly used for GUI development on STM32?

- a) LTDC
- b) HAL
- c) FreeRTOS
- d) TouchGFX
- *Explanation:* TouchGFX is an STM32-specific library for GUI development.

12. What is the refresh rate of an LCD typically measured in?

- a) Hz
- b) Volts
- c) Frames per second
- d) Amps
- *Explanation:* The refresh rate measures how often the screen updates per second, in Hz.

13. What is the main purpose of a GUI in embedded systems?

- a) Enhance data transfer speed
- b) Display data and allow user interaction
- c) Optimize memory usage
- d) Manage interrupts
- *Explanation:* GUIs allow users to visualize data and interact with the system.

14. What is the function of the LTDC in STM32?

- a) Manage low-power modes
- b) Control display interfaces
- c) Read external memory
- d) Generate interrupts
- *Explanation:* LTDC (LCD-TFT Display Controller) handles display-related tasks in STM32.

15. What does the term “real-time rendering” mean in GUI development?

- a) Processing frames as they are displayed
- b) Delayed screen updates
- c) Rendering pre-designed animations
- d) Static image generation
- *Explanation:* Real-time rendering processes data dynamically for immediate display.

16. What unit measures screen resolution?

- a) Pixels per inch (PPI)
- b) Hertz (Hz)
- c) Bits per second (bps)

- d) Cycles per second
- *Explanation:* Screen resolution is measured in pixels per inch.

17. What is the advantage of using a frame buffer in GUI systems?

- a) Reduces power consumption
- b) Stores graphical data for smooth rendering
- c) Eliminates the need for a GPU
- d) Increases data transfer speed
- *Explanation:* Frame buffers store images to provide smooth screen updates.

18. What does "color depth" refer to in an LCD screen?

- a) The brightness level
- b) The number of colors the display can show
- c) The pixel resolution
- d) The refresh rate
- *Explanation:* Color depth indicates the number of distinct colors a display can render.

PCB Design (7 Questions)

19. What is the first step in designing a PCB?

- a) Placing components
- b) Schematic design
- c) Routing traces
- d) Designing the enclosure
- *Explanation:* Schematic design is the foundational step for PCB design.

20. Which layer is used to carry high-frequency signals on a multi-layer PCB?

- a) Power layer
- b) Ground layer
- c) Signal layer
- d) Component layer
- *Explanation:* Signal layers are used for high-frequency signals to avoid interference.

21. What is the purpose of a via in PCB design?

- a) Connects components
- b) Transfers signals between layers
- c) Reduces power consumption
- d) Simplifies soldering
- *Explanation:* Vias electrically connect different PCB layers.

22. Which tool in Altium Designer helps check for design errors?

- a) Design Rule Check (DRC)

- b) Netlist Analyzer
- c) Layer Stack Manager
- d) BOM Generator
- *Explanation:* DRC identifies potential errors during PCB design.

23. What does “ground plane” refer to in PCB design?

- a) A reference point for signals
- b) A heat dissipation layer
- c) A surface for placing components
- d) A power supply layer
- *Explanation:* Ground planes provide a common reference voltage.

24. What is the importance of trace width in PCB design?

- a) Affects signal strength
- b) Determines current-carrying capacity
- c) Impacts thermal dissipation
- d) All of the above
- *Explanation:* Trace width influences current flow, thermal dissipation, and signal integrity.

25. What does “impedance matching” mean in PCB design?

- a) Ensuring resistance matches power supply
- b) Matching signal path impedance to the source
- c) Matching capacitor values
- d) Aligning signal traces
- *Explanation:* Impedance matching ensures minimal signal reflection in high-speed designs.

Answers Embedded Systems (10 Questions)

1. What is the primary function of the main() function in an STM32 program?

- Correct Answer: b) Serve as the entry point of the program

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- Correct Answer: d) All of the above

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