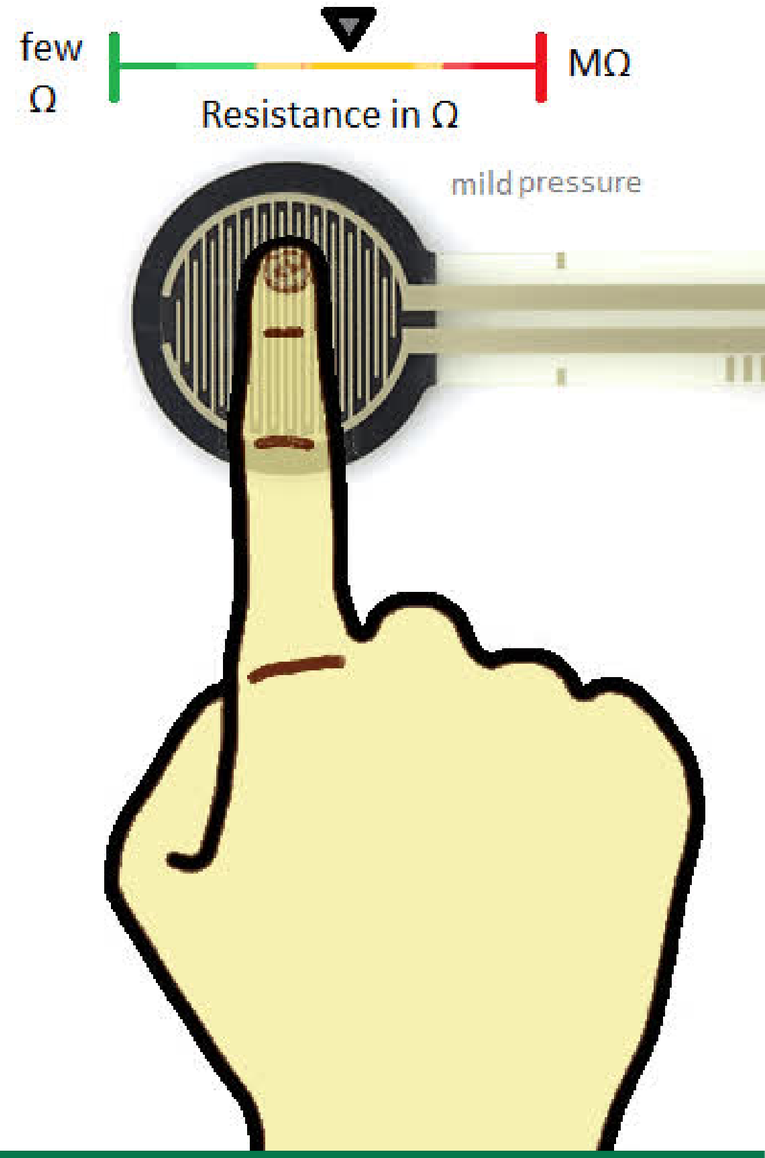
UNIVERSIDAD
NACIONAL
DE COLOMBIA

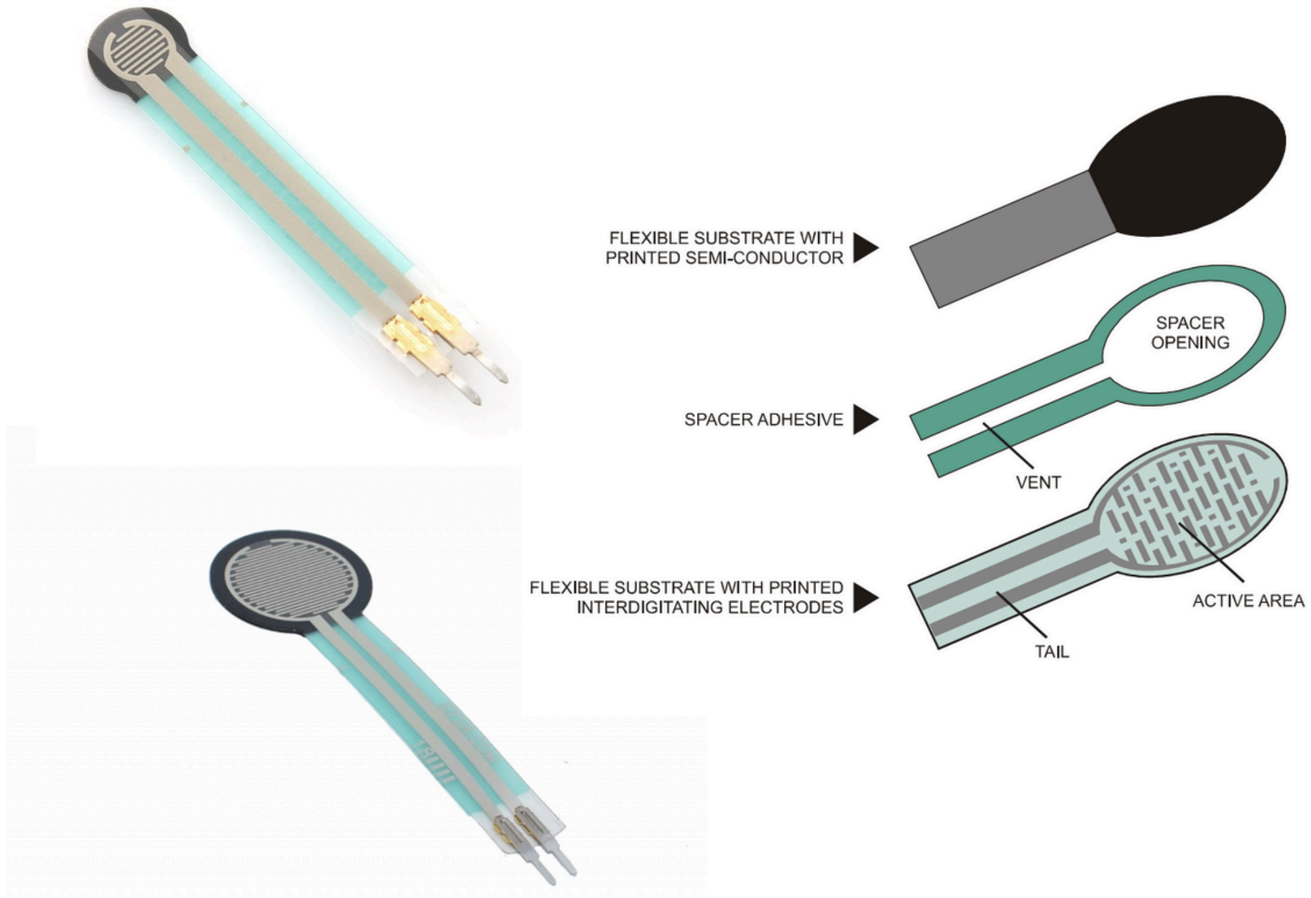
FSR Sensor

Sensores y Actuadores | 2025-I

Facultad de Ingeniería - Departamento de Ingeniería Mecánica y Mecatrónica



FSR (Force-sensing resistor)



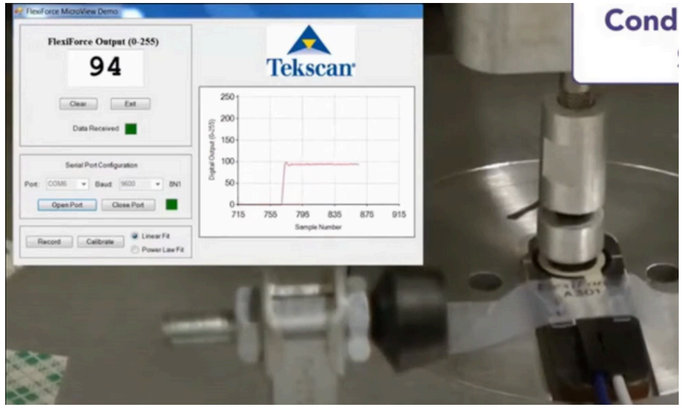
- FSR = polymer force sensor: resistance ↓ when force ↑.
- Two-wire polymer thick-film device (thin, flexible).
- Active area proportional to the geometry of the FSR.
- Behavior: non-linear inverse power law ($R \propto 1/F^k$ roughly).

