For a beginner-friendly vibration sensor project, the Grove - Vibration Sensor (SW-420) is a good choice due to its simple wiring and adjustable sensitivity, making it easy to integrate with platforms like Arduino or Raspberry Pi. Another option is the Spring Vibration Sensor, which is a basic, easily constructed sensor using a spring and a switch, ideal for simple projects. Both offer good sensitivity at low frequencies and can be readily used for detecting vibrations or tilts.

- **Vibration Sensor (SW-420):**
- Pros: Easy to use, adjustable sensitivity, non-directional, and waterproof.
- Cons: May not be as precise or versatile as other sensor types.
- How it works: When vibration or tilt occurs, a circuit is briefly disconnected, and the sensor output goes low.
- Ideal for: Basic vibration detection, tilt sensing, or simple projects.
  A vibration sensor detects mechanical vibrations or movements in its environment. One of the easiest and most cost-effective vibration sensors to use in student or hobby projects is the SW-420 Vibration Sensor Module. It's ideal for basic motion, knock, or shake detection.

SW-420 Vibration Sensor Module

🧠 How It Works

- The **SW-420** contains a spring-type vibration switch.
- When the sensor is at rest (no vibration), the spring and contact are not touching, so the circuit remains open.
- When vibration occurs, the spring touches the contact, briefly closing the circuit and sending a signal.
- The onboard **LM393 comparator** reads this mechanical signal and provides a **digital output (DO)**.
- Sensitivity can be adjusted using the onboard **potentiometer** (knob).

📦 Module Components

Component	Purpose
SW-420 Sensor	Detects vibration via spring mechanism
LM393 Comparator	Converts analog variation to digital output

Component	Purpose
Potentiometer	Adjusts sensitivity threshold
Status LED	Lights up when vibration is detected
DO (Digital Out)	Output pin (HIGH or LOW signal)
VCC, GND	Power pins (3.3V–5V)

⚙️ Electrical Characteristics

Parameter	Value
Operating Voltage	3.3V – 5V
Output Type	Digital (0 or 1)
Current Draw	< 5 mA (typically)
Logic Level	0V (LOW) = vibration detected 5V (HIGH) = no vibration

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🔌 Hardware Setup (with STM32)

SW-420 Pin	Connect To (STM32)
VCC	3.3V or 5V
GND	GND
DO	GPIO Input (e.g., PA0)

💡 Example Use Cases

- Burglar/intruder alarms
- Earthquake or shock detection
- Vibration-triggered lighting
- Vibration monitoring for machines