

Strain Gauge/Load Cell

Strain gauges are introduced as essential components for measuring mass or force electrically; they consist of a flexible plastic with a zig-zag resistance wire pattern. The principle behind strain gauges involves changes in resistance due to stretching or compressing, which correlates with the applied force. To accurately measure small forces, a Wheatstone bridge circuit is utilized to convert resistance changes into measurable voltage differences.

Temperature sensitivity of strain gauges can affect measurements; thus, using multiple gauges (half or full bridge configurations) helps mitigate this issue. Adjustments can be made using ten-turn trimmers after assembling the circuit to ensure accurate readings from the microcontroller's ADC. For easier setups, load cells are recommended as they come pre-configured with Wheatstone bridges and require minimal connections for operation. The HX711 breakout board offers a simple solution by integrating an amplifier and high-resolution ADC for precise weight measurements without complex circuitry.