

**Objective:** to extend the range of battery-less implants to include therapeutic functions

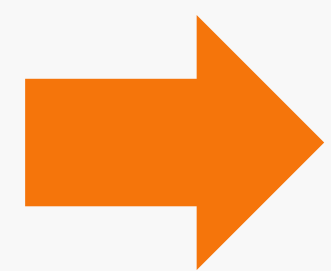
**What is this about:** an alternative technique to energize implants, providing energy directly from a wireless source

### Biomedical implants...

such as pacemakers use mainly batteries as a primary energy source...

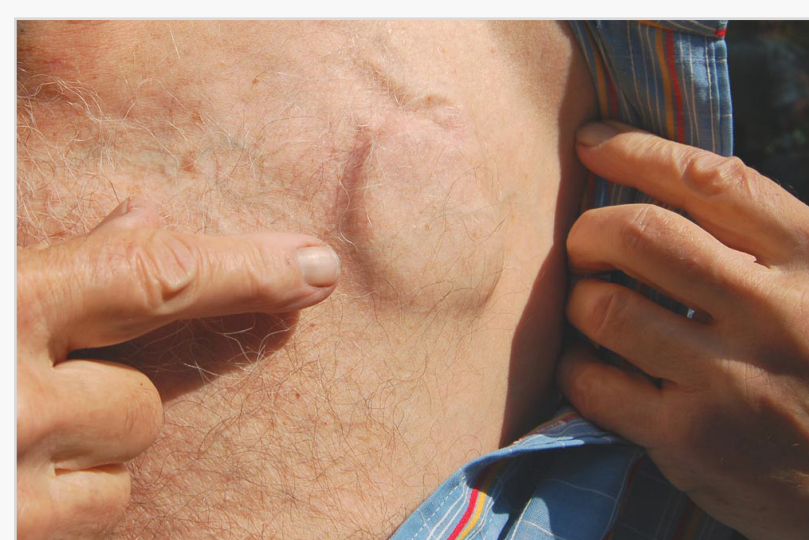


pacemakers



batteries

...but they are **bulky**  
(burden to a patient)

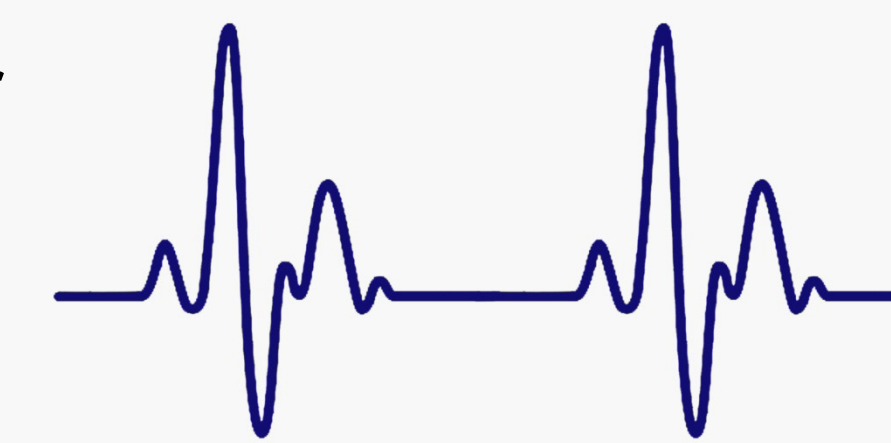


and have to be **recharged or replaced**



### Diagnostics vs. therapeutics

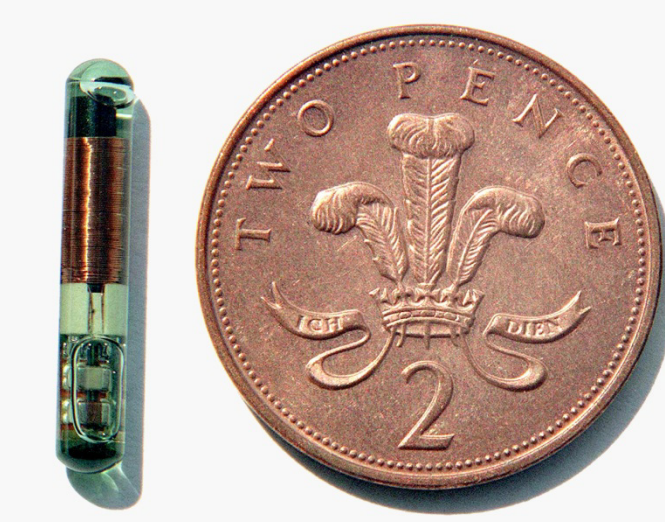
**Energy harvesting** is an attractive alternative to batteries, however, only the **diagnostic** medicine can benefit as the harvested energy is enough for **sensing and monitoring only**.



