ARVENI
YOUR FINGER YOUR POWER

Innovative energy harvesting

www.arveni.com

ARVENI, Jean-Frédéric MARTIN, President founder

WHY ENERGY HARVESTING ?

600 000 000 batteries for remote control

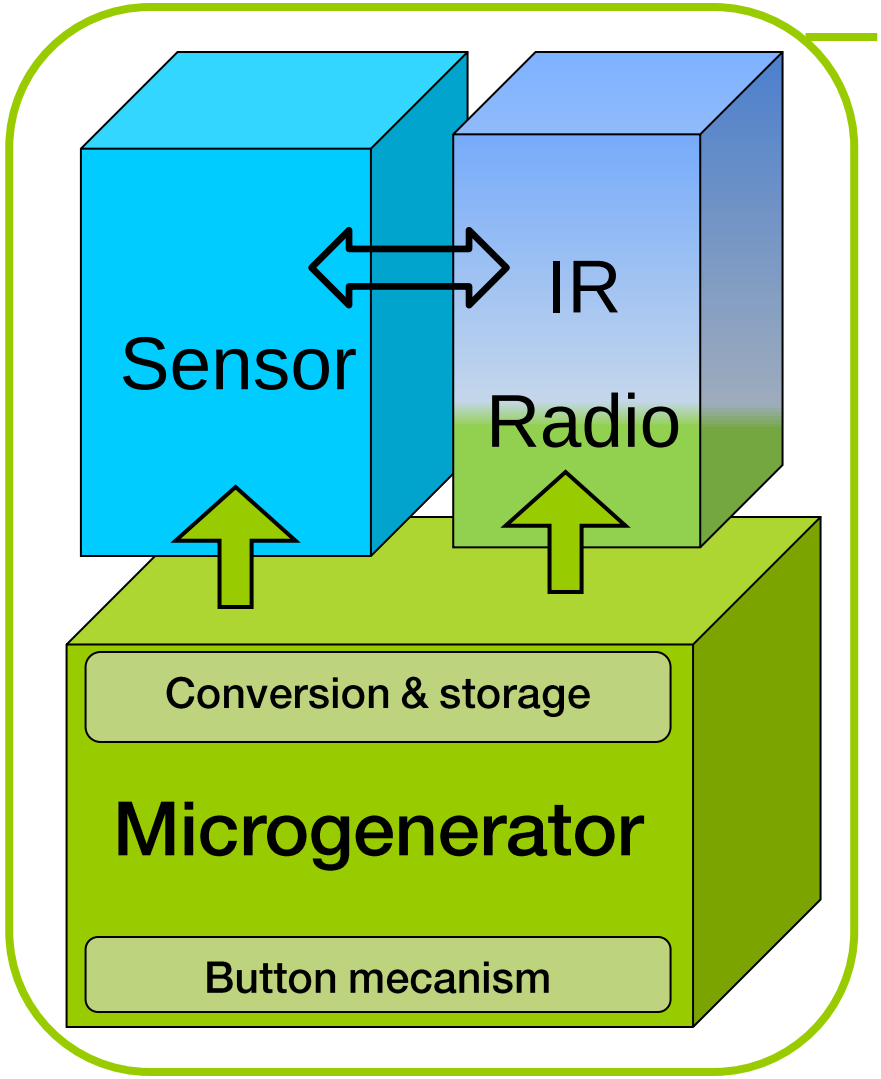
Sold batteries for TV remote, worldwide, in '09

5 000 000 000 batteries ➔ Pollution

Abandoned in the nature, only in EU, in '09 (Ebra)

Microgenerator

Lower total cost of ownership (TCO)



Our offer :

1. Engineering support for µgen integration & radio
2. Microgenerator as component

ARVENI INDUSTRIAL START UP

- Incorporated end 2007, profitability in 2011
- Team of piezo & electronic engineers
- **Own piezo technology** of energy harvesting

- Business model: Arveni is industrial & fabless.
- **Competitive advantage:** More energy !

Strive for technical leadership

TECHNICAL LEADERSHIP

World first single button infrared remote control for SFR (IT provider) in 2009

World first multikey harvesting for radio TV remote control with PHILIPS in 2010

Arveni awarded 3 times in 2010 for its innovative products:

- ✓ **Best of Sensor** Expo (Chicago)
- ✓ Special price of the Jury for embedded electronic (Paris)
- ✓ '60 most promissing startups' EE Times (**California**)

Strong IP & Patent policy

- ✓ 5 patent in licence from Insa School of Engineering
- ✓ 7 patents filed, extended in Japan, US, Eu, China, Korea

THEY TRUST US FOR THEIR PRODUCTS

PHILIPS
sense and simplicity

EDF

somfy®

RÉSEAU FERRÉ DE FRANCE

ERYMA

vossloh

ENERGY (mJoule) → POWER (mWatt)

- Pulse mechanical incoming energy (Ei)

  Force (Newton)* Stroke (millimeter) / 2 = Energy (mJoule)

  e.g.: 4 N * 3 mm / 2 = 6 mJ

- Electric energy rated at 3 Volt (Eor)

  Energy (mJ) = power (mW) * time (second)

  i.e.: **1mJ = 1 milliWatt * 1 sec** or **1 mJ = 40 mW * 25 ms**

- Efficiency rate of conversion: efficiency = Eor / Ei

ARVENI efficiency 5% to 20%

Wireless Sensors	< 90 mW, ms	→ OK
Mobile phone, PC	> 1W, hours	→ NOK

INPUT & OUTPUT MECHANICAL ENERGY

Source	Main feature	Energy input (Ei)	Harvested power
Pedestrian	Sensitive	Ei= W * slab stroke	1 to 2 W (busy street)
Road/railway	Heavy	Ei= W * strain	100 W (busy lane)
Human movement	Ergonomic	$Ei = \frac{1}{2} M_h * v^2$	Lack data
Vibration	Wide frequency range	$Ei = \frac{1}{2} F a / 2 \pi f = \frac{1}{4} M_d a^2 / \pi f$	0 to 50 mW, i.e. power up to 500mW
Pulse or button push	Predictible	$Ei = \frac{1}{2} F * stroke$	0.2 to 5 mJ , i.e. power up to 90 mW

Zero risk makes the customer feel good.

CUSTOMER VALUE CREATION

- **No wiring cost !**
  - Oil & gas: 40 to 100 $/ft
  - Home automation: 50 $
- **No battery costs !**
  - ROI at first avoided battery replacement, ie 4 months to 2 years
- **No life time limitation**
- **No worry**

- **High energy production**
  - 4 to 10 times more energy than competitors under same conditions (pulse)
  - Ability to power most of radio protocols & low cost radio

  ➔ Avoided costs 10 $/unit
- **Reliable product**
  - Very long life time > 700 000 pulses without loss
  - Tested from -20°C to +80°C
  - Designed for mass production … economic
  - Solid state technology (piezo) **no wear** of core microgenerator

Arveni looks for **ambitious** customers

in order to

make <u>your future best seller</u> .

THANK YOU → QUESTIONS & ANSWERS

ARVENI s.a.s.

www.arveni.com

Capital 85 780€
RCS Vienne 501 332 647

8 zi les Triboulieres, Bat Biga
38460 Cremieu
France

contact@arveni.fr
Tel.: (+33) 04 74 33 53 86