Embedded System Configuration Template (STM32F767ZI)

1. ADXL345 Configuration

Parameter	Value/Details
Interface	ISPI
SPI Peripheral	SPI1
SPI Speed	3.3 Mbps
Accelerometer ODR	3200 Hz (Max ADXL345 ODR)
Measurement Range	±16g
Resolution Mode	Full Resolution
INT Pins	Not Used
Address (if I2C)	SPI used
Sampling Method	Timer based Interrupt

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2. Timing Structure

Cycle Name	Duration	Timer Used	Trigger Target(s)
----------	3.2KHz(313us)	TIM3	ADXL Sampling
Micro cycle	0.5 ms	TIM2	PWM Update to Tim8

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3. PWM Configuration (Sine Wave Generator)

Parameter	Value/Details
Timer	TIM8
PWM Output Pin	PC8 (TIM8_CH3)
PWM Frequency	10 kHz
PWM Update Rate	0.5 ms
Duty Cycle Table Size	100 samples (for 100 Hz sine wave)
PWM Mode	PWM1 with preload
Update Mechanism	Interrupt

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4. ADC Configuration

Parameter	Value/Details
ADC Peripheral	ADC1
Channel Used	ADC1_IN0 (e.g., PA0)
Trigger Source	TIM4 TRGO
Sampling Frequency	500 Hz (2ms interval)
Sampling Resolution	12-bit
DMA Mode	Enabled / Manual Restart
Buffer Size	250 samples (for 500 ms @ 2ms)
Sampling Mode	Single Conversion
ADC Input Source	RC-filtered PWM output

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5. RC Filter for PWM → ADC

Parameter	Value
Resistor (R)	10 kΩ
Capacitor (C)	1 µF
Cutoff Frequency	~100 Hz
Output Voltage Range	0–3.3V (matching ADC range)

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6. FreeRTOS Task Configuration

Task Name	Priority	Period	Function
ADC_Task	Medium	Every 2ms	Sample and store ADC value
Ethernet_Task	Low	Every 500ms	Send data buffer over TCP/IP

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7. Ethernet (LWIP / TCP/IP) (Only standalone TCP connection was established)

Parameter	Value
Ethernet Interface	LAN8742 / RMII
Stack Used	LWIP with FreeRTOS integration
Mode	Static IP / DHCP
IP Address	e.g., 192.168.1.10
Ping Response	Yes / No
Data Transmission	TCP Client / Server / UDP
Transmission Rate	Every 500ms (Major Cycle)