**Solution:** wireless power delivery (in particular, via **ultrasound**)...



...it provides enough energy for **actuation** in



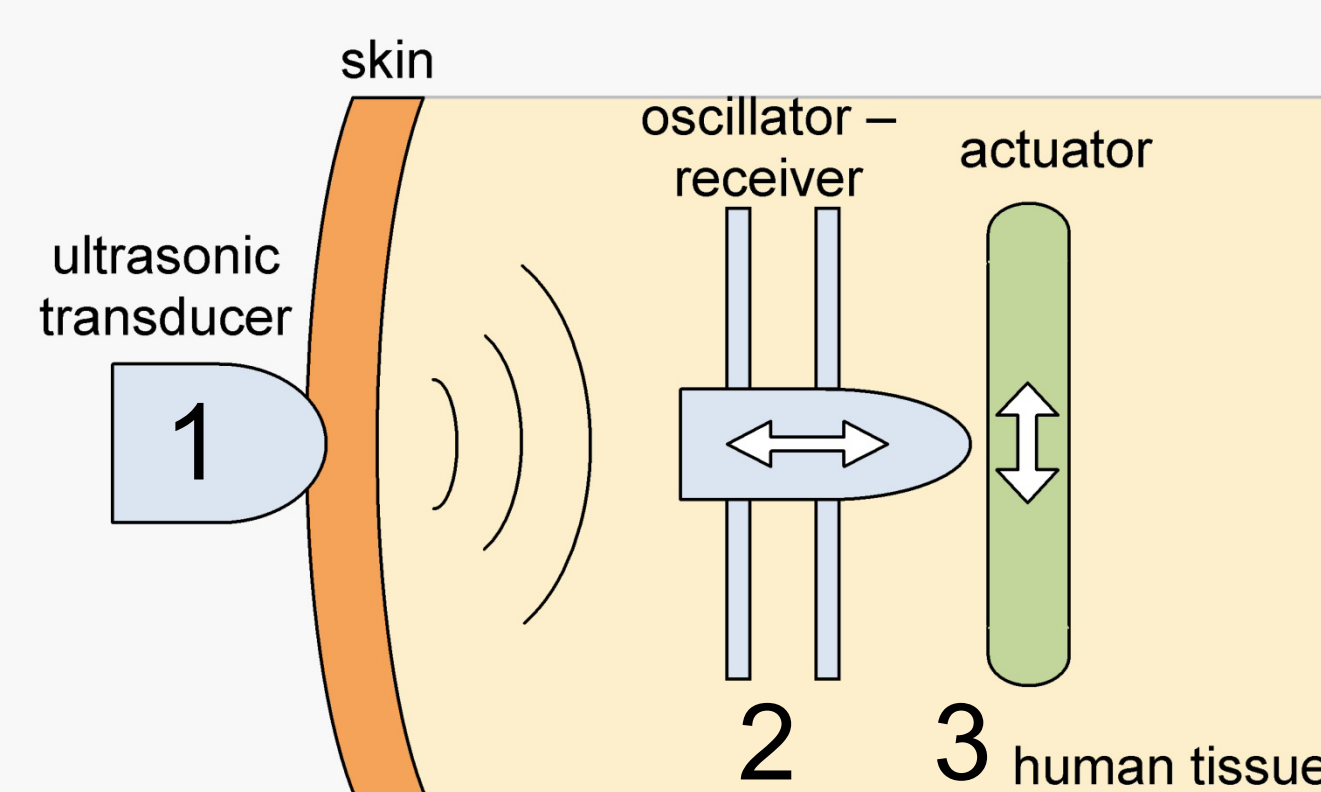
therapeutic implants

**I propose**

### How does it work?

1. An ultrasonic transducer (piezo disk) is attached to the skin and radiates inside the body
2. A specially designed oscillator receives ultrasound waves and starts vibrating
3. An oscillator converts its vibrations into a stepwise motion of an actuator

The actuator is tuned for a certain application...  
e.g. for implant adjustment it is slider, for drug release – carousel etc.