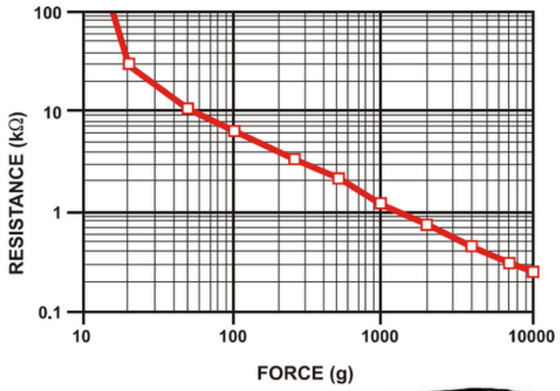
History of FSRs

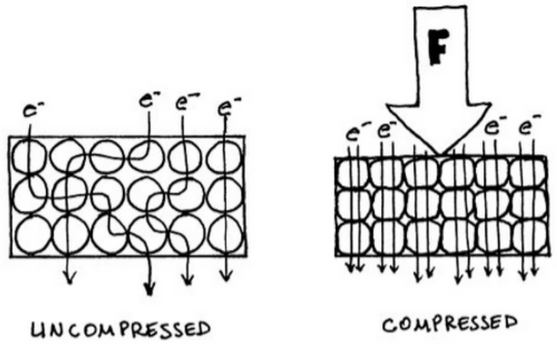
Evolution from Music to Industry

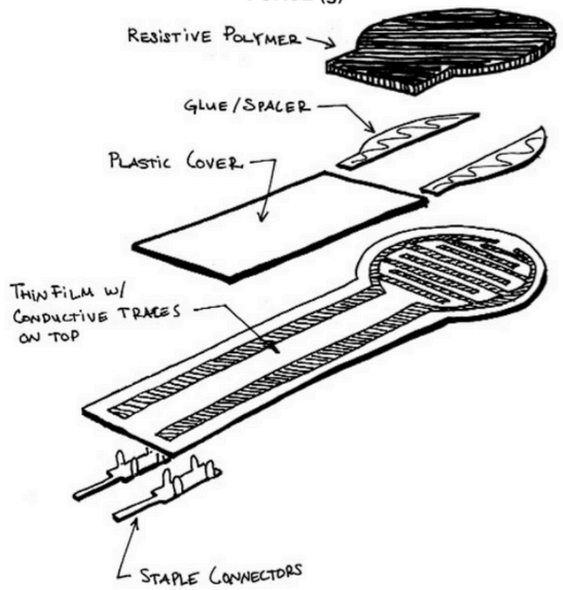
- Invented by Franklin Eventoff in 1977; Interlink Electronics commercialized FSRs starting 1985.
- First used in electronic musical controllers, then expanded to touch/force sensing.
- Interlink’s FSR 400-series was the original family.
- Tekscan later developed similar “FlexiForce” FSR sensors (1990s onward).

FSR (Force-sensing resistor)





