

## Component Specifications

This document provides detailed specifications for each component used in the Wearable Fall Detection System.

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### 1. Arduino Nano

- **Microcontroller:** ATmega328P
- **Operating Voltage:** 5 V
- **Input Voltage (recommended):** 7–12 V
- **Input Voltage (limit):** 6–20 V
- **Digital I/O Pins:** 14 (of which 6 provide PWM output)
- **Analog Input Pins:** 8
- **DC Current per I/O Pin:** 40 mA
- **Flash Memory:** 32 KB (ATmega328P) of which 2 KB used by bootloader
- **SRAM:** 2 KB (ATmega328P)
- **EEPROM:** 1 KB (ATmega328P)
- **Clock Speed:** 16 MHz
- **Dimensions:** 45 × 18 mm
- **Weight:** ~7 g

#### Notes:

- Bootloader: Arduino UNO bootloader
  - USB Interface: USB mini-B connector
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### 2. MPU-6050 (Accelerometer + Gyroscope)

- **Axes:** 3-axis gyroscope, 3-axis accelerometer
- **Gyro Range:** ±250, ±500, ±1000, ±2000 °/s
- **Accel Range:** ±2, ±4, ±8, ±16 g
- **I<sup>2</sup>C Interface:** 400 kHz maximum
- **Operating Voltage:** 2.3 – 3.4 V

- **Power Consumption:** 3.9 mA (normal mode)
- **Dimensions:** 20 × 15 × 2 mm (module board)
- **Weight:** ~1.5 g
- **Features:**
  - 16 bit ADC for each channel
  - Digital Motion Processor (DMP)
  - Temperature sensor

#### **Pin Mapping (module):**

<b>Pin</b>	<b>Function Description</b>
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VCC	VCC	3.3 V supply
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GND	GND	Ground
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SCL	SCL	I <sup>2</sup> C clock (A5)
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SDA	SDA	I <sup>2</sup> C data (A4)
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INT	INT	Interrupt output
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AD0	AD0	I <sup>2</sup> C address select
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### **3. Piezo Buzzer**

- **Type:** Active piezo buzzer (built-in oscillator)
- **Operating Voltage:** 3 – 12 V
- **Rated Voltage:** 5 V
- **Sound Level:** ~85 dB @ 10 cm
- **Resonant Frequency:** 2 300 ± 300 Hz
- **Current Draw:** ~10–15 mA @ 5 V
- **Dimensions:** 12 × 9.5 mm (casing)

#### **Wiring:**

- + (Red wire) → Digital pin D3
- – (Black wire) → GND

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## 4. 18650 Li-ion Battery & TP4056 Charger Module

### 18650 Li-ion Battery

- **Chemistry:** Lithium-ion
- **Nominal Voltage:** 3.7 V
- **Fully Charged Voltage:** 4.2 V
- **Capacity:** 2 600 mAh
- **Max Discharge Current:** 5 A
- **Dimensions:** 65 × 18 mm
- **Weight:** ~45 g

### TP4056 Charger Module

- **Input Voltage:** 4.0–8.0 V (USB 5 V typical)
  - **Charge Current:** adjustable up to 1 A via onboard resistor (default 1 A)
  - **Charging Indicator:** Two LEDs (Charging / Fully Charged)
  - **Protection:** Overcharge, over-discharge (if module includes DW01/FD01)
  - **Dimensions:** 25 × 19 × 3 mm
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## 5. Breadboard & Jumper Wires

- **Breadboard:** 830 tie-points, 2 power rails on each side
  - **Jumper Wires:** 20 male-to-male, 20 male-to-female, 20 female-to-female
  - **Wire Gauge:** 22 AWG (solid core)
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## 6. USB Cable

- **Type:** USB A to USB Mini-B
  - **Length:** 1 m
  - **Data Transfer:** USB 2.0
  - **Power Rating:** 5 V, up to 500 mA
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 **Packaging & Wearable Enclosure**

- **Enclosure Type:** 3D-printed ABS plastic or laser-cut acrylic
  - **Dimensions:** ~60 × 30 × 20 mm
  - **Mounting:** Velcro strap, silicone band
  - **Weight (fully assembled):** ~120 g
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