## PEANUT – Personal Actuator N-ergized by Ultrasonic Transfer

**What is in there?**

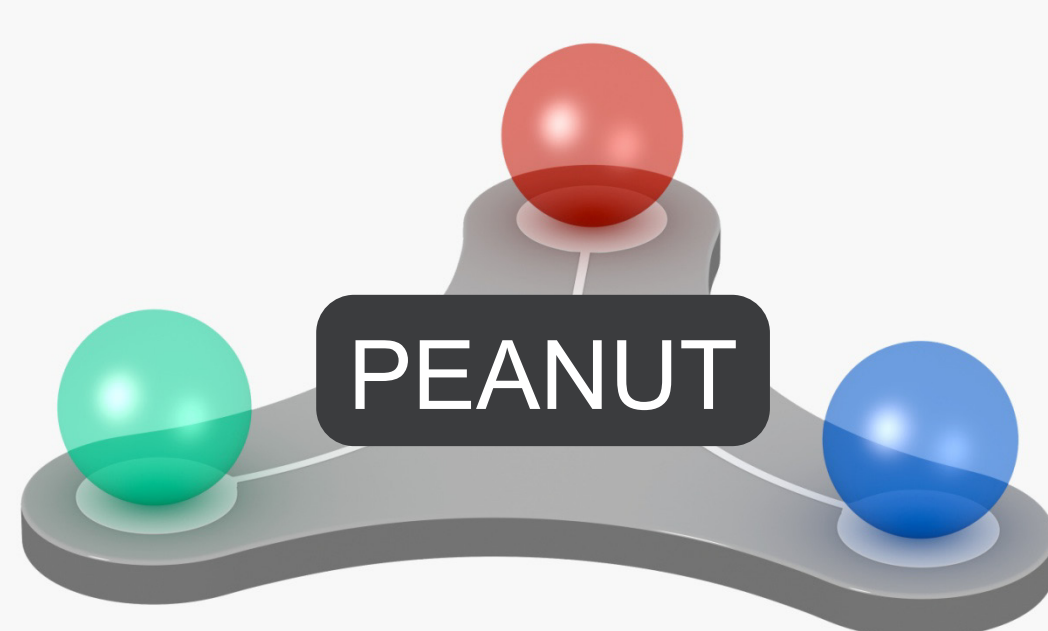


### Where can I use it?

implant mechanical adjustment (e.g. eye lens)



electrical stimulation



valve operation  
(release medication)

