USES 2
Uses of UltraSonic Embedded Sensors

Université Gustave Eiffel

cea

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Embedded self-powered sensor devices for passive monitoring composite components

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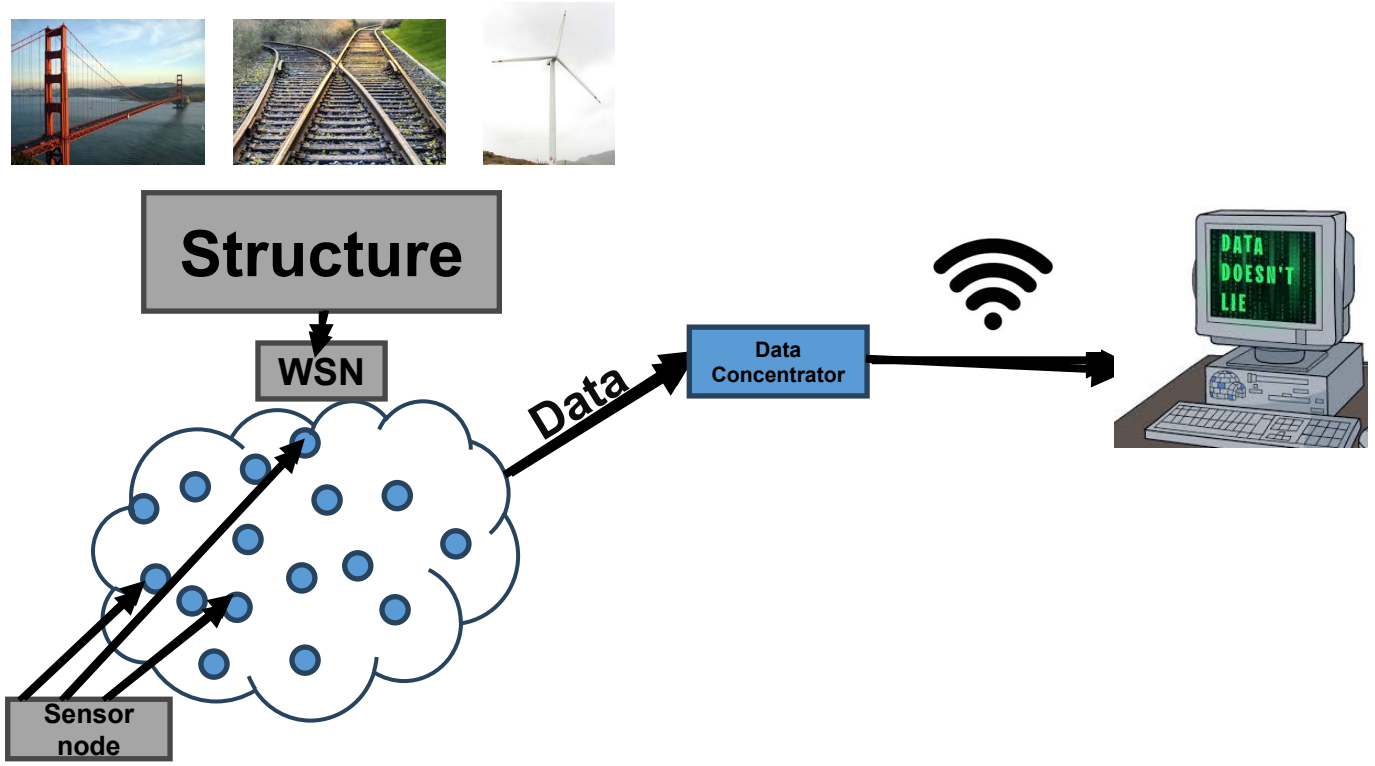
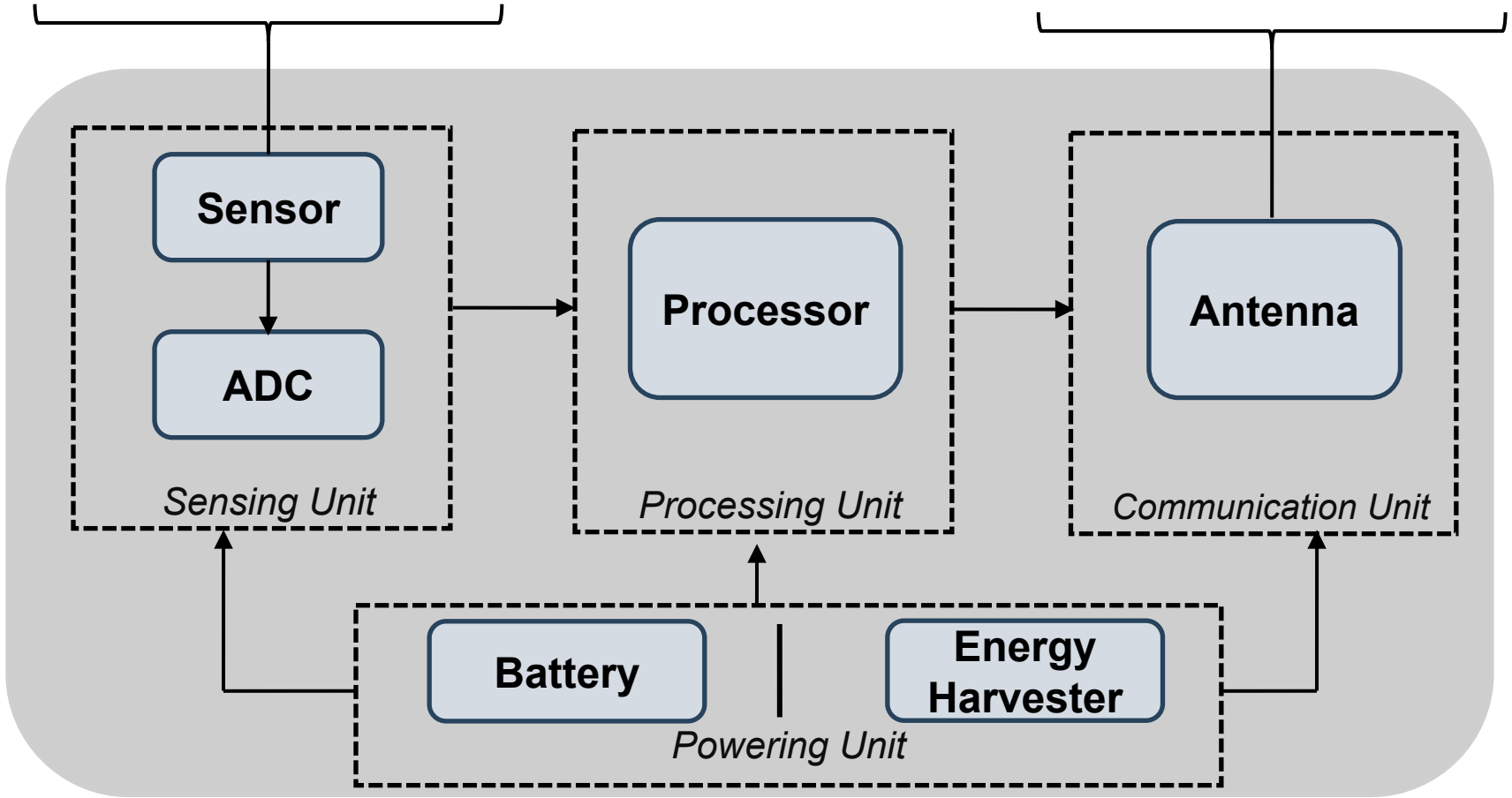
Introduction



