# STM32WL Sensor Node – System Overview

* STM32WL55 MCU with integrated LoRa transceiver
* BME280 sensor for temperature, humidity, and pressure
* MPU-6050 6-axis IMU for motion and vibration detection
* External SMA and header input for analog sensors (e.g., microphone, turbidity, gas sensors)
* Low-noise Analog Front-End with biasing and ESD protection
* π-filter on power input for high-frequency noise attenuation (~500 kHz cutoff)
* 3rd-order Butterworth anti-aliasing filter (~25 kHz cutoff) for ADC input
* Pseudo-differential ADC drive with reference bias for common-mode rejection
* Power Architecture:
* - SMPS (TLV62569) for digital supply
* - LDO (LD3985M33R) for analog and RF circuits
* 868 MHz LoRa output stage with L-match, notch, and π-filter harmonic suppression
* Breakout headers for UART (TX/RX), I²C, SPI, SWD, and analog inputs