### Innovation

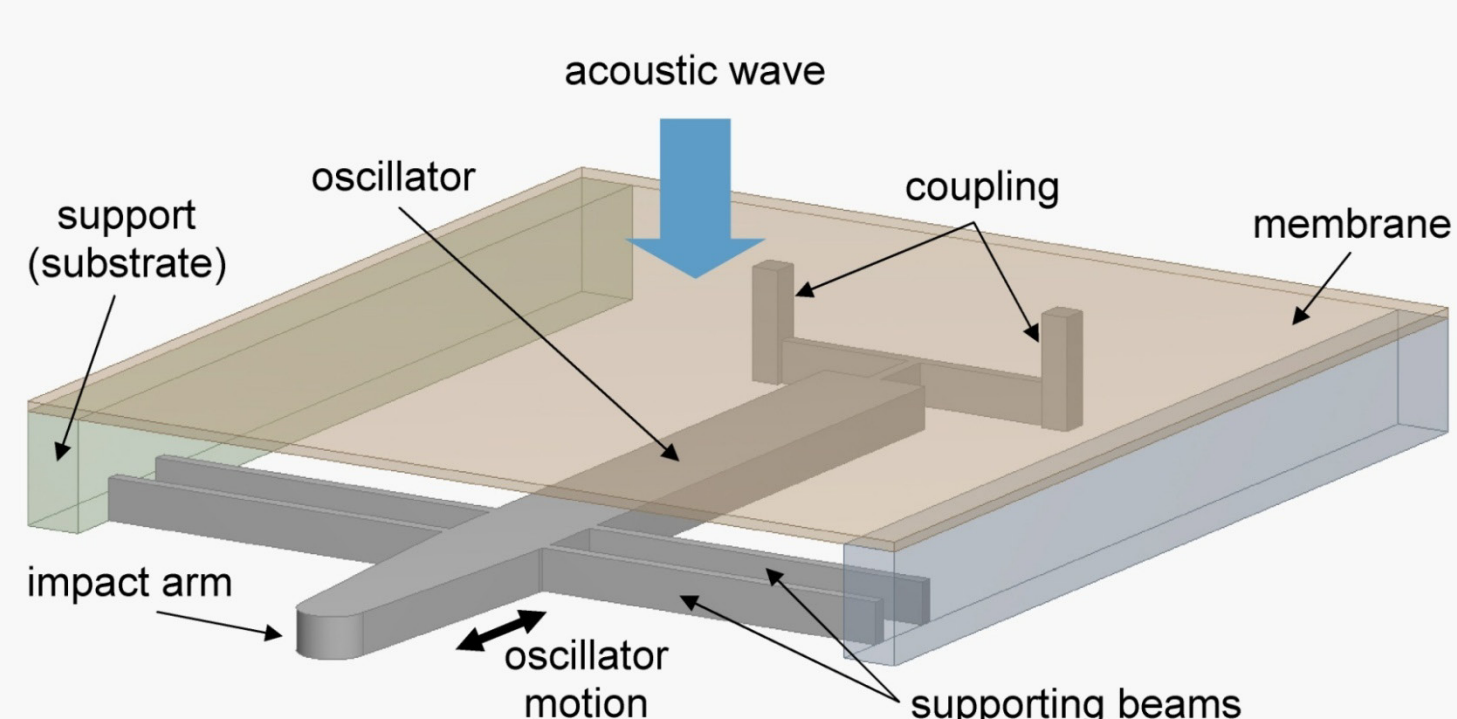
#### Competitive advantage:

1. No accumulation / storage of electrical energy >> **more efficient**
2. Purely mechanical device >> **small and simple**
3. Use of ultrasound >> **can be implanted deeply inside the body**
4. No interference with external sources >> **reliable**