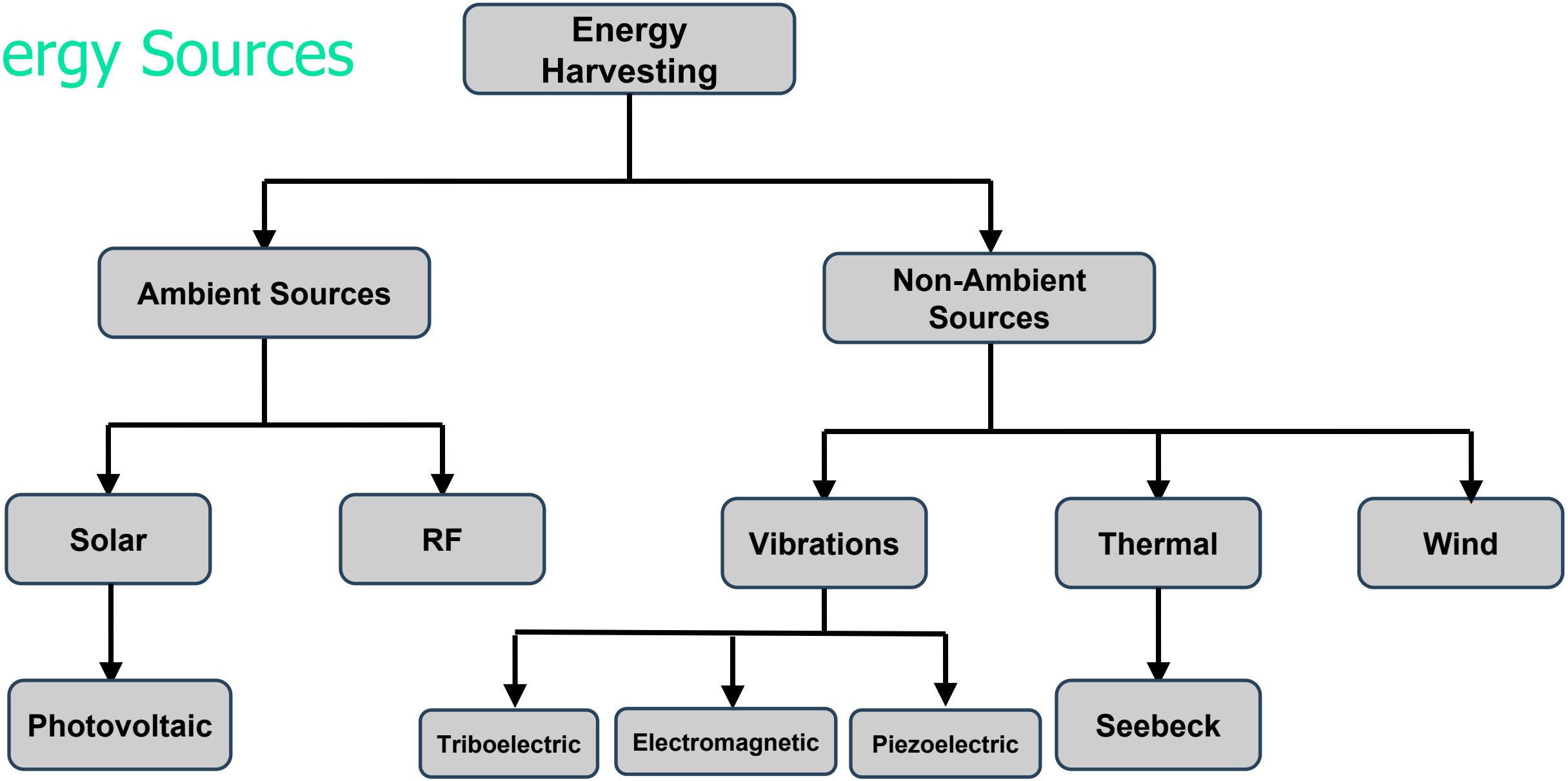
Sensor Node

- Temperature
- Humidity
- Acceleration
- Strain
- …

- WiFi
- ZigBee
- Bluetooth
- …



Energy Sources



Energy Demands

	SunSpot	MicaZ	IMote2
Sleep (µA)	33	15	390
Processing (mA)	104	8	31-53
Receive (mA)	40	19.7	44
Transmit (mA)	40	17.4	44
Idle (mA)	24	-	-
Supply (V)	4.5-5.5	2.7	3.2
Average (mW)	_	2.8	12

Comparison

Energy Source	Power Density (mW/cm^3)
Solar	15
Thermal	0.04
Vibration	10-300

	Piezoelectric	Electromagnetic	Triboelectric
Advantages	• High power output • High coupling coefficient • High current output	• Low impedance • High output current • Simple design	• High voltage output • High energy conversion coefficient • Simplicity
Limitations	• Costly • Resonance dependent • Complexity over material selection and device architecture	• Low output voltage • Scaling down problems • Electromagnetic interference may affect the results	• High impedance • Low current output
Common materials	PZT, Quartz, PVDF, ZnO	NdFeB (Neodymium iron boron)	Polymers

Thank you for your attention

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