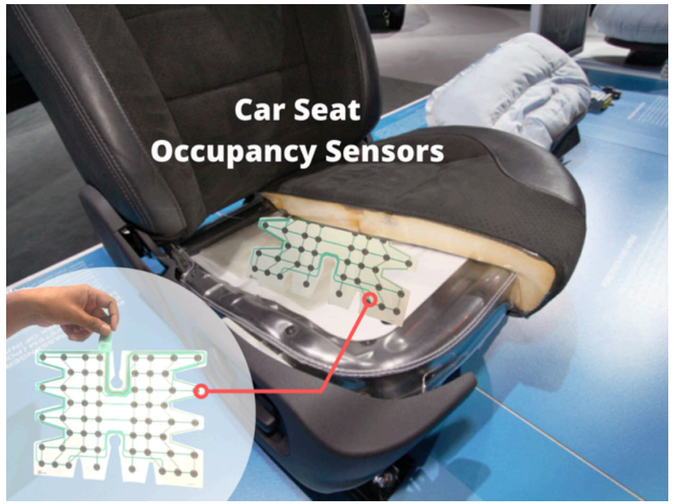


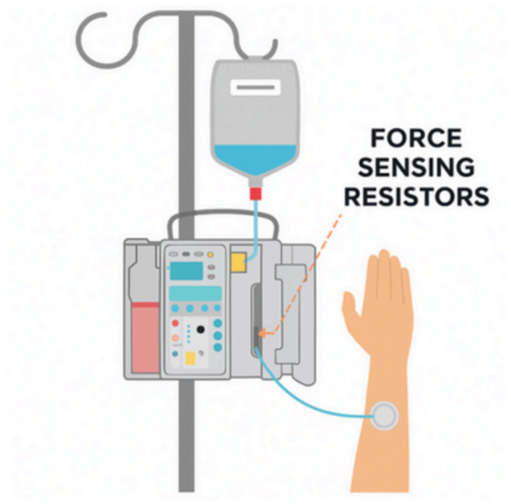


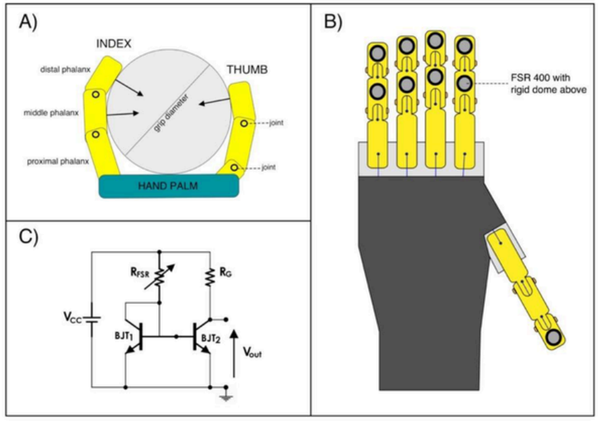
- Construction: two layered membranes (electrode traces + conductive ink) with spacer.
- No force = open circuit; pressing connects ink to electrodes ⇒ current flows.
- More force → more contact area → lower resistance (predictable drop).
- Ultra-thin ~0.45 mm; rating ~10M actuations
- Need electronic configurations to impruve its no-linear behavior

Industrial Application and Integration

Use in automation/PLC systems; Communication







- Automotive: seat sensors, pedals, touch controls.
- Medical: patient monitoring, pump occlusion detection, interface buttons.
- Robotics/Automation: gripper force sensors, safety interlocks, centroid measurement.
- Consumer electronics: pressure-sensitive buttons/drum pads, gaming controllers, etc

Major Brands

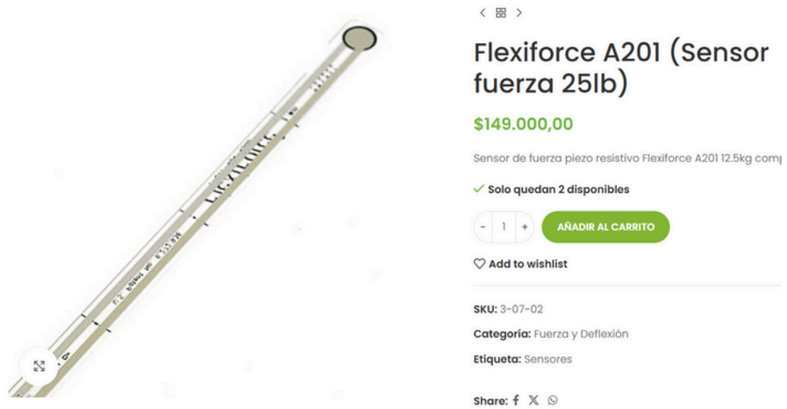
Industry leaders in AC servos

- Interlink Electronics: original FSRs (FSR 400 series: models 400, 402, 404, 406).
- Tekscan (FlexiForce): makes ultra-thin force-sensing resistors (A201, A301, etc.).
- Ohmite: “FSR series” force sensors (polymer thick-film).
- Other: Sensitronics (FSR pioneer), Spectra Symbol (flex sensors), hobbyists (SparkFun, Adafruit).

Pricing

Approximate cost ranges in USD and COP

- Interlink 402: ~$8-9 USD each
- In COP: ~$33,000 COPexchange-rates.org.
- Retail price: SparkFun sells 0.5″ FSR at ~$10.95 (≈44,000 COP).
- Tekscan FlexiForce: ~$35–37 USD (≈150,000 COP) each.
- Bulk discounts (e.g. 5–100 qty) lower per-unit cost.



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Gracias

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