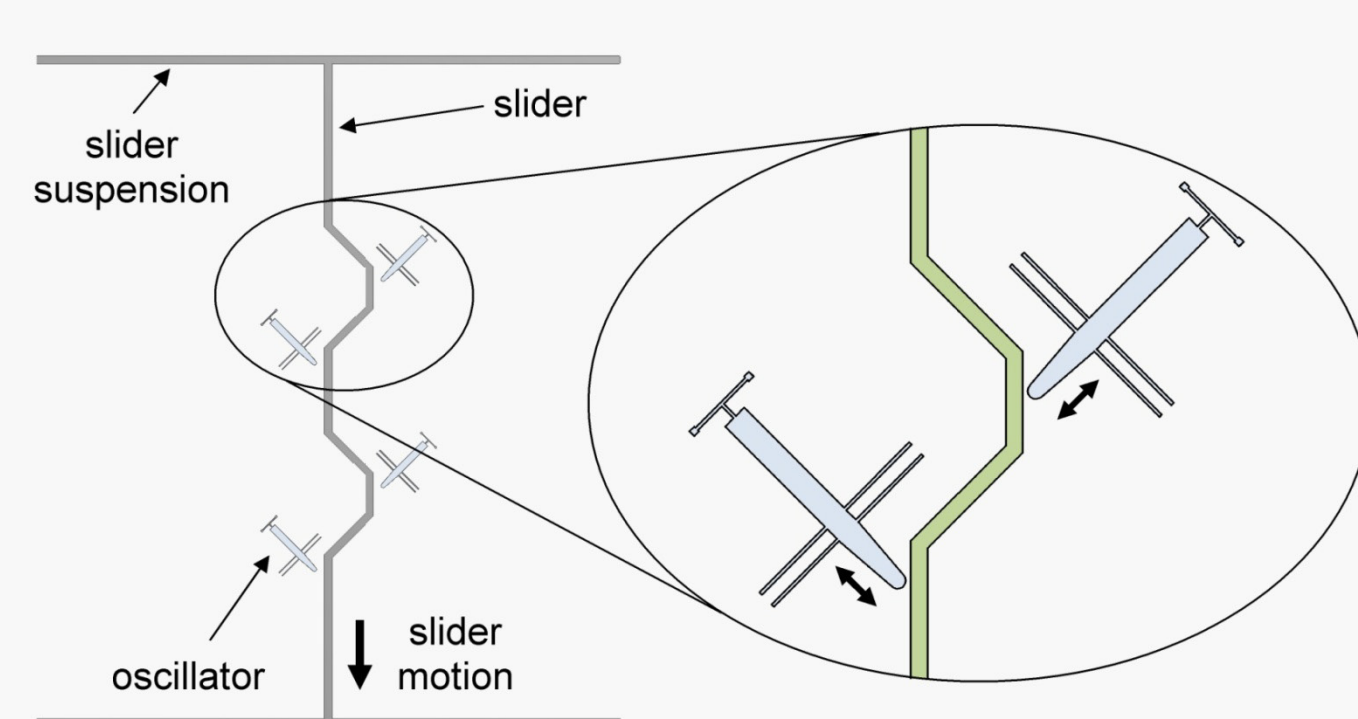
#### Challenges:

1. Small, more affected by misalignment >> **reduced energy input**
2. Complex fabrication >> **variability of design parameters**

### More details



acoustic wave coupling

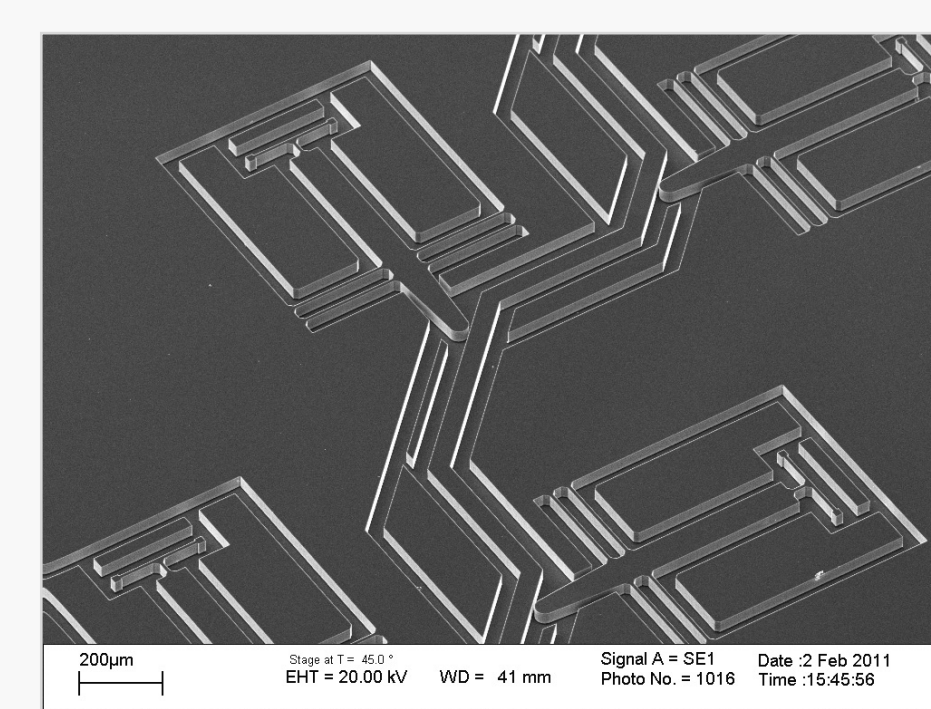


oblique impact and actuator

### How to fabricate it?



me



and my device

